



APPIN MINE VENTILATION AND ACCESS PROJECT CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

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Document ID	APNMP0131	Version	V1	Page 1 of 94
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Table of Contents

- 1. DOCUMENT SCOPE AND PURPOSE 5**
 - 1.1 Introduction5
 - 1.2 AMVA Project Scope.....5
 - 1.3 Construction Schedule 7
 - 1.4 CEMP Purpose8
 - 1.5 Environmental Management Strategy9
 - 1.6 Contractor Management Strategy9
- 2. REGULATORY AND COMPLIANCE REQUIREMENTS 12**
 - 2.1 Approval, Licences and Permits..... 12
- 3. ROLES AND RESPONSIBILITIES..... 18**
 - 3.1 Training and Awareness.....20
- 4. GENERAL ENVIRONMENTAL MANAGEMENT21**
 - 4.1 Environmental Performance Management.....21
 - 4.2 Works Planning21
 - 4.3 Ground Disturbance Permit Procedure22
 - 4.4 General22
 - 4.5 Construction Hours.....24
 - 4.6 Heritage Management.....24
 - 4.7 Vegetation Management and Biodiversity.....28
 - 4.8 Topsoil Management.....31
 - 4.9 Waste and Fuels Materials Management.....31
- 5. SURFACE AND GROUNDWATER MANAGEMENT 35**
 - 5.1 Surface Water and Erosion Sediment Control Plan 35
 - 5.1.1 Erosion and Sediment Control Structures36
 - 5.2 Hydrogeology37
 - 5.3 Groundwater Management During Shaft Construction 38
- 6. NOISE MANAGEMENT PLAN42**
 - 6.1 Receivers42
 - 6.2 Noise background levels42
 - 6.3 Noise Agreements.....44

<i>This document UNCONTROLLED once printed</i>				Page 2 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



6.4 Early Works (Pre-Sink) Noise Management Requirements 44

6.5 Construction Noise Management Requirements (MainSink) 45

6.6 Noise Monitoring Program..... 46

6.7 Noise Mitigation..... 51

7. TRAFFIC MANAGEMENT PLAN..... 52

7.1 General Management and Mitigation Safeguards..... 52

7.2 Traffic Monitoring..... 53

7.3 Traffic Control Plan and Road Closure Protocols..... 54

7.4 Vehicle Movement Plan..... 54

8. AIR QUALITY MANAGEMENT PLAN 58

8.1 Predicted Construction Air Quality Impacts 58

8.2 Air Quality Criteria for the AMVA Project Site 58

8.3 Air Quality Monitoring 59

8.4 Air Quality Management and Mitigation Measures..... 60

9. BLAST MANAGEMENT PLAN 62

9.1 Shaft Construction Engineering Phases..... 62

9.2 Local Environment 65

9.3 Predicted Impacts..... 68

9.4 Blasting Criteria and Requirements..... 68

9.5 Mitigation of Blast Impacts 69

9.6 Monitoring Protocols..... 73

9.7 Blast Related Community Consultation and Complaints Handling..... 84

10. COMMUNITY CONSULTATION AND COMPLAINTS HANDLING 84

10.1 Stakeholder Consultation 85

10.2 Complaints, Enquiries and Disputes Procedure..... 86

10.3 Non-Compliance Management..... 87

11. REPORTING AND REVIEW..... 87

11.1 Reporting..... 87

11.2 CEMP Review 89

11.3 Audits 90

APPENDIX A PERMIT TO DISTURB 92

APPENDIX B DRIVERS CODE OF CONDUCT..... 93

APPENDIX C ROAD SAFETY AUDIT 94

<i>This document UNCONTROLLED once printed</i>				Page 3 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



DOCUMENT REVISION LOG

Persons authorising this plan

NAME	TITLE	DATE
Glen Alsemgeest	Project Management	16/01/2023

Revision History

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0	Draft 1	28/09/2022
A	Draft 2	18/10/2022
B	Final with Agency feedback	21/11/2022
C	Final in response to DPE feedback	16/01/2022

Persons involved in the review of this Plan

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<i>This document UNCONTROLLED once printed</i>				Page 4 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



1. DOCUMENT SCOPE AND PURPOSE

1.1 Introduction

Appin Mine incorporates the underground mining operations, which extract coal from the Bulli Seam, and associated surface activities, including the West Cliff Coal Preparation Plant (WCCPP) and Coal Wash Emplacement Area (CWEA). Appin Mine is located approximately 25 kilometres (km) north-west of Wollongong in New South Wales. Appin Mine is owned and operated by Endeavour Coal Pty Ltd, a subsidiary of Illawarra Coal Holdings Pty Ltd (ICHPL), which is a wholly owned subsidiary of South32 Limited. Appin Mine, Cordeaux Colliery and Dendrobium Mine (and associated facilities) collectively operate as South32 Illawarra Metallurgical Coal (IMC).

ICHPL received Project Approval 08_0150¹ (the Project Approval) from the Planning Assessment Commission of New South Wales (NSW) under delegation of the Minister for Planning and Infrastructure on 22 December 2011 for current and proposed mining of the Bulli Seam Operations (BSO) for 30 years, and production of up to 10.5 million tonnes per annum of run of mine (RoM) coal. This approval incorporates underground mining, transport and coal wash emplacement activities undertaken 24 hours a day, seven days per week.

In April 2022 a modification of the Project Approval (MOD 3) was granted (pursuant to Section 4.55(2) of the *Environmental Planning and Assessment Act 1979 (EP&A Act)*, following an Environmental Assessment (EA) process, to allow for the construction and operation of two ventilation shafts (VS), mine access infrastructure and improved site access at 345 Menangle Road, Menangle NSW, herein referred to as the Appin Mine Ventilation and Access Project (AMVA Project or the Site) shown in Figure 1.

Condition 11 of Schedule 4A of the Project Approval requires the development of a Construction Environmental Management Plan (CEMP). This document has been prepared to address this requirement.

1.2 AMVA Project Scope

The AMVA Project includes construction of:

- Two (2) ventilation shafts VS7 and VS8.
- Mine access infrastructure at VS7.
- Upcast ventilation fans at VS8.
- Administration/bathroom/storage buildings and other supporting surface facilities.
- High and low voltage electrical infrastructure.
- Utilities and security structures.
- Upgraded Site access to Menangle Road and internal Site access roads.
- Other minor activities associated with the construction and operation of the ventilation shafts.

¹ As modified on April 2015 (MOD 1), October 2016 (MOD 2) and April 2022 (MOD 3).

<i>This document UNCONTROLLED once printed</i>				Page 5 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Figure 1 Project Location

<i>This document UNCONTROLLED once printed</i>				Page 6 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



1.3 Construction Schedule

The AMVA Project execution schedule has been staged to facilitate a safe working environment, reduce and control environmental impacts and deliver required works in a timely manner. In summary, these stages are described in the paragraphs below.

1.3.1 Early Works

Early Works as described in definitions the Project Approval include *Site establishment, demolition of buildings and structures, removal and erection of fencing, installation of erosion and sediment controls (including drainage and sediment dams), civil and earthworks, utilities (including power supply infrastructure), commissioning of site offices, **shaft pre-sinking**, and intersection upgrades.*

Shaft pre-sinking was not managed under the Early Works CEMP and has not commenced; therefore, this CEMP will also describe the specific management protocols to be included for shaft pre-sinking which is described in the Modification Report as:

Pre-sinking of the shaft to required depth, construction of a shaft collar which is required to hold the temporary headframe and winder, construction of the headframe and winder and any associated noise mitigation required for 24-hour shaft sinking to occur.

1.3.2 Construction

“Construction” as described in definitions of the Project Approval includes:

*The demolition of buildings or works, carrying out of works and erection of buildings covered by this approval, including the **construction of fans, evase(s), ancillary site infrastructure, mine access infrastructure (winder, headframe, etc.) and shaft sinking activities at the Appin Mine Ventilation and Access Site, but not including Appin Mine Ventilation and Access Site early works.***

The tasks in bold include:

Shaft sinking involving mechanical excavation and/or blasting methods to excavate the shaft to the desired depth.

Shaft lining involving progressively lining the shaft with concrete to a nominal thickness of 300 mm.

Construction of an earthen bund using spoil from the shaft excavation.

Construction of civil and infrastructure works associated with the VS7 and VS8, ventilation and access buildings, administration office, bathhouse facilities, hardstand areas (e.g., parking and laydown areas), pavement/internal roads, boreholes for communications, transformers, electrical substation, switch room and generator.

Detailed description of these elements of the Project are provided in Section 3.1 of the Modification Report (Modification Report for modification to Project Approval 08_0150, 2021 (Niche, 2021)).

1.3.3 CEMP Staging and Scope

Condition 13 of Schedule 2 of the Project Approval allows for the submission of strategies, plans and programs (including the CEMP) on a progressive basis, specifically:

<i>This document UNCONTROLLED once printed</i>				Page 7 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



With the approval of the Secretary, the Proponent may submit any strategies, plans or programs required by this approval on a progressive basis.

Notes: While any strategy, plan or program may be submitted on a progressive basis, the Proponent will need to ensure that the existing operations on Site are covered by suitable strategies, plans or programs at all times; and

If the submission of any strategy, plan or program is to be staged, then the relevant strategy, plan or program must clearly describe the specific stage to which the strategy, plan or program applies, the relationship of this stage to any future stages, and the trigger for updating the strategy, plan or program.

IMC was granted approval from the Planning Secretary on 26 April 2022 to allow for the staged submission of the CEMP required under Condition 11 of Schedule 4A.

1.3.3.1 Scope of this Management Plan

This CEMP would replace the previously approved CEMP upon commencement of the subject works and would apply to:

- **Shaft Pre-Sinking** (Early works)
- The works as described in Section 1.3.2 (i.e. **“Construction as defined the in Project Approval”**).

The CEMP which applies to each stage of work is clarified in yellow in Figure 2.

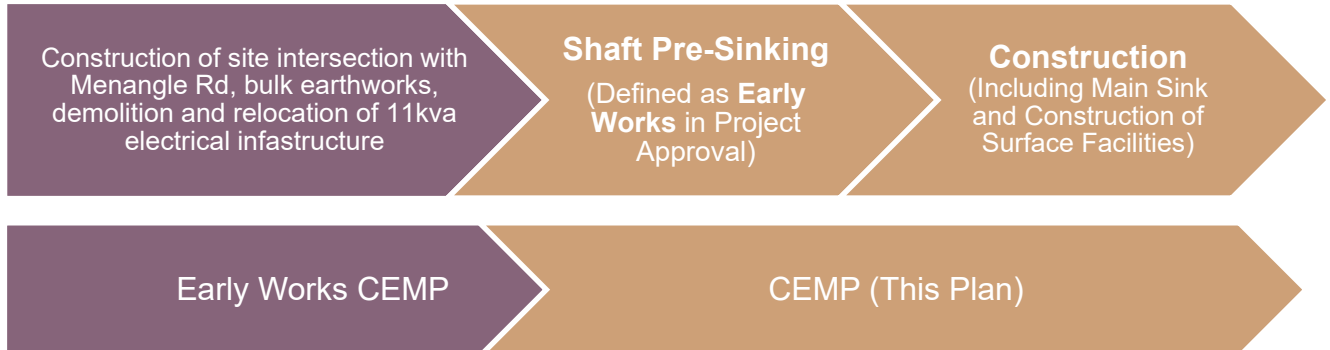


Figure 2 Scope of Construction Environmental Management Plans

1.4 CEMP Purpose

A requirement of Condition 11 of Schedule 4A is the development of a CEMP which provides the specific environmental management and monitoring measures for the construction activities. As such, IMC have developed this CEMP for the purpose of:

- Identifying and implementing relevant environmental, legal/regulatory requirements applicable to the construction works.
- Stating objectives and targets for the environmental performance of the AMVA Project.
- Identifying the environmental management measures to minimise and manage the Project’s impacts on the environment and community during construction.

<i>This document UNCONTROLLED once printed</i>				Page 8 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Outlining how IMC will comply with the Project Approval, licences and permits, during the construction of the AMVA Project.
- Assigning roles and responsibilities for the implementation, management and review process.
- Providing a consistent and uniform approach to environmental management.
- Providing all personnel working on the AMVA Project with sufficient information to undertake their works in accordance with the Project Approval, legal and other relevant environmental requirements.
- Enabling the commitments within the Project Approval to be captured and implemented.

1.5 Environmental Management Strategy

The CEMP provides the environmental management framework for managing and minimising the environmental impacts during the construction activities. This document has been developed to align with the AMVA Project’s environmental assessment, associated documentation and the accompanying technical specialist assessments.

An Environmental Management Strategy (EMS) is required under Schedule 6 of the project approval and is in place for Appin Mine. The EMS has been developed to be generally in accordance with International Organisation for Standardisation (ISO) 14001:2015 Environmental Management Systems. The EMS includes environmental management plans and procedures that are used to manage key environmental issues and for the successful implementation of the environmental strategy, including aspects such as monitoring, communication, environmental risk assessment and training. Procedures have also been developed to appropriately manage areas of residual risk, with all relevant Site personnel trained in relation to these procedures. This CEMP has been prepared to address specific issues associated with the construction of the AMVA Project in consideration of the strategy provided in the EMS. IMC has updated existing environmental managements plans to include relevant details for the AMVA Project as required by the Project Approval.

1.6 Contractor Management Strategy

The EMS also follows a contractor management model in relation to how IMC will manage the environmental aspects of the construction project and the imposition of the environmental conditions (insofar as it is applicable to Contractors), under this CEMP for the AMVA project. Accordingly, works will be undertaken by a range of specialist contractors with expertise across shaft sinking, electrical infrastructure installation, bulk earthworks, civil and roads construction. As such, this CEMP has been developed to provide clear guidance to all IMC staff and Contractors (and Contractor personnel) in relation to:

- What the environmental conditions are.
- How the environmental conditions are to be managed.
- What the roles and responsibilities are in relation to IMC.
- What the roles and responsibilities are in relation to the Contractors during the performance of their duties.
- Identifying the task specific work plans that are required to be developed by the Contractors in order for the respective Contractor to meet all the environmental conditions imposed on them under contract as set out in the CEMP.

<i>This document UNCONTROLLED once printed</i>				Page 9 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



The task specific plans by the Contractors shall, but not be limited to, consider and assess all potential impacts to Health, Safety and the Environment (HSE) for all tasks that are to be performed by the Contractor and the implementation of effective and appropriate controls in consideration of this Primary Work CEMP, which will also be reflected in the Contractors’ environmental management plans specific to their respective tasks.

Figure 1 provides an overview of how the CEMP interacts with other environmental management strategies, documents and procedures (i.e. the Contractors’ HSE plans and documents) which are required for the AMVA project.

Light green boxes denote those documents that will be developed by IMC and the Contractors before the Contractors mobilise and start to perform their respective scope of works in relation to the construction works. IMC will review the Contractor’s environmental management plans and/or procedures prior to the Contractors starting works and, insofar as is necessary, before the Contractor starts a new task or task conditions change.

When Contractors develop their own specific plans (as denoted in the dark green boxes), the Contractors must take into consideration all potential environmental impacts and appropriate controls in accordance with this CEMP.

It will be the responsibility of all contractors when planning and undertaking their work to ensure compliance with the environmental conditions (insofar as it applies to their scope of work and their roles and responsibility) under this CEMP as if the environmental conditions are imposed on the Contractor.

<i>This document UNCONTROLLED once printed</i>				Page 10 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

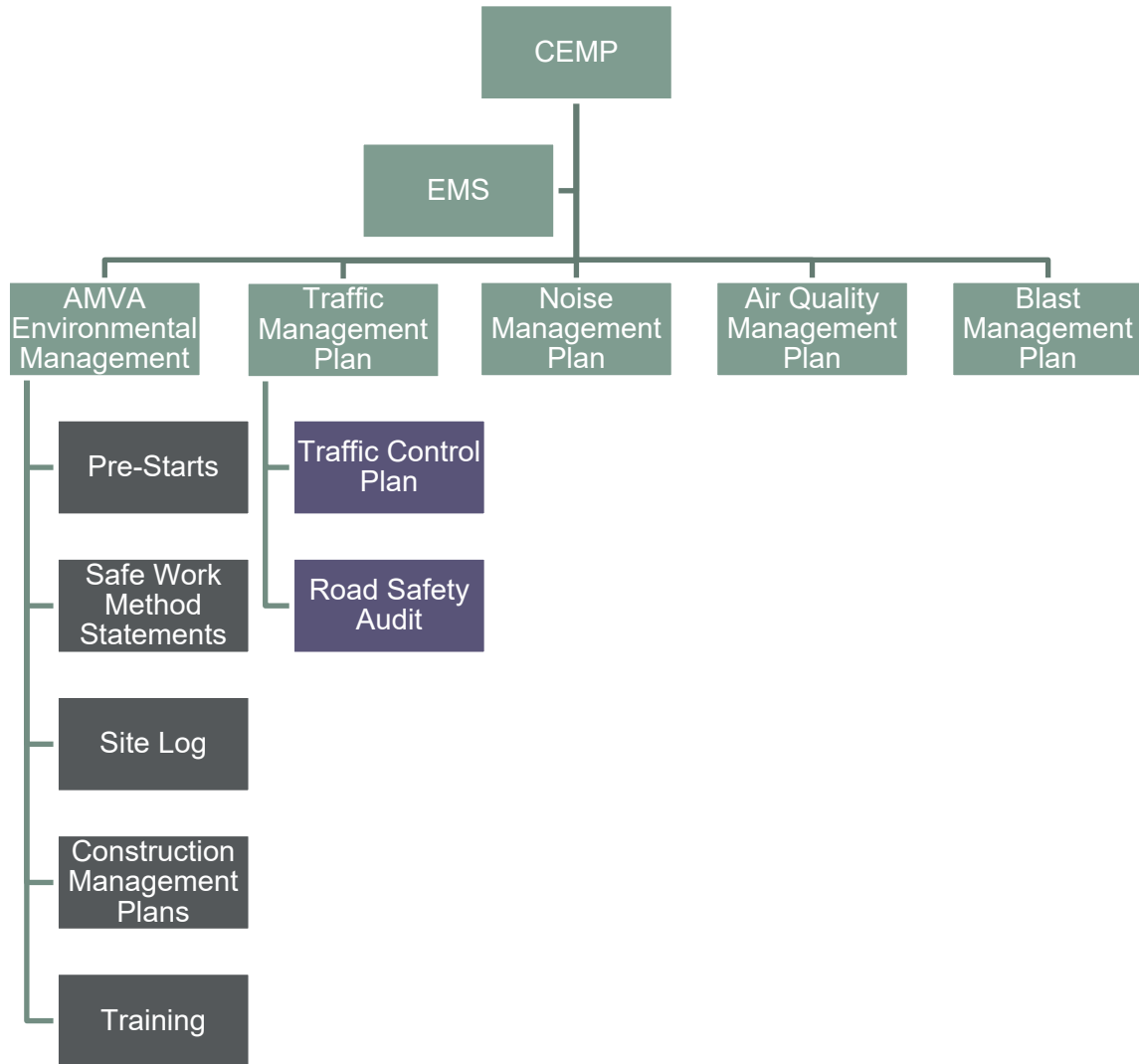


Figure 3 Hierarchy of Construction Environmental Management Tools

Nothing in this CEMP should be read as restricting or limiting IMC’s ability to manage HSE, including managing the environmental conditions under this CEMP by:

- Engaging specialist contactors (e.g. the Contractors) to:
 - provide all necessary management, supervision and personnel to ensure the environmental conditions under this CEMP are identified, managed and effectively implemented; and
 - do all things necessary to ensure that the environmental conditions imposed under this CEMP are met (e.g. that the Contractor physically build or do a task to ensure compliance with the environmental conditions);
- Verifying that the Contractors:
 - have in place the required environmental plans and procedures so that the Contractors have a system in place to manage environmental conditions and obligations as outlined under this CEMP; and
 - are complying with the environmental conditions as stipulated under the CEMP and/or their contractor environmental plans and procedures.

<i>This document UNCONTROLLED once printed</i>				Page 11 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Contractors will be required to keep a site log which is to be kept by the respective Contractor’s site manager detailing all activities performed by the Contractor occurring on a daily basis.

IMC will audit the Contractor’s pre-start, Safe Work Method Statements (SWMS) and site logs to verify environmental controls are being adequately considered and implemented and as a management tool to confirm compliance with relevant criteria and conditions. The purple boxes are management plans which must be developed by responsible and appropriately qualified third parties to assist in the management of environmental aspects at the project. Compliance by IMC and the Contractors shall be in accordance with the roles and responsibilities as outlined in Section 3.

2. REGULATORY AND COMPLIANCE REQUIREMENTS

2.1 Approval, Licences and Permits

All licences, permits and approvals required for the construction of the AMVA Project have or will be obtained and maintained, as required, throughout the construction period. The status of these licences permits and approvals along with the required timing for each is shown in Table 1.

Table 1 Status of Approvals, Licences and Permits

LICENCE/APPROVAL DESCRIPTION	STATUS	APPROVING AUTHORITY	COMMENT
BSO Project Approval (PA 08_0150)	Modified April 2022	DPE	
Environment Protection Licence (EPL) No. 2504	Current	NSW Environment Protection Authority (EPA)	Variation for premises change and inclusion of discharge and overflow points (41 and 42 respectively) from sediment basin at AMVA approved 1 May 2022.
Section 138 Road Opening Permit	Approved	Wollondilly Shire Council	Approved for Intersection Works
Construction and occupation certificates	Principal Certification Authority has been engaged and applicable surface infrastructure being reviewed.	Principal Certifier	Obtain (where applicable) for the proposed building works.
Water access licence (30145) (WAL) and water supply works approval (10WA117285)	Current (expires 14 November 2026 renewed at anniversary date)	WaterNSW	The current allocations are sufficient to support the AMVA Project.
Subsidence Advisory NSW Development Approval	Approved 23 May 2022	Subsidence Advisory NSW	For all works including those in the road reserve.

2.1.1 Project Approval

Condition 11 of Schedule 4A of the Project Approval requires the preparation of a CEMP. Table 2 provides a compliance matrix of where each element of the condition has been addressed in the CEMP.

<i>This document UNCONTROLLED once printed</i>				Page 12 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Table 2 Project Approval CEMP Conditions

CONDITION	DESCRIPTION	SECTION/S ADDRESSED
11	Prior to the commencement of Appin Mine Ventilation and Access Site early works, the Proponent must prepare a Construction Environmental Management Plan for the construction phase of the Appin Mine Ventilation and Access Site to the satisfaction of the Planning Secretary. This plan must:	This Document.
(a)	be prepared in consultation with the EPA	(See Section 10.1)
(b)	provide the specific environmental management and monitoring measures for construction works, including for:	
	i. minimising construction-related noise, dust, visual impacts, and surface disturbance;	Noise management measures are described in Section 6. Air Quality management measures are described in Section 8.4. Visual impact management measures are described in Section 4.7.1.
	ii. stormwater management including erosion and sediment controls and clean water diversion;	Section 5.1 to 5.1.4
	iii. monitoring and managing groundwater inflows and impacts to groundwater resources as a result of shaft construction activities at the Appin Mine Ventilation and Access Site:	Section 5.3
(c)	include details of vegetation clearing protocols, including procedures to minimise the amount of the clearing required on the Appin Mine Ventilation and Access Site	Section 4.7
(d)	include a Construction Blast Management Plan prepared by a suitably qualified and experienced person/s in consultation with the EPA that:	
	i. describes the measures that would be implemented to ensure compliance with the relevant conditions of this approval and that best management practice is being employed;	Section 9
	ii. includes a real-time automated monitoring program prepared in accordance with the guidelines provided in Australian Standard 2187.2-2006: Explosives-Storage and use, Part 2: Use of explosives to: <ul style="list-style-type: none"> • evaluate the performance of the Project and compliance with the applicable criteria; • control flyrock; and 	Monitoring (Section 7.7) Control of Flyrock (Section 7.6.5) Minimisation of Fume Emissions (Section 7.6.3)

This document UNCONTROLLED once printed

Document ID	APNMP0131	Version	V1	Page 13 of 94
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



CONDITION	DESCRIPTION	SECTION/S ADDRESSED
	<ul style="list-style-type: none"> minimise fume emissions from the site; 	
	includes public notification procedures to enable members of the public, particularly surrounding residents, to get up-to-date information on the proposed blast schedule;	Section 7.8.1
	Includes a protocol for investigating and responding to blast-related complaints; and	Section 10.2
	Includes a protocol for investigating and responding to noise complaints.	
(e)	include a Construction Traffic Management Plan prepared in consultation with the TfNSW and WSC, that:	Section 7
	i. includes strategies to manage construction traffic, including road closure protocols, community consultation and measures to avoid potential road safety conflicts with other road users;	Section 7
	ii. includes a program for conducting road safety audits, including both pre and post construction, of the intersection of the Appin Mine Ventilation and Access Site entrance with Menangle Road;	Section 7.4.7
	iii. includes a vehicle movement plan for:	Section 7.4.3
	<ul style="list-style-type: none"> managing light, heavy and over-dimensional vehicles during construction works; 	
	<ul style="list-style-type: none"> transporting construction waste materials; and restricting construction or transportation hours to avoid road user conflicts; and 	
(f)	include a Construction Noise Management Plan that:	Section 6
	i. describes the measures that would be implemented to ensure compliance with the noise conditions of this approval;	Section 6.4 and Section 6.5
	ii. includes a noise monitoring program that: <ul style="list-style-type: none"> uses a combination of real-time and supplementary attended monitoring to evaluate noise generated by the Project during construction; and includes a protocol for determining exceedances of the relevant conditions of this approval. 	Section 6.5
(g)	include a Construction Air Quality Management Plan that:	Section 8
	i. describes the proactive and reactive air quality mitigation measures that would be implemented to ensure compliance with	Section 8.4

<i>This document UNCONTROLLED once printed</i>				Page 14 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



CONDITION	DESCRIPTION	SECTION/S ADDRESSED
	Condition 9 of Schedule 4 of this approval;	
	ii. includes an air quality monitoring program that: <ul style="list-style-type: none"> • includes real time monitoring to evaluate air quality impacts during construction; and • includes a protocol for determining exceedances of the relevant conditions of this approval. 	Section 8.3.

The AMVA Project Modification report (Niche/Element, 2021) considered the outcomes of the various technical specialist assessments as defined by the Project Approval. The subsequent statement of commitments is presented in Table 3 including a reference to where each commitment has been addressed within the CEMP.

Table 3 Environmental Assessment (EA) Environmental Management Commitments

ENVIRONMENT OR COMMUNITY ASPECT	COMMITMENT	SECTION/S ADDRESSED
Working hours and noise	Construction hours will minimise the impact on the community.	Section 4.5
	Activities will be undertaken as per the hours in the relevant project assessment (except emergencies), with a preference to undertake audible activities during day-light hours where possible.	
	Works will be designed with consideration to minimising impacts on the community.	
Public Consultation	IMC will continue to liaise with and provide information regarding surface activities via the IMC Community Consultative Committee, or any other such community group that is deemed appropriate.	Section 10
	IMC will continue to operate the Community Call Line to provide an alternative method for public information.	
Noise	Noise will be mitigated as per the relevant project assessment and/or management plans.	Section 6
	Project layout will give consideration to the mitigation of noise impacts as practicable.	
	Noise performance will be incorporated into contractor performance requirements for surface projects in noise sensitive areas.	
	IMC will undertake noise monitoring as per the relevant project assessment document or management plan.	
	Consultation will be undertaken with receivers subject to significant noise impacts from the Project. Consultation will address any additional noise mitigation measures proposed.	
Air quality and Greenhouse Gas	Construction activities will be managed to minimise the generation of dust.	Section 8
	Suitable measures, such as site layout design, dust suppression, stockpile management, appropriate road surfaces and rehabilitation of disturbed areas will be applied to minimise dust generation.	
	Plant and operating equipment will be maintained appropriately to minimise fuel consumption and associated emissions.	
	Electrical power consumption will be minimised during the operational phases of the Project where at all practicable.	N/A
Water resources	Stormwater runoff, soil and erosion control measures will be managed in accordance with guidelines detailed in the publication Soils and Construction, Volume 1, 4th Edition and Controlled Activities on Waterfront Land. Guidelines for Laying Pipes and	Section 5

<i>This document UNCONTROLLED once printed</i>				Page 15 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



ENVIRONMENT OR COMMUNITY ASPECT	COMMITMENT	SECTION/S ADDRESSED
	<p>Cables in Watercourses on Waterfront Land, 2012, where relevant. Water controls will be employed as per the applicable project assessment or management plan documentation.</p> <p>Service supply boreholes will be cased and grouted to address any known regionally significant aquifers.</p> <p>Drilling process wastewater will be managed as per the relevant project assessment.</p> <p>Water required for projects will be sourced from appropriate sources, such as:</p> <ul style="list-style-type: none"> ○ Recycling captured water where possible, ○ Water Licence in accordance with the requirements of the Water Sharing Plan 2010 (DECCW 2009) and the <i>Water Management Act 2000</i>; ○ An authorised Sydney Water supply; or ○ Appin Mine Filtration Plant. 	
Biodiversity	Biodiversity will be managed as per the relevant project assessment and/or management plans.	Section 4.7
	Projects will be designed and constructed to minimise the amount of clearing of native vegetation and mature trees where practicable.	
	A two-stage clearing process will be undertaken for the felling of any hollow bearing trees.	Not Applicable (there are no hollow bearing trees to be felled)
Heritage (Aboriginal)	Where native vegetation has been cleared, rehabilitation activities will include representative native seed where at all practicable.	Section 4.7
	Heritage will be managed as per the relevant project assessment and/or management plans.	Section 4.6
	<p>Where identified sites are located adjacent to proposed activities a barrier will be installed to prevent interaction.</p> <p>Where unexpected sites are identified during construction activities, works in vicinity of the site shall stop and a qualified archaeologist engaged.</p>	
Heritage (Non-Aboriginal)	IMC will manage and conserve the Mountbatten Group in a manner consistent with its heritage values and in accordance with the Conservation Management Plan.	Not Applicable
	IMC will ensure the sympathetic placement of new buildings and structures on properties subject to heritage infrastructure (such as the Morton Park: Mountbatten Group).	Not Applicable
	Vegetation clearing for Project activities will be minimised and should not include historic plantings.	Not Applicable
	Any relics discovered during Project activities will be assessed and documented by an appropriately qualified cultural heritage expert. Where it is relevant to do so, relics will be retrieved and managed in accordance with any recommendations made by the cultural heritage expert.	Section 4.6
	Where surface projects interact with heritage items owned by other parties (e.g. the Water NSW Upper Canal), the infrastructure owner will be consulted and relevant approvals obtained prior to works.	Not Applicable
Traffic	Traffic will be incorporated into environmental assessment documentation. Where relevant, a Traffic Management Plan will be developed and implemented to minimise impacts and ensure continued road safety.	Section 7



ENVIRONMENT OR COMMUNITY ASPECT	COMMITMENT	SECTION/S ADDRESSED
	IMC will ensure any measures within a Traffic Management Plan will be implemented.	
	For large projects IMC will advise local residents of the commencement of works and any related potential disruptions to local traffic.	
Risks and Hazards	IMC will ensure contractors abide by Company HSEC policies and management systems.	Section 4
	IMC will ensure contractors undertake the appropriate investigations with regards to underground service locations prior to the commencement of excavation works.	
	Diesel storages and pipelines shall be constructed and maintained in accordance with the relevant standards.	
	Appropriate risk management equipment (such as firefighting facilities and spill kits) will be present and maintained, with staff trained in their use.	
	Safety fencing will be installed around excavations and high risk areas of project sites to mitigate risks associated with unauthorised access. Vehicular accesses will be gated and locked when not in use.	Section 4.7
Waste	To minimise waste generation material generated from construction works will be utilised on site or as capping material at West Cliff emplacement area, where suitable.	Section 4.9
	Waste will be appropriately captured and transferred to suitable re-use, recycling or disposal locations.	
Visual Amenity	Clearing of native vegetation and mature trees will be minimised at projects where possible.	Section 4.7
	For long term infrastructure IMC will look to avoid the use of highly reflective materials or materials not commensurate with the surrounds, as is practicable.	
	Screening trees will be included in revegetation works, as and where appropriate for long term projects.	
	Permanent lighting will be installed as per the relevant standards but will consider visual amenity and light spill.	
	Temporary lighting will be arranged to minimise light spillage as much as possible without compromising safety or operations.	
Rehabilitation	IMC will undertake rehabilitation of any areas disturbed by the Project to ensure the environment is returned as close as possible to pre-project condition and/or to meet landowner specific requirements.	Not Applicable for construction
	De-commissioning of boreholes and shafts will be undertaken in accordance with the requirements of the relevant government department/s.	
The Appin Mine Ventilation and Access Project	A care and control agreement will be prepared and implemented for the long-term management of recovered artefacts.	Section 4.6
	IMC will provide biodiversity offsets under the NSW Biodiversity Offset Scheme for the Retirement of two (2) PCT 849 Ecosystem Credits.	Noted
	A Blast Management Strategy will be prepared.	Section 9
	IMC will continue to liaise with and provide information regarding the Project construction via the Menangle Advisory Panel.	This is undertaken quarterly.
	An Infrastructure Management Plan will be prepared in consultation with Transport for NSW, should the potential OSO be constructed at the Site during the operational life of the Site.	Noted

This document UNCONTROLLED once printed

Document ID	APNMP0131	Version	V1	Page 17 of 94
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



2.1.2 Water Access Licence

The AMVA Project will utilise IMC's existing Water Access Licence (WAL) 30145, under the NSW *Water Management Act 2000*, issued for VS6. IMC manages compliance with WAL 30145 as part of the wider Appin Mine management of water licences. The water use from WAL 30145 by the AMVA Project has not introduced any additional licence conditions.

2.1.3 Environmental Protection Licence

IMC operates in accordance with Environment Protection Licence EPL2504. Approval for a licence variation for the purposes of a premises change and the addition of a piped discharge point and overflow from the sediment pond was granted by the EPA on 1 May 2022. Management requirements for surface water are discussed further in Section 5.

2.1.4 Guidelines and Standards

During development of this CEMP, IMC applied the guiding principles found in:

- ISO 14001:2015 Environmental Management Systems.
- South32 Sustainability Policy.
- South32 Environment Standard.

Other relevant guidelines for the AMVA Project include:

- NSW Department of Environment and Climate Change (DECC) Interim Construction Noise Guideline (2009) (ICNG).
- Managing Urban Stormwater: Soils and Construction Manual.
- NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects (NSW Minerals Council 2010).

3. ROLES AND RESPONSIBILITIES

The roles and responsibilities associated with environmental management for the AMVA Project are defined in the Environmental Management Strategy. Table 4 outlines the roles and responsibilities associated with the implementation and periodic review of the CEMP.

Table 4 Roles and Responsibilities

ROLE	RESPONSIBILITIES
All Personnel	<ul style="list-style-type: none"> • Carry out works in accordance with the Project Approval, as described in this CEMP. • Exercise due care, skill and foresight when carrying out the works. • Immediately report all environmental incidents to the IMC Environmental representative. • Comply with all permits, approvals, and subsequent plans associated with the works. • Be able to always locate a copy of this CEMP. • Inform the IMC Environmental representative immediately if it is not practical to comply with a requirement or if the specified controls are inadequate.

<i>This document UNCONTROLLED once printed</i>				Page 18 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



ROLE	RESPONSIBILITIES
	<ul style="list-style-type: none"> Implement corrective actions which have been approved by the appointed Site Supervisor.
IMC Project/Construction Manager or delegated IMC Construction Coordinators	<ul style="list-style-type: none"> Verify all personnel are aware that works must be carried out in accordance with this CEMP. Verify all reports and records are prepared as detailed in this CEMP. Verify all required permits or approvals are approved as specified in the CEMP prior to commencement of works. Verify compliance with all permit requirements as described in Section 2. Ensure consultation and community liaison is undertaken in accordance with this CEMP. Ensure compliance with this CEMP is a condition of engagement for contractors and staff.
Contractor's Managers and Supervisors	<ul style="list-style-type: none"> Ensure compliance with all requirements in this CEMP and any applicable Guidelines, Approvals, Licenses or Permits as described in Section 2 Ensure all personnel are adequately trained, resourced and aware of their responsibilities in regard to the CEMP. Keep the CEMP accessible to all personnel. Monitor environmental performance against requirements in the CEMP. Stop work and report the IMC Environmental Representative and IMC Construction Manager immediately if it is not practical to comply with a CEMP requirement.
Contractor's Representative	<ul style="list-style-type: none"> Be the first point of contact for the IMC Construction Manager. Implement this CEMP to comply with regulatory requirements, audit and non-compliance management. Develop and implement specific EMPs/work method plans for their works as required. Conduct and record daily inspections of Site environmental management controls. Monitor and report environmental performance against the requirements of this CEMP. Nominate the Contractor's Environmental Representative. Ensure that all their staff, consultants and subcontractors are suitably skilled and have a clear understanding of the environmental requirements and consequences of their work. Ensure adequate resources are supplied to ensure implementation of the CEMP. Conduct relevant Site induction and maintain training records. Assist in the conduct of Site audits where required. Ensure that any plan record, inspection or document is retained in so far as compliance with this CEMP and be made available to IMC as requested.
IMC Environmental Representative	<ul style="list-style-type: none"> Be available during construction and present on Site during any critical construction activities. Conduct environmental monitoring as required. Provide advice on contamination, soil management, heritage, vegetation management and protection, and provide environmental support as detailed by this CEMP. Consider and advise on matters specified in the requirements in this plan and compliance with these requirements.



ROLE	RESPONSIBILITIES
	<ul style="list-style-type: none"> Carry out environmental audits during construction work to verify compliance with this CEMP, and report findings to the Project/Construction Manager. Liaise with government regulators and IMC senior leadership team in relation to arising CEMP issues.
IMC Corporate Affairs	Meeting the commitments contained within the CEMP in relation to stakeholder engagement.
IMC Approvals Manager IMC Superintendent Environment IMC General Manager Appin Mine	Provide the necessary resources and systems to meet the requirements of the CEMP.

3.1 Training and Awareness

All personnel (including subcontractors) are required to attend a compulsory Site induction that includes an environmental component before commencing work on Site. This is done to ensure all personnel involved in the AMVA Project are aware of the requirements of the CEMP, EPL and other relevant regulatory approvals. This will assist with minimising the risk of non-compliance with the Project Approval due to the actions of persons that attend the Site, including contractors and subcontractors. Short-term visitors undertaking inspections or entering Site (such as regulators) will be required to undertake a visitor’s site familiarisation and to be accompanied by inducted personnel at all times.

The Site-specific induction for persons undertaking work will include as a minimum:

- Relevant details of the CEMP and EPL requirements including their purpose and objectives.
- Awareness of legislative responsibilities, including that penalties for failing to meet those responsibilities apply.
- Relevant conditions of environmental licences, permits and approvals.
- Incident response, reporting and notification requirements for pollution and other environmental incidents.
- Awareness of key environmental issues relating to the AMVA Project.
- Specific environmental management requirements and responsibilities, including what to do when working in or near environmentally sensitive areas and the associated risks.
- Hours of operation and out of hours works.
- External communications procedures as described in this CEMP.
- Approved transport routes and parking arrangements.

Other generic inductions that may be required include:

- IMC Generic Surface Induction.
- Permit to Work for permit issuers.
- Contractors permit to work procedures.

<i>This document UNCONTROLLED once printed</i>				Page 20 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



To ensure that the CEMP and requirements of the EPL and other regulatory requirements are effectively implemented, each level of Project Management are responsible for ensuring that all personnel reporting to them are aware of the requirements of this CEMP.

A training, qualifications and skills register will be maintained for the duration of the AMVA Project to ensure all personnel are inducted and hold appropriate licenses, training and qualifications for the work they will be undertaking.

4. GENERAL ENVIRONMENTAL MANAGEMENT

All construction works associated with the AMVA Project will be undertaken in accordance with the CEMP. The following sections provide a summary of how impacts to relevant environmental aspects are to be managed during construction of the AMVA Project.

4.1 Environmental Performance Management

The IMC EMS is built on the “Plan, Control, Check, Act” model (Figure 2). This model endorses the concept of continual improvement and is consistent with ISO 14001: Environmental Management Systems. An EMS is a continual cycle of planning, implementing, reviewing and improving the processes and actions that an organisation undertakes to meet its environmental obligations. In accordance with IMC’s EMS, Prior to undertaking a new task or as conditions change the following process will be followed:

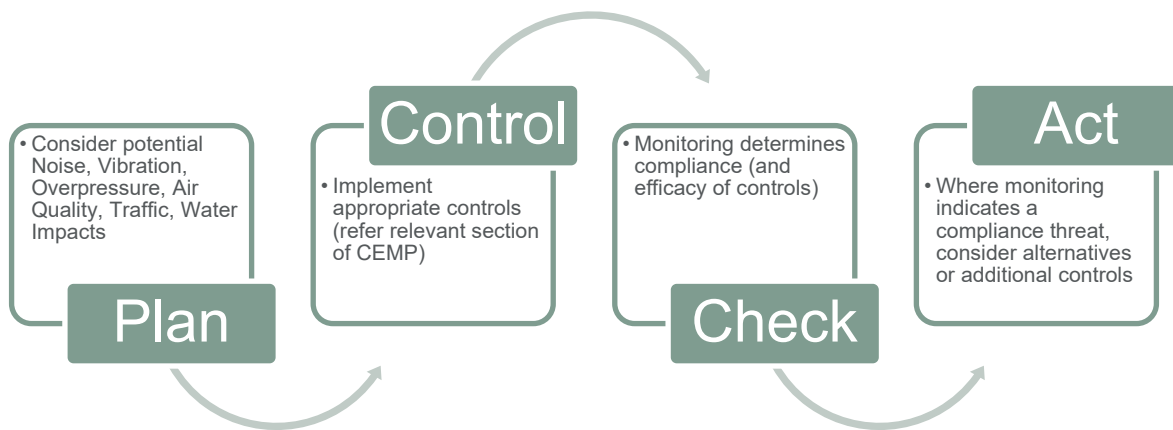


Figure 4 Performance Management Process

4.2 Works Planning

Planning is central to the EMS. To enable relevant environmental controls to be identified and applied the following should be undertaken:

- Pre-start risk assessments to determine potential environmental impacts and apply job specific controls (considering activity, weather, location and interactions).

<i>This document UNCONTROLLED once printed</i>				Page 21 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Daily site logs. A record of site activities should be kept to enable monitoring data to be correlated with activities. This will enable the review and audit process described in Section 9 as well as inform responses to complaints, enquiries and/or disputes.

Specific environmental controls for individual work areas will be developed based on the task and included in job planning documents (SWMS, pre-start and Construction Management Plans). These plans will be developed by specialist contractors and will be consistent with the requirements and strategies set out in this CEMP. IMC require that all works be subject to these documented risk assessments prior to works commencing and review as conditions change. These will be available on request and will be developed in reference to this CEMP.

4.3 Ground Disturbance Permit Procedure

Disturbance is classified as any direct activity with the potential to disturb natural features or cultural heritage. These include, but are not restricted to, clearing of native vegetation, tree removal for bushfire hazard reduction works, construction works, and drilling exploration boreholes.

If there are changes to existing activities/processes or new projects are proposed that have potential for environmental impact, a Permit to Disturb is required. One of the purposes for the Permit to Disturb is to ensure the proposed works have the required environmental approval and that the person(s) undertaking the works have appropriately managed the risks to minimise impacts on the environment and community. The Permit to Disturb process is a standardised system used by IMC which sets minimum requirements for authorising works and contains a checklist of environmental aspects that must be reviewed and approved by the IMC Environment Representative prior to the commencement of any work. These protocols are detailed in:

- Permit to Disturb Procedure (IMC Document ID: IMCP0207) (Appendix A).
- Permit to Disturb Form (IMC Document ID: ICHF0209) (Appendix B).

4.4 General

The following controls are applicable to all construction activities and areas:

- Work areas will be clearly defined prior to any works.
- All building materials, plant and equipment must be contained wholly within the confines of the AMVA Project boundary.
- Vehicles must remain within designated access routes.
- Disturbance to peripheral vegetation to be avoided.
- All personnel must carry out their work in accordance with the responsibilities outlined in Section 3.
- All construction personnel must be made aware of this CEMP.
- All community, regulatory and media enquiries are to be directed to the IMC Project/Construction Manager immediately and the Construction Manager should refer to the procedures set out in Section 10.1.1 or if in doubt, direct the enquiry to IMC’s community specialist.
- Employing routine industry ‘house keeping’ management practices during the works, such as:
 - Maintaining an orderly and tidy workspace.

<i>This document UNCONTROLLED once printed</i>				Page 22 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Ensuring all building materials are appropriately stored or disposed of upon cessation of use.
- Include CEMP and environmental controls awareness specific to the AMVA Project in the Site inductions of staff.
- The CEMP should be readily available on Site and include a Site plan(s) which shows:
 - No go areas (e.g. heritage) and boundaries of the work area.
 - Location of environmental controls (i.e. erosion and sediment controls, fences and/or other measures to protect vegetation or fauna, spill kits).
 - Location and full extent of any vegetation disturbance.

<i>This document UNCONTROLLED once printed</i>				Page 23 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



4.5 Construction Hours

The construction activities and the corresponding hours for Construction at the AMVA Project detailed in Condition 7B of Schedule 2, of the Project Approval are reproduced in Table 5.

Table 5 Construction Hours

ACTIVITY	HOURS (OTHER THAN FOR EMERGENCY OR SAFETY PURPOSES AS APPROVED BY THE PLANNING SECRETARY IN THE CONSTRUCTION TRAFFIC MANAGEMENT PLAN REQUIRED UNDER SCHEDULE 4A CONDITION 12)
Construction Hours	
Construction, including: <ul style="list-style-type: none"> Appin Mine Ventilation and Access Site early works fans, evase(s), ancillary site infrastructure and mine access infrastructure (winder, headframe, etc.) Shaft sinking activities prior to the construction of acoustic sheds/mitigation 	7.00 am to 6.00 pm, Monday to Friday 8.00 am to 1.00 pm Saturday No works on Sunday or Public Holidays
<ul style="list-style-type: none"> Shaft sinking activities once the acoustic sheds/mitigation is in place. Any works that are inaudible at residential premises Concrete deliveries during shaft sinking activities once the acoustic sheds/ mitigation is in place Operation and Commission of the ventilation shafts 	24 hours per day, 7 days per week
Heavy vehicle movements to and from the site except concrete deliveries during shaft sinking activities once the acoustic sheds/ mitigation is in place	7.00 am to 6.00 pm, Monday to Saturday No movements on Sunday or Public Holidays

4.6 Heritage Management

The AMVA project site is subject to an Aboriginal Cultural Heritage Management Plan (Appendix C). There is one registered Aboriginal Cultural Heritage site located within the Project Area (AHIMS # 52-2-4769.). The area is fenced. This site includes six (6) artefacts previously associated with (AHIMS ID#52-2-3687) which were reburied on Country following consultation with Registered Aboriginal Parties (RAPs). The location of this reburial site was determined by the RAPs in consultation with IMC to ensure the burial location is outside of any potential disturbance area. The reburial location is highlighted in Figure 3 of this document.

In the unlikely event that additional heritage site(s)/item(s) are encountered, the unexpected finds methodology will be implemented. It is critical for the construction team to be aware that any suspected archaeological evidence must remain as it was found (in situ) until it is assessed by a qualified archaeologist, as per the below steps. These objects, where they are located and the material around them (referred to as the object’s ‘context’) is critical for understanding their value to

<i>This document UNCONTROLLED once printed</i>				Page 24 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



the Site and determining what may be located near to the area of the find. The object and its context are legally protected under the *NSW National Parks and Wildlife Act 1974* (aboriginal items or remains).

4.6.1 Discovery of Unanticipated Human Remains

The following actions will be taken in instances where human remains or suspected human remains are discovered. Any such discovery in the study area will follow these steps.

- **Discovery:** If suspected human remains are discovered all activity in the vicinity of the human remains must stop to ensure minimal/no additional damage is caused to the remains. The remains must be left in place and protected from harm or damage.
- **Notification:** Once suspected human remains have been found, the Coroners Office and the NSW Police must be notified immediately. Should NSW Police confirm the origin of the remains as non-human and provide a case number for IMC's records, no further action shall be taken. Following this, if the human remains are of suspected Aboriginal ancestral origin, DPIE, Heritage NSW and representatives of the RAPs will be notified of the find and the process as outlined in the Environmental Compliance/Conformance Assessment and Reporting Procedure will be followed.
- **Management:** If the human remains are of Aboriginal ancestral origin an appropriate management strategy will be developed in consultation with RAPs, a suitably qualified archaeologist and Heritage NSW. If the human remains are identified as historical relics, then an appropriate management strategy will be developed in accordance with the Heritage NSW Skeletal Remains Guidelines. If the exhumation of human remains is subsequently required, these works must be undertaken in accordance with the *Public Health Act 1991* exhumation guidelines and relevant heritage guidelines.
- **Recording:** The find will be recorded in accordance with the requirements of the *NPW Act*, *Heritage Act 1977*, *Public Health Act 1991* and Heritage NSW guidelines as appropriate.

4.6.2 Discovery of Unanticipated Aboriginal Cultural Material

All Aboriginal places and objects are protected under the NPW Act. This protection extends to Aboriginal objects and places that have not been identified but might be unearthed during construction. The following contingency plan describes the actions that will be taken in instances where Aboriginal cultural material is discovered. Any such discovery in the study area will follow these steps.

- **Discovery:** Should unanticipated Aboriginal cultural material be identified during any surface works, works will cease in the vicinity of the find.
- **Notification:** DPIE and Heritage NSW will be notified of the find and the process as outlined in the Environmental Compliance/Conformance Assessment and Reporting Procedure will be followed.
- **Management:** In consultation with the Heritage NSW, RAPs and a qualified archaeologist, a management strategy will be developed to manage the identified Aboriginal cultural material. The management strategy will be incorporated into the relevant management plan.
- **Recording:** Any previously unrecorded Aboriginal cultural heritage sites identified during fieldwork (e.g. baseline recording, supplementary fieldwork, pre-clearance surveys, monitoring, follow-up inspections to assess the effectiveness of mitigation/management/remediation

<i>This document UNCONTROLLED once printed</i>				Page 25 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



measures, etc.) will be recorded using the standard Heritage NSW site card. This information will be submitted to Heritage NSW for registration on the AHIMS database. Any previously unrecorded sites will also be subject to subsidence risk and impact assessments, and an archaeological and Aboriginal cultural significance assessment in consultation with Aboriginal stakeholders. Any previously unrecorded Aboriginal cultural heritage sites will be managed in accordance with the requirements of this HMP.

Maps in the relevant management plans will be updated to include the location of any unexpected finds of confirmed Aboriginal objects to prevent inadvertent impacts from other operational activities.

DPIE will have the authority to approve the HMP that covers impact to new finds. Consultation will be undertaken with other agencies and RAPs as required.

4.6.3 Impacts to an Aboriginal Site

In the event that impacts are identified to an Aboriginal site the following should occur.

- **Discovery:** If impacts are identified during any surface works, all works in the vicinity of the site must cease.
- **Notification:** DPIE, RAPs and Heritage NSW will be notified of the find and the process as outlined in the Environmental Compliance/Conformance Assessment and Reporting Procedure will be followed.
- **Management Actions:**
 - i. In consultation with Heritage NSW, RAPs, DPIE and a qualified archaeologist, the site will be inspected, and a management strategy developed. Suitably qualified specialists will be brought in to assist as required.
 - ii. The management strategies will be implemented in accordance with current conservation practice and the conservation principles contained within the ICOMOS Australia Burra Charter. RAPs must be consulted regarding appropriate management methodologies and any advice will be taken into consideration in the development of the management strategies.
 - iii. An appropriate monitoring program will be developed to report on the effectiveness of the management strategy.
- **Reporting:** A report detailing the impact, details of consultation, management actions undertaken and effectiveness of management actions will be completed by a qualified archaeologist within six months of the completion of the impact monitoring program. A copy of this report will be provided to DPIE, Heritage NSW and RAPs.

<i>This document UNCONTROLLED once printed</i>				Page 26 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

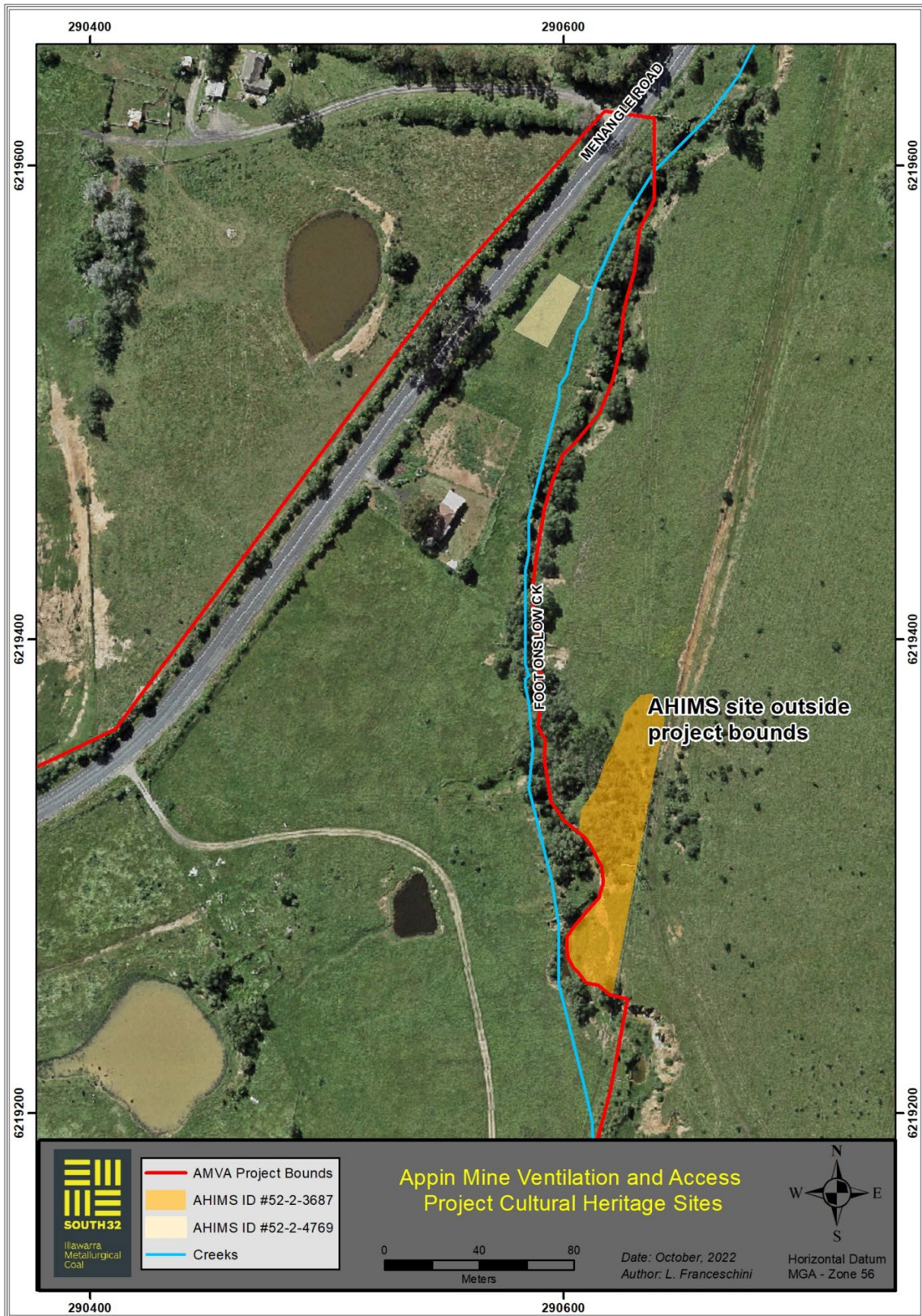


Figure 5 Cultural Heritage Sites

<i>This document UNCONTROLLED once printed</i>				Page 27 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



4.7 Vegetation Management and Biodiversity

The AMVA Project disturbance footprint consists of highly modified native grassland vegetation which has a high representation of introduced species however, the construction of the AMVA Project will result in the clearing of a small amount of Plant Community Type (PCT) 849 *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*.

The impact of this clearing has been offset via the retirement of two (2) ecosystem credits for this PCT in October 2022 satisfying Condition 35A Schedule 4 of the Project Approval.

This Section describes how IMC proposes to manage and protect remaining vegetation during construction of the AMVA Project.

4.7.1.1 Vegetation and Biodiversity Management Protocols

To mitigate the biodiversity impacts from the construction the AMVA Project, the Project have undertaken the following measures prior to construction:

- Completed a Permit to Disturb prior to the commencement of any ground disturbance activities. The Permit to Disturb will outline the control measures that will be implemented during construction works to minimise environmental impacts, including vegetation clearance and manage compliance with the Project Approval.
- Demarcated the project boundary.
- Installed fencing around woodland areas shown in (See Figure 5) . Fencing will be maintained throughout the construction phase of the AMVA Project
- Implemented the erosion sediment controls as detailed in Section 5.1.
- Clearly marked the disturbance boundary for the AMVA Project.
- Undertaken pest and weed management.

During construction the following measures will be implemented in relation to vegetation management and biodiversity management:

- Undertake regular inspection and maintenance of erosion and sediment controls during construction and until disturbed areas are vegetated/stabilised.
- Reduce the disturbance footprint where possible during construction.
- Undertake further pest and weed management.

<i>This document UNCONTROLLED once printed</i>				Page 28 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

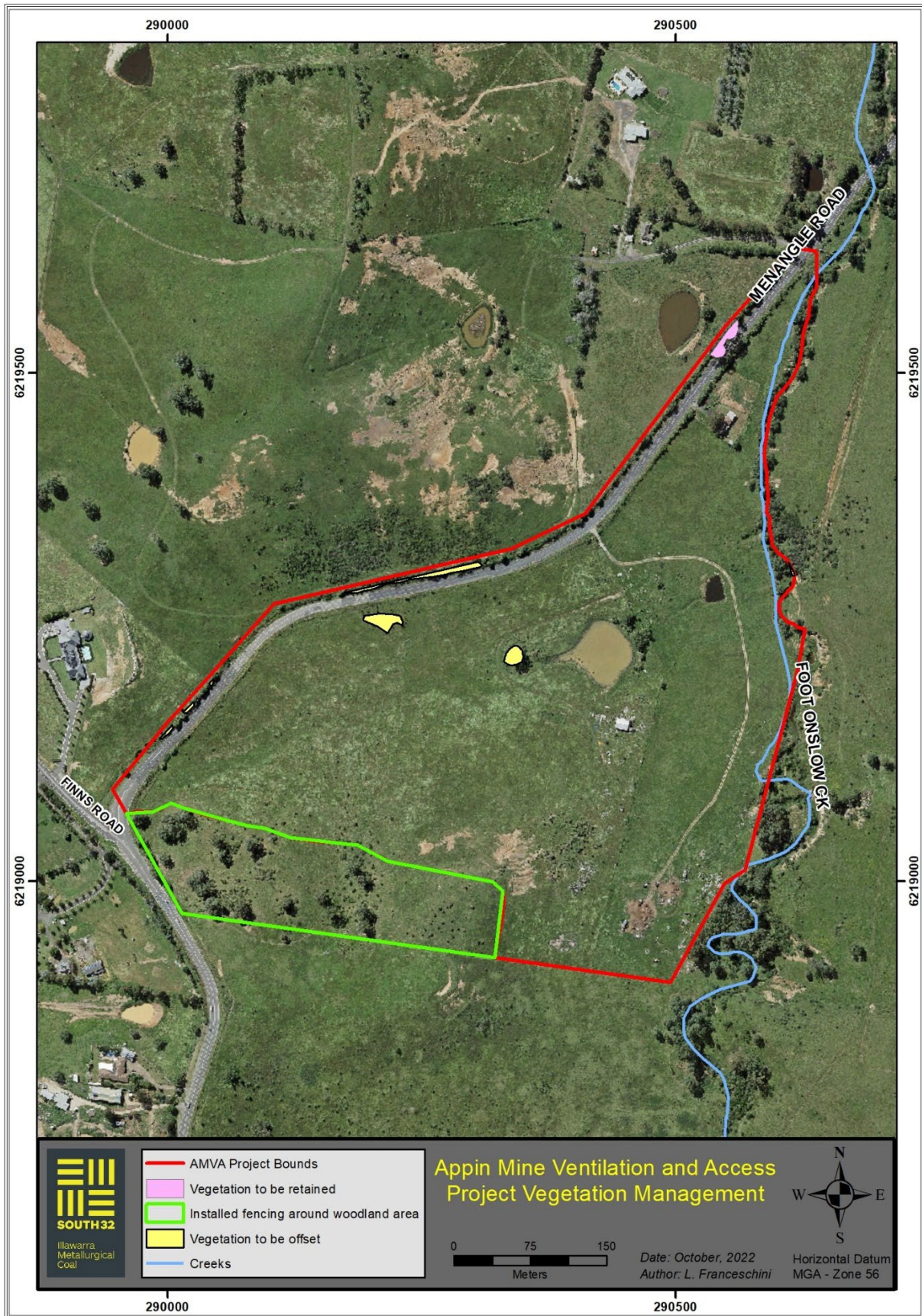


Figure 6 Vegetation Management at AMVA

<i>This document UNCONTROLLED once printed</i>				Page 29 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



4.7.2 Visual Amenity

A visual impact assessment was undertaken as part of the modification environmental assessment. This assessment identified that while the building colour palette (i.e. use of green and grey tones) will help the AMVA Project blend in with colors in the surrounding landscape, the built form and bulk will not contrast well with shapes and contours in the surrounding landscape. IMC will therefore implement the additional management measures as detailed in Section 4.7.1 to further mitigate the visual impacts of the AMVA Project.

4.7.2.1 Management and Mitigation Safeguards

During Early Works, initial vegetative screening was undertaken at the Project site and at neighbouring properties in accordance with Condition 27A of Schedule 4 of the Project Approval.

To provide further visual amenity to neighbours and the community, further tree screen plantings will occur along:

- The Site's boundary with Menangle Road.
- The external perimeter of the noise attenuation bund.
- The eastern edge of the Site.

Tree screening on the Site will consist of locally endemic native plant species. In planning for the tree screening, IMC will be mindful of the Wollondilly Development Control Plan, particularly Part 11.2, Recommended Species (for landscaping). IMC have engaged a bush regeneration expert to plan the screening program.

To mitigate impacts from lighting IMC will:

- Arrange temporary lighting to minimise light spillage as much as possible without compromising safety or operations in accordance with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting.
- Install permanent lighting as per the relevant standards but will consider visual amenity and light spill.

To mitigate visibility of the buildings/structures IMC will look to avoid the use of highly reflective materials or materials not commensurate with the surrounds, as is practicable.

4.7.3 Weeds

There is the potential for invasive weed species to become established at the Site due to ground disturbance activities. The NSW *Biosecurity Act 2015* includes mechanisms (i.e. regulatory tools) that can be used to manage weeds in NSW. Of relevance to the AMVA Project is the General Biosecurity Duty (GBD). The purpose of the GBD is to manage the spread and/or impact of all weeds that pose a biosecurity risk. The GBD is in addition to any requirements included in a control order, biosecurity zone or other instrument made under the NSW *Biosecurity Act 2015*.

For weeds, the GBD means that any person dealing with plant matter must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable).

<i>This document UNCONTROLLED once printed</i>				Page 30 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



4.7.3.1 Weed Management Measures

IMC will implement the following mitigation measures to reduce the risk of weed establishment and spread during construction:

- Vehicles will enter and leave the Site via defined entry points and use constructed roads where practical.
- Personnel, vehicle and equipment hygiene procedures will be implemented to minimise the spread and/or introduction of weeds onto the Site.
- Disturbed areas will be re-sown as soon as practicable to minimise the area of exposed soil for weed establishment and spread.
- Weed species located on site will be controlled by a suitably qualified and licensed contractor.

4.8 Topsoil Management

4.8.1 Topsoil Salvage/Stripping

Topsoil is the surface soil layer which contains organic and mineral matter and is an important contributor to effective rehabilitation post-construction. Topsoil can have high environmental value as it contains both nutrients and native seed stock that can germinate following reinstatement. Generally, topsoil is salvaged to the next soil layer (i.e. sub-soil). Most of the salvaged topsoil will be generated during bulk earthworks. Where topsoil is available, the following measures will be adopted to protect its quality and enhance rehabilitation outcomes:

- Where practical, topsoil will be directly placed on reshaped disturbance areas which are available for rehabilitation.
- Topsoil stripping activities will be supervised to maximise topsoil recovery and minimise mixing of soil profiles.
- When direct placement of topsoil is not practicable, stockpiles will be formed, located away from traffic areas and watercourses.
- Topsoil and subsoils will be stockpiled separately.
- Level or gently sloping areas will be selected as stockpiles sites to minimise erosion and potential soil loss where practicable.
- Appropriate sediment controls will be installed at the base of stockpiles to prevent soil loss.
- Stockpiles to be kept longer than three (3) months will be sown with a suitable cover crop to minimise soil erosion and invasion of weed species.
- Weed growth will be monitored and subsequently controlled as necessary.

Topsoil stockpiles will be no greater than three (3) m in height to preserve soil structure, maximise surface exposure and biological activity.

4.9 Waste and Fuels Materials Management

The major waste streams expected and the primary waste minimisation strategy for the AMVA Project are shown in Table 6.

<i>This document UNCONTROLLED once printed</i>				Page 31 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Table 6 Waste Stream Identification, Classification and Management Strategy

WASTE STREAM	MINIMISATION STRATEGY
Sewage/effluent	Off-site Recycle/Disposal as appropriate
Oily water	
Waste oil	
Parts, washers and liquid waste	
Degreaser	
Engine coolant	
Food Waste	Off-site Landfill
Municipal Waste	Off-site Landfill
Paper and cardboard	Off-site Recycle
Silt, sediment and leaf litter	Reuse on Site
Organic Waste	Mulch and reuse on Site
Wood Waste	Off-site Recycle/Disposal as appropriate
Concrete Waste	Off-site Recycle/Disposal as appropriate
Virgin excavated natural material	Reuse on Site
Building and demolition waste	Off-site Recycle/Disposal as appropriate
Scrap metal	Off-site Recycle
Air filters	Off-site Landfill/recycle as appropriate
Plastic drums	Off-site Recycle/Disposal as appropriate
Batteries	Off-site Recycle/Disposal as appropriate
Oily rags	
Oil absorbent material	
Oil filters	
Empty oil drums	
Waste grease	



4.9.1 **Material Imports**

Any raw materials bought to site (aggregate or sand) should be classified as suitable for the land use, in accordance with NEPM (2012) and any relevant EPA guidelines and Regulations made under the *Protection of the Environment Operations Act and Regulations*. For example, recovered aggregate from the washing process at Dendrobium may be used where it meets the requirement of Resource Recovery Order Part 9, Clause 93 of the *Protection of the Environment Operations (Waste) Regulation 2014*, The Recovered Aggregate Order 2014.

4.9.2 **Waste Stream by Classification**

Waste classification for the receipt and the disposal of material for the AMVA Project will be undertaken in accordance with the EPA Waste Classification Guidelines (2014). Under the guidelines (Part 1) waste is classified into six (6) waste classes:

- Special waste.
- Liquid waste.
- General solid waste (putrescible).
- General solid waste (non-putrescible).
- Hazardous waste.
- Restricted solid waste.

4.9.3 **Fuel and Corrosive Materials Storage**

Fuel will be stored and managed in accordance with AS1940: The storage and handling of flammable and combustible liquids. Corrosive substances will be managed in accordance with AS 3780: The Storage and Handling of Corrosive Substances.

4.9.4 **Spill Response Protocol**

The IMC spill management procedure defines the steps to be undertaken (i.e. spill response and clean up) to prevent environmental contamination by substances used at IMC and to ensure prompt, safe and effective spills management across all IMC sites.

The procedure applies to all substances in use, or being stored, handled and transported by employees, visitors and contractors of IMC that have the potential to cause harm to the environment or personnel. This includes (but is not limited to):

- Oils, fuels and greases (hydrocarbons).
- Chemicals.
- Degreasers.

For management of spills located on external roads (i.e. Menangle Road etc.), spill response should be coordinated with TfNSW. Call 000.

<i>This document UNCONTROLLED once printed</i>				Page 33 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



The key steps with regards to handling a spill on an IMC site are shown in Figure 3.



Figure 7 Spill Response Protocol

Consider

- Perform an appropriate risk assessment (Take 2 or Task Analysis) to assess the risk and determine what PPE or safety measures are appropriate for the spill event, substance and surrounding conditions.
- Refer to Chemalert for handling requirements.

Contain/control

- Barricade the area to prevent unauthorised access. Personnel safety is paramount and should be assessed as the initial response if personnel are involved and/or injured.
- Isolate the source of the spill (if safe to do so and there is a no immediate risk of spilled material entering stormwater drains or the site water management system). This may include turning off a valve or tilting the leaking container.
- If safe, stop the spill from spreading and potentially entering drains and waterways via the use of spill kits, absorbent material, booms etc.
- If the spill has entered the site drainage system, isolate drain or pipe valves (where possible) to contain the spill in the existing drains to prevent the water entering into the site sediment ponds.
- If required, inform your site supervisor to initiate emergency response operations through the site-specific Emergency Response Management Plan, or to gather more assistance or materials for containing large spills.
- If the spilled substance is entering the site water management systems or exiting the site, contact the Environment Team to coordinate the collection of samples to determine environmental impact (if relevant).

NOTE: Two types of spill kits are in use on sites – general purpose and hydrocarbons.

1. General purpose spill kits can be used for both chemical and hydrocarbon spills (usually for water soluble material (hydrophilic)).
2. Hydrocarbon spill kits can only be used for hydrocarbon (oil, grease and diesel) spills (usually for hydrophobic liquids, non-water soluble).

Clean up

- Clean up any remaining materials. Dispose absorbent material in accordance with the disposal requirements as detailed in Section 4.8.1.
- Small volumes of used absorbent material can be disposed in general waste or dedicated hydrocarbon waste bins, if applicable. General waste bins are located in various locations at the Site. Spill sorbent materials used from spill kits must be disposed of in a separate bin for appropriate disposal by a waste contractor.

Report - internal

Fill out an event report for entry into the incident reporting system. Spills are to be classified as follows:

<i>This document UNCONTROLLED once printed</i>				Page 34 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- 0 – 25 L – Hazard Report
- 25 L and above – Event Report

Report - external

If there was actual or potential material environmental harm (as defined under s147 of the *Protection of the Environment Operations Act*), there may be a requirement to make a notification to the EPA or other regulatory agencies. This will be determined by the relevant Environment Team member.

Harm to the environment is determined to be material if:

- it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or
- it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding \$10,000 (or such other amount as is prescribed by the regulations).

Loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment.

To determining whether harm is material, it does not matter that harm to the environment is caused only in the premises where the pollution incident occurs.

5. SURFACE AND GROUNDWATER MANAGEMENT

5.1 Surface Water and Erosion Sediment Control Plan

Sediment and surface water runoff generated as a result of the AMVA Project has the potential to impact water quality. The uncontrolled release of sediment-laden waters may cause impacts to water quality by changing water quality parameters such as turbidity, pH, dissolved oxygen (DO) and electrical conductivity (EC).

The measures implemented to control and manage erosion and sediment that may result from construction activities include:

- Minimising all disturbed areas and progressively stabilising as soon as practical.
- Identifying and delineating disturbance areas and ensuring that disturbance is limited to those areas.
- Designing and constructing diversion banks upslope of disturbance areas, where practical, to direct clean water runoff away from disturbed areas and allow clean surface water to return to natural watercourses.
- Constructing catch drains to capture runoff from disturbed areas and direct dirty water to the sediment pond.
- Constructing other erosion and sediment control measures such as sediment fences and check dams and energy dissipation structures within catchment areas.
- Constructing drainage controls such as table drains at roadsides and on hardstand areas and toe drains on stockpiles/emplacement areas.
- Managing sediment pond as per design requirements in regard to discharge, freeboard, settlement zone and sediment storage zone, flocculation and discharge water quality requirements.

<i>This document UNCONTROLLED once printed</i>				Page 35 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Placing geotextile liners and rock check dams in drains as required to reduce water velocities and prevent scouring.
- Regularly maintaining all controls and inspecting all works weekly and after storm events to ensure erosion and sediment controls are performing adequately.
- Revegetating final landforms (natural landform and drainage design) and disturbed areas, as soon as possible.
- Repairing or redesigning erosion and sediment controls that are not performing adequately, as identified during field inspections.
- Completing a Permit to Disturb prior to the commencement of ground disturbance activities. The Permit to Disturb will reference the erosion and sediment control plan for the construction works to manage dirty water discharges from the Site and protect the clean water systems.

5.1.1 Erosion and Sediment Control Structures

IMC will implement (i.e. construct and maintain) the Erosion and Sediment Control Plan (ESCP) as shown on Figure 7. The ESCP incorporates a range of permanent structures which have been designed to minimise the potential for discharge of dirty water off Site.

The principal erosion and sediment controls used by IMC include:

- Clean water diversion drains.
- Catch drains for dirty water.
- Sediment ponds for dirty water management.
- Temporary controls (e.g. sediment fence).

Specific environmental controls for individual work areas will be developed based on the task and included in job planning documents (SWMS, pre-start and Construction Management Plans). These plans will be developed by specialist contractors and will be consistent with the requirements and strategies set out in this CEMP.

5.1.2 Clean Water Diversion System

To minimise the volume of water managed by the AMVA Project’s dirty water management system, diversion drains have been constructed (during Early Works) upslope of disturbance areas to convey clean water runoff away from the disturbed areas and prevent water from entering the construction areas and the dirty water management systems. This clean water runoff is diverted into nearby watercourses.

All diversions are designed generally in accordance with the ‘Blue Book’ Managing Urban Stormwater – Soils and Construction Volume 1 (Blue Book) (Landcom, 2004) and Volumes 2A, 2C, 2D and 2E (DECC 2008) to cater for a minimum 100-year Average Recurrence Interval (ARI) storm event.

5.1.3 Sediment Pond

The sediment pond (Figure 7) will be used to capture and treat dirty water prior to discharge. A licenced discharge point (LDP41) from the Sediment Pond to Foot Onslow Creek is included in the BSO EPL2504 which includes the following water quality requirements for discharge:

<i>This document UNCONTROLLED once printed</i>				Page 36 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- pH 6.5-8.5
- Total Suspended Solids (TSS) 50 mg/L

The sediment pond will be inspected by IMC and cleaned out as required to maintain capacity (i.e. settling and sediment zones) in accordance with the ‘Blue Book’.

If necessary, flocculation is used to improve the quality of sediment laden water prior to discharge (in accordance with the ‘Blue Book’).

The sediment pond will be maintained throughout the life of the Project into operations.

The sediment pond has been designed to capture a 1 in 10-year, 72-hour duration storm event. The pond will have a maximum capacity of 12,660 m³, a depth of 4.93 m, a wall height of 2.5 m and a 150 mm freeboard.

The sediment pond will be maintained in a drawn down state as far as practicable. This is achieved by using the sediment pond water for:

- Dust suppression bulk earthwork compaction, revegetation and shaft sinking activities.
- Treated to the relevant water quality criteria as described in the EPL prior to being discharged from the Site.

5.1.4 Catch Drains

The AMVA Project’s dirty water management system includes diversion drains, catch drains, batter chutes and scour protection and a sediment pond. The catch drains and associated structures are established to convey runoff from the disturbed areas to the sediment pond. The pad has been designed to be free-draining and directs all dirty water to the sediment pond via a series of diversion drains, chutes and culverts which are located primarily along the perimeter of the pad.

All catch drains are designed to convey peak discharges from a minimum critical duration of a 1 in 10-year ARI storm event.

5.2 Hydrogeology

The geology of the Site comprises Wianamatta shales underlain by Hawkesbury Sandstones. Vertical groundwater flow continuity in the Wianamatta Group is retarded by the Ashfield Shale.

The general groundwater regime for the Project area comprises:

- Perched groundwater systems associated with the Wianamatta Group. These perched water tables are hydraulically disconnected from the deeper groundwater systems;
- Shallow groundwater systems comprising layered water-bearing zones within the saturated Hawkesbury Sandstone. The highest yielding groundwater bores are typically associated with coarse sandstone units and/or fractured sandstone; and
- Deeper groundwater systems within the Narrabeen Group and the Illawarra Coal Measures. These units typically are of much lower permeability than the Hawkesbury Sandstone and produce low bore yields and poorer water quality.

The main aquifer in the Project area is the Hawkesbury Sandstone. Recharge to this system is from rainfall and lateral groundwater flow and discharge is to incised streams and loss by evapotranspiration in outcrop areas.

<i>This document UNCONTROLLED once printed</i>				Page 37 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



A groundwater assessment was undertaken during the Environmental Assessment (HGeo, 2021) to simulate hydrogeological conditions in the AMVA Project area and predict impacts to groundwater resources during excavation and ongoing use of the ventilation shafts. Predicted drawdown due to the AMVA Project is negligible at most registered bores within the modelled area. Negligible impacts to farm dams are predicted as farm dams in the Project area are shallow and effectively perched within the upper weathered horizons of the Wianamatta Group.

During shaft sinking activities groundwater inflows will be encountered as the shaft is advanced through the stratigraphy and associated groundwater systems and this would comprise the incidental ‘take’ or diversion of groundwater caused by the project. The predicted groundwater inflows for construction and operational phases, including controls (Section 5.3) are shown in Table 7. To ensure shaft sinking efficiency, groundwater inflows will be minimised by targeted grouting of fractured zones and advance pre-grouting of fractured strata. With increased controls (additional grouting) actual inflows are likely to be lower than those predicted.

Table 7 Predicted Groundwater Inflows for VS 7 & 8

YEAR	PHASE	VS7 INFLOWS (ML/YEAR)	VS8 INFLOWS (ML/YEAR)	TOTAL PREDICTED INFLOWS (ML/YEAR)
2023	Construction	19.3	11.1	30.4
2024	Construction	29.9	29.9	59.8
Long-Term	Operations	0.07	0.07	0.14

5.3 Groundwater Management During Shaft Construction

5.3.1 Water Allocation

The *Water Act 1912* and *Water Management Act 2000 (WM Act)* provide the framework for the allocation and management of water in NSW and require a licence or approval for taking water. The main tool in the *WM Act* for managing the state’s water resources are Water Sharing Plans, which set out the rules for sharing and trading water within a water source. The AMVA Site is in ‘Nepean Management Zone 2’ (MZ2) of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011. IMC hold two WALs in MZ2 . The WALs are summarized in Table 8.

<i>This document UNCONTROLLED once printed</i>				Page 38 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Table 8 Water Access Licences held by IMC in Nepean Management Zone 2

WAL NUMBER	CATEGORY	TENURE TYPE	EXTRACTION TIMES OR RATES	SHARE COMPONENT (ML/YR)
36477	Aquifer	Continuing	Subject to conditions water may be taken at any time or rate	303
37464	Aquifer	Continuing	Subject to conditions water may be taken at any time or rate	300
TOTAL				603

The Appin Mine Annual Review reports that the water take due to groundwater ingress at Appin Mine was 538 ML in the FY2022, 778 ML in the FY2021 reporting period and 710 ML for the FY2020 reporting period. Total mine take for groundwater is reported against both Sydney Basin Central Groundwater Zone (within which IMC holds two licenses and Nepean Management Zone 2). Modelling indicates that the Project may result in an incidental ‘take’ or diversion of up to 59.8 ML/year of groundwater in 2024, with ongoing operational seepage of less than 0.14 ML/year. The share allocations of Water Access Licenses held by IMC (totaling 877 ML/ year) is sufficient to account for any incidental groundwater take at the Site.

5.3.2 Pre-Grouting

During hydrogeological investigations (Pitt and Sherry, 2021) a higher permeability unit was encountered at the boundary of the Wianamatta Group and the Hawkesbury Sandstone. To control groundwater inflows prior to shaft sinking (including pre-sink), targeted grouting of these horizons will be undertaken prior to advancement of the shafts. Pre-grouting will involve:

- Advancement of 25-30 small diameter (HQ) Reverse-Circulation (RC) drill holes per shaft to a depth of 75 m.
- Injection of cement and hardener to the full depth of the hole at pressure.

Pre-grouting will aim to achieve a decrease in hydraulic conductivity in the subject horizons and allow for shaft sinking to be undertaken with groundwater inflows reduced to < 1.5 L/sec.

5.3.3 Shaft Lining

The shafts will be lined as they are progressed by progressive pouring of a non-hydrostatic concrete lining closely behind the working area during excavation of the shaft. The works will be undertaken such that a maximum of 15 m of unlined wall is exposed at any time through the depth of the shaft.

5.3.4 Transport of Groundwater Inflows

During construction, groundwater inflows will be collected within the shaft within a water ring. This feature forms a ring around the base of intercepts with higher permeability units (or interface between strata) and collects all water ingress. The water is then pumped to the surface for storage and subsequent transport to disposal locations.

<i>This document UNCONTROLLED once printed</i>				Page 39 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



5.3.5 **Surface Storage of Groundwater**

Groundwater collected during shaft sinking will be stored in a series of holding tanks located on the site. The volumes of these tanks have been designed to allow for the storage of projected out of hours (OOH) collection volumes, prior to transport to offsite locations, acknowledging the restrictions on heavy vehicle movements described in Section 4.5 (Construction Hours).

5.3.6 **Disposal Locations**

Groundwater collected during shaft sinking will be transported to water treatment facilities within the Appin Mine water management networks and processed for eventual discharge or reuse in accordance with EPL 2504 and the approved Appin Mine Water Management Plan.

5.3.7 **Monitoring**

IMC will monitor the volume of groundwater inflows from VS7&8 to inform reporting against requirements of the *WM Act*. Inflows will be measured by pumping volumes conveyed to the surface during shaft sinking. A record of daily volumes will be kept and will be available to the Department and WaterNSW on request.

<i>This document UNCONTROLLED once printed</i>				Page 40 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

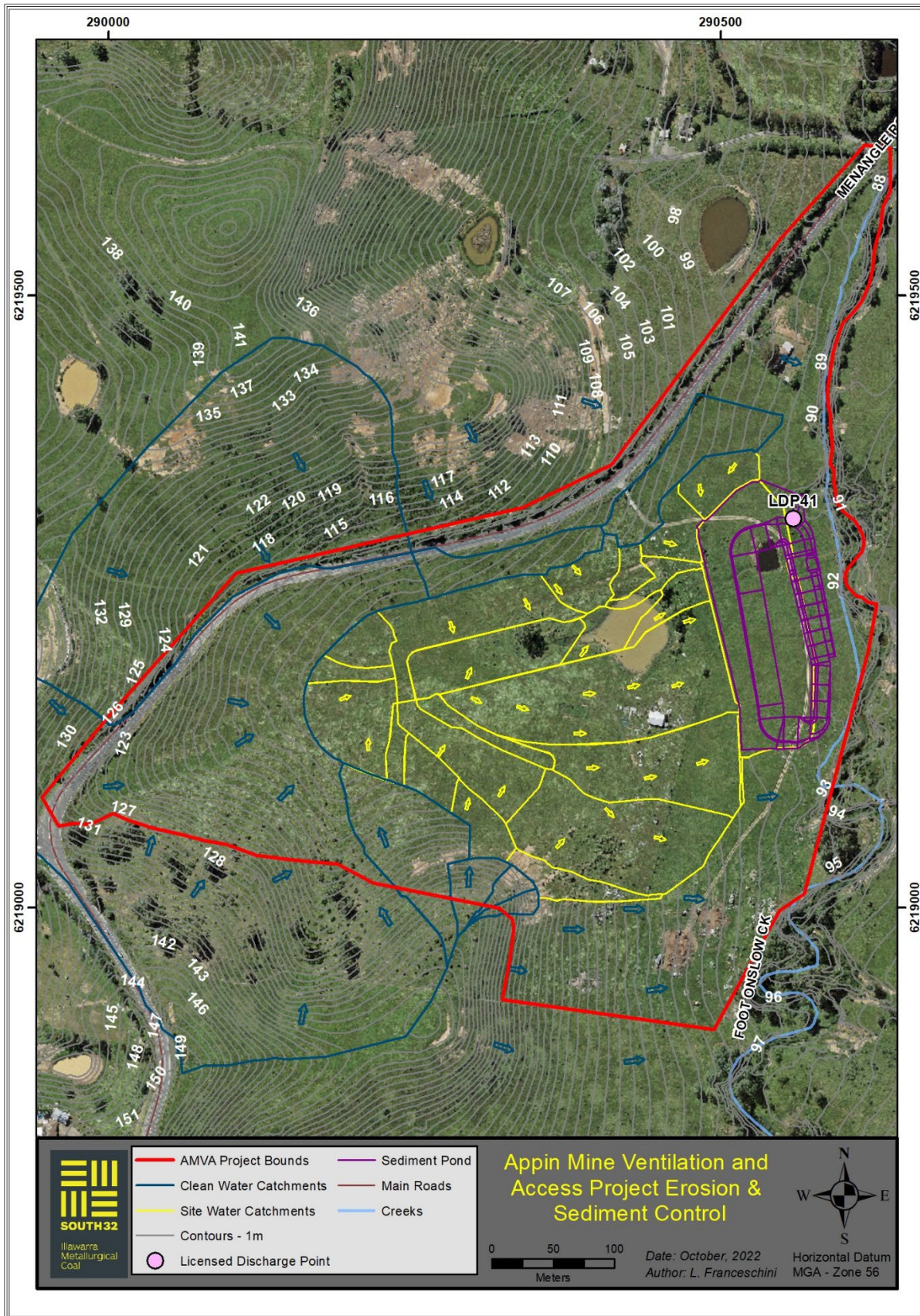


Figure 8 Sitewide Erosion and Sediment Control Plan

<i>This document UNCONTROLLED once printed</i>				Page 41 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



6. NOISE MANAGEMENT PLAN

This Noise Management Plan (NMP) describes how IMC proposes to manage and protect the environment from noise impacts during construction of the AMVA Project and has been prepared to address the requirements of Condition 11(f) of Schedule 4A of the Project Approval.

6.1 Receivers

The AMVA Project is located within an area of mixed land use consisting of grazing, rural residential, residential township (Menangle), mixed agriculture and small business. The identification of the surrounding receivers was completed as part of the modification environmental assessment. Minimising noise from construction at these receivers is the key performance objective of this NMP. Appendix 5 of the Project Approval provides the location of sensitive receivers. Figure 8 provides a summary of those assessed in the Environmental Assessment associated with Modification 3.

6.2 Noise background levels

Background noise monitoring was undertaken in October and November 2020 as part of the modification environmental assessment (Niche, 2021), at R1, R4, R7 and R13 (shown in Fig X) to quantify the existing ambient noise levels and Rating Background Levels (RBLs). The noise monitoring locations were chosen to be representative of the nearest and most potentially affected surrounding receivers and were used to establish the AMVA Project specific construction NML which are summarised in Table 9.

<i>This document UNCONTROLLED once printed</i>				Page 42 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

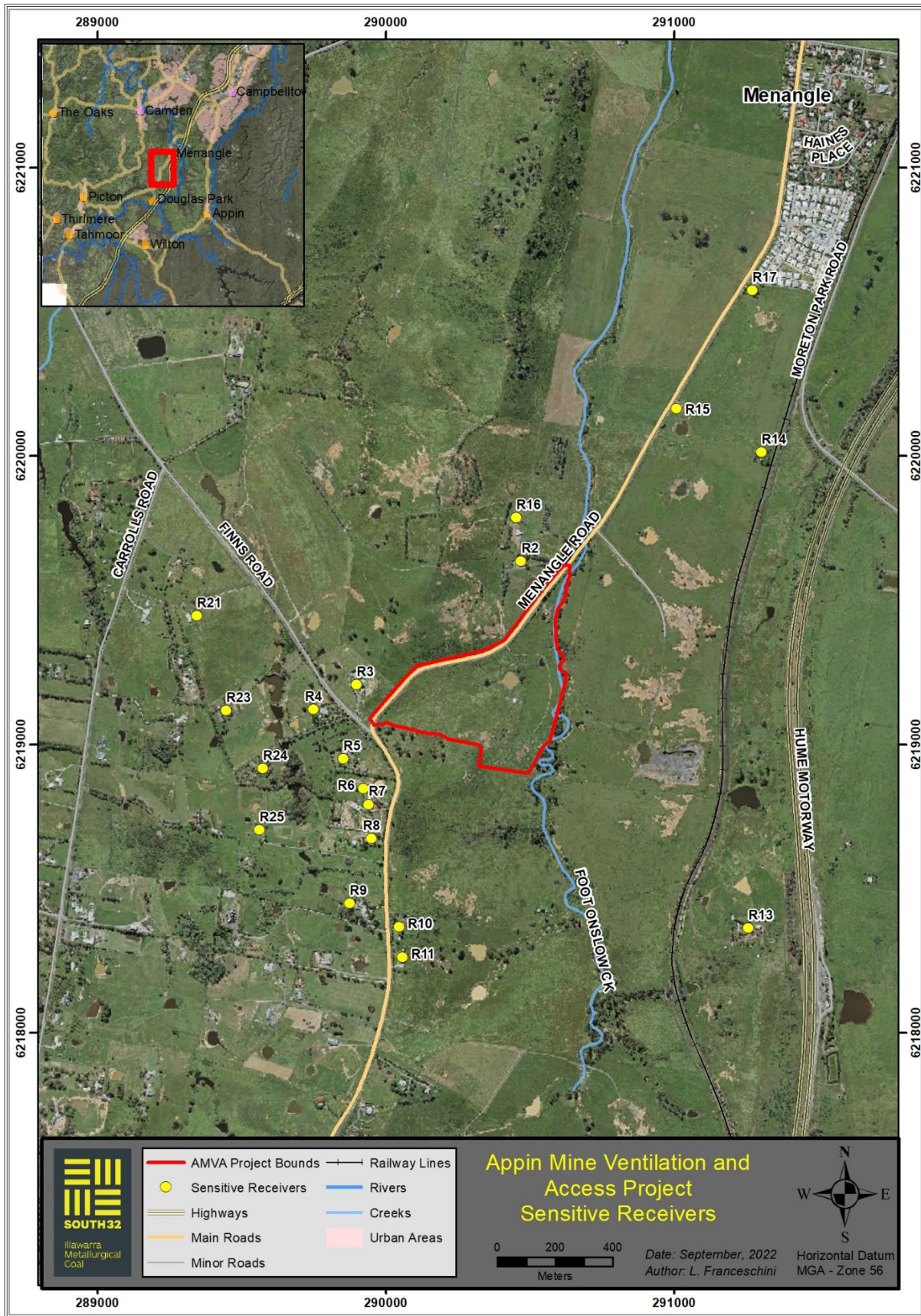


Figure 9 Sensitive Receivers as Identified in Project Approval

<i>This document UNCONTROLLED once printed</i>				Page 43 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Table 9 AMVA Project Rating Background Levels

RECEIVER	TIME OF DAY	RBL (dBA)	PROJECT INTRUSIVENESS NOISE LEVEL
All nearby residences	Day	38	43
	Evening	39	43
	Night	34	39

Source: Noise and Vibration Impact Assessment (RWDI, 2021)

6.3 Noise Agreements

R3, identified in Figure 3 has been acquired by Endeavour Coal Pty Ltd (a subsidiary of South32) and therefore is not considered a sensitive receiver for the purposes of this CEMP or sub-ordinate plans. R2 and R16 also identified in Figure 8 have entered negotiated noise agreements with Endeavour Coal Pty Ltd (subsidiary of IMC). In accordance with the requirements of the Project Approval, the Planning Secretary has been notified of these agreements and for the purposes of compliance, the criteria specified in Table 2b Condition 2C Schedule 4 does not apply to R3, R2 or R16.

6.4 Early Works (Pre-Sink) Noise Management Requirements

IMC has committed to implement all reasonable and feasible noise mitigation and management measures to reduce noise during construction. In particular, these include restricting construction activities to the daytime period (see **Construction Hours**) until acoustic sheds or alternative noise mitigation are constructed for the ventilation shaft construction areas (Early Works).

In accordance with Condition 7b of Schedule 2, any works that are inaudible at residential premises may be undertaken 24 hours a day, 7 days a week.

In accordance with Condition 1 Schedule 4a, noise for Early Works (defined in Section 1.3.1) will be managed in accordance with the requirements of the Interim Construction Noise Guidelines (ICNG) (DECC, 2009). The ICNG provides guidelines for the assessment and management of construction noise. The ICNG focuses on applying a range of work practices to minimise construction noise impacts rather than focusing on achieving numeric noise levels. The main objectives of the ICNG are to:

- Promote a clear understanding of ways to identify and minimise noise from construction works.
- Identify and minimise noise from construction works.
- Focus on applying all ‘feasible’ and ‘reasonable’ work practices to minimise construction noise impacts.
- Encourage construction during the recommended standard hours only, unless approval is given for works that cannot be undertaken during these hours.
- Reduce time spent dealing with complaints at the Project implementation stage.
- Provide flexibility in selecting Site-specific feasible and reasonable work practices to minimise noise impacts.

<i>This document UNCONTROLLED once printed</i>				Page 44 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



6.4.1 Early Works Noise Management Levels

The NML for the Early Works (Pre-Sink) have been derived in accordance with the ICNG. Table 10 shows the NMLs at residences and how they are to be applied during construction of the AMVA Project.

6.4.2 Application of Construction Noise Management Levels

Table 10 Noise Management Levels for Early Works (Pre-Sink)

TIME OF DAY	NMLA EQ (15MINS)	HOW TO APPLY
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL +10 (48 dBA)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise Affected (75 dBA)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: <ul style="list-style-type: none"> • times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences • if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

6.5 Construction Noise Management Requirements (MainSink)

6.5.1 Predicted Noise Impacts for Construction

The Noise and Vibration Impact assessments undertaken during the EA process (RWDI, 2021a) (RWDI, 2022) indicates that shaft sinking, and surface construction activities could comply with the noise criteria set out in Table 2B of condition 2C, Schedule 4 (the noise impact assessment

<i>This document UNCONTROLLED once printed</i>				Page 45 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



criteria) without the use of acoustic sheds/mitigation². Notwithstanding this, IMC will monitor noise levels onsite during construction using real-time monitoring as a management tool and to inform where there is potential for noise impacts at remaining receivers.

6.5.2 Construction Noise Criteria

“Construction” as defined in the Project Approval is described in Section 1.3.2. In relation to required noise criteria, the Approval states;

*The Proponent must ensure that the noise generated by **construction** of the Appin Mine Ventilation and Access Site does not exceed the **noise impact assessment criteria** set out in Table 2B of condition 2C, Schedule 4 at any residence on privately-owned land, or on more than 25 percent of any privately-owned land.*³ The criteria specified in Table 2B of condition 2C, Schedule 4 is shown in Table 12.

Table 11 Construction Noise Criteria

Location	Day	Evening	Night	
	L _{Aeq} (15 Min)	L _{Aeq} (15 Min)	L _{Aeq} (15 Min)	L _{Amax}
All privately Owned Residences or on more than 25 percent of any privately-owned land	43	43	39	54

6.6 Noise Monitoring Program

6.6.1 Overview

Any Project-related noise impacts experienced at the receivers identified in Figure 8 will be a result of:

- The Sound Power Levels (SWL) and location of equipment undertaking work;
- The surrounding topography;
- Meteorological factors; and
- The efficacy of management protocols implemented by the Project.

These set of factors are unique to the Project Site and therefore the noise monitoring protocols presented in this CEMP (and Noise Management Plan) focus on the following on delivering outcomes which align with the IMC EMS (Section 4.1) by Evaluating:

- Noise generated by the project during construction and projected noise levels at receivers.

² Excluding receivers R2 (acquisition) R3 and R16 where negotiated agreements are in place.

³ However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

<i>This document UNCONTROLLED once printed</i>				Page 46 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- The efficacy of controls being implemented (and requirement for additional controls including headframe cladding or screening)
- The impact of Noise-Enhancing meteorological conditions.

On this basis, information gathered during Pre-Sink (under ICNG) will inform the development of additional noise mitigation engineering and noise monitoring protocols to ensure that Main-Sink activities comply with noise criteria set out in Table 2B of condition 2C, Schedule 4. On this basis, at the completion of the Pre-Sink, this Noise Management Plan will be reviewed and updated to include any new engineering and noise monitoring protocols to be implemented. Where changes to the management and monitoring protocols included in this plan are required, IMC shall consult with the EPA and submit the Noise Management Plan for approval in accordance with Condition 11 of Schedule 4a.

6.6.2 Realtime Noise Monitoring Protocol

Noise monitoring protocols approved in the Early Works CEMP will be applied for the Pre-Sink phase. That is, Real-time (unattended) noise monitoring will be undertaken throughout the schedule, at the locations as shown on Figure 9. These locations were selected to be located in the direction of the receivers at the relevant site boundary. Placement at these locations will allow IMC to assess noise levels being generated in the direction of receivers and allow for operational management of noise at the site. Data collected by the monitors will be analyzed regularly to evaluate noise levels. The real-time noise monitoring units will be used to:

- Identify variations in noise levels which can be related to construction.
- Evaluate the effectiveness of noise mitigation measures.
- Monitor noise generated at the Site and background levels.
- Make predictions to determine when impacts are approaching NML (and therefore require compliance monitoring and/or management).
- Manage construction activities on site to assist in the compliance of noise management requirements under the ICNG.

Real-time monitoring will be a key tool used by the AMVA team to inform, monitor and improve environmental performance for noise consistent with the approach to environmental performance management detailed in Section 6.9.

<i>This document UNCONTROLLED once printed</i>				Page 47 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

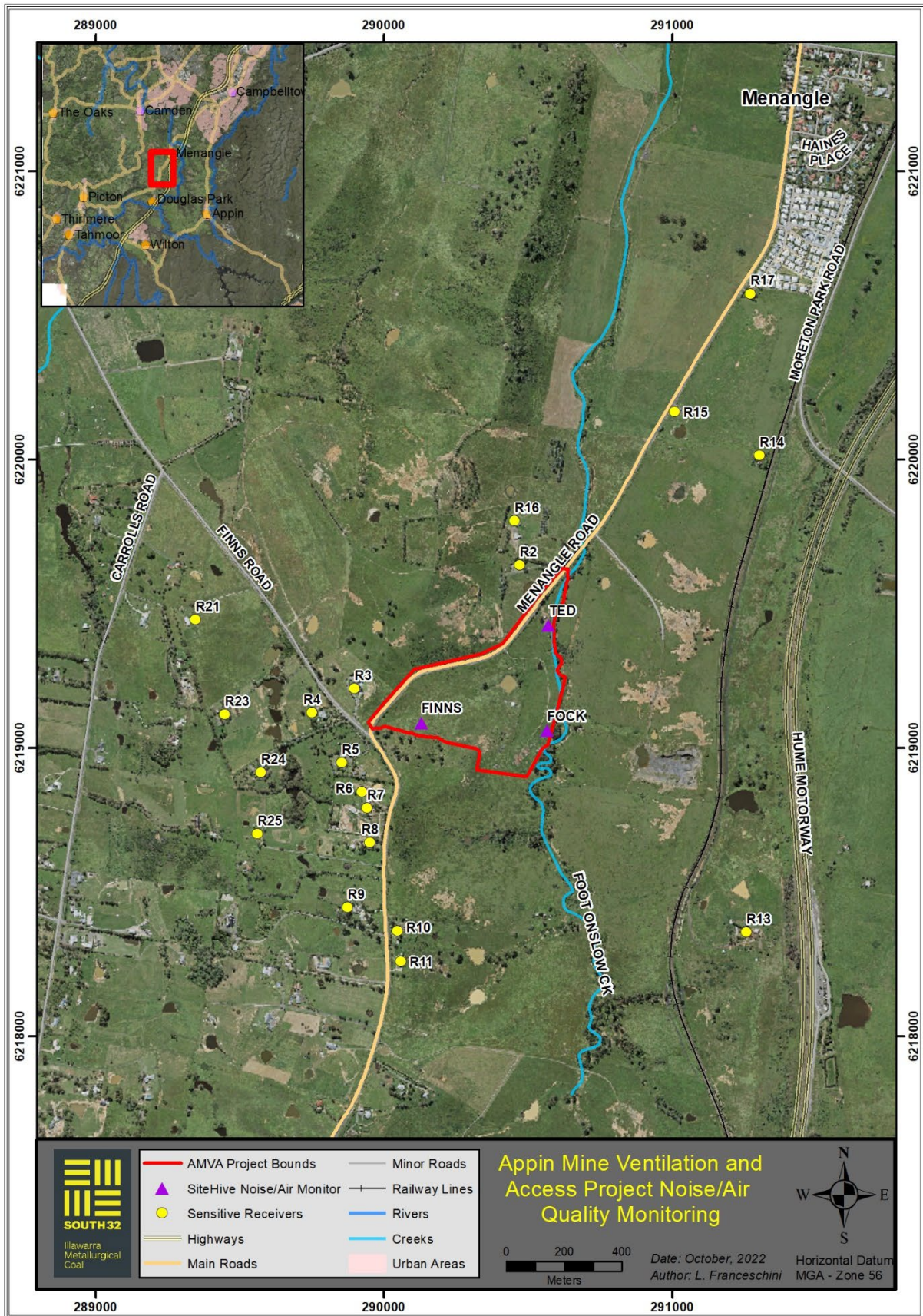


Figure 10 Realtime Air Quality and Noise Monitoring Locations

<i>This document UNCONTROLLED once printed</i>				Page 48 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

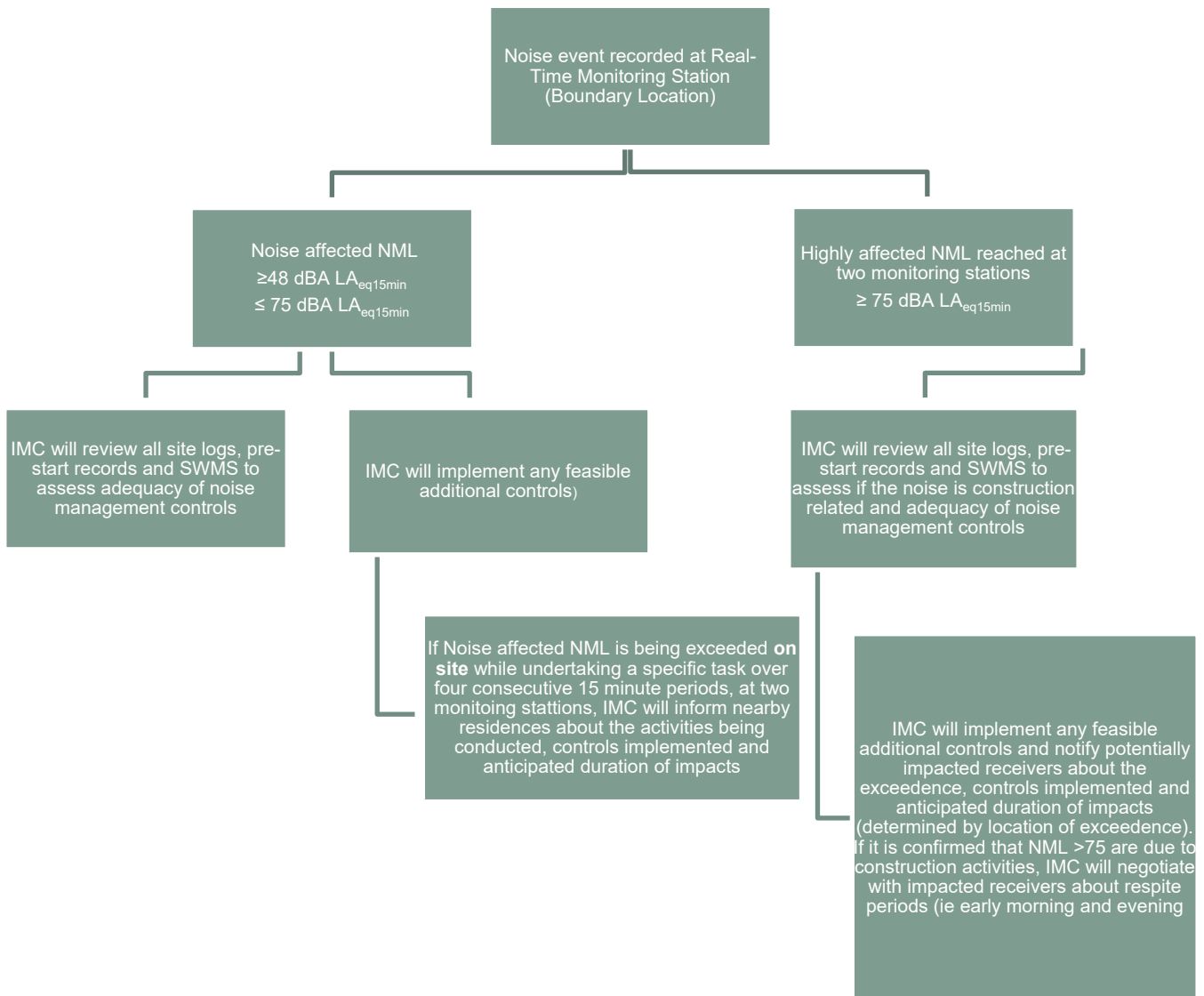


Figure 11 Early Works Real Time Monitoring Protocols

6.6.3 Attended Noise Monitoring Protocol

Attended noise monitoring will be undertaken quarterly at (or nearby) receivers in order to:

- Develop a greater understanding of noise impacts generated by shaft sinking activities at receivers.
- Inform detailed engineering requirements for noise mitigation during main sink.
- Provide information which will assist IMC and their contractors in managing activities in accordance with the requirements of the ICNG.

Attended monitoring will be undertaken in accordance with the relevant Australian Standards and EPA approved methods for sampling including:

- AS1055-1997 Acoustics - Description and Measurement of Environment Noise – General Procedures.

<i>This document UNCONTROLLED once printed</i>				Page 49 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- AS IEC 61672.1 – 2004 - Electroacoustics – Sound Level Meters, Class 1 sound level meter and calibrator.

All acoustic instrumentation used for monitoring under the Noise Monitoring Program shall comply with the requirements of AS 1259.2-1990 - Sound Level Meters and will have current National Association of Testing Authorities (Australia) (NATA) or manufacturer calibration certificates.

6.6.3.1 Completing the Measurement

The attended noise measurements shall be conducted for a minimum of 30 minutes utilising full spectrum time and frequency domain approaches for extracting project noise from the ambient noise environment. During the attended measurement, a log shall be maintained of road traffic or site operations as is relevant to the measurement being undertaken.

Measurement locations shall be in accordance with the Project Approval and EPA noise guidelines for construction, industrial or road traffic noise as is appropriate for the measurement. These attended noise measurements shall consider the effects of:

- Meteorological effects on noise propagation for site noise.
- Extraneous noise levels including uncertainty caused by the ambient LA90 noise level at the time of the measurement.

Additionally, staff, equipment and measurements must meet the following NSW requirements:

- Conditions of Project Approval.
- Noise Policy for Industry, Section 7.
- Approved methods for the measurement and analysis of environmental noise in NSW (EPA 2022).
- Interim Construction Noise Guideline, Section 8 Evaluating performance and compliance, 8.2 For a quantitative assessment.
- Class 1 sound level meter as specified in AS/NZS IEC 61672.1 Electroacoustics: sound level meter specifications.
- Calibrated in a NATA accredited to laboratory to AS/NZS IEC 61672.1, IEC 61260.3.

6.6.3.2 Investigating Noise Complaints

In addition to the protocols specified in Condition 2, Schedule 5, where a receiver considers the project to be exceeding the relevant criteria in Schedule 4, IMC shall:

- Complete a premeasurement review.
- Where the premeasurement review indicates that noise levels from the site may have been a factor, proceed with the attended noise measurement under conditions as close as practicable to the period of the complaint within seven (7) calendar days.
- Review the measured noise levels, adjusted to reflect site conditions at the time of any complaint when appropriate, to inform further actions.
- Further actions may include, but not be limited to:
 - Noise tests of site equipment against the assumed Sound Power Levels in the NVIA.

<i>This document UNCONTROLLED once printed</i>				Page 50 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Review of operational scenarios against approved operations.
- Mitigation of noise from plant and operations (refer to Section 6.9).

6.6.3.3 Responding to an Exceedance

Where a noise exceedance is determined through attended compliance monitoring, then IMC shall undertake notifications as detailed in Condition 1 Schedule 5 of the Project Approval.

6.7 Noise Mitigation

6.7.1 Early Works Noise Management Strategies

Until Pre-sink activities are completed (including construction of the temporary headframe and winder) IMC will undertake works in accordance with the requirement of the ICNG. During this time IMC will utilise Realtime monitoring and daily site logs (See Section 4.2) to continually assess the extent of additional noise management required.

Where noisy works are identified or anticipated a range of potential management interventions may be prescribed; These are;

- Monitoring the work plan and scheduling noisier activities during appropriate times.
- Considering the selection of plant and processes with reduced noise emissions.
- Controlling noise at the source by using equipment fitted with appropriate sound attenuation, where practical (5-10 dBA reduction).
- Turning off machinery when not in use (1-5 dBA reduction).
- Orienting equipment away from sensitive receivers (3-5 dBA reduction).
- Carrying out loading and unloading away from sensitive receivers (3-5 dBA reduction).
- Employing non-noise generating structures such as Site offices, storage sheds, stockpiles and tanks as noise barriers (5-10 dBA reduction).
- Using screens or enclosures for stationary equipment (10-15 dBA reduction).
- Avoiding using noisy plant simultaneously and/or close together, adjacent to boundary with sensitive receivers (2-3 dBA reduction).
- Using dampened tips on rock breakers (3-6 dBA reduction).
- Maximising the offset distance between noisy plant items and sensitive receivers (3-6 dBA reduction).
- Using portable temporary screens (5 -10 dBA reduction).
- Where possible, strategically placing plant and equipment to minimise noise escaping from Site and containing within suitably designed noise mitigation structures.
- Maintaining equipment to manufacturer specifications to achieve high availability and to meet noise emission criteria.
- Conducting noise management training with relevant personnel and completion of regular toolbox talks to enforce the importance of noise mitigation.
- Undertaking the process of change management prior to commencing new construction activities or when construction equipment changes.

<i>This document UNCONTROLLED once printed</i>				Page 51 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Implementing the Driver’s Code of Conduct.
- Monitoring the number of plant on Site and their SWL in relation to that predicted in the NVIA.

6.7.2 Construction Noise Management Strategies

Following the construction of the temporary headframe and winder and associated noise mitigation at the completion of Pre-Sink further works, all works will be required to be undertaken in compliance with the noise criteria set out in Table 2b, Condition 2C of Schedule 4. The range of engineering options identified during the Environmental Assessment to ensure compliance with Conditions of Approval may include (or combination of);

- Construction of Headframe and winder cladding.
- Construction of temporary sheds or screening.
- Engineered matting on impact surfaces (truck trays and chutes);
- Construction of high, solid, acoustic barriers which shield potentially impacted receivers these may be constructed of;
 - 100mm thick Hebel;
 - Plywood hoarding;
 - Shipping containers; or
 - Echo Barrier (or equal) draped over scaffolding.

All these options present significant investment undertakings for IMC. As such, real-time and attended monitoring undertaken during Pre-Sink will form the basis of refined engineering and noise management strategies to be adopted for the Project.

In addition to refining noise management strategies for shaft-sinking, noise monitoring undertaken during Pre-Sink will allow for the development of Realtime monitoring protocols which would indicate when activities and associated controls need to be reviewed, where consultation needs to occur and where attended (compliance monitoring needs to be undertaken) to ensure that the Conditions of Approval are complied with.

7. TRAFFIC MANAGEMENT PLAN

This section describes how IMC proposes to manage traffic during construction of the AMVA Project and has been prepared to address the requirements of Condition 11(e) of Schedule 4A, of the Project Approval.

7.1 General Management and Mitigation Safeguards

IMC is committed to implementing the following controls in order to comply with its traffic commitments during construction:

- Drivers are to follow road traffic signage, applicable legislation and directions for emergency personnel.
- Compression breaking is to be avoided unless in an emergency situation (of note is the hill on Finns Road towards Site).

<i>This document UNCONTROLLED once printed</i>				Page 52 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Vehicles are to be clean of any mud or other material which may become loose during transport, prior to exiting the Site.
- A wash down bay or hose down area will be established on Site for vehicles and machinery entering the Site for the first time (or those that require periodic cleaning). The wash down bay will be maintained.
- All bulk material loads are to be covered.
- No idling engines while on Site (other than in designated areas/times - i.e. concrete trucks).
- Where heavy vehicle GPS data is recorded, this information is to be provided to IMC to investigate incidents reported by the community and compliance with recommended routes, when requested.

7.2 Traffic Monitoring

IMC will ensure traffic impacts are minimised by utilising the existing strategies for monitoring and management of traffic including:

- Ensuring enforcement of the AMVA Drivers Code of Conduct (DCoC) (Appendix C)
- Monitoring of compliance against the transport routes both internally (via operational employees) and externally (via the Community Call Line).
- Investigation of all complaints.
- Following up any breaches with the person or contract company involved and recorded in the event reporting system G360.
- Undertaking disciplinary action, where required.

<i>This document UNCONTROLLED once printed</i>				Page 53 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



7.3 Traffic Control Plan and Road Closure Protocols

During construction IMC may require partial or full closure of Menangle Road. This may be undertaken outside of the standard construction hours specified in Section 4.5 to make use of lower traffic volumes for safety reasons and to reduce impacts to road users.

Wollondilly Shire Council (WSC), as the roads authority, has control over Menangle Road and any proposal to close Menangle Road requires WSC permission. IMC intends to minimise disruption to normal traffic conditions through the application of traffic control measures in accordance with the Australian Standard *AS1742.3: Manual of Uniform Traffic Control Devices, Part 3: Traffic Control for Works on Roads*. Traffic will be controlled at the Menangle Road intersection upgrade in accordance with the required standards and a Traffic Control Plan (TCP) developed and submitted to the WSC for approval. IMC will seek approval from WSC, as the relevant roads authority under s138 of the *Roads Act 1993*, for activities on and in connection with public roads associated with the Project. IMC will address any special conditions issued as part of the s138 Application.

In addition to requirements associated with WSC approval for road occupancy pursuant to Section 138 of the *Roads Act*, a Road Occupancy Licence will be secured for any activity likely to impact on traffic flow, even if that activity takes place off-road. The planning, coordination and licensing of road occupancies in the Sydney region is the responsibility of the Network Access Coordination Unit at the Transport Management Centre. For regions outside Sydney, Transport for NSW manages the process.

7.3.1 Community Consultation for Road Closures

The TCP will outline measures to advise motorists of changes in the road network conditions/operation or the expected vehicle movements to/from the Site (NB TCP are now referred to by Transport for NSW (TfNSW) as Traffic Guidance Scheme (TGS). TGS is a diagram(s) showing signs and devices arranged to warn traffic and guide it around, past or, if necessary through a work site or temporary hazard. In accordance with TfNSW specifications, during construction, the contractor shall each morning, prior to commencing work, ensure all signage is erected in accordance with the TGS and is clearly visible to motorists. Each evening, upon completion of work, the contractor is to ensure signage is either covered or removed as required, or appropriate for the stage of the works.

If required, traffic controllers will be used to facilitate the safe movement of construction vehicles entering and exiting the Site.

Any temporary traffic controls, signage or works within a public road corridor must have approval under s138 of the *Roads Act 1993*.

7.4 Vehicle Movement Plan

7.4.1 Construction Vehicle Transport Routes

Figure 11 shows the transport routes to be used by the majority of heavy and light vehicles during the construction of the AMVA Project. These are described as:

- **Traffic to/from the South:** Traffic will access the Site via the Hume Motorway M31, Picton Road and Menangle Road.

<i>This document UNCONTROLLED once printed</i>				Page 54 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- **Traffic from the North:** Traffic will access the Site via the Remembrance Driveway, Finns Road, Woodbridge Road and Menangle Road. (Note: the section of Finns Road between Woodbridge Road and Menangle Road has a 15-tonne limit).

These transport routes apply to all heavy vehicles including vehicles transporting construction waste materials.

These restrictions do not apply to:

- Delivery vehicles that are undertaking deliveries to other customers either prior to or following a delivery to the AMVA Project.
- Oversize vehicles where the transport route is specified in the permit.
- Any employees that reside in the local area (e.g. Campbelltown, Wilton or Douglas Park).
- The infrequent use of other roads for consultation with neighbouring landowners, environmental monitoring and inspection.

In addition, the following restrictions apply:

- Heavy vehicle traffic is prohibited to travel through Broughton Pass and Douglas Park Gorge (via the existing sign-posted limits).
- All employees and contractors of IMC are subject to induction training which identifies roads that are restricted for use and obligations under the Project Approval.
- All vehicles which are not defined as General Access Vehicles (GAV) in the National Heavy Vehicle Regulator (NHVR) Guidelines would require a permit to access site on Menangle Rd from the North.

7.4.2 Drivers Code of Conduct

A DCoC has been prepared for the AMVA Project (Appendix B). The DCoC applies to all project related vehicles (i.e. Contractor vehicles, IMC Vehicles).

7.4.3 Over Dimensional and Heavy Vehicle Access

Any over dimensional vehicles movements will be undertaken in accordance with the NHVR Guidelines and relevant road authority requirements.

Some of the key specifications of this guideline include:

- Pilot and escort vehicles will be used to provide other road users with an advance warning that the vehicle ahead is over dimensional.

7.4.4 Over dimensional vehicles shall not travel roads damaged by floods, submergence or earthquakes. *Parking*

All parking (heavy and light vehicles) will occur on Site. No offsite parking is available at the Site.

7.4.5 Managing Road User Conflicts

A small proportion of the workforce traffic will continue to utilise the regional roads (i.e. such as Wilton Road at Broughton Pass and Douglas Park Gorge on Douglas Park Drive) to travel between Appin North, Appin West, Appin East and other facilities. This is consistent with the current use of these roads. It is noted that the avoidance of traffic noise impacts on Douglas Park Drive in Douglas Park (which is located on the route between the regional roads and the AMVA Project) is the subject of

<i>This document UNCONTROLLED once printed</i>				Page 55 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



an existing Project Approval condition (i.e. Condition 5 of Schedule 4,). Traffic noise related impacts at this location will continue to be managed in accordance with the Appin Mine Noise Management Plan, Appin Mine Traffic Management Plan (TMP) and AMVA DCOC. Under these plans, IMC seeks to minimise road traffic noise generated by employee commuter vehicles on public roads.

Heavy vehicle movements will occur through the day. The transport routes involve the use of major arterial roads (e.g. Hume Highway, Picton Road, Camden Bypass, Old Hume Highway and Remembrance Driveway) and roads in semi-rural areas (e.g. Finns Road, Woodbridge Road and Menangle Road). The use of these roads therefore minimises potential conflicts associated with the local roads and impacts on residential areas.

The construction workforce trips do not coincide with the commuter morning and afternoon peak hours on the road network adjacent to the Site and therefore no construction related impacts to road users are predicted to occur.

7.4.6 Transporting construction waste materials

All waste will be classified in accordance with EPA Waste Classification Guidelines (2014) prior to transport. Clause 70 of the *Protection of the Environment Operations (Waste) Regulation 2014 (Waste Regulation 2014)* requires that:

- Waste that is transported by a motor vehicle or trailer, must be transported in a manner that avoids the waste spilling, leaking or otherwise escaping.
- The motor vehicle or trailer used to transport the waste must be constructed and maintained so as to avoid the waste spilling, leaking or otherwise escaping from the motor vehicle or trailer.

7.4.7 Road Safety Audits

In accordance with Schedule 4A, Condition 11, IMC are required to undertake a program of road safety audits, including both pre and post construction of the intersection of the Appin Mine Ventilation and Access Site entrance with Menangle Road. Accordingly, a pre-construction road safety audit was completed and is included as Appendix C. At completion of the of the Appin Mine Ventilation and Access Site entrance with Menangle Road, a post construction audit will be completed to verify the works have been undertaken to the satisfaction of WsC.

<i>This document UNCONTROLLED once printed</i>				Page 56 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

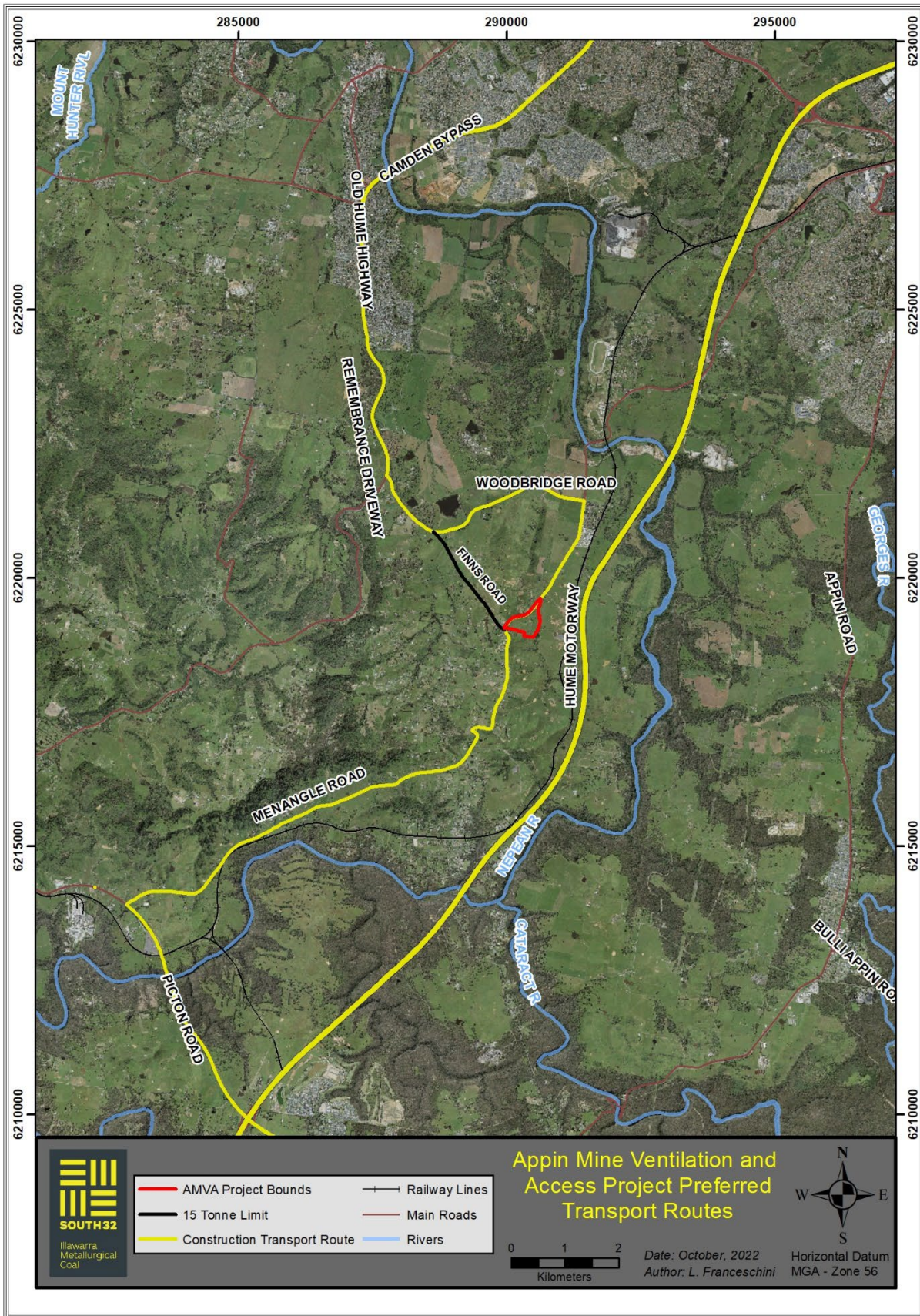


Figure 12 Preferred Transport Routes

<i>This document UNCONTROLLED once printed</i>				Page 57 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



8. AIR QUALITY MANAGEMENT PLAN

This section describes how IMC proposes to manage and protect air quality during construction. This Plan includes both proactive as well as reactive management measures to minimise the impact of dust on the surrounding environment, including surrounding properties and receivers.

8.1 Predicted Construction Air Quality Impacts

Within the Air Quality and Greenhouse Gas Assessment undertaken as part of the modification EA⁴ an emissions inventory was developed for a single construction year, selected to assess the worst-case air quality impacts when material handling/movement is at a maximum. The highest predicted dust concentrations during construction occur at the closest assessment location (R2). Modelling predictions indicated that there would be no days over the 24-hour average impact assessment criterion for Particulate Matter < 10 µm (PM₁₀) and Particulate Matter < 2.5 µm (PM_{2.5}) and no exceedances of the annual average impact assessment criterion at any assessment location for PM₁₀, PM_{2.5}, Total Suspended Particulate (TSP) and dust deposition shown in Table 17.

IMC will however undertake real-time air quality monitoring against the compliance conditions and provide a mechanism for comparison of site and regional air quality to determine the cause of any potential exceedance.

8.2 Air Quality Criteria for the AMVA Project Site

The air quality criteria for the AMVA Project are detailed in Condition 9 of Schedule 4 of the Project Approval and are summarised in Table 17. The criteria apply to all residences on privately owned land.

Table 12 Project Approval Air Quality Criteria

POLLUTANT	AVERAGING PERIOD	D CRITERION	
Long Term Impact Assessment Criteria for Particulate Matter			
Particulate Matter < 10 µm (PM ₁₀)	Annual	^a 25 µg/m ³	
Particulate Matter < 10 µm (PM ₁₀)	24-Hour	^a 50 µg/m ³	
Particulate Matter < 10 µm (PM _{2.5})	Annual	^a 8 µg/m ³	
Particulate Matter < 2.5 µm (PM _{2.5})	24-Hour	^a 25 µg/m ³	
Total Suspended Particulate (TSP)	Annual	90 µg/m ³	
Deposited Dust	Annual	Maximum increase in deposited dust level	Maximum total deposited dust level
		g/m ² /month ^b	

Notes:

- ^a Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to other sources)

⁴ EMM, (2021) Air Quality and Greenhouse Gas Assessment for Appin Mine Ventilation and Access Project.



- ^b Incremental impact (i.e. incremental increase in concentrations due to the project on its own)
- ^c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and
- ^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed to by the Planning Secretary in consultation with EPA.

Source: Project Approval Schedule 4, Condition 9

8.3 Air Quality Monitoring

8.3.1 Realtime Monitoring Protocols

Air quality monitoring will be carried out throughout the construction phase. The intent of this monitoring program will be to:

- Collect information about air quality dynamics at the Site and provide insights into how construction activities may be impacting on air quality.
- Compare site air quality monitoring results to local and regional air quality.

Realtime monitoring units will be placed along with real-time noise and imagery instruments at the locations specified in Figure 9.

These units collect the following data in 15-minute increments:

- TSP
- PM10
- PM2.5

IMC will receive daily reports from each monitoring station with air quality dynamics (PM_{2.5}, PM₁₀ and TSP) over the day. IMC will also be issued with alerts when potential exceedances for the 24-Hour Air Quality criteria occurs.

When an exceedance or potential exceedance is noted, IMC will review the site data imagery taken at monitoring locations and site logs and local and regional air quality data to determine the potential cause of exceedance, suitability of existing controls and any opportunities to improve air quality management.

In the event of a complaint, IMC will review real time data, site information and local and regional air quality data to determine the cause. If it is determined that construction activities may be contributing to the exceedance, IMC will undertake attended or targeted monitoring to confirm ongoing performance of the activity. If an exceedance of the air quality criteria listed in Condition 9 of Schedule 4 of the Project Approval occurs, IMC will comply with the notification protocols set out in Schedule 5.

8.3.2 Deposited Dust

A network of dust deposition gauges (DDGs) have been utilised at Appin Mine (installed over the period of 2012 – 2014). The DDGs have provided a long-term baseline of deposition in the area however do not feed into dust control actions or provide timely information regarding air quality conditions at a fine time scale. The existing data set from the site does not indicate that any of the operational sites or activities at Appin Mine are a cause for concern for particulate exposure to residents of the area. The network of DDGs were decommissioned in 2020.

<i>This document UNCONTROLLED once printed</i>				Page 59 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Targeted temporary residential air quality monitoring may be undertaken using DDGs in response to any community complaints, or for construction activities (for background data and air quality during construction).

8.4 Air Quality Management and Mitigation Measures

This section describes how IMC will manage and protect air quality during construction of the AMVA Project and has been prepared to address the requirements of Condition 11(g) of Schedule 4A, of the Project Approval.

Specific environmental controls for individual work areas will be developed based on the task and included in job planning documents (SWMS, pre-start and Construction Management Plans). These plans will be developed by specialist contractors and will be consistent with the requirements and strategies set out in this CEMP.

8.4.1 Visual Monitoring and Inspections

Regular monitoring and inspections will be carried out during construction. Monitoring and inspections will include, but are not limited to:

- Weekly Site inspections by the IMC Environment Representative to identify and action any air quality issues related to:
 - Visible sources of dust.
 - Visible dust emissions.
 - Implementation and effectiveness of dust controls.
 - No continuous visible vehicle/plant/equipment emissions for longer than 10 seconds as per the *Protection of the Environment Operations (Clean Air) Regulation*.
 - No mud tracking off-site; check main exit/entry points and material on public roads.
- Documented Site inspections by IMC or designated principal contractor while construction works are occurring. The frequency of these inspections is to reflect the risk associated with potential activities. The objectives of the inspections are to identify and action any air quality issues related to:
 - Visual monitoring of dust.
 - Haul/access road integrity.
 - Any other relevant mitigation measures. An adaptive approach to dust management will be implemented, where mitigation measures will be amended and improved if they are found not be meeting the required outcomes.
- Monitoring weather conditions at the premises. The weather forecast (e.g. rainfall) will be checked daily to allow for proactive dust management actions to be implemented
- Pre-use plant inspections will be conducted and recorded to verify that plant is in good working order.

Required actions and ongoing issues identified during Site inspections will be recorded and actioned appropriately within agreed timeframes by relevant AMVA Project personnel. These inspections are to be recorded as part of Environmental Inspection Checklist (internal document).

<i>This document UNCONTROLLED once printed</i>				Page 60 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



8.4.2 Standard Controls and Management Measures

IMC or nominated representative will undertake the following standard controls where required in relation to air quality management:

Reporting and record keeping:

- Record any exceptional incidents that cause dust and/or air emissions, either on or off Site, and the action taken to resolve the situation.
- Dust generation – general:
 - Weather forecast (e.g. rainfall and wind) will be checked daily to allow for proactive dust management actions to be implemented.
 - Erect screens or barriers around potentially dusty activities and material stockpiles, where practicable.
 - Provide an adequate water supply on the construction Site for effective dust/particulate matter suppression/mitigation.
 - Prevent on Site runoff of dirty water or tracking of mud.
 - Temporarily stop or alter non-essential dust generating activities during high wind conditions.
 - Schedule activities to avoid adverse weather conditions by reviewing weather forecasts.
 - Implementing effective dust/particulate matter suppression/mitigation. This may include the application of a crusting agent to assist with minimising dust emissions from non trafficable areas.
- Materials handling:
 - Not overloading trucks to reduce spillage during loading/unloading and hauling.
 - Minimise drop heights from loading, unloading or handling spoil/excavated material.
- Soil Stripping:
 - Soil stripping will be limited to areas required for construction.
- Exposed Areas:
 - Minimise the disturbance area.
 - Exposed areas will be stabilised as soon as practicable.
 - Long-term soil stockpiles will be revegetated.
 - Progressive reshaping of overburden emplacement and topsoil areas in preparation for progressive rehabilitation.
- Dust generation from vehicles moving on paved and unpaved roads:
 - Haul roads will be constructed with competent material.
 - All haul roads will be graded and shall be subject to regular maintenance (use of crushed gravel to sheet roads etc.) to reduce fines build up and minimise dust generation.
 - Watering of main haulage routes or applying dust suppressants, as required.
 - Routes to be clearly marked and speed limits enforced.

<i>This document UNCONTROLLED once printed</i>				Page 61 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Ensure vehicles entering and leaving Site are covered during off Site transport.
- Install a wheel wash or shaker grid or hose down area to prevent wheel tracking of material.
- Removal of sediment/dust from sealed trafficable areas (e.g. Road sweeper).

9. BLAST MANAGEMENT PLAN

Condition 11 (d) of Schedule 4a of the Project Approval requires that a Construction Blast Management Plan (CBMP) be developed for the Project. This CBMP has been developed in response to this requirement. Section 2.1.1 provides a compliance matrix which details which sections of the plan address each of the prescribed requirements of the Project Approval.

The objectives of this CBMP are to:

- describe the measures that would be implemented to comply with the relevant conditions of the Project Approval and verify best management practice is being employed;
- includes a real-time automated monitoring program prepared in accordance with the guidelines provided in Australian Standard 2187.2-2006: Explosives-Storage and use, Part 2: Use of explosives to:
 - evaluate the performance of the project and compliance with the applicable criteria;
 - control flyrock; and
 - minimise fume emissions from the site;
- include public notification procedures to enable members of the public, particularly surrounding residents, to get up-to-date information on the proposed blast schedule;
- include a protocol for investigating and responding to blast-related complaints; and
- include a protocol for investigating and responding to noise complaints.

This Blast Management Plan has been developed in consideration of the guidance provided in the Code of Practice provided by the Australian Explosives Industry and Safety Group (AEISG) and the NSW Explosives Act 2003 and NSW Explosives Regulations 2013.

9.1 Shaft Construction Engineering Phases

The shaft will be constructed in two distinct engineering phases:

- Pre-sink; and
- Main shaft construction.

9.1.1 Pre-Sink

The pre-sink phase would involve the construction of a shaft collar and the utilisation of a crane and single deck stage for the excavation of the shaft to the required depth for the installation of the main sink stage in preparation for the main shaft construction (generally 30-50 meters depth). The pre-sink would use both mechanical excavation and controlled blasting to excavate the shaft.

Initially, broken rock would be removed from the shaft via standard civil excavation methods. Once the shaft collar and shaft excavation headframe are installed, broken rock would be removed via kibbles.

<i>This document UNCONTROLLED once printed</i>				Page 62 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



The shaft collar would be installed to support the temporary headframe and final ventilation ducting. This collar is constructed of heavily reinforced concrete designed to withstand the stress loads and vibration during the shaft excavation and prevent surface water ingress into the shaft. The walls of the shaft are supported incrementally by temporary ground support followed by the permanent concrete lining.

Prior to the commencement of works for the main sink, the following plant and equipment would be assembled and installed for each shaft:

- shaft sinking head frame;
- winder, winder house and associated control systems;
- kibble and kibble winder; and
- stage and stage winders.

Installation and operation of this plant and equipment provides the means for the main shaft construction team to access progressively deeper shaft depths during the main shaft construction phase.

9.1.2 Main Shaft Construction

The main shaft construction phase will be undertaken from the final pre-sink depth to the final shaft depth by blind sinking using the controlled blasting method. The headframe, winding equipment, kibble and stage provide access to the shaft for personnel, equipment and removal of broken rock.

Excavation by controlled blasting would generally follow a repetitive shaft sinking cycle:

- Progressive incremental drilling and loading of boreholes into the base of the shaft with explosive charges and stemming material;
- Controlled blasting using electronically sequentially timed detonation of explosives to manage the amount of energy released, known as construction blasts;
- Removal (mucking out) of the spoil via the kibble;
- Installation of temporary rock support; and
- Installation of permanent shaft lining.

9.1.3 Regulatory Requirements

A compliance matrix for Blast Management requirements in the Project Approval are included in Table 2.

9.1.4 Preparation of the Blast Management Plan

In accordance with the requirements of Condition 11 (d) of the Project Approval, this Construction Blast Management Plan has been prepared by a suitably qualified and experienced person, Ian B. Thurgood B.E. Civil (Hons) former Senior Technical Blasting Engineer and Construction Blasting Business Development Manager for Orica. Ian is currently a Technical and Commercial Consultant at Between the Lines Pty Ltd. Ian is an SME for Drilling and Blasting having over 20 years’ experience in the mining, civil engineering, quarrying and construction industries with a majority of this time spent directly managing, designing, or providing technical support for blasting activities in these environments.

<i>This document UNCONTROLLED once printed</i>				Page 63 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



9.1.5 Operating Conditions

During blasting operations on the Appin Mine Ventilation and Access Site, IMC must:

- (a) engage suitably qualified and experienced person/s to oversee the process of blasting, including blast planning, design, supervision and monitoring;
- (b) implement best management practice to:
 - i. protect the safety of people (including road users) and livestock in the surrounding area;
 - ii. protect public or private infrastructure/property in the surrounding area from any damage; and
 - iii. minimise the dust and fume emissions of any blasting;
 to the satisfaction of the Planning Secretary.

Accordingly, RUC Cementation (IMC's nominated shaft sinking contractor) is engaging with Orica Mining Services (the Blasting Contractor) for the supply of explosives, technical support, environmental monitoring systems and blasting services to complement their in-house shotfiring team delivering this project. Orica Quarry & Construction Services is a well-experienced and licensed blasting contractor that operates under the *NSW Explosives Act 2003* and *NSW Explosives Regulations 2013*.

Orica's construction services team provides expert advice aimed at delivering innovative blasting solutions in environments previously thought impossible.

9.1.6 Personnel Accountabilities and Requirements

Table 13 and Table 14 provide details on the roles, responsibilities and required expertise of key blast management staff and contractors.

Table 13 Skills and Experience Requirements

ROLE/POSITION	MINIMUM EXPERIENCE
Shot firing Crew/Operator	Trained & Competent in Equipment Explosives Awareness Trained
Shotfirer	Holder of a blasting explosives user's licence (Explosives Regulations 2013, Reg 28) and 2 years' experience working under a holder of the like licence in mining or construction blasting work.
Supervisor	5 years' experience in mining or construction including blasting work in tunnels & shafts
Blasting/Project Engineer	12 months experience in construction work where construction blasting has taken place
Project Manager	10 years' experience in mining or construction work where blasting has taken place.

<i>This document UNCONTROLLED once printed</i>				Page 64 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Table 14 Blast Management Accountabilities

ROLE	RESPONSIBILITIES
Project Manager	<ul style="list-style-type: none"> • Approval of the blast management plan • Coordinate blast monitoring according to the BMP • Manage and report blast incidents • Review the performance of the blast management plan in meeting the objectives/targets • Coordinate structural assessments on heritage items • Manage blast related complaints. • Evaluate monitoring results and compliance with approval conditions/blast management plan commitments • Undertaken blast management reporting • Train relevant personnel in the requirements of the plan
Project Engineer	<ul style="list-style-type: none"> • Undertake blast design accounting for all geological information • Facilitate and/or implement blast management controls in accordance with the blast management system • Coordinate the infrastructure monitoring program • Undertake blast fume monitoring
Blasting Supervisor	<ul style="list-style-type: none"> • Ensure that the drill pattern is drilled according to the design • Ensure that the blasting pattern is loaded with explosives and stemming according to the blast design • Facilitate and/or implement blast management controls in accordance with the blast management system
Driller/Drill Operator	Record relevant drilling information and report any environmental issues
Shotfirer's	<ul style="list-style-type: none"> • Load and fire according to the blast design • Comply with blast checklist • Notify any abnormalities that may lead to non-conformance
All persons	Comply with the requirement of this BMP

9.2 Local Environment

Blasting has the potential to impact on natural and built features, the community and other infrastructure. This section provides a summary of these features surrounding the Site and provides commentary on related management requirements.

9.2.1 Receivers

Figure 8 provides detail on receivers where noise, vibration and overpressure impacts were assessed during the Environmental Assessment.

<i>This document UNCONTROLLED once printed</i>				Page 65 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



9.2.2 Geology

The planned shafts are to access the Bulli seam through primarily competent sandstone strata units with some claystone units. The project is within 200 m of the large fault zone known as the Wandinong Fault which does exhibit displacements of over 20 m. A number of small at seam level faults have been mapped or interpolated into the general area as well. It is noted that the area has been well investigated and shows good consistency with the surrounding strata with any influence or effect from the inferred geological structures likely to be minor or well understood.

The predominant features in the above stratigraphy include two competent mass sandstone units – Hawkesbury Sandstone (HBSS) and Bulgo Sandstone (BGSS) - split by the thinner and comparatively lower strength Bald Hill Claystone (BACS) around the -150m level, with a thin layer of comparatively weaker Wombarra Claystone (WBCS) at around 400 m.

Even with the slightly weaker geological bands mentioned above, the material to be blasted within the majority of the depth of the vent shafts should provide sufficient confinement to contain the explosive energy within each blast. Any changes in geology will be assessed prior to blasting so that designs and risk control measures can be adjusted to suit where applicable.

9.2.3 Transport Infrastructure

The site is within proximity of a range of transport infrastructure including the following nearby features.

- Menangle Road (115 m, closest point);
- Finns Road, Intersection w/ Menangle Road (450 m);
- M31 Hume Highway (930 m, closest point); and
- Main South Railway Line (710 m, closest point).

The blasting assessments undertaken during the NVIA prepared during the Environmental Assessment did not predict any impacts to these assets as a result of blasting.

<i>This document UNCONTROLLED once printed</i>				Page 66 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

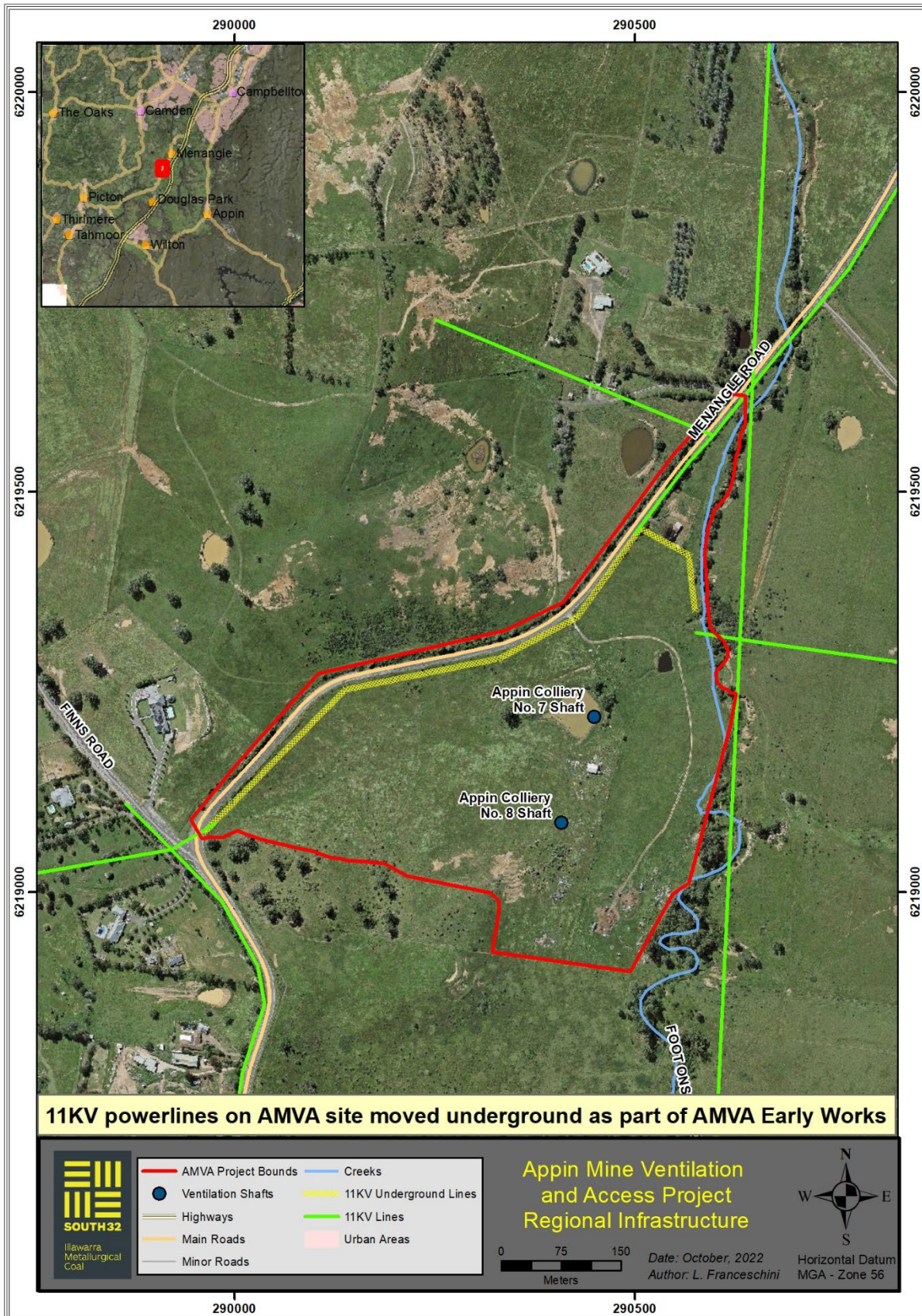


Figure 13 Regional Infrastructure

<i>This document UNCONTROLLED once printed</i>				Page 67 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



9.2.4 **Communications, Water and Electrical Infrastructure**

The following infrastructure have been identified adjacent to the Project. These are shown in Figure 13:

- Sydney Water (water pipelines);
- Telstra (communications/fibre optic cables);
- Endeavour Energy (powerlines); and
- NBN Co (fibre optic cables).

IMC will consult with these service providers to determine any blast vibration restrictions for their assets and consider these in development of blast design.

9.3 **Predicted Impacts**

9.3.1 **Noise**

Audible noise from blasts, which can typically be described as a “pop”, is unlikely to cause annoyance. However, if the audible noise associated with a blast is sufficiently loud, blast events occurring at night, could lead to sleep disturbance impacts. When IMC proposes to carry out blasting outside of the hours specified in condition 4 of Schedule 4A of the Project Approval, then it must demonstrate that the airblast overpressure levels from the blasting complies with the night-time LAmax sleep disturbance maximum noise trigger level criteria specified in Table 2B of condition 2C, Schedule 4 (shown in Table 12). Accordingly, a monitoring program to confirm compliance with these conditions will be undertaken and an application made to the Planning Secretary.

9.3.2 **Vibration**

DEC (2006) provides guidance for assessing human exposure to vibration. The publication is based on British Standard BS 6472:1992 – Guide to evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz). The recommended night-time (10.00 pm – 7.00 am) Peak Particle Velocity (PPV) vibration limit for residences in DEC (2006) is 2.8 mm/s. The NVIA (RWDI, 2021) predicted that blasting activities would comply with the applicable vibration criteria (included in Table 15) at all receivers.

9.3.3 **Overpressure**

Table 32 of the NVIA predicted impacts up to 8 dBa at some receivers. Due to the vertical orientation of the vent shafts, which can’t be accounted for in the predictions, overpressure levels at sensitive receivers are anticipated to be significantly lower than those presented herein. Notwithstanding, the controls provided in Section 9.5.1 will be implemented to comply with criteria specified in the Project Approval (Table 15).

9.4 **Blasting Criteria and Requirements**

9.4.1 **Blasting Hours**

In accordance with Condition 4 of Schedule 4A of the Project Approval, operational hours for blasting will initially be restricted to between the hours of 9:00 am and 5:00 pm Monday to Friday, and 9:00 am to 1:00 pm on Saturdays. No blasting will take place on Sundays or public holidays or at any

<i>This document UNCONTROLLED once printed</i>				Page 68 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



other time without the written approval of the Planning Secretary, unless required for safety or misfire management reasons.

It is IMC;s intention to seek approval, pursuant to Condition 5 of Schedule 4A of the Project Approval, to perform blasting activities outside the nominated hours once it can be demonstrated that the airblast overpressure levels comply with the night-time L_{Amax} sleep disturbance maximum noise trigger level criteria as specified in Table 2B of Condition 2C in Schedule 4.

9.4.2 Vibration and Overpressure

In accordance with the Project Approval, the criteria for on-site blasting activities are presented in the Table below.

Table 15 Vibration and Overpressure Criteria

LOCATION	AIRBLAST OVERPRESSURE (DB(LIN PEAK))	GROUND VIBRATION (MM/S)	ALLOWABLE EXCEEDANCE
Residence on privately owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months

However, these criteria do not apply if the Proponent has a written agreement with the relevant owner and the Proponent has advised the Department in writing of the terms of this agreement, or if the Planning Secretary agree other criteria.

9.4.3 Blast Frequency

IMC intend to conduct a maximum of one (1) blast per 24-hour period at each of the shafts unless an additional blast is required following a blast misfire. Condition 6 of Schedule 4A does not apply to blasts required to ensure the safety of the mine or its workers. ⁵

9.5 Mitigation of Blast Impacts

9.5.1 Management of Overpressure

9.5.1.1 Adaptive Management

Blast design will be guided by the principle of adaptive management. Accordingly, trial blasts are used to inform the development of a safe and compliant (with Project Approval conditions) blast program. A ‘trial blast’ involves firing several small explosive charges in the ground to be blasted and monitoring the resultant vibrations at key monitoring locations around the site. The purpose of a trial blast is to:

⁵ For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a ventilation shaft of the site.

<i>This document UNCONTROLLED once printed</i>				Page 69 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Confirm the site law (the site-specific relationship between explosive charge weight, distance to sensitive receivers and magnitude of vibration);
- Confirm blast design parameters on a smaller scale prior to full scale construction blasting;
- Confirm monitoring results are in-line with predictions; and
- Optimize the site blasting procedures.

The trial blasts and construction blasts shall be designed by a specialist blasting consultant. Subsequent construction blast designs shall consider the performance of previous construction blasts thus enabling IMC and RUC to continuously improve the efficiency and technical performance of the blasts whilst controlling environmental impacts such as vibration and overpressure.

9.5.1.2 Blast Designs

All blasts designs will be conducted by a qualified drill and blast (D&B) engineer with experience in construction and shaft-sinking environments. Explosive sleep times are not permitted to exceed the manufacturer’s recommendations unless unforeseen exceptional circumstances arise in which case IMC and RUC in consultation with relevant personnel, will make a risk-based determination regarding the necessity to delay firing the blast.

Following the completion of drilling, RUC will dip drill holes in advance of loading when practicable to verify drill hole depth and presence of water. Blast loading designs will be updated to reflect the most accurate information from drill hole dip records when available i.e., explosive product selection, explosive volume, stemming height.

9.5.2 Fume Management

The group of gases known as Oxides of Nitrogen or NOx, of which the most common are nitrous oxide (NO) and nitrogen dioxide (NO₂), are often found in the post-blast gases of ammonium nitrate-based explosives such as what will be used in blasting on this project. Together, these gases are loosely referred to as “NOx”. Nitrous oxide is invisible, but nitrogen dioxide ranges from yellow to dark red depending on the concentration and size of the gas cloud. Blasting produces a sudden localised release of gases with potentially high concentrations of NOx. These gases are toxic and pose a health risk if people are exposed to them before the plumes can dissipate.

According to the *Australian Explosives Industry and Safety Group (AEISG) Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting, Edition 2, 2011* (“the Code”), the six most likely causes for creating NOx-generating blasting conditions might be the result of:

- Explosive formulation and quality assurance;
- Geological conditions;
- Blast design;
- Explosive product selection;
- On-bench practices; and
- Contamination of explosive in the blast-hole.

Whilst the risk of fume generation from blasting at this project is considered low, due to the expectedly low moisture content of the rock, and the small surface area being blasted, each of the

<i>This document UNCONTROLLED once printed</i>				Page 70 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



primary risk factors for fume generation identified in the AEISG Code (as provided above) are discussed below.

9.5.2.1 Product Selection

All bulk and packaged emulsion explosive products used on this project shall be fit-for-purpose, water-proof and designed for wet-hole application. No dry-hole only explosive products will be used on this project, regardless of actual hole condition.

9.5.2.2 Environmental Factors

The Blasting Contractor will consider the meteorological forecast on a daily basis so that the implications of adverse meteorological conditions that may have the potential to exacerbate dust, fume and overpressure impacts are considered prior to blasting, especially during the pre-sink phase. Once permanent coverings are in place over the top of the vent shafts then these checks will not be required.

9.5.2.3 Pre-Blast Fume Risk Assessment

The Blasting Contractor will adopt blasting practices that balance both safety and environmental performance. To enable the most efficient blast performance, IMC will utilise the AEISG NOx Risk Assessment Proforma Tool from Appendix 8 of the Code to assess specific influences on post blast fume in consideration of the overall blast performance.

9.5.2.4 Fume Mitigation Controls

There are many contributing factors to consider when designing a blast that minimises the potential for a fume event. The D&B Engineer is responsible for all blast designs at the project. Blast designs will be influenced by varying geological conditions at the project, conditions that will be identified during drilling operations prior to loading explosives. IMC will utilise a continuous improvement philosophy based on drill and blast experience to adjust design parameters for optimal performance. Blast design parameters to be considered, based on information obtained during production drilling operations, include:

- Explosives product selection suitable to the moisture content of various strata;
- Powder factor selection to sufficiently fragment the strata for the safety of excavation operations;
- Blast pattern timing that protects adjacent blast holes, but does not confine the explosive product reaction; and
- Explosives sleep time minimised (nominally less than one (1) shift when practicable).

More details on contributing factors, their characteristics and mitigation measures to be employed in this Project are detailed in Table 16.

9.5.2.5 Rating and Recording of Blast Fume Events

All blasts will be video recorded to capture the post blast environment. All videos will be a minimum duration of one minute following the blast event or until any fume dissipates or leaves the view of the camera. Video footage will be stored as an electronic file. All blasts at the project will be rated for fume generation by applying the AESIG (2011) Visual NOx Fume Rating Scale in AEISG Post-Blast Fume Rating Guideline (Figure 4). In the case of a fume event, video recording of the blast events

<i>This document UNCONTROLLED once printed</i>				Page 71 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



shall be utilised to assist in the determination of an appropriate fume ranking for reporting purposes and all written records kept for a minimum of two years after completion of the blasting program. Meteorological monitoring will be used to determine the likely, if any, offsite impact of NOx fume events post blasting. It is important to note that the visual appearance of a post-blast NOx gas plume will depend on both the concentration of NOx gases and the size of the plume, therefore, the visual rating is approximate and therefore provides a mechanism for categorising NOx fume development only.

9.5.2.6 Ignition of Gas

A major risk existing on this working underground coal mine site is related to the presence of coal seam gas. The presence of gas shall be monitored on every shaft blast and once the prescribed threshold of coal seam gas is detected then IMC shall adopt the use of permitted explosives, suitable for blasting in coal gaseous environments.

9.5.3 Dust Management

Blasting operations can generate dust. Though the blasting dust plume is raised for only a few minutes and most of the dust settles in and around the blasting area, some of it is dispersed before settling down. Depending on meteorological conditions the dust dispersal can travel substantial distances. The impacts of blasting operations on the air quality depend on the nature and concentrations of the emissions, meteorological conditions and the nature of the receptors being humans, flora, fauna, or materials.

Notwithstanding the above, the modelling conducted in Section ES4 of the Air Quality and Greenhouse Gas Assessment ("AQGHG") for this project has predicted that there will be no exceedances of the annual average impact assessment criterion (specified in Section 8.2) at any assessment location due to blasting.

In accordance with Condition 11(b) of Schedule 4, IMC shall minimise any visible air pollution generated by the project.

In order to mitigate these potential dust emissions, the Blasting Contractor and IMC may employ One or more of the following control measures:

- Manual excavation of near-surface weathered materials to depth of refusal before blasting employed for lower levels of harder rock.
- Erection of an acoustic shed ‘shrouding’ the opening to each vent shaft.
- Ensuring sufficient and good quality stemming is used in blast holes.
- Avoiding blasting during strong wind periods to aid in dispersion of dust before reaching nearby population centres.
- Ensuring that blasting is not undertaken during temperature inversions unless shaft ventilation can prevent accumulation of fume or dust.

9.5.4 Flyrock Management

Flyrock is usually the term given to projected rock that leaves the clearance area, whereas rock or stemming ejection is the term used for projectiles leaving the immediate blast area but not leaving the clearance area. A flyrock incident is therefore classified as a safety incident, whereas rock ejection events are usually classified as a quality management incident or non-conformance to the blast plan.

<i>This document UNCONTROLLED once printed</i>				Page 72 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Subsequently, it is especially important to clearly define the blast clearance area so that should such incidents occur then it will be investigated and reported appropriately.

To manage the risk of flyrock and rock ejections, there are several mitigation measures that will be taken on this project. These are:

- Stemming aggregate quality management.
- Blast design and scaled depth of burial (SDoB) analysis.
- Blast clearance/exclusion zone analysis and enforcing.
- Blast loading quality management.
- Physical blast coverings and protection layers (blast-mats).

9.6 Monitoring Protocols

9.6.1 Vibration and Overpressure

In accordance with Condition 11 (d) (ii) of Schedule 4A of the Project Approval, blast monitoring instrumentation to be used to measure and record the airblast overpressure and ground vibration levels which record in real-time and are automated. It is proposed Orica’s ENVIROTrack™ system or equivalent will be employed at the locations shown in Figure 13 (M1-M3). The ENVIROTrack™ monitoring technology communicates continually with field sensors via a wireless network, and the measurement data is automatically transferred from the measurement point, providing accurate data in real-time, to a secure online portal.

A further requirement of Condition 11 (d) (ii) of Schedule 4A of the Project Approval is for the monitoring program to be prepared in accordance with the guidelines provided in the Australian Standard AS 2187.2-2006 (Explosives – Storage, Transport and Use - Use of Explosives). Appendix J, Section J 3.1.2 of this Standard contains these guidelines as follows.

- Read the instruction manual (ensuring the operator of the monitors understands how to use the system correctly).
- Instrument calibration (ensuring monitors are calibrated and recording correctly).
- Pre-blast preparation (understanding blast characteristics and location with respect to monitors).
- Record the full waveform (ensuring sufficient memory capacity is available to ensure the entire duration of the blast is captured).
- Record the blast (ensure the system has been tested to confirm recording will be successful).
- Ground vibration transducer placement (ensuring the transducer is coupled correctly with the ground so that an accurate reading is recorded).
- Microphone placement (ensuring microphone is placed at minimum 1 m height with windshield attached).

In meeting the requirements of AS2187.2’s guidelines mentioned above the following protocols will be implemented in conjunction with the Blast monitoring system:

- Full training on the operation and maintenance of the system will be included in the supply contract for this system. Additionally, Orica have local technical personnel who are familiar with this system and available for support based out of their Marulan Quarry Services depot and their Kurri Kurri Technical Centre in NSW.

<i>This document UNCONTROLLED once printed</i>				Page 73 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Initial calibration of this system will be included with commissioning upon installation. Ongoing calibration will be completed according to manufacturer’s recommendations and records shall be maintained at the project.
- The ENVIROTrack™ system requires pertinent blast data to be input for every nominated blast event (to differentiate from other events potentially causing waveforms to be recorded). This data input will be the responsibility of the shotfirer or project engineer after the blast.
- The ENVIROTrack™ system records vibration and air overpressures on a 24-7 basis and data is uploaded into a secure online portal with significant memory space in the associated cloud. There will be no risk that full waveforms are not captured for each blast at every monitoring location.
- Part of the commissioning of the system will be to conduct a field test to ensure that the monitors are recording correctly prior to the first blast being performed.
- The ground transducer and microphone will be installed by Orica who is providing the system according to the manufacturers specification. Orica’s personnel are experienced with this system and the requirements for placing these devices correctly in accordance with AS2187.2.

<i>This document UNCONTROLLED once printed</i>				Page 74 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

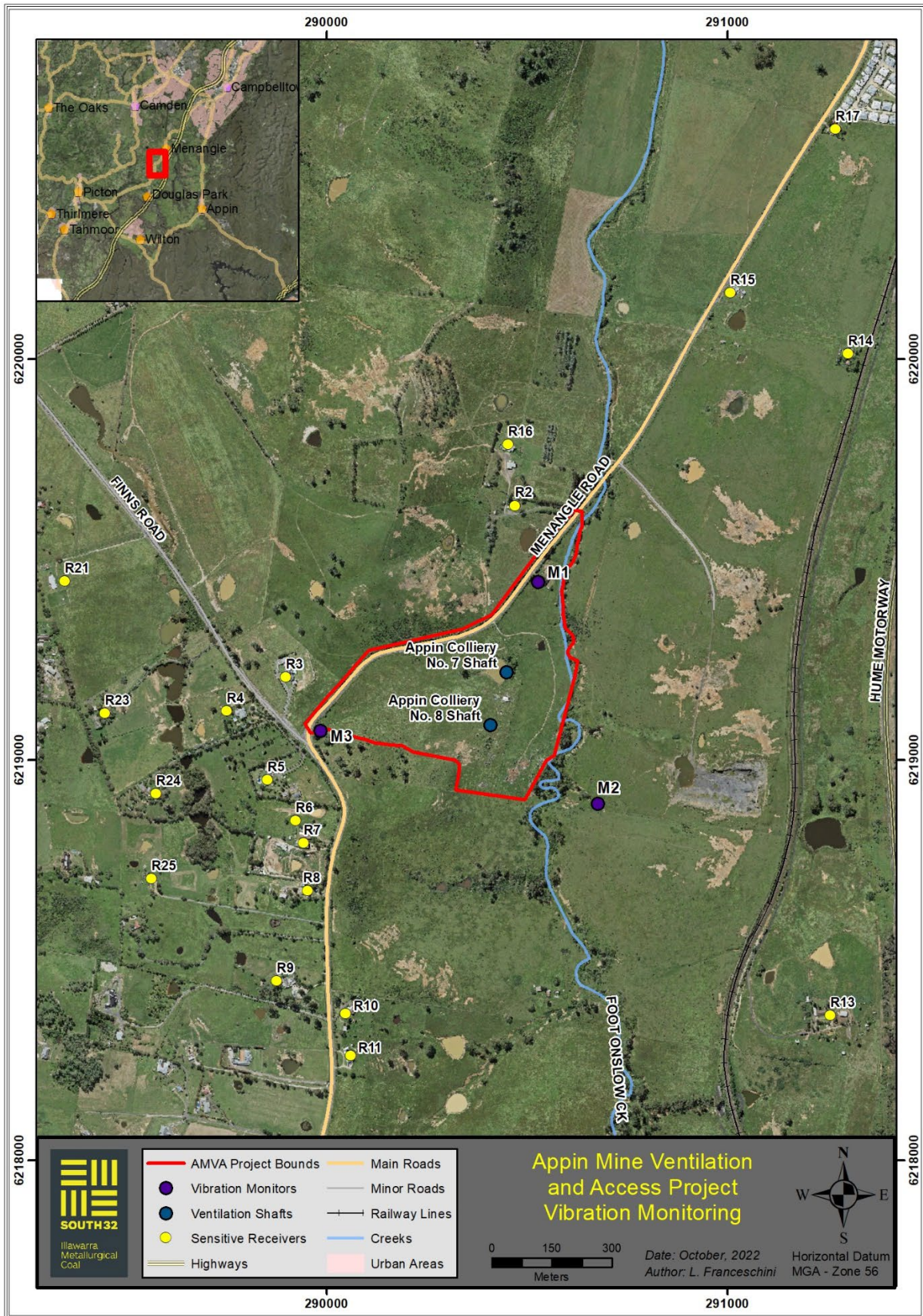


Figure 14 Noise and Vibration Monitoring Locations

<i>This document UNCONTROLLED once printed</i>				Page 75 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



9.6.2 Fume and Flyrock Monitoring

The visual monitoring protocols presented here are also key control described in 9.5.2.5. All blasts will be video recorded to capture the post blast environment. All videos will be a minimum duration of one minute following the blast event or until the fume dissipates or leaves the view of the camera. Video footage will be stored with the jobpack’s electronic files. All blasts at the project will be rated for fume generation by applying the AESIG (2011) Visual NOx Fume Rating Scale in Figure 4. In the case of a fume event, video recording of the blast events shall be utilised to assist in the determination of an appropriate fume ranking for reporting purposes

Each blast will be ranked when fume is at its greatest extent using the AEISG ranking and all written records kept for a minimum of two years after completion of the blasting program. Meteorological monitoring will be used to determine the likely, if any, offsite impact of NOx fume events post blasting. It is important to note that the visual appearance of a post-blast NOx gas plume will depend on both the concentration of NOx gases and the size of the plume, therefore, the visual rating is approximate and therefore provides a mechanism for categorising NOx fume development only.

Assessing the amount of NOx gases produced from a blast will depend on the distance the observer is from the blast and the prevailing weather conditions. The intensity of the NOx gases produced in a blast should be measured on a simple scale from 0 to 5 based on the table below.

IMC will notify DPE for any post blast fume event which is a:

- Rating three at its highest extent and leaves the Project Approval boundary; or
- Rating four or five, whether it leaves site or not.

<i>This document UNCONTROLLED once printed</i>				Page 76 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



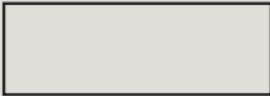





Level	Colour	Pantone Number
Level 0 No NOx gas		Warm Grey 1C (RGB 244, 222, 217)
Level 1 Slight NOx gas		Pantone 155C (RGB 244, 219, 170)
Level 2 Minor yellow/orange gas		Pantone 157C (RGB 237, 160, 79)
Level 3 Orange gas		Pantone 158C (RGB 232, 117, 17)
Level 4 Orange/red gas		Pantone 1525C (RGB 181, 84, 0)
Level 5 Red/purple gases		Pantone 161C (RGB 99, 58, 17)

Figure 15 AEISG Post-Blast Fume Rating Guideline

<i>This document UNCONTROLLED once printed</i>				Page 77 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



Table 16 Blast Fume Mitigation Factors

CONTRIBUTING FACTOR	SUB CATEGORY	MITIGATION
Product Formulation	Product incorrectly formulated	<ul style="list-style-type: none"> Explosives formulated to manufacturer recommended oxygen balance to minimise the likelihood of post blast fume RUC intend on using the following explosive products sourced from the explosive’s contractor. <ul style="list-style-type: none"> Civec™ Drive Emulsion – booster sensitive pumped explosive with excellent water resistance, designed for use in civil tunnelling and underground construction applications such as the shaft-sinking in this project. Senatel™ P1 Permitted 1000 Packaged Emulsion – detonator sensitive emulsion explosive packaged in 400 mm x 32 mm diameter cartridges designed for use in small diameter blastholes in underground and surface blasting applications. Senatel™ P1 Permitted 1000 Packaged Emulsion – detonator sensitive emulsion explosive packaged in 400 mm x 32 mm diameter cartridges designed for use in small diameter blastholes in underground and surface blasting applications. The above products are specifically formulated for the intended application on this project
	Delivery system metering incorrectly	<ul style="list-style-type: none"> Calibration records of the explosive manufacturing unit will be requested and retained to ensure explosive mixing is in the correct proportions. Monitoring of manufactured explosive product undertaken on every blast to ensure consistent quality and mixture.
	Delivery systems setting for product delivery manually overridden	<p>Calibration records of the explosive manufacturing unit will be requested and retained to ensure explosive mixing is in the correct proportions.</p> <p>Monitoring of manufactured explosive product undertaken on every blast to ensure consistent quality and mixture.</p>
	Explosives precursors not manufactured to specification	<ul style="list-style-type: none"> RUC will rely on the explosive’s contractor quality management at the point of manufacture for all precursor products.
	Precursor degradation during transport and storage	<p>RUC will be receiving deliveries of explosives products from explosive’s contractor and store it on-site in magazines and storage tanks. The volumes of these storages will be small enough that turnover of stock will be regular, leaving little avenue for stock to pass the use-by date.</p> <p>All products will be checked against provided manufacturing dates and use-by dates to ensure no out-of-date product is used in the blasting.</p>

<i>This document UNCONTROLLED once printed</i>			
Document ID	APNMP0131	Version	V1
Last Date Updated	16/01/2023	Next Review Date	16/01/2026



CONTRIBUTING FACTOR	SUB CATEGORY	MITIGATION
	Raw material changes	RUC will rely on explosive’s contractors quality management of raw materials at the point of manufacture for all bulk and packaged products. Considering the low volumes to be used on this project this should not be a significant risk.
	Inadequate product sensitivity for conditions of application	<ul style="list-style-type: none"> Follow manufacturer’s recommendations on product selection specific to blasthole depth and diameter ‘On bench’ quality control conducted in accordance with manufacturer’s recommendations Ensure sufficient time for chemical processes (e.g., gassing) to complete prior to stemming
	Inadequate Mixing of Raw Materials	<ul style="list-style-type: none"> RUC will rely on the explosive’s contractor quality management at the point of manufacture for all packaged products.
	Explosive Product Changes	<ul style="list-style-type: none"> Explosives will be stored on-site in the customer magazines and emulsion storage tank. All deliveries will be checked against orders and variances from approved products investigated accordingly by RUC and IMC. Shotfirers, blast crew and engineers will be instructed on approved products to load for each application.
Product Selection	Non-water-resistant products loaded into wet or dewatered holes	All explosive products planned to be used are water-resistant.
	Excessive energy in weak/soft strata desensitising adjacent product columns	<p>The geological conditions present on this project are far less likely to result in energy dissipation through the rock (and incomplete explosion reaction) as weak, clayey and/or unconfined geology.</p> <p>Drilling logs and operator feedback on strata hardness will be incorporated into blast design where necessary.</p>
	Primer of insufficient strength to initiate explosive column	Considering the shallow depths of the blast holes and subsequent explosive charge length, it is not anticipated that this will be a significant factor in fume on this project.

<i>This document UNCONTROLLED once printed</i>				Page 79 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



CONTRIBUTING FACTOR	SUB CATEGORY	MITIGATION
	Desensitisation of explosive column from in-hole cord initiation	Considering the shallow depths of the blast holes and subsequent explosive charge length, it is not anticipated that this will be a significant factor in fume on this project.
	Inappropriate explosive product for application	<ul style="list-style-type: none"> RUC will be using fit-for-purpose explosives supplied by a reputable supplier.
On-bench Practices	Hole Condition incorrectly identified/ not understood	<ul style="list-style-type: none"> Considering that all explosives’ products to be used will be waterproof and fit for purpose for construction blasting, the incorrect identification of hole condition (being wet or dry etc) should not be a major factor in fume generation on this project. Dip all holes prior to loading Record wet, dewatered, and dry holes on blast pattern and use this information as a basis for product selection Measure recharge rate of dewatered holes and choose products according to manufacturer’s recommendations Record load sheets for each hole Minimise time between drilling and loading, especially in soft and clay strata. Note, enough time should be allowed for any dynamic water in the hole to be identified Minimise sleep time
	Blast not drilled as per blast plan	<ul style="list-style-type: none"> Inspections of blasts by the designated engineer or blast supervisor prior to loading will ensure drilling has been completed as per design.
	Dewatering of holes diverts water into holes previously loaded with dry hole explosive products	<ul style="list-style-type: none"> Considering that all explosives’ products to be used will be waterproof and fit for purpose for construction blasting, the holes should not need dewatering prior to loading and the presence of water in the holes should not be a major factor in fume generation on this project.

<i>This document UNCONTROLLED once printed</i>				Page 80 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



CONTRIBUTING FACTOR	SUB CATEGORY	MITIGATION
Changes to Conditions after loading	Dynamic water	<ul style="list-style-type: none"> Utilize packaged explosives where dynamic water is likely to lift pumpable emulsion from the hole. Use hole liners Minimise sleep time of shot
	Excessive sleep time leading up to deteriorated product	<ul style="list-style-type: none"> Fire blasts within manufacturer’s recommended sleep time
Blast Design	Explosive desensitisation due to blast hole depth	<ul style="list-style-type: none"> The depth of blast holes will only be between 1.2 and 4m, much less than the range of depths where desensitisation of the explosive at depth is likely.
	Inappropriate Priming and/or Placement	<ul style="list-style-type: none"> IMC and RUC will ensure trained and competent personnel are used for all blast loading. Due to the shallow nature of the holes, variations in primer positioning is not expected to be a major risk on the performance of the blast or fume generation.
	Mismatch of Explosives and Rock Type	<ul style="list-style-type: none"> The selected bulk explosives are fit-for-purpose and designed for civil construction and underground blasting.
	Interhole Explosive Desensitisation	<ul style="list-style-type: none"> RUC will employ an experienced blasting engineer to review conditions and design each blast. Blast designs will commence with conservative assumptions regarding conditions and blast performance.
	Intra-hole Explosive Desensitisation in Decked Blast Holes	<ul style="list-style-type: none"> It is not envisaged that RUC will be utilising decked holes for blasting at this project
	Initiation of Significant Explosive Quantities in a Single Blast Event	<ul style="list-style-type: none"> Blasts will be restricted to explosive volumes of circa 200-300 kg each per vent shaft due to the area available and lift-by-lift nature of shaft-sinking

<i>This document UNCONTROLLED once printed</i>				Page 81 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



CONTRIBUTING FACTOR	SUB CATEGORY	MITIGATION
Geological Conditions	Lack of relief in weak/soft strata	<ul style="list-style-type: none"> The geological conditions (predominantly sandstone and claystone) present on this project are far less likely to result in energy dissipation through the rock (and incomplete explosion reaction) as weak, clayey and/or unconfined geology.
	Inadequate Ground Confinement	<ul style="list-style-type: none"> Similarly, the geological conditions (predominantly sandstone and claystone) present on this project are unlikely to result in energy dissipation through the rock (and incomplete explosion reaction) compared to weak, clayey and/or unconfined geology.
	Explosive Product Seeping into Cracks	<ul style="list-style-type: none"> Bulk emulsion-based explosives will be used primarily for blasting on this project and due to the narrow and short holes for each lift it is not expected that product ‘runaways’ will be a major risk. However, loading volumes will be monitored against design and should holes be regularly taking excessive product to achieve full column height then alternate products such as packaged explosive shall be considered.
	Dynamic Water in Holes	<ul style="list-style-type: none"> Whilst a fully water-proof bulk emulsion-based explosive will be used primarily for blasting on this project, it is intended for cases where there is significant dynamic water present then alternate products such as packaged explosive shall be considered.
	Moisture in Clay	<ul style="list-style-type: none"> Only water-proof bulk emulsion-based explosives, and water-proof packaged explosives will be used primarily for blasting on this project so moisture content of surrounding ground should not be a major factor.
	Blasthole Wall Deterioration between drilling and loading	<ul style="list-style-type: none"> The drilling, loading, and blasting cycle shall be limited to well under 24 hours which should leave little avenue for blasthole walls to deteriorate.
	Chemistry of Rock	<ul style="list-style-type: none"> The rock to be blasted in this project (predominantly sandstone and claystone) is deemed competent and does not exhibit any concerning chemistry that may affect explosives and blasting practices. Conditions will be monitored for each vent shaft to ensure that geological changes do not cause issues with explosives usage.

<i>This document UNCONTROLLED once printed</i>				Page 82 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



CONTRIBUTING FACTOR	SUB CATEGORY	MITIGATION
Contamination of Explosives in Blast Hole	Explosive product mixes with mud/sediment at bottom of hole	<ul style="list-style-type: none"> Only trained and competent personnel, supervised by experienced shotfirers who understand the requirements of correct toe-loading of bulk products shall be used for blast loading. This should not be an issue when using packaged emulsion products as there would be little to no mixing of sediment throughout the column, even if packages are tamped.
	Penetration of stemming material into top of explosive column fluid/pumpable explosive products only)	<ul style="list-style-type: none"> If required, stemming retention devices can be employed to ensure no mixing of stemming with explosive column; This is not usually an issue for low volume and small diameter blast hole loading; and, Where possible and practicable, bulk explosives of higher density THAN water shall be used to support stemming zone interface.
	Water entrainment in explosive product	<ul style="list-style-type: none"> Only trained and competent personnel, supervised by experienced shotfirers who understand the requirements of correct toe-loading of bulk products shall be used for blast loading.
	Moisture in ground attacking explosive product	<ul style="list-style-type: none"> Considering that all explosives’ products to be used will be waterproof and fit for purpose for construction blasting, the presence of moisture in the ground should not be a major factor in fume generation on this project.
	Contamination of explosives column by drill cuttings during loading	<ul style="list-style-type: none"> Only trained and competent personnel, supervised by experienced shotfirers who understand the correct loading techniques of bulk products shall be used for blast loading. Blast zones will be maintained free of loose rock and fine materials which could contaminate blast holes and affect explosion.
	Water accumulation on a sleeping shot	<ul style="list-style-type: none"> If required, blast holes will be dewatered if subject to accumulation of water Due to the permanent erection of acoustic shed over the opening of each vent shaft, it is not expected that rainfall will reach blast areas in any considerable manner; and, RUC will minimise the time between drilling and charging of blast holes and avoid sleeping blasts to further reduce the potential for contamination.

<i>This document UNCONTROLLED once printed</i>				Page 83 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



9.7 Blast Related Community Consultation and Complaints Handling

9.7.1 Public Notification Procedures

Prior to the commencement of blasting operations, IMC shall undertake a Community Information Session with local residences within approximately 1000 m radius of the blasting area. This townhall session will be to inform and educate the community on upcoming blasting operations, expected impacts and details on the management of concerns and complaints should they arise in relation to the blasting activities.

Further to this townhall, and prior to the blasting campaign commencement, the local community shall also be provided written notification regarding the following:

- The proposed blasting timetable and duration;
- Notification process for blasts;
- Their entitlement to initial property inspections prior to blasting, and additional or future updated property inspections if required;
- The procedure available to residents for reporting possible blasting related damage to a residence or other vibration infrastructure (such as water supply or underground irrigation mains).

Further to the above community engagement, a blast notification board, detailing the date and time of the next blast shall be maintained on both directions on Menangle Road and will be updated at least 24 hours before each blast.

9.7.2 Agency Notification

Prior to the commencement of blasting operations, IMC will notify EPA of the intended commencement date and provide details of a site contact who is appointed to liaise with the EPA in regard to blasting matters.

10. COMMUNITY CONSULTATION AND COMPLAINTS HANDLING

All communication with the key stakeholders, local community or media will be undertaken in accordance with IMC Stakeholder Engagement Management Plan (SEMP).

Information distributed to the community and other stakeholders will detail relevant construction information (e.g. progress, traffic disruptions and controls, out of hours works etc.) and will be provided through a range of channels which may include:

- Community information sessions;
- Quarterly community newsletters, letterbox drops, open days and group tours.
- Appin Mine Community Consultative Committee (meets every two months).
- Menangle Advisory Panel.
- Individual meetings with residents and other key stakeholders as required.
- Content repository on the IMC website, updated as required.

IMC has a 24-hour, free community call line (1800 102 210) and email address (illawarracomunity@south32.net) which is displayed at all IMC Project and Mine Sites, and

<i>This document UNCONTROLLED once printed</i>				Page 84 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



included in newsletters, letters and other correspondence. The call line is for all complaints and general enquiries regarding environmental or community issues associated with IMC’s operations.

10.1 Stakeholder Consultation

In accordance with Condition 11 of Schedule 4A of the Project Approval, consultation was undertaken with the EPA, WSC and TfNSW regarding the development of the CEMP and relevant subplans (Traffic, Noise, Air Quality). The CEMP was provided for comment to the agencies listed in Table 18 which provides a summary of the stakeholder consultation during the preparation of the CEMP, the comment received and where this has been addressed in CEMP. Further evidence of consultation with agencies has been provided through the Major Projects Planning Portal.

Table 17 Record of consultation

STAKEHOLDER	SUMMARY OF CONSULTATION
EPA (CEMP generally, and Blast Management Plan)	<p>The EPA reviewed the CEMP and BMP and provided the following feedback on 2nd November:</p> <p><i>I have reviewed the CEMP and thought it was very thorough. I have no substantive comments except for a minor clarification on page 69 copied below. Does “Section 7.6.1” in the text relate to the NVIA as I couldn’t find that section in the CEMP?</i></p> <p>IMC have amended the link on Section on page 69 accordingly.</p>
TfNSW (Traffic)	<p>Since issuing TfNSW the CEMP via the planning portal on 18th October 2022, IMC note that no feedback was received from TfNSW through the Major Projects planning portal.</p> <p>In addition, IMC have made multiple attempts to contact TfNSW for additional comment on the TMP, via phone and email with no response received. (18th October, 14th November and 10th January 2022.</p> <p>IMC have made small changes to the TMP based on feedback from WsC regarding heavy vehicle movements.</p> <p>There are no substantive changes to the TMP since feedback was received from TfNSW in relation to the Early Works CEMP and associated TMP. IMC note however that earlier feedback on the TMP has been integrated into the plan, and that the plan represents new feedback from the Roads Authority (WsC).</p>
WSC (Traffic)	<p>WsC requested that it be made explicit that vehicles which are not which are not General Access Vehicles (GAV) be required to obtain relevant permits for access to site from the North on Menangle Rd.</p> <p>This change was made in Section 7.4.1 accordingly.</p>

Details of the community consultation to be undertaken during construction of the AMVA Project can be found in Section 10.1.1.

10.1.1 Communication and Consultation Strategy

IMC’s community consultation and communication is guided by the SEMP. The SEMP details the strategies used by IMC regarding social management and stakeholder engagement in the areas in which IMC operate. IMC acknowledges that commitment to a systematic approach is required to achieve sound social performance and best practice community relations. Such a system provides

<i>This document UNCONTROLLED once printed</i>				Page 85 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



order and consistency so that stakeholder engagement is addressed through the allocation of appropriate resources, assignment of responsibilities and ongoing evaluation of practices, procedures and processes.

To ensure that these mechanisms are working effectively and that stakeholder engagement strategies are meeting both IMC and stakeholder requirements, evaluation methods are also employed. Such evaluation is informed primarily by community and stakeholder surveys, but also community enquiries/feedback/complaints, community committees, information forums or other similar communications and engagement mechanisms.

The SEMP is managed by, and under responsibility of, the Principal Community and Specialist Community. The SEMP provides the foundation for the strategies on communication and consultation required under the SEMP.

A number of rural residential properties (sensitive receivers) are in the general location of the AMVA Project. As these residential properties are the nearest to the AMVA Project, consultation will be undertaken with the applicable residents utilising the mechanisms detailed in Section 10.

10.2 Complaints, Enquiries and Disputes Procedure

All complaints received are managed in accordance with the IMC Handling Community Complaints, Enquiries and Disputes Procedure. Complaints and enquiries may also be received in-person by any IMC employee or contractor. If a community member attends the work site in-person, then their safety and welfare must be considered a priority.

Employees/contractors should be courteous and polite and use plain language.

In the first instance, community members should be referred to the Community Call Line and email address. If they insist, the following information should be recorded and immediately relayed to the Community Call Line:

- Date and time of visit
- First and last name of community member
- Phone number of community member
- Email address of community member
- Reason for the visit
- Do they require a call back?

Notifying the Community Call Line will alert the Community team who will trigger an investigation.

The purpose of the investigation is to validate the enquiry or complaint and determine the likely cause, if there are any mitigating circumstances, and identify opportunities to prevent a repeat. The investigation will commence as soon as practicable and will involve all relevant people directly related to the enquiry or complaint. An initial response or acknowledgement will be provided within 24 hours of the enquiry or complaint being received.

In most cases, the investigation can be completed within three or four business days unless the investigation calls for sampling, monitoring or multiple inspections. The outcomes of investigations, including steps taken and remedial or corrective action, will be discussed with relevant members of IMC and the community member. A summary of all complaints received during the reporting year will

<i>This document UNCONTROLLED once printed</i>				Page 86 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



be provided as part of the Annual Review. A log of complaints is also maintained on the South32 website at: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

10.3 Non-Compliance Management

10.3.1 Non-Compliance, Corrective Action and Preventative Action

Events, non-compliances, corrective actions and preventative actions are managed in accordance with the IMC Reporting and Investigation Standard and Environmental Compliance/Conformance Assessment and Reporting Procedure. These procedures which apply to all IMC operations, detail the processes to be utilised with respect to event and hazard reporting, investigation and corrective action identification. The key elements of the process include:

- Identification of events, non-conformances and/or non-compliances.
- Recording of the event, non-conformance and/or non-compliance in the event management system G360.
- Investigation/evaluation of the event, non-conformance and/or non-compliance to determine specific corrective and preventative actions.
- Assigning corrective and preventative actions to responsible persons in G360.
- Review of corrective actions to ensure the status and effectiveness of the actions.

Exceedance or non-compliances with relevant criteria will be reported to all relevant agencies via the Annual Review and EPL Annual Return or notified in accordance with Section 8.3.2.

10.3.2 Notification of Pollution Incidents to Government Authorities and the Public

In accordance with Condition 7 of Schedule 6 of the Project Approval and Condition R2 of EPL 2504, IMC is to notify the Planning Secretary, EPA and other relevant agencies of any incident that has caused (or threatens to cause) material harm to the environment. The process and contact numbers for these notifications is outlined in the Pollution Incident Response Management Plan (PIRMP). For any other incidents associated with the Project, the proponent shall notify the Planning Secretary and any other relevant agency as soon as practicable after the becoming aware of the incident (refer to Section 11).

The EPA is to be notified immediately following detection by telephoning 131 555 and DPE by emailing compliance@planning.nsw.gov.au at the earliest opportunity.

Within seven (7) days of these notifications, a written report is to be provided to the Planning Secretary and other relevant agencies (in accordance with Appendix 7 of the Project Approval) and the EPA (in accordance with Condition R2.2 of the EPL).

11. REPORTING AND REVIEW

11.1 Reporting

The monitoring results associated with the CEMP (see Sections 4) are compiled and reported to internal and external stakeholders (as required). The reports include:

- 14-day report (compliance with EPL water quality conditions which is updated on the IMC website).

<i>This document UNCONTROLLED once printed</i>				Page 87 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- Annual Review (for Project Approval).
- Annual Return (for EPL).
- National Pollutant Inventory.
- Internal sustainability report.
- Periodic environmental and operational updates to the Appin Mine Community Consultative Committee.

The results of compliance monitoring will be made available in the 14-day report included on the company website.

11.1.1 Annual Review

IMC will report on the AMVA Project environmental performance in the Appin Mine Annual Review. The Annual Review is prepared in accordance with the requirement of Condition 4 of Schedule 6 of the Project Approval and is submitted to relevant agencies in September each year. Annual Reviews are made available to the general public via the IMC website.

11.1.2 Incident Notifications

The Planning Secretary will be notified in writing via the Major Projects website within seven (7) days after IMC becomes aware of an incident. The notification will identify the project (including the development application number and the name of the development if it has one) and set out the location and nature of the incident. Written notification of an incident must:

- a) identify the project and application number;
- b) provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident;
- c) identify how the incident was detected;
- d) identify when the Proponent became aware of the incident;
- e) identify any actual or potential non-compliance with conditions of approval;
- f) describe what immediate steps were taken in relation to the incident;
- g) identify further action(s) that will be taken in relation to the incident; and
- h) identify a project contact for further communication regarding the incident

11.1.3 Incident Reporting

Within 30 days of the date on which the incident⁶ occurred or as otherwise agreed to by the Planning Secretary, IMC will provide the Planning Secretary and any relevant public authorities (as determined by the Planning Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested. The Incident Report will include:

⁶The definition of an incident in accordance with the Project Approval is “A set of circumstances that causes or threatens to cause material harm to the environment; and/or breaches or exceeds the limits or performance measures/criteria in this approval”.

<i>This document UNCONTROLLED once printed</i>				Page 88 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



- a) a summary of the incident;
- b) outcomes of an incident investigation, including identification of the cause of the incident;
- c) details of the corrective and preventative actions that have been, or will be, implemented to address; the incident and prevent recurrence; and
- d) details of any communication with other stakeholders regarding the incident.

11.1.4 Exceedance/Non-compliance Notifications

The Secretary will be notified in writing via the Major Projects website within seven days after the Proponent becomes aware of any non-compliance. The notification will identify the project and the application number for it, set out the condition of approval that the project is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

Note: A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance The website is:

<https://www.planningportal.nsw.gov.au/major-projects>.

The EPA should also be notified of the exceedance/non-compliance (via email).

11.1.5 Notification of Landowners

If an exceedance of criteria listed in Schedule 4 of the Mine Approval is identified, IMC will in accordance with, Condition 1 of Schedule 5 of the Project Approval:

- Notify affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the project is again complying with the relevant criteria; and
- Send a copy of the NSW Health fact sheet entitled “Mine Dust and You” (as may be updated from time to time) to the affected landowners and/or existing tenants of the land (including the tenants of any mine-owned land).

11.2 CEMP Review

In accordance with Condition 5 of Schedule 6 of the Mine Approval, the CEMP will be reviewed, and if necessary revised, within three (3) months of:

- The submission of an Annual Review.
- The submission of an Incident Report.
- The submission of an Independent Environmental Audit report.
- Any modification to the conditions of the Project Approval (unless the conditions require otherwise).
- A direction of the Planning Secretary under Condition 4 of Schedule 2.

Outcomes from each review will be documented in the Management Plan Review Log. The CEMP will only be revised where a material change to site operations or environmental management has occurred, or in accordance with the review period on the CEMP. Administrative or descriptive changes do not constitute a material change. Where a review triggers a revision of the CEMP, the CEMP will be revised and submitted to the Planning Secretary for approval.

<i>This document UNCONTROLLED once printed</i>				Page 89 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



11.3 Audits

11.3.1 Independent Environmental Audit

In accordance with Condition 9 of Schedule 6 of the Project Approval, an Independent Environmental Audit (IEA) of the project shall be commissioned every three years, that will include a review of the CEMP. The audit report is required to be submitted to the Planning Secretary within six (6) weeks of completion of the IEA.

The most recent IEA was conducted in 2019, with the next IEA scheduled to be conducted in 2022. Recommendations from the IEA will be incorporated into the CEMP where appropriate.

11.3.2 Governance Reviews

Internal Governance Reviews of the CEMP will be nominally undertaken on an annual basis.

<i>This document UNCONTROLLED once printed</i>				Page 90 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

REFERENCES



DECC (2009) Interim Construction Noise Guideline. State of NSW and Department of Environment and Climate Change NSW

Department of Planning, Industry and Environment (2021) State significant development guidelines – preparing a submissions report

EMM Pty Ltd (2021) Air Quality and Greenhouse Gas Assessment for the Appin Mine Ventilation and Access Project

EPA (2017) Noise Policy for Industry

HGeo (2021) Groundwater Assessment Appin Mine Ventilation and Access Project

Illawarra Metallurgical Coal (June 2021) Intelligent Land Management Assessment, Appin Mine Ventilation and Access Project, Modification Report for modification to Project Approval 08_0150

Landcom (2004) Managing Urban Stormwater: Soils and Construction.

Niche Environment and Heritage (2021) Aboriginal Cultural Heritage Assessment Report for the Appin Mine Ventilation and Access Project

Niche Environment and Heritage (2021) Biodiversity Development Assessment Report for the Appin Mine Ventilation and Access Project

Niche Environment and Heritage (2021) Historical Heritage Assessment for the Appin Mine Ventilation and Access Project

RWDI Australia Pty Ltd (2021) Noise and Vibration Impact Assessment for the Appin Mine Ventilation and Access Project

South32 (2022) Early Works Construction Environmental Management Plan.

Transport and Urban Planning Pty Ltd (2021) Traffic Assessment Report for the Appin Mine Ventilation and Access Project

Wollondilly Shire Council (2011) Wollondilly Local Environmental Plan 2011.

<i>This document UNCONTROLLED once printed</i>				Page 91 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	



APPENDIX A PERMIT TO DISTURB

<i>This document UNCONTROLLED once printed</i>				Page 92 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

Permit to Disturb

(Vegetation/Land/Heritage)



Permit No. <i>(Issued by Environment Representative)</i>	IMC Site / Project Name
<p><i>It is the responsibility of the Project Supervisor to retain a copy of the approved Permit during the job. It is the responsibility of the Illawarra Metallurgical Coal (IMC) Environment Representative to retain a copy of the approved Permit for IMC records.</i></p>	

SECTION 1 – PROJECT DETAILS (to be completed by person requesting Permit)		
Name: <i>(Permit will be issued to this person)</i>	Phone:	
Dept/Company Name:		
Start Date:	Finish Date:	Request Date:
TYPE OF ACTIVITY (tick all applicable):		
<input type="checkbox"/> Vegetation Clearing	<input type="checkbox"/> Work within or in proximity to natural watercourses	<input type="checkbox"/> Exploration (seismic lines, access tracks, drill sites/pads/mud pits)
<input type="checkbox"/> Land Disturbance	<input type="checkbox"/> Cultural site/structure	<input type="checkbox"/> Other (specify)
<p>Additional approvals may be required over and above this Permit.</p> <ul style="list-style-type: none"> - Controlled Activity Approval - if proposed works are within 40 metres of a watercourse. - Tree Management Order - if undertaking works outside of existing development consent defined area (e.g. outside surface lease areas). - Modification of Approval - if the activity includes clearing of endangered ecological communities. - Biodiversity Development Assessment Report for a development not already approved. <p>The Environment/Approvals Representative will be able to assist with these approvals. Note that this is likely to delay the commencement of work and sufficient time is to be allowed for in the work schedule.</p>		
<p>DETAILED DESCRIPTION OF WORK to include:</p> <ul style="list-style-type: none"> - Types of equipment being used, method for clearing/excavation and procedures to be followed. - A detailed plan of the proposed works, including disturbance footprint, topsoil and sub-soil volumes, including stockpile locations (where applicable). - Proposed rehabilitation associated with the work. - Drill site number, geophysical line number and access track/s <i>(for exploration activities only)</i>. - Any additional information regarding the work to be undertaken. 		

Note: Scope of Work/project documentation to be referenced and attached to Permit to Disturb if insufficient space.

Permit to Disturb

(Vegetation/Land/Heritage)

SECTION 2 – ENVIRONMENTAL ASSESSMENT (to be completed by IMC Environment Representative)

Is the detail provided in Section 1 sufficient and is all required information listed provided with the application?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
Aspects to be Considered	Y / N / NA	Comment
Does the plan include operational disturbances required for access, earthworks, stockpile locations etc.?		
Does IMC have tenure through land ownership, occupancy, lease, contract or agreement to undertake the planned activity? (Survey to be undertaken to confirm boundary line if doubt exists).		
Are necessary external approvals, consents or permits in place to access the land and to undertake the planned activity?		
Is the activity consistent with the Rehabilitation Management Plan and the relevant Development Consent/Project Approval?		
Is there adequate clearing allocation for the project?		
Are Landholder Access Agreements in place? (e.g. private landowners or other stakeholders).		
Have relevant agents, agencies, authorities, stakeholders or landowners been consulted where required? If yes, who?		
Does the disturbance relate to Exploration activities? (If so, the activity will be undertaken in accordance with DPI Environmental Management Principles: Exploration & Resource Assessment. (ref EDG10: Surface Disturbance Notice for Exploration Activities. Note: refer to 'Exploration Title Management' (ICAP0097)).		
Have necessary environmental (e.g. flora, fauna, aquatic) or cultural (e.g. Aboriginal heritage) impact assessments been undertaken? If applicable, these need to be attached to this Permit.		
Is vehicle hygiene a concern for the project? Are vehicles required to be cleaned pre and/or post activities?		
Is the area to be cleared required to be surveyed and demarcated?		
Are clearing buffers in place to avoid potential impact to nearby sensitive receptors?		
Has a review of previous flora/fauna surveys within the proposed disturbance footprint been undertaken to determine whether threatened and/or endangered species and/or potential habitat have been previously identified? (If no previous surveys have been undertaken, a survey is to be arranged).		
Has a two-stage clearing process for areas where there is potential habitat (i.e. hollow-bearing trees) been considered?		
Have alternate sites that are already disturbed been considered when selecting the proposed location?		
Has the impact on surrounds (dust, noise, community, access) been considered and addressed adequately in project plan?		
For large-scale clearing activities, has boundary clearing been considered to delineate the boundaries?		
Has an effective drainage design to control runoff been incorporated into the project plan? Sediment control plan to be attached where applicable.		

This document UNCONTROLLED once printed

Document ID	IMCF0209	Version	5.0	Page 2 of 4
Last Date Updated	25/11/2022	Next Review Date	25/11/2027	

Permit to Disturb

(Vegetation/Land/Heritage)



PROJECT SPECIFIC CONDITIONS/CONTROLS

SECTION 3 – KNOWLEDGE TRANSFER (to be completed by Project Supervisor and/or Contractor Supervisor)

Requirement	Confirmed?	Comment
Area has been walked/driven by Project Supervisor and Contractor Supervisor.		
Contractor Supervisor has been provided with a copy of this Permit and all attachments (including copies of plans and previous flora/fauna surveys etc).		
Contractor Supervisor has been briefed and understands the requirements of the Permit.		
Contractor Supervisor is aware of requirement to discuss Permit conditions with all operators prior to commencing work.		
Signed (Project Supervisor)		
Signed (Contractor Supervisor)		
Date		

Note: Work approved under this Permit is not permitted to commence until the requirements in Section 3 have been confirmed.

SECTION 4 – PERMIT APPROVAL (to be completed by Environment Representative)

REQUIREMENT	Confirmed?	Comment
Area inspected and confirmed that key risks are understood by Project Supervisor and Contractor Supervisor.		
Copy of Permit saved in SharePoint. (Permit to Disturb > Site)		
Signed (Environment Representative)		
Date		

Note: Work approved under this Permit is not permitted to commence until the requirements in Section 4 have been confirmed.

<i>This document UNCONTROLLED once printed</i>				Page 3 of 4
Document ID	IMCF0209	Version	5.0	
Last Date Updated	25/11/2022	Next Review Date	25/11/2027	

Permit to Disturb

(Vegetation/Land/Heritage)



SECTION 5 – OPERATOR AWARENESS (to be completed by ALL operators prior to commencement of works)

- I understand the conditions of this Permit and all associated environmental considerations.
- I agree to work in accordance with relevant procedures and project conditions as specified in Section 2.
- I will stop work immediately if any unplanned disturbance or impacts occur and report details to the Contractor Supervisor and Environment Representative immediately.

Name:	Signed:	Date:
Name:	Signed:	Date:
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Permit to be returned to IMC Environment Representative on completion of project.

SECTION 6 – PERMIT COMPLETION (to be completed by Environment Representative)

Has the disturbance been undertaken in compliance with the conditions of the Permit i.e. all project specific conditions/controls have been undertaken/implemented? (If no, event report to be completed and actions to address non-compliance to be assigned).	<input type="checkbox"/> YES <input type="checkbox"/> NO
Event number(s) for incident/non-compliance (if applicable):	
Have rehabilitation works (if required) been completed and monitoring program established? (If no, program for these works to be provided to Environment Representative and Permit not to be signed off until complete).	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Copy of completed Permit saved in SharePoint. (Permit to Disturb > Site)	<input type="checkbox"/> YES
Signed (Environment Representative)	
Date	



APPENDIX B DRIVERS CODE OF CONDUCT

<i>This document UNCONTROLLED once printed</i>				Page 93 of 94
Document ID	APNMP0131	Version	V1	
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

STANDARD

SITE: Appin Mine Ventilation and Access Project	DEPARTMENT: Environment and Community
--	---------------------------------------

AMVA DRIVERS CODE OF CONDUCT

ORIGINATOR:	APNSTD0313
AUTHORISER: Chris Schultz POSITION: Lead Environment	

1. PURPOSE

The Appin Mine Ventilation Shaft and Mine Access (AMVA) Drivers’ Code of Conduct is a component of the Construction Environmental Management Plan for the construction period of the AMVA project. The aim of the Drivers’ Code of Conduct is to minimise the impacts of traffic associated with the AMVA on local residents by reducing noise and limiting traffic, resulting in a safer traffic environment for the whole community. All employees, visitors and contractors engaged to work at the AMVA site are required to drive in a responsible manner and adhere to the requirements of the Drivers’ Code of Conduct.

2. ALLOWABLE TRAVEL TIMES

NO VEHICLES (other than personnel passenger vehicles transporting people to/from and/or between the mine’s workplaces) are to travel to or from the AMVA site location outside of the allowable travel times in the table below (except in cases of emergency). **These hours also apply during school holidays. There are no allowable travel times on Sundays and Public Holidays.**

Allowable Travel Times	
Monday to Friday	6.00 – 18.00
Saturday	7.00 – 14.00

Personnel passenger vehicles are defined as vehicles used to transport people to and from work, including trades persons required to travel with their tools of trade in work vehicles to get to and from work. Although personnel passenger vehicles may travel outside of the allowable times, personnel are strongly encouraged to plan their work so travel is not required outside of the allowable times.

3. OTHER REQUIREMENTS

You **MUST NOT:**

- Bring oversize trucks or loads without necessary approvals and controls.

<i>This document UNCONTROLLED once printed</i>				Page 1 of 4
Document ID	APNSTD0313	Version	1.0	
Last Date Updated	16/06/2022	Next Review Date	16/06/2027	

- Exceed the maximum sign-posted speed limits on any roads.
- Turn right leaving site.
- Overtake in awkward, inappropriate situations or where vision is limited.
- Throw rubbish out of your vehicle as you are travelling.
- Travel through Douglas Park township¹ and through Douglas Park gorge (Douglas Park Drive between Blades Bridge and Mitchell Place)²
- Travel along Finns Road with GVM of >15 tonnes.

You **MUST**:

- Access site through the preferred routes shown in Figure 6.1.
- Hold a current and valid driver licence for the class of vehicle that you operate.
- Adjust your driving to the road conditions (slow down in wet conditions and on narrow roads).
- Demonstrate driver courtesy.
- Limit the use of compression braking (except where it is not safe to do so).
- Comply with the road rules pertaining to your vehicle.
- Comply with site parking (i.e. not on the side of public roads), speed limits and traffic management requirements.
- Drive in a manner that minimises vehicle noise.
- Ensure that loads are covered (where required), properly secured and no loose items can dislodge from trays.

The map provided in Figure 6.1 shows the location of the:

- Preferred travel routes.

4. RECORDING OF BREACHES

IMC will rely on both internal (via employees and management) and external (via the public) avenues when monitoring compliance to the DCOC.

A 24-hour Community Call Line (1800 102 210) and email (illawarracommunity@south32.net) is in place for local residents to lodge complaints against any driver observed contravening this Code. All complaints are investigated, and disciplinary action may be taken. Breach notices may also be issued. Complaints pertaining to a breach of the Code are included in the complaints report published to South32's website - www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

Event reports will be completed by relevant Illawarra Metallurgical Coal (IMC) personnel where breaches of the Code have been identified.

¹ Unless in support of local business (i.e. local service station, pharmacy, general store etc.).

² Unless travelling between IMC site's for work purposes.

<i>This document UNCONTROLLED once printed</i>				Page 2 of 4
Document ID	APNSTD0313	Version	1.0	
Last Date Updated	16/06/2022	Next Review Date	16/06/2027	

5. PENALTIES FOR NON-COMPLIANCE

If a person or company is found to be acting contrary to this Code, disciplinary action may be taken. This will include, but not be limited to:

- 1st occurrence – warning letter.
- 2nd occurrence – warning letter and suspension of driver from site for a defined period.
- 3rd occurrence – final warning letter and review of the person’s or company’s continued working association with Illawarra Metallurgical Coal.

Breaches will be recording in the event recording system (G360) to assign actions and conduct investigations. Note that these breach notices apply over a 12-month rolling period. Opportunities to audit against attainable location technology in relevant vehicles will also be utilised for investigatory reasons.

IMC reserves the right to review a person’s or company’s continued working association with the mine following any breaches of the Code.

6. REVIEW HISTORY

DATE	VERSION	BY	REASON
16/06/2022	1.0	Chris Schultz	New document

<i>This document UNCONTROLLED once printed</i>				Page 3 of 4
Document ID	APNSTD0313	Version	1.0	
Last Date Updated	16/06/2022	Next Review Date	16/06/2027	

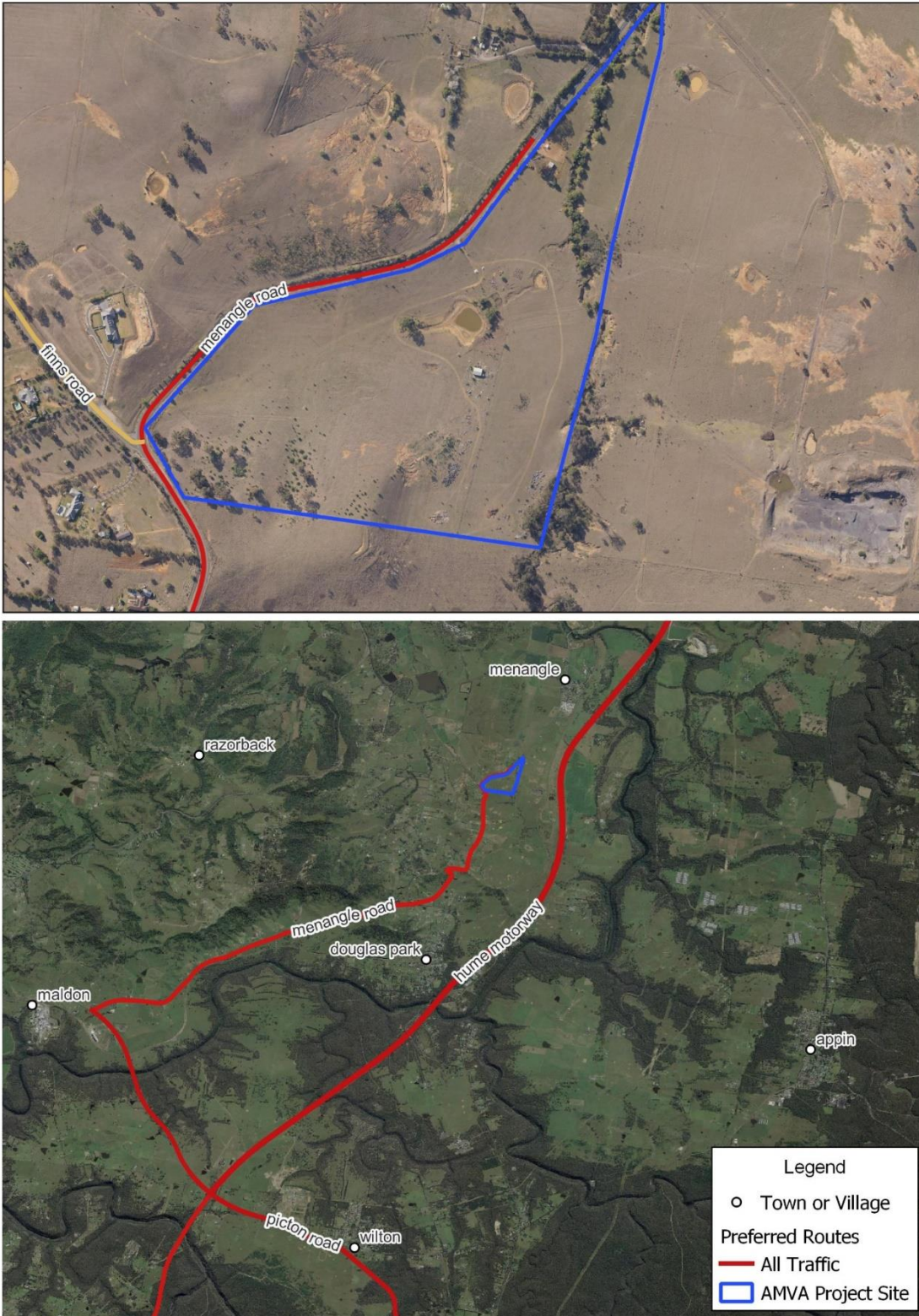


Figure 6-1 Preferred Travel Routes AMVA Project

<i>This document UNCONTROLLED once printed</i>				Page 4 of 4
Document ID	APNSTD0313	Version	1.0	
Last Date Updated	16/06/2022	Next Review Date	16/06/2027	



APPENDIX C ROAD SAFETY AUDIT

This document UNCONTROLLED once printed

Document ID	APNMP0131	Version	V1	Page 94 of 94
Last Date Updated	16/01/2023	Next Review Date	16/01/2026	

REPORT

MENANGLE ROAD – Finns
Road to Foot Onslow Creek
Road Safety Audit
Existing Conditions



PREPARED FOR SOUTH32

DOCUMENT CONTROL

ISSUE	DATE	ISSUE DETAILS	AUTHOR	CHECKED	APPROVED
1	16/02/2022	Report – Draft Issue	Peter Lucas	Rachel Larina	Brendan Hogan
2	11/03/2022	Report – Revision 01	Peter Lucas	Rachel Larina	Brendan Hogan
3	22/03/2022	Report – Final	Peter Lucas	Rachel Larina	Brendan Hogan

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Contents

1	Introduction	2
1.1	Background	2
1.2	Road Safety Audit.....	4
2	Audit process	5
2.1	Audit Process Summary	5
2.3	Reference Materials.....	6
2.4	Considerations.....	6
2.5	Assessment Methodology.....	6
2.6	Check Lists	6
2.7	Project Documentation	7
2.8	Site Inspections	7
3	Risk Matrix	8
4	Audit Findings	10
4.1	General Findings	10
4.2	Summary	14
5	Responding to the Audit	26
6	Formal Statement	26
	APPENDIX A – Corrective Action Register	27

Tables

Table 2-1	Audit Summary	5
Table 3-1	Incident Frequency	8
Table 3-2	Incident Severity	8
Table 3-3	Resultant Level of Risk Matrix	8
Table 3-4	Treatment Approach.....	9
Table 4-1	Summary of Road Safety Audit Findings.....	15

Figures

Figure 1.1	Locality Plan	2
Figure 1.2	Typical Section of Menangle Road	3
Figure 4.1	Pavement Heaving and Bleeding	12
Figure 4.2	Property Access Locations	13

1 Introduction

1.1 Background

An Existing Conditions Road Safety Audit was requested by Wollondilly Shire Council (WSC) and South32 on a section of Menangle Road, Menangle, NSW, which extents between Finns Road and Foot Onslow Creek, see Figure 1.1. The site is approximately 35km northwest of Wollongong and 8km northwest of Appin. This section of the Menangle Road limits safe travel due to the following:

- Poor sight lines
- Non-frangible vegetation, cross drainage culvert headwalls, and infrastructure within the clear zone
- Extensive road heaving



Figure 1.1 Locality Plan

Menangle Road is currently signposted as an 80km/hr zone, which means the road has a design speed of 90km/hr. The posted speed limit was easily achieved during the site visit. The road longitudinal grades along the investigated section are relatively flat with a maximum grade of 4%. The road cross section comprises of approximately 7m wide sealed travel lanes and shoulders with a width of approximately 2m. The shoulders show significant signs of wear with cracking, potholing, vegetation growth and heaving.

Electricity pole, road signs, guideposts and cross drainage culverts are commonly found within the clear zone along both sides of the carriageway. A 35km/hr speed advisory sign for turning and a curve advisory sign are placed on Curve 1. There are no speed advisory signs and curve advisory signs on both Curve 2 and Curve 3, see Figure 1.1. All Curve locations have chevron alignment marker for both directions which indicates that the current horizontal curves geometry is not ideal. There are two 'Accident Zone' signs at either end of the area which would indicate regular traffic accident occurrences.



Figure 1.2 Typical Section of Menangle Road

1.2 Road Safety Audit

The Austroads Guide to Road Safety Part 6: Road Safety Audit (2022) defines a Road Safety Audit (RSA) as:

“a formal examination of an existing or future road or traffic project or an existing road, in which an independent, qualified team reports on the projects crash potential and safety performance.”

An Audit is not a check against standards. Compliance with standards, which may represent the minimum requirements, does not guarantee safety.

The essential elements of this definition are that the Audit is:

- A formal process and not an informal check.
- An independent process.
- Carried out by someone with appropriate experience and training; and
- Restricted to road safety issues.

The objectives of an RSA are:

- To identify safety risks for road users and others affected by the road project; and
- To ensure that measures to eliminate or reduce the risks are considered in full.

The benefits of conducting an RSA include:

- The likelihood of accidents on the road network can be reduced; and
- The severity of accidents can be reduced.

In accordance with Austroads Guide to Road Safety Part 6: Road Safety Audit (2022), the aim of an RSA is:

“To identify any existing road safety risks inherent in the design, layout, and road furniture, which are not consistent with the road’s function and use. There should be a consistency of standards such that the road user’s perception of local conditions assists safe behaviour.”

2 Audit process

2.1 Audit Process Summary

The Audit Summary is provided in Table 2-1.

Table 2-1 Audit Summary

Audited project:	
Audit on behalf of:	South32
Project Number	21-000489
Project Location	Menangle Road - Menangle
Project Sponsor	South32
Contact	Ben Skerman Area Manager – Civil Major Projects & Studies (Australia East) Phone: +61 419 707 471 Email: skerb1@south32.net
Principals Authorised Person (PAP)	Calibre Professional Services Pty Ltd Level 6 121 Marcus Clark Street Canberra ACT 2601
Contact	Tara Lockwood Project Delivery Manager – Transport Phone: 02 6211 7100 Email: Tara.Lockwood@calibregroup.com
Road Safety Audit Calibre Consulting (ACT) Pty Ltd Phone: (02) 6211 7100	Audit Team: email: Peter.Lucas@calibregroup.com Peter Lucas – Auditor (Level 3) - ID RSA-02-0580 Rachel Larina – Auditor (Level 1) - ID RSA-02-1574 Brendan Hogan - Auditor (Level 2) - ID RSA-02-0793
Audit Type:	Existing Conditions
Commencement Meeting:	Briefing via email correspondence – Tara Lockwood / Glen Hardy
Site Inspections:	Day Inspection - Thursday 3 rd February 2022 18:00 – 19:30 Night Inspection - Thursday 3 rd February 2022 20:30 – 21:00
Audit Dates:	3 rd February 2022
Issue Draft Report	16 th February 2022
Completion Meeting:	17 th March 2022
Submit Final Audit Report:	22 nd March 2022

2.3 Reference Materials

The following list of references provided background information during the Audit:

- Transport NSW (TNSW): Guidelines for Road Safety Audit Practices (2011)
- Austroads: Guide to Road Safety Part 6: Road Safety Audit (2022)
- Austroads: Guide to Road Design and RMS Supplementary materials
- RMS Delineation Guidelines
- RMS Road Design Guide
- Australian Standard AS1742 – manual of Uniform Traffic Control Devices and RMS Supplements

2.4 Considerations

The following site attributes with respect to the road environment and surroundings were considered during the audit:

Existing Features	Identified road users
<ul style="list-style-type: none"> • Road horizontal alignment • Road vertical alignment • Road corridor widths • Existing accesses • Roadside hazards • Road signs and line marking 	<ul style="list-style-type: none"> • General public – all transport modes • LGA garbage and recycling services • School and commuter bus operations • Vulnerable road users • Emergency services • Road maintenance operations • Heavy vehicle movements (9.9% ADT)
Adjoining land use:	Other:
<ul style="list-style-type: none"> • Agricultural operations • Rural residential 	<ul style="list-style-type: none"> • Traffic volumes • Rain events and flooding in flat terrain • Seasonal adverse weather fog and flooding • Bushfire • Driver behaviour • Wildlife

2.5 Assessment Methodology

The assessment included the following tasks:

1. Site visit including –
 - a. Day and night drive through of the approximately 1.0 km project area with video capture
 - b. Photography of key roadway deficiencies (where safe to do so)
2. Visual assessment and recording of hazards and deficiencies –
 - a. Pavement condition
 - b. Road geometry
 - c. Formation width and shape
 - d. Road furniture
 - e. Clear zones and unprotected hazards
 - f. Signage
3. Report preparation.

2.6 Check Lists

In undertaking the Road Safety Audit, the Audit team referenced the relevant Austroads standard checklist for the relevant project phase.

It should be noted that while checklists have been used as an aid to complete the Audit, they do not form the basis for Audit findings, hence are not provided as part of this Road Safety Audit Report.

2.7 Project Documentation

Traffic volume data was sourced from;

Transport & Urban Planning Pty Ltd–South 32 Vent Shaft–Menangle–Traffic Volume Summary – 1 December 2020

2.8 Site Inspections

The Audit team conducted a night and daytime onsite inspection. Photographs of the area were taken during the daytime. In car video capture in both directions during day and night were taken.

Day time: Thursday 3rd February 2022 at 18:00 to 19:30

Night time: Thursday 3rd February 2022 at 20:30 to 21:00

The weather was fine. The road surface was dry during all inspections.

3 Risk Matrix

The Risk Matrix, as shown in Table 3-3, has been used to determine a risk rating for each identified road safety risk. Table 3-1 and Table 3-2 have also been used to determine the likelihood of an event occurring and the seriousness of the outcome to establish a resultant risk factor rating. Table 3-1, Table 3-2, Table 3-3, and Table 3-4 conform to Austroads Guide to Road Safety Part 6: Section 10.5

Table 3-1 Incident Frequency

Frequency	Description
Almost Certain	One per quarter
Likely	Quarter to 1 year
Possible	1 to 3 years
Unlikely	3 to 7 years
Rare	7 years +

Table 3-2 Incident Severity

Severity	Description	Examples
Fatal	Death at scene or within 30 days of the crash	High-speed, multi-vehicle crash on a freeway. Car runs into crowded bus stop. Bus and petrol tanker collide. Collapse of a bridge or tunnel. Pedestrian or cyclist struck by a medium/high speed car.
Serious	Admitted to hospital	High or medium-speed vehicle/vehicle collision. High or medium-speed collision with a fixed roadside object.
Moderate	Major first aid and/or presents to hospital (not admitted)	Vehicle collides with a cycle on low speed (< 40km/hr)
Minor	Likely minor injury	Some low-speed vehicle collisions. Cyclist falls from bicycle at low speed. Left turn rear-end crash in a slip lane.
Insignificant	Property Damage	Vehicle collides with objects (no injuries) Car reverses into post

Table 3-3 Resultant Level of Risk Matrix

Frequency of Occurrence (Likelihood)	Severity of Outcome				
	Insignificant	Minor	Moderate	Serious	Fatal
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	Extreme	Extreme
Possible	Low	Medium	High	High	Extreme
Unlikely	Negligible	Low	Medium	High	Extreme
Rare	Negligible	Negligible	Low	Medium	High

Table 3-4 Treatment Approach

Risk	Suggested Treatment Approach
Extreme	Must be corrected regardless of cost
High	Should be corrected or the risk significantly reduced, even if the treatment cost is moderate
Medium	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
Low	Should be corrected or the risk reduced if the treatment cost is low
Negligible	No action required

4 Audit Findings

The Audit team carried out an Existing Conditions Road Safety Audit of Menangle Road, Menangle NSW between Finns Road and Foot Onslow Creek, Menangle.

The Road Safety Audit of the project was conducted in accordance with the Transport for New South Wales (TNSW): Guidelines for Road Safety Audit Practices (2011) and Austroads publication AGRS06-22; "Guide to Road Safety Part 6: Road Safety Audit".

Key elements examined included:

- Horizontal and vertical alignment
- Pavement condition
- Sight distance
- Roadside environment
- Traffic Signs
- Roadworks posted speed limits
- Line marking
- Driver behaviour

The following commentary relates to the findings of the Audit and identified road safety risks and includes comment on specific items in line with the Audit scope. A detailed summary of Road Safety Audit findings is provided in Table 4-1.

4.1 General Findings

4.1.1 Horizontal Alignment

As per shown in Figure 1.1, the Menangle Road section from Finns Road to Foot Onslow Creek has three curves. The approximate radius of the curves are as follow:

- Curve 1 radius : 50m
- Curve 2 radius : 115m
- Curve 3 radius : 220m

Austroads Guide to Road Design Part 3 – Geometric Design - Table 7.6 stipulates a minimum desirable horizontal radius for 90km/hr (Design Speed) of 336m at 6% crossfall with a friction factor of 0.13. The absolute minimum radius with 6% superelevation and friction factor of 0.13 is 245m. Therefore, Curves 1, 2, and 3 fail to meet the horizontal criteria for a design speed of 90km/hr.

Due to Curves 2 and 3's failure to meet the horizontal criteria, curve advisory sign (W1-3), speed advisory sign (W8-2), and chevron signs around the outside of the curve are needed.

4.1.2 Vertical Alignment

The road alignment generally has a grade of 4-5% from Curve 1 to Curve 3. From Curve 3 through to Foot Onslow Creek, the road vertical grade falls at approximately 3%. According to Austroads Guide to Road Design Part 3 – Geometric Design - Table 8.3 stipulates that the general maximum grade for rolling terrain for 80km/hr operating speed is 5-7%. Therefore, the studied section of Menangle Road complies with the Austroads Guide.

4.1.3 Cross Section

The existing two 3.5m asphaltic surfaced traffic lanes of Menangle Road satisfies Austroads Guide to Road Design Part 3 – Geometric Design – Section 4.2.6.

As the design speed of Curves 1, 2 and 3 is 90km/hr, curve widening to accommodate heavy vehicle wheel tracking should be evident. Based on the road type of Menangle Road, the standard design vehicle is 19m Semi-Trailer. Austroads Guide to Road Design Part 3 – Geometric Design - Table 7.13 stipulates 0.8m pavement widening should be applied for a road with a design vehicle of 19m Semi-Trailer and a design speed of 90km/hr. The existing road appears to lack any curve widening.

According to Austroads Guide to Road Design Part 3 – Geometric Design - Table 7.8, the maximum value of the superelevation on Rural Roads is 6%. Currently, the existing superelevation around Curve 3 is up to 12% grade through some areas. Therefore, the superelevation for Curve 3 does not comply with the Austroads Guides.

The existing shoulder width of the Menangle Road is approximately 2.0m. This complies with Austroads Guide to Road Design Part 3 – Geometric Design - Table 4.7.

The assessor cannot indicate the width of the existing road verge as it was indistinguishable due to vegetation overgrown and unmaintained. Austroads Guide to Road Design Part 3 – Geometric Design - Table 4.9 states that the minimum road verge width is 1.0m. In addition, table drains in cut were also overgrown and unmaintained.

4.1.4 Clear Zone

The 2020 revision of Austroads Guide Road Design Part 6 - Roadside Design, Safety and Barriers removed the concept of 'Clear Zone' due to the following considerations:

- *Clear zones cannot deliver Safe System outcomes in isolation and should be regarded as a supporting treatment*
- *Some clear zone is better than none at all when continuous lengths of barrier cannot be installed*
- *Clear zones should be regarded as having the potential to be a hazard in their own right in the same way that barriers are afforded this attention*

However, for the purpose of creating a focus to the identification and assessment of roadside hazards, a Clear Zone of 6.5m in fill and 5.0m in cut for this section of road with Design ADT 1501-6000 at 90km/hr is adopted.

A number of unprotected hazards were indicated within this zone and pose a particular risk to errant vehicles. These hazards are:

- Culvert headwalls
- Traffic signs with non-frangible posts
- Utility power poles
- Steep cut batter slopes
- Fence Strainer post

The maximum existing batter slopes in fill are 1:4. This is acceptable as per the Austroads guide. The maximum existing batter slope in cut are up to 1:1 around Curve 3 area, this does not comply with the Austroads criteria and constitutes a roadside hazard.

4.1.5 Pavement

The assessors evaluated the pavement to be in poor to very poor condition. Patches, potholes, pavement heaving, and water ingress were found throughout the studied section of the Menangle Road, especially around the curves area.

The assessors established that the surface water remains on the asphaltic pavement surface due to overgrown vegetation on the sealed shoulder, verge and table drains. As the water has nowhere to go, it seeps through the sealed pavement and gradually degrades the underlying pavement structure, which causes pavement damage.

In addition, significant signs of pavement bleeding were seen in the existing pavement, particularly around Curve 3 through to Foot Onslow Creek. This bleeding has a significant effect on the road's coefficient of friction which reduces the friction between vehicle tyres and road surface.



Figure 4.1 Pavement Heaving and Bleeding

4.1.6 Property Access

Two property accesses on the southern side of the alignment have insufficient Safe Intersection Sight Distance (SISD) to safely enter Menangle Road. Austroads Guide to Road Design Part 4A – Unsignalised and Signalised Intersections - Table 3.2 specifies a SISD of 214m for a vehicle parked 5m from the road edge line. The SISD for property access for 345 Menangle Road were obstructed by overgrown vegetation. The SISD for the turning to the paddock entrance were obstructed by a Chevron Alignment Marker and overgrown vegetation, See Figure 4.2.

Even under Extended Design Domain (EDD) criteria these accesses do not fulfill Austroads requirements.



Figure 4.2 Property Access Locations

4.1.7 Stopping Sight Distance (SSD)

Stopping Sight Distance allows a driver, upon seeing an object 0.2m above the road surface, enough time to stop and avoid colliding with the object. According to the Austroads Guide to Road Design Part 3 – Geometric Design - Table 3.5, the desirable minimum stopping sight distance (SSD) for a road with 90km/hr design speed at 2.0 seconds reaction time is 139m.

According to Austroads, only Curve 3 does not satisfy the SSD requirements.

4.1.8 Vegetation

The existing roadside vegetation is gradually encroaching into the verge and table drain area. It has become so overgrown that it interrupts Sight Lines and Signposting. The overgrown vegetation has also reduced sight distances and contributed to pavement deteriorations.

4.2 Summary

4.2.1 Curve 1

Curve 1 is in an 80km/hr signposted zone but has a speed and curve warning advisory sign for 35km/hr. The 50m radius based on 6% superelevation and a friction factor of 0.30 (40km/hr) has a calculated speed of 40km/hr. The speed and curve warning advisory signs are an appropriate mitigation measure although they do not totally eliminate the risk to users. The pavement is in relatively good condition considering the amount of turning movements that occur. Delineation and signposting are also in good condition.

4.2.2 Curve 2

Curve 2 is in an 80km/hr signposted zone and is bounded on either side by Chevron Hazard Markers. The 115m radius based on 6% superelevation and a friction factor of 0.13 (90km/hr) has a calculated speed of 53km/hr. The minimum radius for 90km/hr with 6% superelevation and a friction factor of 0.13 is 336m.

The pavement is showing signs of stress. Potholes are appearing and areas of patching are evident. Pavement cracking is starting to appear. Verge and table drains have become ineffective as they are heavily overgrown with grasses and vegetation. Surface water has no escape possibilities and is gradually undermining the road pavement subgrade.

Delineation and signposting are in good condition.

A fence strainer post on the southern edge is well inside the 90km/hr Clear Zone.

4.2.3 Curve 3

Curve 3 is in an 80km/hr signposted zone and is bounded on either side by Chevron Hazard Markers. The 220m radius based on 6% superelevation and a friction factor of 0.13 (90km/hr) has a calculated speed of 73km/hr. The minimum radius for 90km/hr with 6% superelevation and a friction factor of 0.13 is 336m.

The pavement is in very poor condition and, in some areas completely failed. Potholes, patching, pavement bleeding and pavement heaving are common. The pavement bleeding alone would make a friction factor of 0.13 very optimistic. Ineffective shoulder, verge and table drains have contributed to the degradation of the road pavement and will continue to do so.



Delineation and signposting are in good condition, although with the gradual degradation of the pavement the linemarking and RPM's will become ineffective.



Stopping Sight Distance (SSD) is compromised on the northern edge with a steep cut embankment and vegetation obscuring sight lines.



4.2.4 Clear Zone



A number of unprotected hazards are inside the regulated Clear Zone. These unprotected hazards are stormwater headwalls, utility poles, traffic signs, steep cut batter slopes, and fence strainer posts are inside the zone. These unprotected hazards pose a significant risk to road users.



Table 4-1 Summary of Road Safety Audit Findings



21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
1		Curve 2	<p>Curve 2 radius and superelevation for design speed 90km/hr zone does not comply with Austroads Guide to Road Design Part 3 Table 7.6.</p> <p>The noncompliance can could cause an errant vehicle to perceive the tight radius unprepared and run off the road.</p>	Road alignment and cross section	Possible	Serious	High
2		Curve 2	<p>The pavement shows the existence of potholes, cracks, and patching. The damage was likely caused by surface water unable to escape the road surface due to overgrown vegetation on the road verge and table drains. Water pooling on the road surface contributes significantly to pavement damage.</p> <p>Potholes, cracks, and pavement patching's can cause vehicle ride to be irregular reducing stability. Serious potholes can cause vehicle tyre damage resulting in loss of control.</p>	Road pavement	Possible	Serious	High



21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
3		Curve 2	<p>Inadequate advisory signs for substandard curve radius. Only curve chevron exists on-site.</p> <p>Inadequate advisory signs on curves may cause drivers to perceive the curve unprepared and run off the road</p>	Traffic signs	Possible	Serious	High
4		Curve 2	<p>The fence strainer post is well inside the 90km/hr design speed clear zone. If an errant vehicle ran off the road at that location it would increase the severity of the incident and not enable the vehicle to recover resulting in a high or medium speed collision with a fixed roadside object.</p>	Roadside hazards	Rare	Serious	Medium



21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
5		Curve 3	<p>Curve 3 radius and superelevation for design speed 90km/hr zone does not comply with Austroads Guide to Road Design Part 3 Table 7.6.</p> <p>The noncompliance could cause errant vehicles to not perceive the tight radius and run off the road.</p>	Road alignment and cross section	Likely	Serious	Extreme
6		Curve 3	<p>The pavement shows the existence of potholes, cracks, and road heaving. The damages were likely caused by surface water unable to escape the road surface due to overgrown vegetation on the road verge and table drains. Water pooling on the road surface is a contributing cause the pavement damages.</p> <p>Potholes, cracks, and pavement patching's can cause vehicle ride to be irregular reducing stability. Serious potholes can cause vehicle tyre damage resulting in loss of control.</p>	Road pavement	Possible	Serious	High



21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
7		Curve 3	Inadequate advisory signs for substandard curve radius. Only curve chevron exists on-site. Inadequate advisory signs on curves may cause drivers to perceive the curve unprepared and run off the road	Traffic signs	Possible	Serious	High
8		Curve 3	The Stopping Sight Distance (SSD) for Curve 3 is inadequate due to steep cut embankment and overgrown vegetation obscuring the required SSD line. This limits the drive's ability to perceive oncoming traffic or a hazard on the road ahead which could result in a collision or damage.	Road alignment and cross section	Unlikely	Moderate	Medium



21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
9		Throughout the Menangle Road	<p>A number of stormwater headwalls fall within the Austroads 90km/hr Clear Zone criteria of 6.5m in fill and 5.0m in cut and are unprotected and are a hazard.</p> <p>This poses the risk of errant vehicle falling into the headwall surface gap without the possibility of recovery.</p>	Roadside hazards	Unlikely	Moderate	Medium
10		Throughout the Menangle Road	<p>A number of utility poles fall within the Austroads 90km/hr Clear Zone criteria of 6.5m in fill and 5.0m in cut and are unprotected.</p> <p>This poses risk to the errant vehicle in the event of a car swerves off the road. The car would not have enough distance to stop before the pole, which will exacerbate the incident.</p>	Roadside hazards	Unlikely	Serious	High


21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
11		345 Menangle Road	<p>Safe Intersection Sight Distance (SISD) at the 345 Menangle Road residence is obstructed by overgrown vegetation. Any vehicle attempting to exit the property access will not be able to adequately detect any oncoming traffic. Traffic on Menangle Rd will not be able to perceive outgoing vehicle from the property access.</p> <p>Collision may happen due to the inadequate SISD</p>	Intersections	Likely	Serious	Extreme
12		Paddock entrance of the Mining site	<p>Safe Intersection Sight Distance (SISD) at the Paddock entrance of the Mining Site is obstructed by overgrown vegetation and signage. Traffic on Menangle Rd will not be able to perceive outgoing vehicle from the property access.</p> <p>Collision may happen due to the inadequate SISD.</p>	Intersections	Likely	Serious	Extreme

21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
13			<p>The Traffic Sign is obstructed by overgrown vegetation.</p> <p>Drivers' inability to read the traffic sign could lead to confusion and hesitation</p>	Traffic signs	Unlikely	Minor	Low
14			<p>The Traffic Sign has lost its reflective properties.</p> <p>Drivers' inability to read traffic signs could lead to confusion and hesitation</p>	Traffic signs	Unlikely	Insignificant	Negligible

21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
15		Curve 1	<p>The advisory traffic sign of Curve 1 has deteriorated due to sun damage.</p> <p>Drivers inability to read traffic signs could lead to confusion and hesitation</p>	Traffic signs	Unlikely	Minor	Low
16		Throughout the Menangle Road	<p>There are damaged and missing guideposts all throughout the studied section of Menangle Road.</p> <p>Drivers inability to judge the road alignment, especially at night, could lead to vehicle runoff.</p>	Traffic signs	Unlikely	Minor	Low

21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
17			<p>Traffic signs with non-frangible posts are within the Austroads 90km/hr Clear Zone criteria of 6.5m in fill and 5.0m in cut and are unprotected.</p> <p>This poses risk to the errant vehicle in the event of a car swerves off the road. The car would not have enough distance to stop before the sign, which will exacerbate the incident.</p>	Roadside hazards	Rare	Minor	Negligible
18		Throughout the Menangle Road	<p>Evidence of Pavement Bleeding were seen throughout the studied section of Menangle Road.</p> <p>Pavement with a less than desirable friction factor can lead to vehicle instability during wet weather and possible loss of control.</p>	Road pavement	Unlikely	Moderate	Medium

21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
19		Curve 3	<p>Curve 3 roadside batter slope of 1:1 does not comply with the Austroads standard slope requirement of maximum 1:4 in cut. According to Austroads, the non-compliance is deemed to be roadside hazard.</p> <p>Errant vehicles may collide with the batter resulting in damage or even hospitalisation.</p>	Roadside hazards	Unlikely	Moderate	Medium
20		Throughout the Menangle Road	<p>Degraded and missing line marking and RPM's.</p> <p>The missing line marking and RPMs may cause drivers to stray from the carriageway, especially at night or during wet weather.</p>	Delineation	Unlikely	Moderate	Medium
21		property access	<p>Substandard SSID and lack of driveway advisory signage may cause vehicle to slow down abruptly resulting in rear end crashes</p>	Traffic signs	Unlikely	Moderate	Medium

21-000489 - Menangle Road RSA							
Item	Image	Road Location	Description/Risk to Road Safety	Audit Category	Frequency	Severity	Risk Rating
22		Curve 1	<p>Curve 1 radius and superelevation for design speed 90km/hr zone does not comply with Austroads Guide to Road Design Part 3 Table 7.6.</p> <p>The noncompliance could cause an errant vehicle to perceive the tight radius unprepared and run off the road. (Noted that Curve and Speed Advisory signs exist on either side)</p>	Road alignment and cross section	Possible	Serious	High

5 Responding to the Audit

The Project Sponsor is under no obligation to accept the findings outlined in this Audit Report. The report has been prepared to provide the project team with information relating to road safety risks identified via the Road Safety Audit process and as outlined in the Audit Findings above.

A formal Road Safety Audit should be responded to in writing.

This Audit will be recorded on the NSW Register of Road Safety Auditors and the Project Sponsor and Project Manager should expect email notification from the register to confirm the Audit has been carried out.

6 Formal Statement

The team auditing the project documentation and inspecting the site are all accredited Road Safety Auditors. The Audit Team have been not involved, nor provided any input into future design or preparation of plans associated with this project.

The Road Safety Audit was carried out by the Audit Team using all the available material as referenced. Every effort was made to ensure that all safety issues were considered.

It should be noted that while every effort has been made to identify potential safety risks, no guarantee can be made that every safety risk has been identified.

The Audit Team recommend that the road safety risks identified during the Audit be assessed, and were considered necessary by the Project Team, corrective actions identified and implemented.





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MENANGLE ROAD

Appendix A Corrective Action Register

SOUTH32



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