



Blast Management Plan

Table of Commitments - BMP

Commitment Ref	Commitment Description	Approval/EIS Reference	Status	MP Section
3.3.1_1	United Wambo will ensure that blasting on the site does not cause exceedances of the blast criteria in EPL 3141 and SSD7142.	SSD 7142 Condition B8 Schedule 3 Condition L4	Ongoing commitment	3.3.1
3.3.2_1	United Wambo will only carry out blasting on the site - between 9 am and 5 pm (Monday to Saturday inclusive). No blasting is allowed on Sundays, public holidays or any other time without the prior written approval of the Planning Secretary. - a maximum of 3 single blast events a day; - a maximum of 15 single blast events a week, averaged over a calendar year. United Wambo will not close the Golden Highway more than once per day due to blasting, except where required for blast misfires or blasts required to ensure the safety of the mine, its workers or the general public.	SSD 7142 Condition B10 SOC_8.0_Management Measures_002 SOC_8.0_Management Measures_032 SOC_6.07_Blasting_001 SOC_6.07_Blasting_012 SOC_RTS_A_088 SSD 7142 Condition B11 SOC_8.0_Management Measures_033 SOC_6.07_Blasting_013 SOC_RTS_A_089 SOC_RTS_A_129 SOC_RTS_A_130 SSD 7142 Condition B20 SOC_6.07_Blasting_008 SOC_8.0_Management Measures_034 SOC_6.07_Blasting_014 SOC_RTS_A_090 SOC_RTS_A_135	Ongoing commitment	3.3.2
3.5.1_1	The Blast Management Plan has been prepared for United Wambo to guide blasting practices, and has been developed in consideration of internal and external requirements listed in Section 3.4 and the existing Wambo Coal Pty Ltd Plans and strategies.	SOC_6.4_Air Quality_019-2 SOC_6.7_Blasting_003 SOC_6.7_Blasting_010-1 SOC_RTS_A_085	Complete	3.5.1
3.5.1.1_1	United Wambo will engage a suitably qualified and experienced person to prepare a Blast Management Plan (BMP) for the	SSD 7142 Condition B21(a) SOC_8.0_Management Measures_020	Complete	3.5.1.1

Commitment Ref	Commitment Description	Approval/EIS Reference	Status	MP Section
	site. The Plan will be prepared in accordance with relevant statutory requirements (including approvals and EIS commitments)	SOC_8.0_Management Measures_031 SOC_6.07_Blasting_003 SOC_6.07_Blasting_009 SOC_6.07_Blasting_010 SOC_6.4_Air Quality_026 SOC_RTS_A_085 SOC_RTS_A_086		
3.5.1.2_1	United will develop a Blasting Management Plan in consultation with the EPA and submit to the Planning Secretary for approval.	SSD 7142 Condition B21(b) SOC_6.07_Blasting_003 SOC_6.07_Blasting_010-1 SOC_RTS_A_085	Complete	3.5.1.2
3.5.1.2_2	United will develop a Blasting Road Closure Management Plan in consultation with RMS and Singleton Council prior to any blasting within 500 metres of any public road.	SSD 7142 Condition B21(f) SOC_6.07_Blasting_010-5 SOC_RTS_A_086-4 SOC_RTS_A_136	Complete	3.5.1.2
3.5.1.3_1	United Wambo will not undertake any blasting until the Blast Management Plan is approved by the Planning Secretary.	SSD 7142 Condition B22	Complete	3.5.1.3
3.5.1.3_2	Prior to the commencement of Phase 2 the BMP must be revised and submitted to DPE	SSD 7142 Condition E6	Complete	3.5.1.3
3.5.2_1	United Wambo will implement the approved BMP (and any supporting plans), in accordance with relevant statutory requirements (including approvals and EIS commitments).	SSD 7142 Condition B23 SOC_8.0_Management Measures_020 SOC_8.0_Management Measures_031 SOC_6.07_Blasting_010 SOC_6.4_Air Quality_026 SOC_8.0_Management Measures_035	Ongoing commitment	3.5.2
4.3_1	United Wambo are taking reasonable steps to: - ensure the safety of people and livestock from blasting impacts of the development; - protect public and private infrastructure and property in the vicinity of the site from blasting damage associated with the development; and - minimise the dust and fume emissions of any blasting.	SSD 7142 Condition B18a SSD 7142 Condition B21(c) SOC_8.0_Management Measures_029 SOC_8.0_Management Measures_030 SOC_6.09_Ecology_002-12 SOC_RTS_A_087	Ongoing commitment	4.3

Commitment Ref	Commitment Description	Approval/EIS Reference	Status	MP Section
4.3_2	As part of the blast design process, United Wambo will: • Not undertake simultaneous blasting from the two open cut pits (i.e. Wambo Open Cut and United Open Cut). • Use all reasonable efforts to co-ordinate the timing of blasting at the site with nearby mines to minimise cumulative blasting impacts, including road closures. • United Wambo will not close the Golden Highway more than once per day due to blasting, except where required for blast misfires or blasts required to ensure the safety of the mine, its workers or the general public. Closures will be managed in consultation with HVO in order to minimise closures, and avoid peak traffic periods. • Adopt Glencore blasting procedures relating to fume management, including implementation of a pre-blast assessment protocol that outlines the process for designing blasts to meet the relevant criteria and minimise impacts (refer to Appendix E for additional information). • Notification is provided to all nearby mining operations, Singleton Council and Transport NSW by email. Notifications associated with closure off Comleroi Road for any blast after 7:00am, must be by 12 noon on the previous working day. Changes to the design may include limiting the charge mass of blasts close to potentially affected locations or other blast vibration management controls (e.g. optimisation of initiation design).	SSD 7142 Condition B18(b) SOC_8.0_Management Measures_036 SOC_6.07_Blasting_002 SOC_6.07_Blasting_004 SOC_6.07_Blasting_006 SOC_6.07_Blasting_007 SOC_6.07_Blasting_009 SOC_6.07_Blasting_011 SOC_6.07_Blasting_018 SOC_6.07_Blasting_019 SOC_6.07_Blasting_020 SOC_6.07_Blasting_023 SOC_6.07_Blasting_025 SOC_6.07_Blasting_027 SOC_6.07_Blasting_028 SOC_PAC_Res_002 SOC_RTS_A_005 SOC_RTS_A_087 SOC_RTS_A_094 SOC_RTS_A_095 SOC_RTS_A_096 SOC_RTS_A_098 SOC_RTS_A_128 SOC_RTS_A_135 SOC_6.4_Air Quality_012 SOC_6.4_Air Quality_026 SOC_8.0_Management Measures_020 SOC_8.0_Management Measures_031 Schedule 3 Condition L4	Ongoing commitment	4.3

Commitment Ref	Commitment Description	Approval/EIS Reference	Status	MP Section
4.3_3	A pre-blast review of weather conditions so as to avoid blasting in adverse conditions, and changes to the design may include limiting the charge mass of blasts close to potentially affected locations or other blast vibration management controls (e.g. optimisation of initiation design).	SOC_8.0_Management Measures_031-3 SOC_6.4_Air Quality_005 SOC_6.4_Air Quality_019-1 SOC_RTS_A_005 SOC_RTS_A_086-3	Ongoing	4.3
4.3_4	United Wambo will operate a suitable system to enable interested members of the public to get up-to-date information on the proposed blasting schedule on the site and associated public road closures, including notification via SMS message of the blasting schedule and associated road closures for that day and any variations to that schedule and closures.	SSD 7142 Condition B18 SOC_6.20_Public Health_003 SOC_6.07_Blasting_029 SOC_PAC_Res_002 Schedule 3 Condition L4 SOC_RTS_A_131	Ongoing commitment	4.3
4.3_5	United Wambo can vary the blasting criteria if an agreement has been executed owner/s of the residence or infrastructure and advised the Department in writing the terms of the agreement. No blasting was permitted within 500m of any public road without an agreement and approval from the department.	SSD 7142 Condition B9 SSD 7142 Condition B19 SSD 7142 Condition B21(g) SOC_6.7_Blasting_005	Ongoing commitment	4.3
4.3_6	Implement appropriate exclusion zones to manage the risk of flyrock. This includes the closure of the Golden Hwy and Comleroi Rd when within the exclusion zone (refer to Appendices I, J and K for more information). Equipment will be available to clear potential flyrock from roadways.	SSD 7142 Condition B19	Ongoing commitment	4.3

Commitment Ref	Commitment Description	Approval/EIS Reference	Status	MP Section
4.3_7	Road licences are required for closure of public roads. The following processes are implemented for road closures: • Traffic control must follow approved plans and be managed by a qualified person, • stoppages limited to 15 minutes. • United inspects and repairs any damage • long-term signage must be installed at closure points to inform the public of delays, including a contact number for inquiries. • Shift Activation website to manage the ROL	Commitment A009 Commitment A010 Commitment A011 Commitment A016 Commitment A018 Commitment A019 Commitment A020 Condition 001 Condition 010	Ongoing	4.3
4.4.1_1	United Wambo will offer all private landholders located within 2 kilometres of the Project extraction areas a property inspection prior to the commencement of blasting for the Project in order to establish the condition of private structures.	SOC_8.0_Management Measures_038 SOC_6.07_Blasting_021 SOC_PAC_Res_004	Complete	SPMP
4.4.1_2	In accordance with SSD 7142 Conditions B13 to B17, United Wambo have an ongoing requirement to complete property inspections or investigations as requested by private landholders. This includes: • engaging a suitably qualified, experienced and independent person; and • providing the landholder a copy of the report findings • organise repairs as and when required	SSD 7142 Condition B13 SOC_PAC_Res_003 SSD 7142 Condition B15 SSD 7142 Condition B16 SSD 7142 Condition B17	Ongoing (as and when required)	SPMP
5.1.1_1	United Wambo will establish a blast monitoring network and monitoring program in accordance with the requirements of relevant approvals and EIS commitments.	SOC_8.0_Management Measures_031 SOC_6.07_Blasting_015	Complete	5.1
5.1.1_2	United Wambo will undertake blast monitoring in accordance with the approved BMP (and associated approvals).	SSD 7142 Condition B18 EPL 3141 Schedule 5 Condition M7 SOC_6.07_Blasting_015 SOC_PAC_Res_002 SOC_RTS_A_091	Ongoing commitment	5.1

Commitment Ref	Commitment Description	Approval/EIS Reference	Status	MP Section
5.1.1_3	United Wambo will undertake periodic monitoring of infrastructure, including the transmission towers and Golden Highway when blasting within a 500 metre radius of the United Open Cut or Wambo Open Cut.	SOC_6.07_Blasting_024	Ongoing commitment	5.1
5.1.2_1	All blasts will be video recorded to capture the post blast environment. The video camera will be staffed, where practicable, in order to follow the path of any fume generated. All videos will be a minimum duration of 1 minute following the blast event or until the fume dissipates or leaves the view of the camera. All blasts at the Project will be fume rated applying the AESIG (2011) Visual NOx Fume Rating Scale (or equivalent).	SOC_PAC_Res_005 SOC_PAC_Res_002	Ongoing Commitment	5.1.2
5.1.3_1	United Wambo will undertake an assessment and trial of potential methods for monitoring post blast fume, including the use of fixed and mobile gas monitoring equipment. The trial will determine the feasibility and benefit of utilising the monitoring equipment in comparison to using the AESIG (2011) Visual NOx Fume Rating Scale. The assessment and trial will be completed within two years of the commencement of mining activities of the Project and any proposed changes to the fume monitoring system resulting from this trial will be implemented within this same timeframe.	SOC_PAC_Res_007	Complete	5.1.3
5.1.3_2	United Wambo will review the outcomes of the Ravensworth Open Cut blast fume monitoring trial once complete and will implement any outcomes that will improve the Project blast model and/or pre-blast procedure.	SOC_PAC_Res_006	Complete	5.1.3

Commitment Ref	Commitment Description	Approval/EIS Reference	Status	MP Section
5.1.3_3	United Wambo will undertake an assessment and trial of potential methods for monitoring post blast fume, including the use of fixed and mobile gas monitoring equipment. The trial will determine the feasibility and benefit of utilising the monitoring equipment in comparison to using the AESIG (2011) Visual NOx Fume Rating Scale. The assessment and trial will be completed within two years of the commencement of mining activities of the Project and any proposed changes to the fume monitoring system resulting from this trial will be implemented within this same timeframe.	SOC_PAC_Res_007	Complete	5.1.3
5.4_1	In the event of a blast fume event: - The Blast Supervisor is to advise affect personnel of the fume event and provide direction on what to do to avoid being affected by the fume. - The ECM or delegate is to call sensitive receptors if there is a potential that the fume could or is migrating to their residence		Ongoing commitment	5.4
6.2_1	United Wambo will review the pre-blast assessment protocol on a regular basis, as part of the continuous improvement process.	SOC_6.07_Blasting_026	Ongoing commitment	6.1

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1. Purpose

The purpose of this Blast Management Plan (BMP) is to describe the management and mitigation strategies, procedures, controls and monitoring programs that will be implemented to manage blast impacts at the United Wambo Open Cut Coal Mine (United Wambo).

2. Scope and Objectives

2.1 Scope

United Wambo is situated approximately 15 kilometres west of Singleton, near the village of Warkworth, New South Wales (*Figure 2-1*). United Wambo is a 50:50 joint venture between United Collieries Pty Limited (United) and Wambo Coal Pty Limited (Wambo). United is owned 95 per cent by Abelsore Pty Limited, a wholly owned subsidiary of Glencore Coal Pty Limited (Glencore) and five per cent by the Mining and Energy Union (MEU). Wambo is a subsidiary of Peabody Energy Australia Pty Limited.

United Wambo is managed by Glencore and has approval to extract up to 10 million tonnes per annum (mtpa) of Run of Mine (ROM) coal up until 31 August 2042. ROM coal is processed through the Wambo Coal Handling and Preparation Plant (CHPP) and transported by rail from Wambo to the Port of Newcastle for export.

This BMP applies to blasting activities at United Wambo and addresses the relevant conditions of SSD 7142 and EPL 3141. It forms part of United Wambo's Environmental Management System (EMS) and should be read in conjunction with the **United Wambo Environmental Management Strategy (EM Strategy)**.

The BMP applies to all United Wambo employees, and contractors working for, or on behalf of, United Wambo within the project approval boundary.



Figure 2-1: Site Locality

2.2 Objectives

The objectives of this BMP are to:

- to provide the context on baseline blast monitoring data and sensitive receiver locations, and the potential impacts associated with the operation;
- outline the obligations and commitment measures to be implemented to blast impacts from the operation;
- ensure blast management measures are effective and implementable at United Wambo to reduce the potential for impacts on the community and infrastructure, including specific blast controls and site-wide Management Systems and Procedures; and
- establish a blast monitoring system to assess the blast impact on surrounding sensitive receivers and performance against SSD 7142 and EPL 3141 specific blast impact assessment criteria.

3. Planning

3.1 Baseline Data

A comprehensive list of environmental impact assessments undertaken for United Wambo is provided in the United Wambo Environmental Impact Statement. The most recent blasting assessment undertaken is the **United Wambo Open Cut Coal Mine Project – Blast Impact Assessment (Enviro Strata Consulting, 2016)**, included as Appendix 10 of **United Wambo Open Cut Coal Mine Project – Environmental Impact Statement (EIS) (Umwelt 2016b)** and summarised in Section 6.7 of the EIS. As part of these assessments, blast sensitive receiver locations were identified, and historical blast monitoring data was collated and analysed for United Wambo.

3.1.1 Blast Monitoring Data

Blast monitoring has been undertaken at the Wambo Pit since February 2004, historic sites used for baseline monitoring are kept on file, current blast monitoring sites are shown in **Figure 3-1**. In addition, all blasts at Wambo have been assessed based on their blast fume ranking since 2 July 2012.

A summary of the airblast overpressure and ground vibration results, for the period 2012 to 2018 and their performance against respective blasting criteria is presented in **Table 3-1** and **Table 3-2**, respectively. Blast Fume Ranking results since 2012 are presented in **Table 3-3**.

There have been no exceedances of the 5 per cent allowable over the 115 dBL of the total number of blasts during a 12-month period since monitoring began in 2004. There were two overpressure exceedances above 120dBL including one in 2010 and one in 2012 (i.e. due to minor face burst). No blasts have exceeded the 120dBL airblast overpressure limit since 2012. **Table 3-1** shows the airblast overpressure monitoring results collected at BM02, BM05 and BM07 from 2012 to 2018.

There has not been an exceedance for either the >5 mm/s or >10 mm/s ground vibration limits recorded by Wambo external blast monitoring units at a private residence since DA305-7-2003 approval was granted, confirming fully controlled ground vibration impacts. **Table 3-2** shows the ground vibration monitoring results collected at BM02, BM05 and BM07 from 2012 to 2018.

Since blast fume monitoring commenced on 2 July 2012, all blasts at Wambo have been assessed based on their blast fume ranking. For the 2012 – 2018 monitoring period, 98.3 per cent of all blasts have been assessed as Category 2 or below, another 1.4 per cent of blasts assessed as Category 3 and only one assessed as Category 4 blast fume event, which occurred in 2012. No blast fume Category 5 has been generated.

Table 3-1: Review of Airblast Overpressure Results for Wambo Open Cut, 2012 – 2018

Period	No. Blasts for Period	Monitoring Location	>115dBL (<5% Target)	>120dBL (0% Target)	Airblast Overpressure (dBL)	
			%	%	Ave	Max.
01/01/2012 – 31/12/2012	70	BM02	3.3	1.6	99.9	120.6
		BM05	0.0	0.0	103.5	114.6
		BM07	1.4	0.0	103.3	115.2
	73	BM02	0.0	0.0	98.4	109.5

Period	No. Blasts for Period	Monitoring Location	>115dBL (<5% Target)	>120dBL (0% Target)	Airblast Overpressure (dBL)	
			%	%	Ave	Max.
01/01/2013 – 31/12/2013		BM05	1.7	0.0	103.2	114.4
		BM07	1.7	0.0	101.8	111.5
01/01/2014 – 31/12/2014	78	BM02	0.0	0.0	99.9	113.1
		BM05	0.0	0.0	100.9	113.0
		BM07	0.0	0.0	102.3	110.8
01/01/2015 – 31/12/2015	79	BM02	0.0	0.0	100.9	113.4
		BM05	0.0	0.0	104.4	113.3
		BM07	0.0	0.0	102.4	112.4
01/01/2016 – 31/12/2016	106	BM02	1.0	0.0	96.4	118.6
		BM05	1.9	0	103.7	115.8
		BM07	1.0	0.0	99.8	115.7
01/01/2017 – 31/12/2017	96	BM02	2.1	0.0	99.9	119.3
		BM05	3.1	0.0	104.2	118.5
		BM07	0.0	0.0	92.4	110.5
01/01/2018 – 31/12/2018	96	BM02	1.0	0.0	97.5	117.0
		BM05	2.1	0.0	104.3	116.5
		BM07	0.0	0.0	98.2	111.4

Table 3-2: Review of Ground Vibration Results for Wambo Open Cut, 2012 – 2018

Period	No. Blasts for Period	Monitoring Location	>5mm/s (<5% Target)	>10mm/s (0% Target)	Ground Vibration (mm/s)	
			%	%	Ave	Max.
01/01/2012 – 31/12/2012	80	BM02	0.0	0.0	0.16	0.55
		BM05	0.0	0.0	0.48	1.38
		BM07	0.0	0.0	0.55	1.40
01/01/2013 – 31/12/2013	62	BM02	0.0	0.0	0.15	0.53
		BM05	0.0	0.0	0.40	1.83
		BM07	0.0	0.0	0.39	1.86

Period	No. Blasts for Period	Monitoring Location	>5mm/s (<5% Target)	>10mm/s (0% Target)	Ground Vibration (mm/s)	
			%	%	Ave	Max.
01/01/2014 – 31/12/2014	75	BM02	0.0	0.0	0.16	0.65
		BM05	0.0	0.0	0.38	1.37
		BM07	0.0	0.0	0.43	1.44
01/01/2015 – 31/12/2015	79	BM02	0.0	0.0	0.14	0.52
		BM05	0.0	0.0	0.43	1.72
		BM07	0.0	0.0	0.44	1.44
01/01/2016 – 31/12/2016	106	BM02	0.0	0.0	0.15	1.79
		BM05	0.0	0.0	0.43	1.43
		BM07	0.0	0.0	0.41	1.84
01/01/2017 – 31/12/2017	96	BM02	0.0	0.0	0.19	2.09
		BM05	0.0	0.0	0.56	2.75
		BM07	0.0	0.0	0.47	1.87
01/01/2018 – 31/12/2018	96	BM02	0.0	0.0	0.11	1.82
		BM05	0.0	0.0	0.60	2.81
		BM07	0.0	0.0	0.54	3.25

Table 3-3: Blast Fume Rankings Results for Wambo Open Cut, 2012 – 2018

NO _x Fume Ranking	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)	2017 (%)	2018 (%)	Total (%)
0	61.5	85.5	85.3	81.0	88.9	79.6	72.7	79.4
1	15.4	4.8	10.7	16.7	8.3	19.4	23.2	15.4
2	17.9	6.5	2.7	2.4	2.8	0.0	4.0	3.9
3	2.6	3.2	1.3	0.0	0.0	0.0	0.0	1.1
4	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.2
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

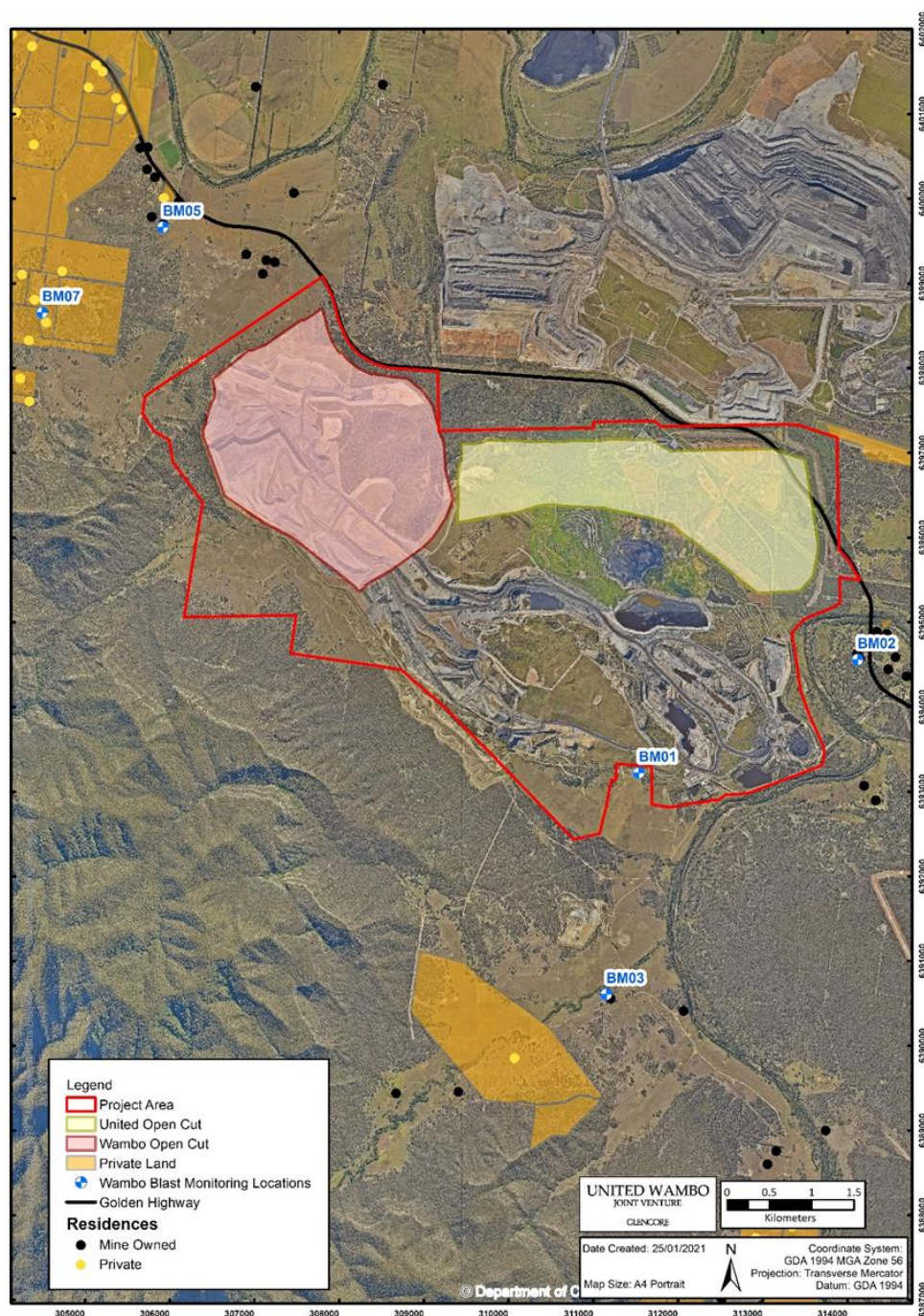


Figure 3-1: Blast Monitoring Locations of the EIS

3.1.2 Blast Sensitive Receiver Locations

Blast sensitive receiver locations were identified and assessed in the **United Wambo Open Cut Coal Mine Project Blasting Impact Assessment (Enviro Strata Consulting, 2016)**. Blast sensitive receiver locations include:

- private residences;
- infrastructure, including:

- public roads and bridges, including the Golden Highway, proposed Golden Highway realignment and Comleroi Road;
- power transmission lines;
- prescribed dams within Wambo;
- Hunter Valley Gliding Club and Warkworth Shooting Complex; and
- telecommunications infrastructure;
- historic sites, including;
- St Philips Church, Warkworth;
- Wambo Homestead Complex;
- the former Warkworth Public School;
- Piggery and Butcher's Hut;
- former Queen Victoria Inn;
- Springwood Homestead;
- the Montrose Property (including the shearing shed); and
- Dog-leg Fence.

3.2 Blasting Impacts

3.2.1 Ground Vibration

The **United Wambo Open Cut Coal Mine Project – Environmental Impact Statement (EIS) (Umwelt 2016)** assessed the potential impact of ground vibrations from blasting on private residential receivers within a 5km radius of the United Open Cut. Ground vibration impact outside the 5km radius is considered negligible.

3.2.2 Airblast

The **United Wambo Open Cut Coal Mine Project – Environmental Impact Statement (EIS) (Umwelt 2016)** assessed the potential impact of airblast overpressure from blasting on private residential receivers within a 5km radius of the United Open Cut. Airblast overpressure impact outside the 5km radius were estimated to be well below the 115dBL criteria and were not assessed.

3.2.3 Flyrock

There is a risk of injury to people or damage to property as a result of flyrock from blasting. This impact is limited to the area immediately surrounding the blast zone. The closest private residence (i.e. residence ID 19 located at Warkworth village) is located approximately 1,070 metres from the United Open Cut, therefore the potential risks of flyrock on surrounding private residences are considered negligible.

3.2.4 Dust and Fume

Impacts from blasting on air quality, including the production of dust and fume. Dust related impacts are discussed in the **AQGHGMP**.

Post-blast fume can be produced in non-ideal explosive conditions of the ammonium nitrate/fuel oil (ANFO) and visible as an orange/brown plume. Factors include:

- explosive formulation and quality assurance;
- explosive product selection;
- on-bench practices;
- rainfall;
- blast design;
- geological conditions;
- contamination of explosive in the blast-hole; and
- sleep time.

Post-blast fumes comprise of oxides of nitrogen (NO_x) including nitric oxide (NO) and nitrogen dioxide (NO₂). In general, at the point of emission, NO will comprise the greatest proportion of the total emission. Typically this is 90% by volume of the NO_x. The remaining 10% will comprise mostly NO₂. It is the NO₂ which has been linked to adverse health effects.

3.3 Criteria and Performance Metrics

United Wambo develop internal targets as part of annual planning (**EM Strategy Section 3.6**), which inform operational management, and ensure that obligated criteria and performance metrics outlined in this section are complied with.

3.3.1 Criteria

SSD 7142 and EPL 3141 specify ground vibration and airblast overpressure criteria for the sensitive receiver locations outlined in **Section 3.1.1**. These criteria were developed in accordance with relevant guidelines, in consultation with the relevant service providers and in consideration of precedents set by other sites and regulatory agencies. Blast criteria are presented in **Table 3-4** to **Table 3-6**.

The criteria presented in **Table 3-4** to **Table 3-6** were developed in consideration of Project Approval requirements and also through the completion of research in relation to the impacts of vibration on particular structures. United Wambo may therefore alter the vibration criteria based on the results of further detailed assessments and/or through further consultation with relevant government agencies and infrastructure providers. United Wambo will advise DPIE in writing of any agreements reached with relevant service providers or surrounding mining operations regarding the revision of the criteria contained within **Table 3-4** to **Table 3-6**.

United Wambo have a blasting agreement in place with Hunter Valley in regard to Former Warkworth Public School – included in the Development Consent as “Other heritage items”.

3.3.1.1 Privately Owned Residences

The relevant limits for residence on privately-owned land from **SSD 7142** and **EPL 3141** in relation to both ground vibration and airblast overpressure are summarised in **Table 3-4**.

Table 3-4: Impact Assessment Criteria at Privately-Owned Residences

Location	Ground Vibration Criteria (mm/s)	Allowable Exceedance Vibration	Airblast Overpressure Criterion (dB Linear Peak)	Allowable Exceedance – Airblast Overpressure
Residence on privately-owned land	5	5% of the total number of blasts over a 12-month period	115	5% of the total number of blasts over a 12-month period
	10	0%	120	0%

3.3.1.2 Infrastructure

Impact assessment criteria for infrastructure items have been developed through consultation with regulatory authorities with consideration to research undertaken and in consultation with the relevant infrastructure owners. The impact assessment criteria for private and publicly owned infrastructure in proximity to United Wambo are provided in **Table 3-5**.

Table 3-5: Impact Assessment Criteria for Infrastructure

Infrastructure	Ground Vibration Criterion (mm/s)	Airblast Overpressure Criterion (dB Linear Peak)
Electricity transmission suspension towers	100	-
Electricity transmission tension towers	50	-
Wambo Tailings Dam (North-East Tailings Dam)	50 (progressive limit) currently set at 40 ¹	-
HVO Riverview Void Inpit Water Storage ²	50	-
United Tailings Dam 2		
Wambo Hunter Pit Tailings Dam		
Public roads and bridges (including the Golden Highway)	100	0
HVO surface infrastructure – unoccupied	100	133
HVO infrastructure – occupied	25	133
Hunter Valley Gliding Club		
Warkworth Shooting Complex		
Telecommunication infrastructure and cables	100	-

¹ The vibration limit imposed by the Dam Safety NSW on Wambo Open Cut applicable to the Wambo Tailings Dam wall is currently set at 40 mm/s (i.e. progressive ground vibration limits from 20, 30, 40 and up to 50 mm/s) pending six blasts for each allowable vibration range and dam condition assessment, and approval by Dam Safety NSW, as stated in the conditions imposed by Dam Safety NSW (Annexure “D” Standard Mining Conditions, 2007) and the variation to the approval (2008) endorsed by DPI (2008). In addition, when blasting within the notification area of the dam wall (i.e. within a 1 kilometre radius) Dam Safety NSW requires that additional

monitoring of blast vibrations be undertaken on the embankment crest. On this basis, the current 40 mm/s vibration criterion has been used for the tailings dam and is applicable to the Project.

- 2 The Maximum PPV limit for the prescribed Riverview Pit Dam wall is 50mm/s with results from blasts occurring within the notification zone needing to be reviewed within 2hrs of the blast being fired, United Wambo will consult with HVO to ensure appropriate dam inspections are undertaken.

3.3.1.3 Historic Heritage Structures

Impact assessment criteria for heritage structures within the project area are detailed in **Table 3-6**.

Table 3-6: Impact Assessment Criteria for Heritage Structures

Site	Ground Vibration Criterion (mm/s)	Airblast Overpressure Criterion (dB Linear Peak)
St Phillips Church	5	-
Former Warkworth Public School ⁴ , Piggery and Butcher's Hut, former Queen Victoria Inn, Springwood Homestead	5 ⁴	133
Wambo Homestead Complex 1	5 ¹	120
Montrose Property	N/A ²	-
Dog-leg Fence	No limits specified	-

- 1 Ground vibration and air blast levels experienced at the Wambo Homestead Complex (WHC) blast monitoring station are not to exceed the structural damage assessment criteria prescribed by Australian Standard AS 2187.2-2006 'Explosives—Storage and use Part 2: Use of explosives' to prevent damage to the heritage items. The latest version of AS 2187.2-2006 no longer has reference to Sensitive and Heritage Structures which previously placed a PPV at 5mm/s criteria for the WHC. United will continue to apply this conservative PPV limit but will continue to undertake further monitoring and assessments if there is a need to modify this criteria in the future.
- 2 Montrose Property is predicted to experience vibration impacts up to 14mm/s as per the Blasting Impact Assessment (Enviro Strata Consulting, 2016). As a result of the predicted impact, heritage archival recording will be undertaken on the Montrose shearing shed, and a structural assessment will be completed on the Montrose Property prior to blasting within 500m, to mitigate impacts on the structure.
- 3 The Dog-leg Fence is in a state of disrepair and is structurally unsound. No vibration limits are specified. The Dog-leg Fence will be managed in accordance with the Historic Heritage Management Plan.
- 4 Agreement with HVO for Former Warkworth Public School vibration criteria has increased from 5mm/s to 10mm/s.

3.3.2 Performance Metrics

Additional performance metrics relevant to this BMP are listed in **Table 3-7**. The Drill and Blast Supervisor is responsible for managing compliance with these metrics.

Table 3-7: Additional Performance Metric - Blasting

Metric	Allowance
Blast Timing	Between 9am and 5pm, Monday to Saturday Inclusive ¹
Number of Blasts	Maximum of 3 single blast events a day; Maximum of 15 single blast events a week, averaged over a calendar year.

Metric	Allowance
Road Closure – Golden Highway	One closure per day ²

Notes to Table 3-7:

1. No blasting is allowed on Sundays, public holidays or any other time without the prior written approval of the Planning Secretary.
2. Except where required for blast misfires or blasts required to ensure the safety of the mine, its workers or the general public.
 - a. A blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine. For the avoidance of doubt, should an additional blast be required after a blast misfire, this additional blast and the blast misfire are counted as a single blast (for the purposes of counting blasts per day or per week).

3.4 Requirements of this Plan

United Wambo operations and support teams undertake consistent approaches to ensure that all approvals and licences are obtained and managed in accordance with conditions. **Section 3.4** outlines those approvals, licences and other regulatory requirements on applicable to United Wambo, obligations are added to the compliance management system to ensure compliance is managed.

3.4.1 Statutory Requirements

3.4.1.1 Development Consent

United Wambo received **Development Consent (SSD 7142)** in accordance with Part 4 of the **Environmental Planning & Assessment Act 1979 (EP&A Act)** from the NSW Independent Planning Commission (IPC), on 29 August 2019. Conditions within **SSD 7142** relating to blast management, and where these are addressed within this document, are provided in **Appendix A -0** (Table A1).

Further commitments relating to blast management were made during the environmental assessment phase of the project. These commitments are summarised in Appendix B - (Table B1).

3.4.1.2 Environment Protection Licence

United Wambo operates under **EPL 3141**, issued by the **NSW Environment Protection Agency (EPA)** under the authority of the **Protection of the Environment Operations Act 1997 (POEO Act)**. Conditions within **EPL 3141** that regulate blasting at the United Wambo are provided in **Appendix A -** (Table A2).

3.4.2 Other Approvals/Policy

3.4.2.1 Road Occupancy Licence

United Wambo have been issued Road Occupancy Licence No. 1811500 (**Appendix G -**) - Approval from Roads and Maritime Services (RMS). United Wambo will renew the licence annually or as required to allow road closures of the Golden Highway

3.4.2.2 Use of a Council Road – Works Within a Road Reserve

United Wambo have been issued an Approval for Use of a Council Road – Application No. 17644/2022 (**Appendix H -**), approved from Singleton Council (SC). United Wambo will renew the approval annually or as required to allow road closures of Comleroi Road.

3.5 Preparation and Implementation

3.5.1 Preparation of BMP

The Blast Management Plan has been prepared for United Wambo to guide blasting practices, and has been developed in consideration of internal and external requirements listed in Section 3.4 and the existing Wambo Coal Pty Ltd plans and strategies.

The following supporting documents were prepared and implemented in conjunction with the BMP:

1. Road Closure Management Plan
2. Blast Fume Management Strategy.

As part of the July 2024 review of the BMP, these documents were consolidated into the BMP. This change provides a better overview of all impacts and management measures, while also removing duplication across blasting related documents.

Any commitments associated with these supporting documents have been identified (in the Statement of Commitments at the front of this document) and addressed in the relevant sections of this BMP. Where further detail is required on the processes to be implemented to address the commitment, then this detail is included within appendices.

3.5.1.1 Suitably Qualified Person

United Wambo engaged a suitably qualified and experienced person to prepare the initial BMP for the site, in accordance with Condition B21 of **SSD 7142**. The Plan was prepared in accordance with relevant statutory requirements (including approvals and EIS commitments) and was approved by the then NSW Department of Planning, Industry and Environment (DPIE, now NSW DPE) on 31 March 2020. A copy of the approval is attached in **Appendix B -**.

3.5.1.2 Stakeholder Consultation

This BMP has been prepared in consultation with the EPA and submitted to the Planning Secretary for approval.

The EPA was contacted and provided with the opportunity to provide comment and feedback on the management plans prepared for **SSD 7142**, including the BMP. The EPA noted that they do not undertake consultation for management plans and, as such, offered no comment in relation to these plans apart from ensuring that the plans consider the conditions of any Environment Protection Licence conditions in force at the time (Appendix C -).

In addition, the following stakeholders were consulted as part of the preparation of the BMP and supporting documents outlines in Section 3.5.1.4.

- Hunter Valley Gliding: in relation to procedures associated with blasting onsite;
- Roads and Maritime Services and Singleton Council: in relation to road closures and traffic management plans.

United Wambo continue to consult with these stakeholders as required as part of management plan reviews.

3.5.1.3 BMP Hold Points

The BMP was reviewed and revised (when applicable) in accordance with the following hold points of **SSD 7142**:

- prior to the commencement of Phase 1B (Version 3) and approved by DPE on 31 March 2020. Phase 1B commenced on 17 July 2020.
- prior to the commencement of Phase 2 (Version 4) and approved by DPE on 19 November 2020. Phase 2 commenced on 1 December 2020.

Further details on these revisions are included in the change information table in **Section 9.3**.

3.5.2 Implementation of BMP

United Wambo will implement the approved BMP (which includes the Blast Fume Strategy and Road Closure MP), in accordance with relevant statutory requirements (including approvals and EIS commitments).

A copy of the currently approved BMP is publicly available on the United Wambo website. The approval letter from DPE is included in **Appendix C** -.

4. Implementation

4.1 Training and Awareness

Effective implementation and maintenance of this plan depends on the competency of the United Wambo Workforce and its Contractors.

Training is provided to relevant personnel in accordance with the site Training Needs Analysis and the **United Wambo EM Strategy**. For further details, refer to the **United Wambo EM Strategy**.

4.2 Response Mechanisms and Strategies

The blast response strategy is based on a combination of proactive and reactive mechanisms to achieve compliance with approval obligations and commitments.

4.2.1 Proactive Mechanisms

Proactive blast management involves the planning of activities in advance of blasting, to minimise impacts on the community, road users, infrastructure and livestock. Specifically, proactive blast management includes:

- Implementation of a robust blast design and planning process;
- Implementation of a pre-blast assessment process, including a review of forecast meteorological conditions and assessment of predicted ground vibration and airblast overpressure levels; and
- modification of planned mining activities, as appropriate, to minimise blast impacts.

4.2.2 Reactive Mechanisms

Reactive blast management includes the modification or suspension of activities in response to triggers:

- meteorological conditions, such as dry, windy conditions, with winds blowing towards sensitive receptors;
- blast misfires

4.3 Management and Mitigation Measures

United Wambo will use a number of measures to minimise the blast impacts outlined in **Section 3.2**. Implementation of the mitigation measures identified in **Table 4-1** ensures United Wambo are taking reasonable steps to:

- ensure the safety of people and livestock from blasting impacts of the development;
- protect public and private infrastructure and property in the vicinity of the site from blasting damage associated with the development; and
- minimise the dust and fume emissions of any blasting.

Instances where a blast impact and associated management measure are applicable to another environmental or community aspect, the control measures and procedures may be detailed in that applicable management plan. The following management plans cross-over with the BMP:

- ***Air Quality and Greenhouse Gas Management Plan***: blast related emissions;
- ***Social Performance Management Plan*** (SPMP): consultation with stakeholders regarding blast impacts;
- ***Historic Heritage Management Plan*** (HHMP): photo archival reports and investigations.

OBJ

Table 4-1: Management Measures relating to Blasting

Control Type	Impact Type	Management Measure	Trigger/Evidence	Responsibility
Blast Design	Blast Vibration Impacts Social Inconvenience and Road Access Limitations	As part of the blast design process, United Wambo will: • Not undertake simultaneous blasting from the two open cut pits (i.e. Wambo Open Cut and United Open Cut). • Use all reasonable efforts to co-ordinate the timing of blasting at the site with nearby mines to minimise cumulative blasting impacts, including road closures. • United Wambo will not close the Golden Highway more than once per day due to blasting, except where required for blast misfires or blasts required to ensure the safety of the mine, its workers or the general public. Closures will be managed in consultation with HVO in order to minimise closures, and avoid peak traffic periods. • Adopt Glencore blasting procedures relating to fume management, including implementation of a pre-blast assessment protocol that outlines the process for designing blasts to meet the relevant criteria and minimise impacts (refer to Appendix E for additional information). • Notification is provided to all nearby mining operations, Singleton Council and Transport NSW by email. Notifications associated with closure off Comleroi Road for any blast after 7:00am, must be by 12 noon on the previous working day. Changes to the design may include limiting the charge mass of blasts close to potentially affected locations or other blast vibration management controls (e.g. optimisation of initiation design).	Blast Design	Technical Services Dept
Pre-blast Assessment Process	Blast Vibration Impacts Social Inconvenience and Road Access Limitations	A pre-blast review of weather conditions so as to avoid blasting in adverse conditions, and changes to the design may include limiting the charge mass of blasts close to potentially affected locations or other blast vibration management controls (e.g. optimisation of initiation design).	Pre-blast Assessments	Environment and Community Dept

Control Type	Impact Type	Management Measure	Trigger/Evidence	Responsibility
Stakeholder Communication	Social Inconvenience and Road Access Limitations	United Wambo will operate a suitable system to enable interested members of the public to get up-to-date information on the proposed blasting schedule on the site and associated public road closures, including notification via SMS message of the blasting schedule and associated road closures for that day and any variations to that schedule and closures.	Website / Procedures / Consultation Records	Environment and Community Dept
Agreements	Vibration and overpressure	United Wambo can vary the blasting criteria if an agreement has been executed owner/s of the residence or infrastructure and advised the Department in writing the terms of the agreement. No blasting was permitted within 500m of any public road without an agreement and approval from the department.	Executed agreements	Environment and Community Dept
Blast Exclusions	Flyrock	Implement appropriate exclusion zones to manage the risk of flyrock. This includes the closure of the Golden Hwy and Comleroi Rd when within the exclusion zone (refer to Appendices I, J and K for more information). Equipment will be available to clear potential flyrock from roadways.	PTO	Drill and Blast Dept
Road Closures	Social Inconvenience and Road Access Limitations	Road licences are required for closure of public roads. The following processes are implemented for road closures: • Traffic control must follow approved plans and be managed by a qualified person, • stoppages limited to 15 minutes. • United inspects and repairs any damage • long-term signage must be installed at closure points to inform the public of delays, including a contact number for inquiries. • Shift Activation website to manage the ROL	PTO	Drill and Blast Dept

4.3.1 Pre-Blast Assessment Protocol

A pre-blast assessment protocol has been established so that the implications of adverse meteorological conditions are considered prior to blasting. The adverse meteorological conditions may have the potential to exacerbate dust, fume and overpressure impacts.

A weather forecast assessment is made on a daily basis and constraints are determined based on wind speed and direction and the potential for temperature inversions that may influence the impact of blasts on the community in accordance with the pre-blast assessment protocol. Constraints with regard to wind speed, wind direction and temperature inversions will be reviewed on an as required basis and modified where appropriate.

4.3.1.1 Product Selection

Product selection for wet or dry holes and various geological conditions will be in consideration of factors outlined in **Appendix E - Blast Fume Mitigating Factors** and **Figure 4-1**, using the most accurate information from drill hole dip records when available.

Where evidence of water is present, both in hole and strata moisture, United Wambo will utilise emulsion based bulk explosive product to reduce the potential adverse effects water has on Amonium Nitrate, however, this product adds significant cost to drill and blast activities. Therefore, to minimise mining costs where United Wambo considers conditions are suitable, as determined by the Drill & Blast Engineer, in consultation with the Shotfirer, United Wambo will use alternative explosive products.

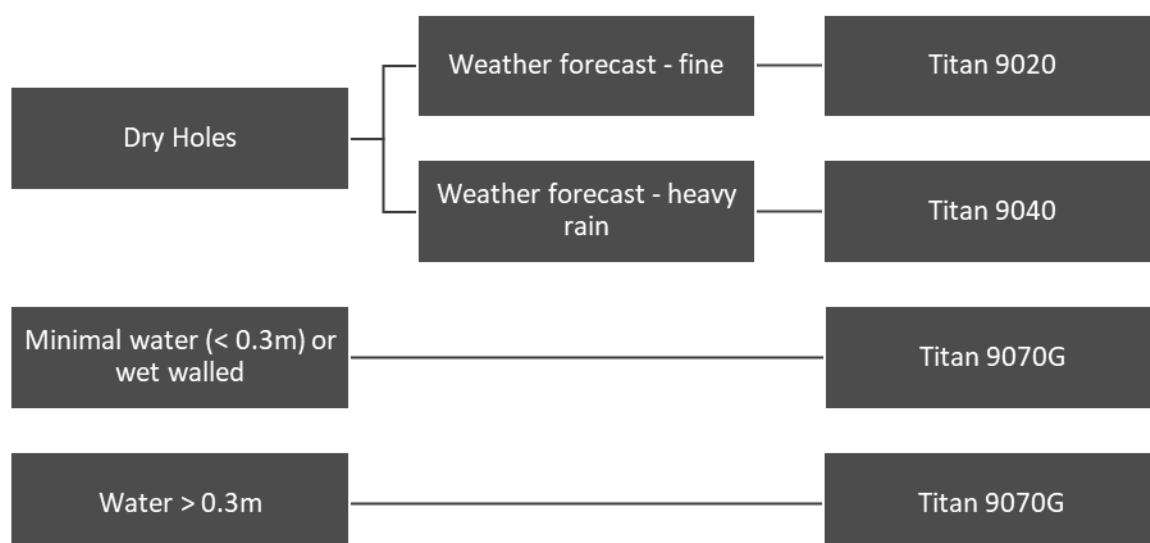


Figure 4-1: Explosives Product Selection Matrix

4.3.2 Pre-Blast Notification

4.3.2.1 Community

United Wambo will operate a Community Response Line and email address to address any pre-blast enquiries. United Wambo also provides a blast SMS notification service to members of the community

who have registered for the service. The SMS message with blasting details is sent out the day before the scheduled blast event.

Registering for the Blast SMS service involves calling the Community Response Line or emailing the email address detailed below and requesting a mobile number be added to the list.

- 24-hr Community Response Line: 1800 801 440
- E-mail enquiries – UnitedEnvironmental@glencore.com.au

4.3.2.2 Hunter Valley Gliding club and Singleton Clay Target Club

United Wambo will notify the Hunter Valley Gliding Club and Singleton Clay Target Club at the start of each week of the blast dates and times for the upcoming week. Should a planned blast date align with days that activities are being undertaken at either location, then further consultation will be undertaken regarding specific management measures such as exclusion areas, forecast meteorological conditions and predicted impacts.

Suitable representatives from each organisation will also be included on the blast SMS services described in **Section 4.3.1.1**.

United Wambo has negotiated an agreement with Hunter Valley Gliding Club Cooperative Limited. This agreement encompasses blasting notification, adjustment of operations where practicable and impact mitigation.

4.3.2.3 Other Mines

United Wambo will liaise with the operator of Hunter Valley Operations in relation to the coordination of blasts to avoid concurrent blasting and, therefore, cumulative airblast and vibration impacts. To prevent cumulative blasting impacts with surrounding mines, United Wambo includes the Drill & Blast Supervisors from Mount Thorley Warkworth Operations and Hunter Valley Operations (HVO) on all blast email notifications. Should blasting activities be scheduled to be fired simultaneously by United Wambo and another operation, blasts will be rescheduled in consultation with the other operation.

The assessment of concurrent blasts is included in the Pre-Blast Assessment Protocol.

In the event of a blast event being rescheduled, further email notification is made alerting neighbouring mining operations of the change.

Due to close locations of HVO South and Wambo Underground, United Wambo has introduced an additional level of communication with these mines to minimise impact on both sides. United Wambo will continue liaise with the adjacent Wambo Underground and manage potential fume, dust ingress and vibration impact into underground workings. United Wambo and adjacent HVO South will require more advanced interaction as both operations can impact on each other (i.e. road closures, vibrations, dust and fumes).

As a Joint Venture partner United Wambo has liaised with Wambo Coal regarding the impacts of the United Wambo Open Cut. United Wambo will utilise the existing Wambo Coal blast criteria for the Wambo Underground Mine and CHPP in the design of blasts. Blast vibration predictions will be calculated using a site law calculator. If vibration is predicted to be above existing Wambo Coal criteria, the blast design will be amended until it satisfies the nominated criteria. Blast hole loading practices will include recording the mass of explosives loaded in each last hole that is then available to be verified against the blast design criteria. Any significant observed exceptions will be remodelled to determine compliance with the blast criteria for the Wambo Underground Mine and CHPP. If remodelling indicates an exceedance of blast criteria, remedial action will be taken on the blast which may include removing explosives from blast holes prior to firing.

United Wambo will aim to provide email notice three days in advance of blasting to Wambo operations (underground mine, CHPP, and train loading facilities) nominated representatives. In exceptional circumstances where a blast must be fired ahead of schedule without three days notification (e.g. spontaneous combustion adjacent to blast hole loading), United Wambo will liaise directly with nominated Wambo operations representatives to prioritise the safety of personnel and coordinate firing the blast safely in consideration of all operations.

In the initial blast notification, United Wambo will provide the location of the blast and the predicted vibration at the underground entry and CHPP. On the day of the blast a United Wambo representative will confirm the blast time with nominated Wambo Coal operations representatives. The Wambo Coal Underground Mine and CHPP will utilise the information provided to determine the appropriate action to be taken at the time of the blast in accordance with their own Safety Management Systems.

As Glencore is a Joint Venture partner with Yancoal in ownership of Hunter Valley Operations (HVO), United Wambo has landholder permission and an agreement with HVO to blast adjacent to HVO land.

The agreement includes processes to manage advance blast notifications, placement of blast sentries on HVO land when the blast exclusion zone encroaches HVO land, monitoring of vibration limits on critical HVO infrastructure, process to manage exceedance of the blast criteria and mitigation methods.

United Wambo will contact HVO for all blasting operations to best minimise cumulative dust/fumes coming from both sites blasting at the same time of day. United Wambo will also communicate with HVO whether United Wambo requires a road blast guard on HVO's site, for HVO roads falling within the blasting perimeter.

4.4 Baseline Property Inspections/Assessments/Recordings

4.4.1 Private Landholders

In accordance with SSD 7142 Condition D4, United Wambo was required to notify landholders and existing tenants of their rights under the consent (offer all private landholders located within 2 kilometres of the Project extraction areas a property inspection prior to the commencement of blasting) and to provide any contextual information within one month of the date of consent.

In accordance with SSD 7142 Conditions B13 to B17, United Wambo have an ongoing requirement to complete property inspections or investigations as requested by private landholders. This includes:

- engaging a suitably qualified, experienced and independent person; and
- providing the landholder a copy of the report findings
- organise repairs as and when required

The ***Social Performance Management Plan*** details the notification and structural assessment processes for landholders and is the source of compliance to ensure notifications are made when required.

4.4.2 Historic Heritage

United Wambo completed condition assessments on all historical sites (excluding those that will be removed or subject to archival recording) located within 2 kilometres of the extraction areas prior to the commencement of blasting. Further detail on these assessments is included in the ***Historic Heritage Management Plan***.

5. Measurement and Evaluation

5.1 Monitoring

5.1.1 Blast Monitoring Program

The United Wambo Blast Monitoring Program has incorporated the former Wambo Coal BMP and includes monitoring of airblast overpressure and ground vibration for all blasts at locations as close as reasonably practical to the nearest private residential receivers (refer **Figure 5-1**).

Monitoring will also be undertaken at relevant public/private infrastructure, heritage sites and the Wambo Homestead Complex.

The objective of the monitoring program is to obtain assurance that ground vibration and airblast overpressure limits are being achieved at private residential receivers and that damage criteria are being achieved for public/private infrastructure, heritage sites and the Wambo Homestead Complex.

The details associated with the United Wambo blast monitoring network have been summarised in **Table 5-1**.

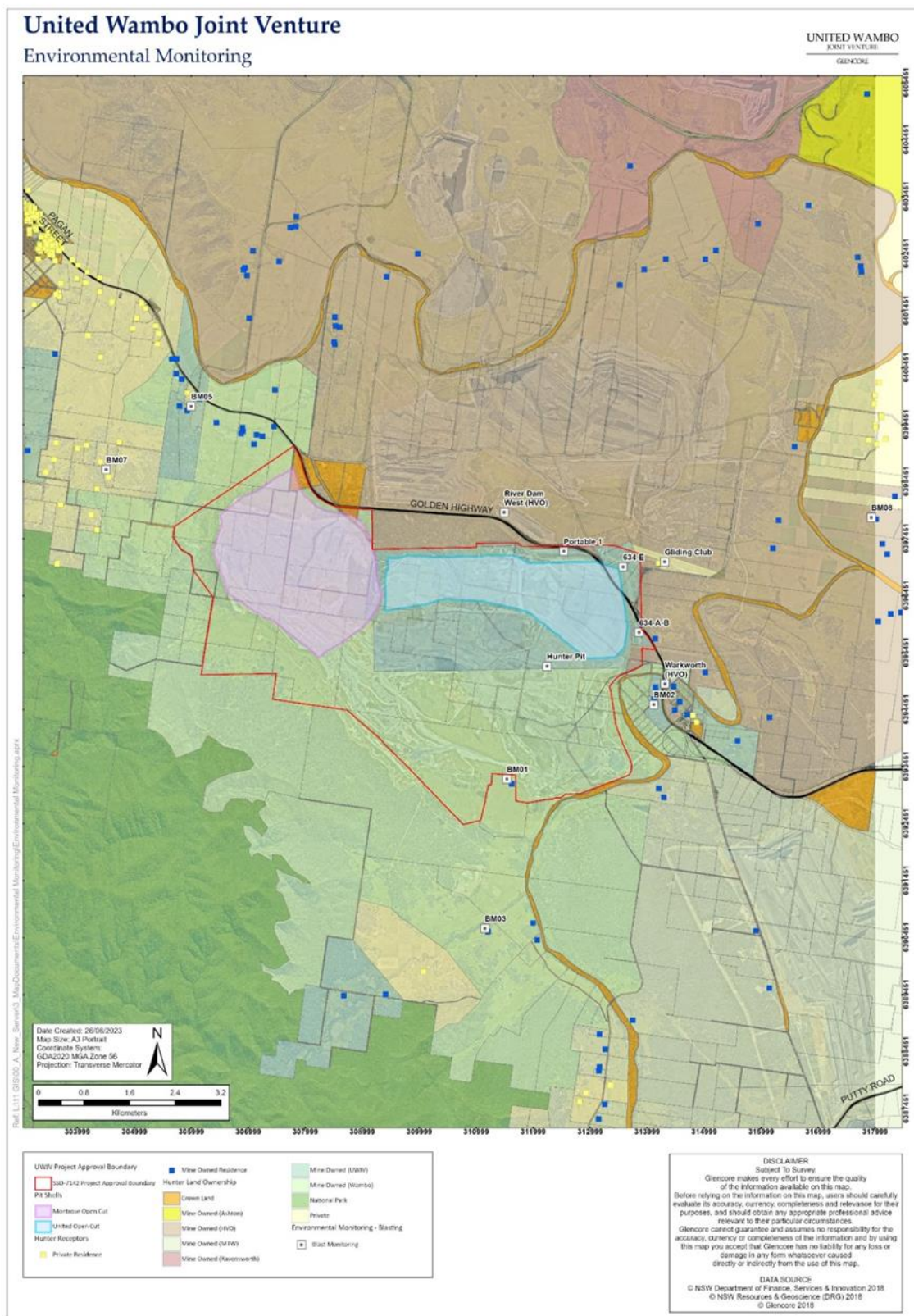


Figure 5-1 Blast Monitoring Locations

Table 5-1: Blast Monitoring Locations

Monitoring Site	Parameter	Easting	Northing	Location	Equipment Type	Frequency	Standard	Purpose
BM01	Ground Vibration & Airblast Overpressure	311537	6393235	Wambo Homestead	Fixed monitor – geophone & microphone	Continuous during blast	AS2187.2-2006	Compliance
BM02	Ground Vibration & Airblast Overpressure	314114	6394542	Warkworth Village	Fixed monitor – geophone & microphone	Continuous during blast	AS2187.2-2006	Compliance
BM03	Ground Vibration & Airblast Overpressure	311151	6390613	South Wambo	Fixed monitor – geophone & microphone	Continuous during blast	AS2187.2-2006	Compliance
BM05	Ground Vibration & Airblast Overpressure	305994	6399774	Moses Crossing	Fixed monitor – geophone & microphone	Continuous during blast	AS2187.2-2006	Compliance
BM07	Ground Vibration & Airblast Overpressure	304502	6398663	Redmanvale Road	Fixed monitor – geophone & microphone	Continuous during blast	AS2187.2-2006	Compliance
BM08	Ground Vibration & Airblast Overpressure	317932	6397824	Maison Dieu	Fixed monitor – geophone & microphone	Continuous during blast	AS2187.2-2006	Compliance

5.1.2 Blast Videos

All blasts will be video recorded to capture the post blast environment. The video camera will be staffed, where practicable, in order to follow the path of any fume generated. All videos will be a minimum duration of 1 minute following the blast event or until the fume dissipates or leaves the view of the camera. All blasts at the Project will be fume rated applying the AESIG (2011) Visual NOx Fume Rating Scale (or equivalent).

5.1.3 Blast Fume Monitoring Trial

United Wambo committed to undertake an assessment and trial of potential methods for monitoring post blast fume within two years of the commencement of Phase 2 of the Project, including the use of fixed and mobile gas monitoring equipment. The trial was to determine the feasibility and benefit of utilising the monitoring equipment in comparison to using the AESIG (2011) Visual NOx Fume Rating Scale to determine offsite impacts. The assessment was to include:

- review of the outcomes of other fume monitoring trials, including the trial undertaken at the nearby Ravensworth Open Cut; and
- investigation of available fume monitoring technology.

United Wambo undertook a review of other fume monitoring trials and investigated fume monitoring technology. United Wambo has determined that, due to the environmental performance of the site (where no Level 3 or above blast fume events have been recorded offsite to date) and the difficulty in placing monitors in appropriate locations onsite to record fume events onsite, current blast fume management practices being trialled and implemented on site to reduce the occurrence of fume during blasting activities is a more appropriate outcome and should be continued.

Since commencement of blasting activities in April 2020, United Wambo have implemented strict controls when loading and firing blasts, to minimise the probability of producing blast fume. Site controls that have been implemented, or are planned to be implemented, at United Wambo are as follows:

- use of dust, blast fume and inversion modelling using predictive meteorological data;
- use of a dewatering truck to improve hole conditions prior to loading;
- changes in product selection and introduction of air decks in the blast hole to improve explosives confinement;
- changes in initiation sequence to improve interactions with major strata joint sets, which reduces the chance of explosive running away and burning off during the initiation sequence;
- changes in powder factors, k-factor, stemming height;
- analysis of site trends in material fragmentation; and
- use of blast hole liners to minimise explosive downhole contamination, where required.

United Wambo will continue to implement best practice blasting procedures with the aim of minimising the occurrence of blast fume during blasting activities. Blast models will be used in conjunction with historical data to give the most accurate prediction models.

5.2 Compliance Management

Compliance management is an ongoing process and is conducted in accordance with the **United Wambo EM Strategy** – which provides the process for planning and executing the assurance program. The main compliance management processes conducted by United Wambo include:

- workplace interactions and planned task observations
- inspections
- audits
 - validation of monitoring data
 - internal audits
 - external audits

For further details, refer to the **United Wambo EM Strategy**

5.3 Complaint Management

All complaints received by United Wambo are managed in accordance with the **United Wambo EM Strategy**, which details the process to ensure complaints are properly documented and handled in accordance with statutory requirements and company policy. A summary of complaint and grievance management includes:

- acknowledging all complaints by contacting the complainant to discuss the details of the complaint within 24 hours of receipt, where requested/practicable;
- investigating complaints impartially giving proper consideration to the facts and the circumstances prevailing at the time;
- implementing corrective actions if required;
- reporting investigation outcomes and corrective actions taken to the complainant; and
- all complaints are recorded in the compliance management system.
- Community members can raise a complaint/grievance 24 hours/7 days a week by calling the community response line on 1800 801 440.

For further details, refer to the **United Wambo EM Strategy**.

5.4 Incident and Non-compliance Management

All incidents recorded at United Wambo are managed in accordance with the **United Wambo EM Strategy**, which details the process to ensure incidents are properly documented, investigated and reported in accordance with statutory requirements and company policy. Incident and non-compliance management includes:

- all personnel (United Wambo employees and contractors) are required to report environmental incidents/non-compliances to their immediate supervisor/site contact;
- the Supervisor or site contact contacts a member of the United Wambo Environment and Community Department (E&C Department), immediately after becoming aware of the incident/non-compliance;
- the E&C Department determines the appropriate corrective or preventative action required to remediate or prevent a reoccurrence of the incident/non-compliance; and

- the details and final investigation results from all environmental incidents/non-compliance are recorded in the site compliance system

For further details, refer to the **United Wambo EM Strategy**.

Incidents which are reportable to an external stakeholder are outlined in **Table 5-2**.

Table 5-2 Blasting reportable incidents

Incident	Stakeholder	Trigger
Exceedance of blast criteria	DPHI EPA CCC Near Neighbour/Tenant (only those impacted)	Results above criteria outlined in section 3.3
Blast Fume - level 3 leaving site - level 4 or 5	DPHI EPA CCC Near Neighbour/Tenant (only those impacted)	Review of blast against AEISG (2011) Visual NOx Fume Rating Scale Refer to PIRMP

If exposure to fume has occurred, the steps outlined in the **Post Blast Fume Personnel Exposure Procedure** are to be followed.

5.4.1 Fume Event

In the event of a blast fume event:

- The Blast Supervisor is to advise affect personnel of the fume event and provide direction on what to do to avoid being affected by the fume.
- The ECM or delegate is to call sensitive receptors if there is a potential that the fume could or is migrating to their residence

5.4.1.1 Recording Blast Fume Events

All blasts will be video recorded to capture the post blast environment. The video camera will be manned where possible in order to follow the path of any fume generated. 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 for a minimum of one year on site.

In the case of a fume event, video recording of the blast events is utilised to assist in the determination of an appropriate fume ranking for reporting purposes. All blasts at United Wambo will be fume-rated applying the AESIG (2011) Visual NOx Fume Rating Scale:

Each blast will be ranked when fume is at its greatest extent. 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.

5.4.1.2 Fault Tree Analysis

Should NOx be produced in a surface blast, the following fault tree (**Figure 5-2**) can be used to identify which of the fundamental causes was the significant contributor to the generation of NOx. Once the

likely causes have been identified, appropriate action plans can then be put in place to mitigate and reduce the generation of NOx from future surface blasts. The fault tree can also be used to educate those responsible for surface blasts as to their responsibilities in ensuring appropriate steps are taken in the design, loading and firing of the blast to minimise the likelihood of generating NOx from the blast.

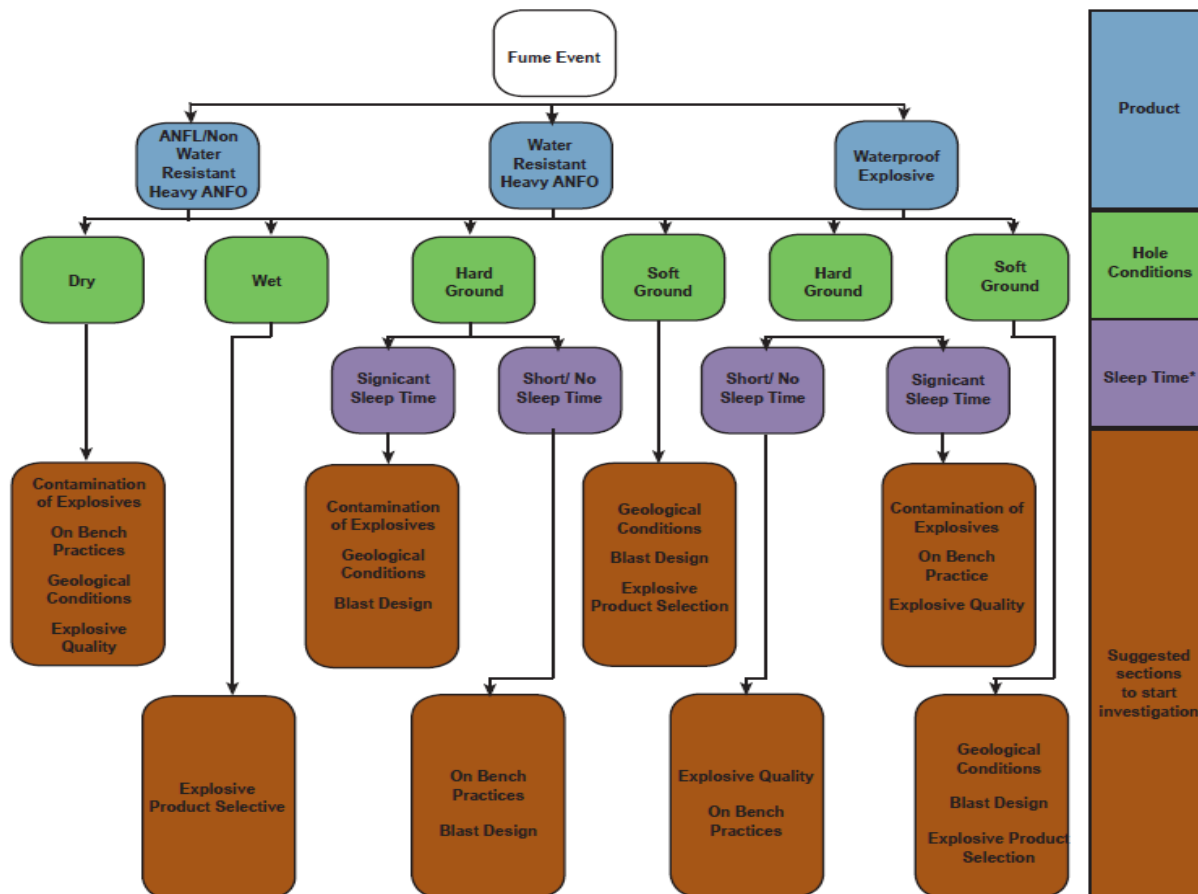


Figure 5-2: Fume Event Fault Tree Analysis (AEISG Code of Practice)

5.5 Reporting/Access to Information

Reporting of blast monitoring results and performance will be undertaken in accordance with the schedule outlined in the **EM Strategy, Section 5.5**.

5.6 Record Keeping

All environmental monitoring data is maintained in accordance with the **EM Strategy** and maintained on the premise for a period of four years.

6. Review and Improvement

6.1 Continuous Improvement

Where possible, United Wambo will implement all reasonable and feasible best practice blast mitigation measures. The basis for continuous improvement of blast mitigation measures will be through the ongoing monitoring of blast impacts and the corrective/preventative action process outlined in **Section 5.4.1.3** of the **United Wambo EM Strategy**.

The main avenues for continuous improvement are through site evaluation processes, which includes:

- Monitoring (**Section 5.1**)
- Compliance Management (**Section 5.2**)
- Complaint Management (**Section 5.3**)
- Incident and Non-compliance Management (**Section 5.4**)

6.2 Plan Review

This BMP and associated documents will be reviewed in accordance with **SSD 7142** and the United Wambo **EM Strategy**. Where changes to the BMP (including management measures or monitoring programs) are required, the DPHI will approve the proposed changes prior to implementation.

6.3 Change Management

All changes to operations, facilities, plant equipment and production processes are required to be assessed in accordance with the change management process.

Change management will be undertaken at United Wambo in accordance with the **United Wambo EM Strategy**, which provides the process for managing the risks associated with change. For further details, refer to the **United Wambo EM Strategy**.

7. Accountabilities

Table 7-1 summarises the accountabilities of personnel involved in the implementation of this BMP.

Table 7-1: BMP Accountabilities

Role	Responsibilities
Operations Manager	• provide adequate resources for the implementation of this plan.
Mine Manager	• ensure blasting controls/measures are understood and used as intended for effective blast management.
Drill and Blast Superintendent (DBS), and Environment & Community Manager (ECM)	• Identify potential blasting impacts and implement actions to mitigate the identified risks; • Coordinate and conduct training to ensure all relevant personnel are aware of fume management practices and mitigation measures;

Role	Responsibilities
	- coordinate incident investigation processes including associated reporting requirements in accordance with legal requirements and incident reporting procedures; and - coordinate the implementation of corrective actions and evaluate their effectiveness; and - ensure all internal and external reporting requirements are met.
Environment & Community Officer	- coordinate, advise and assist with the implementation monitoring in accordance with this plan; - maintain procedures to ensure potential impacts are identified; - coordinate monitoring surveys and develop proactive strategies to minimise impacts; - maintain monitoring equipment in accordance with the requirements of the Project Approval and this plan; - complete blasting monitoring reports and make these reports available on the United Wambo website as per the requirements of the Project Approval; - investigate and document findings from blasting complaints; - provide input regarding the effectiveness of blast mitigation measures; and - complete reporting requirements for the Annual Review associated with this plan.
Department Managers	- ensure personnel undertake the relevant blast management training; - assist in the coordination of monitoring surveys and development of proactive strategies to minimise blast impacts; - ensure that personnel and contractors carry out work in accordance with this BMP; and - provide input regarding the effectiveness of blast mitigation measures.
All Employees and Contractors	Undertake all activities in accordance with this BMP

8. Acronyms and Definitions

Table 8-1 summarises the acronyms and definitions relating to this BMP.

Table 8-1: BMP Acronyms and Definitions

Term	Description
DPE	NSW Department of Planning and Environment
DPHI	NSW Department of Planning, Housing and Infrastructure
EPA	NSW Environment Protection Authority
EPL3141	Environment Protection Licence 3141
SSD7172	Development Consent SSD7142
TARP	Trigger Action Response Plan

9. Document Information

Relevant legislation, standards and other reference information must be regularly reviewed and monitored for updates and should be included in the site management system. Related documents and reference information in this section provides the linkage and source to develop and maintain site compliance information.

9.1 Related Documents

Related documents, listed in **Table 9-1** below, are *documents* directly related to or referenced from within this document.

Table 9-1 – Related documents

Number	Title
HSEC POL 0005	Glencore Environmental Policy
HSEC POL 0006	Glencore Community and Stakeholder Engagement Policy
GCAA-625378177-10324	GCAA 11.10 Air Quality Management Protocol
GCAA-625378177-10245	GCAA 11.10 Mobile Crushing Unit Dust Management
GCAA-625378177-10246	GCAA 11.10 Drill Dust Management
GCAA-625378177-14786	11.01 Real Time Monitoring
UWOC-1689771511-360	United Wambo Environmental Management Strategy

9.2 Reference Information

Reference information, listed in **Table 9-2** below, is *information* that is directly referred to for the development of this document.

Table 9-2 – Reference information

Reference	Title
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EP&A Regulation	Environmental Planning and Assessment Regulation 2000 (NSW)
POEO Act	Protection of the Environment Operations Act 1997
POELA Act	Protection of the Environment Legislation Amendment Act 2011
EPA, 2022	Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales, December 2007
EPA, 2005	Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, August 2005
AS/NZS 3580.1.1:2007	AS/NZS 3580.1.1:2007 Guide to siting air monitoring equipment

Reference	Title
AS 3580.10.1-2003	AS 3580.10.1-2003 Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method
AS/NZS 3580.9.3-2003	AS/NZS 3580.9.3-2003 Methods for the Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – Total Suspended Particulate Matter (TSP) – High Volume Air Sampler Gravimetric Method
AS 3580.9.6-2003	AS 3580.9.6-2003 Particulate Matter - PM ₁₀ - high volume sampler with size-selective inlet
AS 3580.9.8-2008	AS 3580.9.8-2008 Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM ₁₀ continuous direct mass method using a tapered element oscillating microbalance analyser
Donnelly et al, 2011	NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and / or Minimise Emissions of Particulate Matter from Coal Mining, Katestone Environmental Pty Ltd for NSW Office of Environment and Heritage, Donnelly S-J, Balch A, Wiebe A, Shaw N, Welchman S, Schloss A, Castillo E, Henville K, Vernon A and Planner J (2010), December 2010
EPA, 2012	EPA (2012) "Air Emissions Inventory for the Greater Metropolitan Region in New South Wales, 2008 Calendar Year, Off-Road Mobile Emissions". Technical Report No. 6. Prepared by the Environment Protection Authority. EPA 2012/0050. August 2012
Jacobs, 2016	United Wambo Project Air Quality Impact Assessment
Umwelt, 2016	United and Wambo Open Cut Coal Mine Project Environmental Impact Statement, Umwelt, August 2016
Jacobs, 2018a	United Wambo Project Response to Submission Part A Report, Umwelt & Jacobs 2018
Jacobs, 2018b	United Wambo Air Quality Impact Assessment for Independent Planning Commission, Jacobs July 2018
Jacobs, 2021	Air Quality Assessment of Modification to United Wambo ROM Coal Stockpile, Jacobs, 15 June 2021

9.3 Change Information

Full details of the document history are recorded in the document control register, by version. A summary of the current change is provided in **Table 9-3** below.

Table 9-3 – Change information

Version	Date	Change Details
D.1	September 2019	New document (Prepared by United Wambo reviewed by Jacobs)
1.0	November 2019	Updated to address comments received from Department of Planning, Industry and Environment
1.1	April 2020	Updated Environmental Protection Licence requirements
1.2	June 2020	Updated to address comments received from NSW Department of Planning, Industry and Environment prior to commencement of Phase 1B

Version	Date	Change Details
2.0	July 2020	Updated to address comments received from NSW Department of Planning, Industry and Environment prior to commencement of Phase 2
3.0	November 2020	Updated for Phase 1B
4.0	February 2021	Phase 2 AQGHGMP
5.0	November 2021	Updated following Independent Environmental Audit Report and Annual Review. Updates made to: • Correct formatting errors • Meteorological Trigger Action Response Plan • Dust Trigger Action Response Plan
6.0	April 2022	Revised post Modification 1 approval
7.0	August 2022	Minor formatting and revision of version number
draft 8.0	July 2024	Updated following 2023 IEA. Key changes have been outlined in a Summary of Changes Document provided to the DHPI on 16 August 2024. Blast sentry terminology changed to Blast Guard 6 November 2024.

Appendix A - Statutory Requirements Relating to the BMP

Source	Reference	Obligation
SSD7142	<i>SSD 7142 Condition B10</i>	<i>The Applicant must only carry out blasting on the site between 9 am and 5 pm (Monday to Saturday inclusive). No blasting is allowed on Sundays, public holidays or any other time without the prior written approval of the Planning Secretary.</i>
SSD7142	<i>SSD 7142 Condition B11</i>	<i>The Applicant may carry out a maximum of: (a) 3 single blast events a day; and (b) 15 single blast events a week, averaged over a calendar year.</i>
SSD7142	<i>SSD 7142 Condition B12</i>	<i>Condition B11 does not apply to single blast events that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or to blast misfires or blasts required to ensure the safety of the mine, its workers or the general public. Within conditions B11 and B12, 'single blast event' means a blast which involves either a single detonation or a number of individual blasts fired in quick succession in a discrete area of the development. Should an additional blast be required after a blast misfire, this additional blast and the blast misfire are counted as a single blast event</i>
SSD7142	<i>SSD 7142 Condition B13</i>	<i>If the Applicant receives a written request from the owner of any privately-owned land within 3 kilometres of any approved open cut mining pit on the site for a property inspection to establish the baseline condition of any buildings and structures on their land, or to have a previous property inspection updated, then within 2 months of receiving this request the Applicant must: (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to: (i) establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and (ii) identify measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and structures; and (b) give the landowner a copy of the new or updated property inspection report.</i>
SSD7142	<i>SSD 7142 Condition B14</i>	<i>If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the property inspection report, either party may refer the matter to the Planning Secretary for resolution.</i>
SSD7142	<i>SSD 7142 Condition B15</i>	<i>If the owner of any privately-owned land within 3 kilometres of any approved open cut mining pit on the site or any other landowner where the Planning Secretary is satisfied an investigation is warranted, claims in writing that buildings or structures on their land have been damaged as a result of blasting on the site, then within 2 months of receiving this written claim the Applicant must: (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and (b) give the landowner a copy of the property investigation report.</i>

Source	Reference	Obligation
SSD7142	SSD 7142 Condition B16	<i>If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant must repair the damage to the satisfaction of the Planning Secretary.</i>
SSD7142	SSD 7142 Condition B17	<i>If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Planning Secretary for resolution.</i>
SSD7142	SSD 7142 Condition B18	The Applicant must: (a) take all reasonable steps to: (i) ensure the safety of people and livestock from blasting impacts of the development; (ii) protect public and private infrastructure and property in the vicinity of the site from blasting damage associated with the development; and (iii) minimise the dust and fume emissions of any blasting; (b) ensure that blasting on the site does not damage heritage items, beyond those predicted in the document/s listed in condition A2(c), and develop specific measures to protect heritage items outside the approved disturbance areas from any blasting damage associated with the development; (c) minimise the frequency and duration of any public road closures for blasting, and use all reasonable efforts to avoid road closures during peak traffic periods; (d) operate a suitable system to enable interested members of the public to get up-to-date information on the proposed blasting schedule on the site and associated public road closures, including notification via SMS message of the blasting schedule and associated road closures for that day and any variations to that schedule and closures; (e) use all reasonable efforts to co-ordinate the timing of blasting at the site with nearby mines to minimise cumulative blasting impacts; (f) consult with HVO prior to undertaking any blasting within 500 metres of its operations; and (g) carry out regular blast monitoring to determine whether the development is complying with the relevant conditions of this consent. Notes: ☐ For the location of the heritage items referred to in paragraph (b), refer to the figure in Appendix 5.
SSD7142	SSD 7142 Condition B19	The Applicant must not undertake blasting on the site within 500 metres of any public road or any land outside the site not owned by the Applicant, unless the blast generates ground vibration of 0.5 mm/s or less, or the Applicant has: (a) a written agreement with the relevant infrastructure owner or landowner to allow blasting to be carried out closer to the public road or land, and the Applicant has advised the Department in writing of the terms of this agreement; or (b) demonstrated, to the satisfaction of the Planning Secretary, that the blasting can be carried out closer to the public road or land without compromising the safety of people or livestock or damaging the road or other buildings and structures, and updated the Blast Management Plan to include specific mitigation measures to be implemented while blasting is being carried out within 500 metres of the road or land.
SSD7142	SSD 7142 Condition B20	<i>The Applicant may not close the Golden Highway more than once per day due to blasting, except where required for blast misfires or blasts</i>

Source	Reference	Obligation
		<i>required to ensure the safety of the mine, its workers or the general public.</i>
SSD7142	SSD 7142 Condition B21	<i>The Applicant must prepare a Blast Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:</i> <i>(a) be prepared by a suitably qualified and experienced person/s;</i> <i>(b) be prepared in consultation with the EPA;</i> <i>(c) describe the measures that will be implemented to ensure compliance with the blasting criteria and conditions of this consent;</i> <i>(d) include a Blast Fume Management Strategy for:</i> <i>(i) minimising blast fume emissions;</i> <i>(ii) rating in accordance with Visual NOx Fume Rating Scale (AEISG, 2011), or equivalent, and recording blast fume events; and</i> <i>(iii) reporting significant blast fume events to the Department;</i> <i>(e) describe the proposed blast fume trial for investigating alternative monitoring equipment and how the results would be implemented on the site;</i> <i>(f) include a Road Closure Management Plan for any blasting within 500 metres of a public road, that has been prepared in consultation with relevant roads authorities and includes provisions for:</i> <i>(i) minimising the duration of closures, both on a per event basis and weekly basis;</i> <i>(ii) avoiding peak traffic periods as far as reasonable; and</i> <i>(iii) co-ordinating closures with nearby mines to minimise the cumulative effect of road closures;</i> <i>(g) identify any agreed alternative ground vibration limits for public or private infrastructure in the vicinity of the site (if relevant);</i> <i>(h) include a strategy to manage potential blast interactions with nearby mines, including identifying appropriate blast criteria for nearby underground workings to ensure structural integrity and the safety of underground workers;</i> <i>(i) include a communication protocol with Hunter Valley Gliding Club and Warkworth Shooting Complex to notify the clubs of upcoming blasts which may impact their activities;</i> <i>(j) include a strategy to monitor, mitigate and manage the effects of blasting on heritage items, particularly those identified in the figure in Appendix 5, including undertaking baseline (i.e. pre-blasting) and ongoing risk-based dilapidation surveys (subject to landowner access arrangements); and</i> <i>(k) include a monitoring program for evaluating and reporting on compliance with the relevant conditions of this consent.</i>
SSD7142	SSD 7142 Condition B22	<i>The Applicant must not undertake any blasting until the Blast Management Plan is approved by the Planning Secretary.</i>
SSD7142	SSD 7142 Condition B23	<i>The Applicant must implement the Blast Management Plan as approved by the Planning Secretary.</i>
SSD7142	SSD 7142 Condition B28	<i>The Applicant must:</i> <i>(a) take all reasonable steps to:</i> <i>(i) minimise odour, fume and particulate matter (including PM10 and crustal and combustion PM2.5) emissions of the development;</i>
SSD7142	SSD 7142 Condition B8	<i>The Applicant must ensure that blasting on the site does not cause exceedances of the criteria at the locations shown in Table 2.</i>

Source	Reference	Obligation
		<i>Table 2: Blasting criteria</i> <i>The locations referred to in Table 2 are shown in Appendix 5</i>
SSD7142	<i>SSD 7142 Condition B9</i>	<i>The blasting criteria in Table 2 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or infrastructure to exceed the blasting criteria, and the Applicant has advised the Department in writing of the terms of this agreement.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_002</i>	<i>Blasting will be undertaken 9.00 am to 5.00 pm on Monday to Saturday, with no blasting to be undertaken on Sundays or public holidays.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_020</i>	<i>United will implement Glencore blasting procedures relating to fume management as part of the Project, including a pre-blast review of weather conditions so as to avoid blasting in adverse conditions.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_020</i>	<i>A site specific Blast Management Plan will also be developed and implemented during operations, including key fume management actions, such as defining the potential risk zone based upon weather patterns prior to blasting based on an assessment of real-time weather conditions.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_029</i>	<i>United will implement the blast management controls necessary to meet the relevant criteria for private residences (except where a negotiated agreement exists), infrastructure and other sensitive receivers.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_030</i>	<i>United will manage blasting to meet the existing agreed vibration and overpressure criteria at the Wambo Homestead Complex.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_031</i>	<i>Blasting activities will be undertaken in accordance with a Blast Management Plan to be prepared and implemented for the Project which includes controls to manage safety to people, property and livestock, vibration and airblast emissions and dust and fume emissions. The cumulative effects of blasting will be managed through:</i> <i>o a pre-blast assessment protocol that outlines the process for designing blasts to meet the relevant criteria</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_031</i>	<i>o continued operation of the existing multi-station blast monitoring system for the Wambo Open Cut and installation of an additional monitoring station located to the northeast in the Maison Dieu area</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_031</i>	<i>o operation of a weather monitoring system which allows for the assessment of pre-blast meteorological conditions as part of the pre-blast assessment protocol</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_031</i>	<i>o implementation of appropriate exclusion zones to manage the risk of flyrock.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_032</i>	<i>Blasting will be undertaken between 9.00 am and 5.00 pm Monday to Saturday, with no blasting to be undertaken on Sundays or public holidays.</i>

Source	Reference	Obligation
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_033</i>	<i>Blasting associated with the Project will be limited to a maximum of 15 blasts per week and three blasts per day, with an allowance for additional blasts where there are low vibration blasts or misfires.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_034</i>	<i>Blasting related closures of the Golden Highway associated with the Project will be limited to a maximum of one per day.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_035</i>	<i>United will develop and implement a Blasting Road Closure Management Plan in consultation with RMS and Singleton Council prior to any blasting within 500 metres of any public road.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_036</i>	<i>United will liaise with the operators of adjacent mines in relation to the coordination of blasts to seek to avoid concurrent blasting.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_037</i>	<i>United will liaise with HVO regarding blasting within 500 metres of the Riverview Pit Dam wall.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_038</i>	<i>United will offer all private landholders located within 2 kilometres of the Project extraction areas a property inspection prior to the commencement of blasting for the Project in order to establish the condition of private structures.</i>
SSD7142 EIS SOC Mgmt Measures	<i>SOC_8.0_Management Measures_039</i>	<i>A condition assessment will also be completed on all historical sites (excluding those that will be removed or subject to archival recording by the Project and the Dog leg fence) located within 2 kilometres of the extraction areas prior to the commencement of blasting for the Project.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.05_GHG_009</i>	<i>Section 6.5.5 - Table 6.10 GHGEA 5.3.2 Table 5.2 Page 27 Blasting strategies to improve extraction efficiency and reduce energy usage and associated emissions - Optimisation of blasting management practices to optimise payloads and minimise the need for secondary treatment of waste material.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_001</i>	<i>Section 6.7.1 Blasting within the Wambo Open Cut is currently undertaken between the hours of 9.00am and 5.00pm Monday to Saturday, in accordance with the conditions of the Wambo mine development consent. These conditions permit up to 15 blasts per week and up to three blasts per day that generate ground vibration greater than 0.5 mm/s at any residence on privately owned land, with an allowance for an additional blast required following a blast misfire. United will manage blasting practices for the Project within the limits of these existing blasting conditions. That is, no more than 15 blasts per week or three blasts per day from the combined operation of the Wambo Open Cut and United Open Cut, with an allowance for additional blasts where there are low vibration blasts or misfires.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_002</i>	<i>Section 6.7.1 To avoid any potential issues due to blast interaction, procedures will be put in place to seek to avoid concurrent blasts with the HVO South mine which is located to the north of the Project on the opposite side of the Golden Highway</i>

Source	Reference	Obligation
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_003</i>	Section 6.7.1 <i>This detailed blast design process will be set out in a Blast Management Plan (BMP) to be prepared for the Project and implemented for all blasting activity. This BMP will be prepared in consideration of the relevant aspects of the existing Wambo Open Cut BMP (Wambo BMP 2014) and Wambo Blast Fume Management Strategy (2015) which are currently being implemented at Wambo Mine.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_004</i>	Section 6.7.1 <i>The Project will utilise a mixture of explosive materials depending on the needs of the specific blast design and considering the strata conditions in which the blast will occur. A Nonel delay system or electronic detonators (or alternate achieving the same outcome) will be used to initiate blasts, allowing for single hole initiation to minimised blast impacts.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_005</i>	Section 6.7.5.1 <i>Any blasting impacts in excess of the criteria at residence 19 would be the subject of a negotiated agreement with the resident while it remains privately owned.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_006</i>	Section 6.7.5.2 <i>Flyrock will be managed through the implementation of appropriate exclusion zones and in accordance with a road closure protocol to be developed in consultation with RMS and Singleton Council as part of the Blast Management Plan for the Project.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_007</i>	Section 6.7.5.2 <i>Closures of the Golden Highway will be managed in consultation with HVO in order to minimise the frequency of closures for road users.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_008</i>	Section 6.7.5.2 <i>United will limit road closures associated with the Project on the Golden Highway to a maximum of one per day, consistent with the requirements of the existing Wambo Mine consent.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_009</i>	Section 6.7.5.6 <i>United will liaise with the operators of these mining operations regarding the coordination of blasting activities so as to minimise the possibility of concurrent blasting and therefore cumulative airblast and vibration impacts. Procedures for liaison with the operators of other mining operations will be set out in the Blast Management Plan to be prepared for the Project.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_010</i>	Section 6.7.6 <i>Blasting activities will be undertaken in accordance with a Blast Management Plan to be prepared and implemented for the Project. This Blast Management Plan will be prepared in consideration of the relevant aspects of the existing Wambo Open Cut Blast Management Plan (Peabody Energy 2015), including the Blast Fume Management Strategy, which is currently being implemented at Wambo Mine. The Blast Management Plan will include the following management and monitoring measures to minimise the potential impacts of blasting activities:</i>

Source	Reference	Obligation
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_011</i>	Section 6.7.6 · A pre-blast assessment protocol that outlines the process for designing blasts to meet the relevant criteria, which may include limiting the charge mass of blasts close to potentially affected locations or other blast vibration management controls (e.g. optimisation of initiation design)
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_012</i>	Section 6.7.6 · blasting will be undertaken between 9.00am and 5.00pm Monday to Saturday
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_013</i>	Section 6.7.6 · a maximum of 15 blasts per week and three blasts per day, with an allowance for additional blasts where there are low vibration blasts or misfires
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_014</i>	Section 6.7.6 · blasting related closures of the Golden Highway associated with the Project will be limited to one per day
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_015</i>	Section 6.7.6 BIA 8.0 Page 64 · continued operation of the existing multi-station blast monitoring system for the Wambo Open Cut and installation of one additional monitoring station located to the northeast in the Maison Dieu area (ID 485, 495 or 496)
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_016</i>	Section 6.7.6 · access to weather monitoring data to allow for the assessment of pre-blast meteorological conditions as part of the pre-blast assessment protocol
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_017</i>	Section 6.7.6 BIA 8.0 Page 65 · development of a road closure management plan in consultation with RMS and Singleton Council
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_018</i>	Section 6.7.6 · implementation of appropriate exclusion zones to manage the risk of flyrock
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_019</i>	Section 6.7.6 · coordination of blasting times between the two Project mining areas to avoid blasting occurring simultaneously
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_020</i>	Section 6.7.6 BIA 8.0 Page 65 · liaison with the operators of adjacent mines in relation to the coordination of blasts to avoid concurrent blasting and therefore cumulative airblast and vibration impacts.
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_021</i>	Section 6.7.6 In addition to the measures outlined above, United will offer all private residential landholders located within two kilometres of the Project extraction areas a property inspection prior to the commencement of blasting for the Project in order to establish the condition of private structures

Source	Reference	Obligation
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_022</i>	Section 6.7.6 <i>A condition assessment will also be completed of all historical sites located within two kilometres of the extraction areas that are proposed to be retained or that have not been subject to archival recording, prior to the commencement of blasting for the Project.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_023</i>	BIA 3.0 Page 18 <i>To avoid any combined impacts of blasting on the adjacent community no simultaneous blasting from the two open cut pits (i.e. Wambo Open Cut and United Open Cut) is to be undertaken.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_024</i>	BIA 8.0 Page 64 <i>Periodic monitoring of infrastructure, including the transmission towers and Golden Highway will be required when blasting within a 500 metre radius of the United Open Cut or Wambo Open Cut.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_025</i>	BIA 8.0 Page 64 <i>Pre-Blast Assessment Protocol</i> <i>A pre-blast assessment protocol plays an essential role in managing blast impacts. It is important to draw an appropriate and detailed protocol that minimises the impacts on the surrounding area. The protocol developed for the Project will build on the existing protocol in place for the Wambo Open Cut and update it to also address the United Open Cut.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_026</i>	BIA 8.0 Page 64 <i>Due to the size of United Open Cut and the extension of Wambo Open Cut to the north it is important to highlight the need for an ongoing update to the pre-blast assessment protocol in line with the advancement of each mining area. Both protocols need to be reviewed on a regular basis.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_027</i>	BIA 8.0 Page 65 <i>United will seek to develop such a protocol in consultation with nearby mining operations to avoid concurrent blasts and with a commitment to maintaining safe working practices between the operations.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_028</i>	BIA 8.0 Page 65 <i>The risks associated with two different operations (i.e. open cut and underground) acting simultaneously can be effectively managed via the implementation of an appropriate protocol. The development of such a protocol will occur in consultation with the relevant operators with a commitment to maintaining safe working practices between the operations.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_029</i>	BIA 8.0 Page 65 <i>Due to the close proximity of the Hunter Valley Gliding Club and Warkworth Shooting Complex to the proposed United Open Cut a communication channel needs to be established to inform them of upcoming blasts. Blasting events may influence the operational activities of these clubs.</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.07_Blasting_030</i>	BIA Addendum 4.0 Page 6 <i>United will continue to consult with HVO regarding blast notifications. Should the Dam still be prescribed when United blasting operations move within the 500 m Notification Zone further consultation with HVO will occur so that appropriate inspections are undertaken.</i>

Source	Reference	Obligation
SSD7142 EIS SOC Main Text	<i>SOC_6.09_Ecology_002</i>	<i>o blasting controls to minimise blast overpressure and vibration impacts</i>
SSD7142 EIS SOC Main Text	<i>SOC_6.20_Public Health_003</i>	Section 6.20 Table 6.52 Page 418 Specialist Report SIOA Table 5.20 Page 89 A blast notification system will be established for the Project so that the surrounding community can be notified of and prepared for blasts that occur.
SSD7142 EIS SOC Main Text	<i>SOC_6.4_Air Quality_012</i>	Section 6.4.6 AQIA 9 Table 28 Page 90 • Blasting overburden (Pre-blast checks including review of meteorological conditions)
SSD7142 EIS SOC Main Text	<i>SOC_6.4_Air Quality_026</i>	Section 6.4.6 Blast Fume Management United will implement existing Glencore blasting procedures in place at other Glencore Hunter Valley mines relating to fume management, including pre-blast review of weather conditions so as to avoid blasting in adverse conditions.
SSD7142 EIS SOC Main Text	<i>SOC_6.4_Air Quality_026</i>	A site specific blast management plan will also be developed and implemented during operations (refer to Section 6.7), including key fume management actions such as defining the potential risk zone based upon weather patterns and the ability to fire a blast based on an assessment of real-time weather conditions. The blast fume management actions will be determined in consideration of the relevant aspects of the existing Wambo Blast Fume Management Strategy (Peabody Energy 2015a) currently implemented at Wambo mine.
SSD7142 EIS SOC PAC Res	<i>SOC_PAC_Res_002</i>	Section Blasting Page 111 During mining operations, United will design its blasting practices in a manner that will, as far as reasonably practicable: o protect the health and safety of people o protect property, public infrastructure, and livestock o minimise the dust and fume emissions from blasting at the Project o minimise the frequency and duration of any road closures for blasting, and use all reasonable efforts to avoid road closures during peak traffic periods o use all reasonable efforts to coordinate the timing of blasting at the site with any nearby mines to minimise cumulative blasting impacts, and o carry out blast monitoring to confirm the Project is complying with the relevant conditions of the development consent.
SSD7142 EIS SOC PAC Res	<i>SOC_PAC_Res_003</i>	Section Blasting Page 111 United will undertake property inspections of the properties identified in Table 3.6 prior to blasting associated with the Project. United will, at its cost: o commission a suitably qualified, experienced and independent person in consultation with the residence owner to: - establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report, and - identify measures that should be implemented at the property to minimise the potential blasting impacts of the development on these buildings and/or structures, and o give the landholder a copy of the new or updated property inspection report.

Source	Reference	Obligation
SSD7142 EIS SOC PAC Res	<i>SOC_PAC_Res_004</i>	Section Blasting Page 111 If any owner of privately owned land within 2 km of blasting operations claims that buildings and/or structures on their land have been damaged as a result of blasting at the Project, United will: - o commission a suitably qualified, experienced and independent person to investigate the claim, and - o give the landowner a copy of the property investigation report. If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then United will repair the damage. If United or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.
SSD7142 EIS SOC PAC Res	<i>SOC_PAC_Res_005</i>	Section Blasting Page 112 All blasts will be video recorded to capture the post blast environment. The video camera will be staffed, where practicable, in order to follow the path of any fume generated. All videos will be a minimum duration of 1 minute following the blast event or until the fume dissipates or leaves the view of the camera. All blasts at the Project will be fume rated applying the AESIG (2011) Visual NOx Fume Rating Scale (or equivalent).
SSD7142 EIS SOC PAC Res	<i>SOC_PAC_Res_006</i>	Section Blasting Page 112 United will review the outcomes of the Ravensworth Open Cut blast fume monitoring trial once complete and will implement any outcomes that will improve the Project blast model and/or pre-blast procedure.
SSD7142 EIS SOC PAC Res	<i>SOC_PAC_Res_007</i>	Section Blasting Page 112 United will undertake an assessment and trial of potential methods for monitoring post blast fume, including the use of fixed and mobile gas monitoring equipment. The trial will determine the feasibility and benefit of utilising the monitoring equipment in comparison to using the AESIG (2011) Visual NOx Fume Rating Scale. The assessment and trial will be completed within two years of the commencement of mining activities of the Project and any proposed changes to the fume monitoring system resulting from this trial will be implemented within this same timeframe.
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_005</i>	Section 3.1 • Blasting overburden (Pre-blast checks including review of meteorological conditions)
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_085</i>	Section 3.12 As committed to in the EIS, United will develop a Blast Management Plan to guide blasting practice at the site.
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_086</i>	Section 3.12 As detailed in Section 6.7.6 of the EIS, the Blast Management Plan will include the following management and monitoring measures to minimise the potential impacts of blasting activities:
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_087</i>	Section 3.12 • a pre-blast assessment protocol that outlines the process for designing blasts to meet the relevant criteria, which may include limiting the charge mass of blasts close to potentially affected locations or other blast vibration management controls (e.g. optimisation of initiation design)

Source	Reference	Obligation
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_088</i>	Section 3.12 · blasting will be undertaken between 9.00 am and 5.00 pm Monday to Saturday
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_089</i>	Section 3.12 · a maximum of 15 blasts per week and three blasts per day, with an allowance for additional blasts where there are low vibration blasts or misfires
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_090</i>	Section 3.12 · blasting related closures of the Golden Highway associated with the Project will be limited to one per day
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_091</i>	Section 3.12 · continued operation of the existing multi-station blast monitoring system for the Wambo Open Cut and installation of one additional monitoring station located to the northeast in the Maison Dieu area
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_092</i>	Section 3.12 · access to weather monitoring data to allow for the assessment of pre-blast meteorological conditions as part of the pre-blast assessment protocol
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_093</i>	Section 3.12 · development of a road closure management plan in consultation with RMS and Singleton Council
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_094</i>	Section 3.12 · implementation of appropriate exclusion zones to manage the risk of flyrock
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_095</i>	Section 3.12 · coordination of blasting times between the two Project mining areas to avoid blasting occurring simultaneously
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_096</i>	Section 3.12 · liaison with the operators of nearby mines in relation to the coordination of blasts to avoid concurrent blasting and therefore cumulative airblast and vibration impacts
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_097</i>	Section 3.12 · liaison with HVO regarding blasting within 500 metres of the Riverview Pit Dam wall.
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_098</i>	Section 3.12 United has also committed to implementation of Glencore blasting procedures relating to fume management as part of the Project and that key fume management actions will be outlined in the Blast Management Plan.
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_128</i>	Section 4.5.1 United will liaise with the operators of these mining operations regarding the coordination of blasting activities so as to minimise the possibility of concurrent blasting and therefore cumulative airblast and vibration impacts.

Source	Reference	Obligation
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_128</i>	<i>Procedures for liaison with the operators of other mining operations will be set out in the Blast Management Plan to be prepared for the Project.</i>
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_129</i>	<i>Section 4.5.1 As also outlined in the EIS, United has committed to maintain the current limits on number of blasts at the Wambo open cut and the Project will therefore not result in an increase in the number of blasts per day or per week when compared to the existing situation.</i>
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_130</i>	<i>Section 4.5.2.2 United will manage blasting practices for the Project within the limits of these existing blasting conditions. That is, no more than 15 blasts per week or three blasts per day from the combined operation of the Wambo Open Cut and United Open Cut, with an allowance for additional blasts where there are low vibration blasts or misfires.</i>
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_131</i>	<i>Section 4.5.2.2 The HVGC will be notified of all blasting activity in the United Open Cut, this process will form part of the management plan to be developed with the HVGC prior to mining commencing should the Project be approved. United will also consult with HVGC on blasting procedures and schedules to determine an appropriate strategy to minimise impacts to HVGC as far as practicable.</i>
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_135</i>	<i>Section 4.12.1 Closures of the Golden Highway will be managed in consultation with HVO in order to minimise the frequency of closures for road users. United will limit road closures associated with the Project on the Golden Highway to a maximum of one per day, consistent with the requirements of the existing Wambo mine development consent. As a result, the Project will not increase the number of road closures that are currently approved.</i>
SSD7142 EIS SOC RTS	<i>SOC_RTS_A_136</i>	<i>Section 4.12.1 United have also committed to development of a road closure management plan in consultation with RMS and Singleton Council.</i>
EPL3141	<i>Schedule 3 Condition L4</i>	<i>L4 Blasting L4.1 The airblast overpressure level from blasting operations in or on the premises must not exceed 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; at either monitoring point 19,20,21 and 22 in Condition P1.3.</i>
EPL3141	<i>Schedule 3 Condition L4</i>	<i>L4.2 The airblast overpressure level from blasting operations in or on the premises must not exceed 120 dB (Lin Peak) at any time; at either monitoring 19,20,21 and 22 in Condition P1.3.</i>
EPL3141	<i>Schedule 3 Condition L4</i>	<i>L4.3 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed: 5 mm/second for more than 5% of the total number of blasts during each reporting period; at either monitoring 19,20,21 and 22 in Condition P1.3.</i>
EPL3141	<i>Schedule 3 Condition L4</i>	<i>L4.4 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed 10 mm/second at any time; at either monitoring 18,19,20,21 and 22 in Condition P1.3.</i>

Source	Reference	Obligation
EPL3141	Schedule 3 Condition L4	<i>L4.5 Offensive blast fume must not be emitted from the premises.</i> <i>Definition: Offensive blast fume means post-blast gases from the detonation of explosives at the premises that by reason of their nature, duration, character or quality, or the time at which they are emitted, or any other circumstances:</i> <i>1. are harmful to (or likely to be harmful to) a person that is outside the premises from which it is emitted, or</i> <i>2. interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted.</i>
EPL3141	Schedule 5 Condition M7	<i>M7 Blasting</i> <i>M7.1 To determine compliance with conditions L4.1, L4.2, L4.3 and L4.4:</i> <i>a) Airblast overpressure and ground vibration levels must be measured and electronically recorded for monitoring points 18,19,20,21 and 22 for the parameters specified in Column 1 of the table below; and</i> <i>b) The licensee must use the units of measure, sampling method, and sample at the frequency specified opposite in the other columns.</i> <i>Parameters - Units of Measure - Frequency - Sampling Method</i> <i>Airblast Overpressure - Decibels (Linear Peak) - All blasts - Australian Standard AS 2187.2-2006</i> <i>Ground Vibration Peak Particle Velocity - millimeters/second - All blasts - Australian Standard AS 2187.2-2006</i>
EPL3141	Schedule 6 Condition R5.1	<i>R5 Other reporting conditions</i> <i>Blast Exceedance Reporting</i> <i>R5.1 The Licensee must report any exceedance of the Licence blast limits to the regional office of the EPA as soon as practicable after the exceedance becomes known to the Licensee or to one of the Licensee's employees or agents.</i>
EPL3141	Schedule 6 Condition R5.1	<i>R5.1 Blast Monitoring Report.</i> <i>The results of the blast monitoring required by condition M7.1 must be submitted to the EPA with the Annual Return at the end of each reporting period.</i>

Appendix B - Approval of Original BMP



Aislinn Farnon
Approvals Manager
United Wambo Joint Venture Project
134 Jerrys Plains Road
WARKWARTH NSW

31/03/2020

Dear Ms Farnon

**United Wambo Open Cut Coal Project (SSD 7142)
Blast Management Plan**

I refer to your recent correspondence submitting a revised copy of the Phase 1A and 1B Blast Management Plan for the United Wambo Open Cut Coal Project, prepared in accordance with condition B21 of the United Wambo Open Cut Coal Mine development consent (SSD 7142).

The Department has carefully reviewed the document and is satisfied that it adequately addresses the requirements of SSD 7142. Further the Department notes that Glencore has consulted with the Environmental Protection Authority (EPA) previously and that the EPA had at that time clarified that it would not comment on management plans for the site. The Department understands that this is a policy position of the EPA and notes that the EPA will reaffirm this advice to Glencore in the near future.

Accordingly, the Secretary has approved the Blast Management Plan (Revision 1, dated March 2020). I note that this management plan must be revised and resubmitted to the Department for approval prior to commencing Phase 2 of operations, or at any other time should the EPA request further revisions.

Please ensure that the approved plan is placed on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact Melanie Hollis on 8217 2043.

Yours sincerely

Matthew Sprott
Director
Resource Assessments (Coal & Quarries)

as nominee of the Planning Secretary

4 Parramatta Square, 12 Darcy Street, Parramatta 2150 | dpie.nsw.gov.au | 1

Appendix C - Stakeholder Consultation



DOC20/614229-1

United Wambo Joint Venture
134 Jerrys Plains Road
WARKWORTH NSW 2330

Returned via the Major Projects Portal

5 August 2020

Attention: Aislinn Farnon

Dear Mr Farnon

United Wambo Open Cut Coal Mine Blast Management Plan (SSD-7142-PA-30)

Reference is made to your request on 30 July 2020 via the Department of Planning, Industry and Environment's major projects portal requesting the Environment Protection Authority (EPA) to review and comment on the United Wambo Open Cut Coal Mine Blast Management Plan.

The EPA encourages the development of such plans to ensure that licensees have determined how they will meet their statutory obligations and designated environmental objectives.

Being a regulatory authority, the EPA's role is to set environmental management objectives rather than being directly involved in the development of strategies to achieve those objectives. Accordingly, the EPA has not reviewed this management plan.

If you have any questions about this matter, please contact Jenny Rushton on 02 6883 5301 or by email to hunter.region@epa.nsw.gov.au

Yours sincerely

A handwritten signature in black ink, appearing to read 'Jenny'.

JENNY LANGE
A/Unit Head – Regional Operations

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Appendix D - Current Approval Letter from DPE

Department of Planning and Environment



Our ref: SSD-7142-PA-112

Aislinn Farnon
Environment and Community Manager
United Collieries Pty Ltd
Old New England Highway
Ravensworth NSW 2333

09/08/2023

Subject: Approval of Revised Blast Management Plan

Dear Ms Farnon

I refer to the revised Blast Management Plan (version 7, dated May 2023) which was submitted in accordance with Condition B21 of Schedule 2 of the development consent for the United Wambo Open Cut Coal Mine (SSD-7142).

The Department has carefully reviewed the document and is satisfied that it meets the requirements of the relevant conditions in SSD-7142.

Accordingly, as nominee of the Planning Secretary, I approve the revised Blast Management Plan (version 7, dated May 2023).

You are reminded that if there are any inconsistencies between the Blast Management Plan and the conditions of approval, the conditions prevail.

Please ensure you make the document publicly available on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact me on (02) 4908 8696.

Yours sincerely

A handwritten signature in black ink, appearing to read "Joe Fittell".

Joe Fittell
Team Leader
Resource Assessments
As nominee of the Planning Secretary

4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150
Locked Bag 5022, Parramatta NSW 2124

www.dpie.nsw.gov.au

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Appendix E - Blast Fume Mitigation Factors

Contributing Factor	Sub Category	Characteristics of fume	Mitigation
Product Formulation	Product incorrectly formulated	- Persistent - All blasts and all locations utilising a specific product	Explosives formulated to an appropriate oxygen balance to minimise the likely hood of post blast fume
	Delivery system metering incorrectly	- Persistent - All areas associated with loading from a specific delivery system	- Monthly calibration of metering systems (if a hole is overloaded it will be detected prior to stemming and rectified prior to blasting) - Quality control of explosives products conducted in accordance with manufacturer's recommendations
	Delivery systems settings for product delivery manually overridden		Do not override calibration settings on manufacturing systems
	Explosives precursors not manufactured to specification	- Increased frequency - All blasts and all locations utilising product(s) that incorporate a specific precursor	Confirm with supplier that precursors are within specification
	Precursor degradation during transport and storage	- Variable - Traceable to a precursor which has degraded between manufacture and use	- Appropriate storage location and stock rotation management - Appropriate transport and transfer precursors - Inspection and/or testing of precursors prior to use in accordance with manufacturer's recommendations - Suitable storage of raw materials (e.g. protect stored AN bags from rain, ensure no water in diesel storage tank, etc)
	Raw material changes	- Persistent - All blast and locations utilising product(s) that incorporate a specific raw material	Change management procedures in place by suppliers

Contributing Factor	Sub Category	Characteristics of fume	Mitigation
			Prior notification to suppliers from site management systems where precursors are supplied by sites, for example customer supplied fuels
	Inadequate product sensitivity for conditions of application	- If product is fundamentally insensitive, expect persistent post blast fume in all blasts and all locations - If product is insensitive for some applications on site, expect persistent post blast fume in specific locations only (e.g. small diameter/or deep blast holes)	- 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
Product Selection	Non water resistant products loaded into wet or dewatered holes	- Variable - Blasts containing wet/dewatered blastholes only	- Use the Explosives Product Selection Matrix as provided in <i>Error! Reference source not found.</i> - Follow manufacturer's recommendations on product selection - Regular education of bench crew on product recommendations from the supplier - Discipline in on-bench practices (refer to section below)
	Excessive energy in weak/soft strata desensitising adjacent product columns	- Persistent - In specific areas known to contain weak/soft strata only	- Understand geology of each shot and design blast (timing and product) to match, for example reduction of powder factor - Follow manufacturer's recommendations on product selection - Obtain appropriate technical assistance if required to ensure optimal result
	Primer of insufficient strength to initiate explosive column	- Persistent - All blasts using a particular primer type/size	Follow manufacturer's recommendations on compatibility of initiating systems with explosives
	Desensitisation of explosive column from in-hole cord initiation	- Persistent - Only in areas where in-hole cord initiation is used	Follow manufacturer's recommendations on compatibility of initiating systems with explosives

Contributing Factor	Sub Category	Characteristics of fume	Mitigation
On-bench Practices	Hole conditions not understood	• Variable • Only when using non water resistant explosive products	• 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 • Use blasthole cameras to ascertain hole condition in critical areas • Minimise sleep time
	Blast not drilled as per drill plan	• Variable • Can be correlated with inaccurately drilled patterns	• Maintenance of accurate drilling records and review of blast design if required to compensate for inaccuracies
	Dewatering of holes diverts water into holes previously loaded with dry hole products	• Variable • Only when using non water resistant explosive products	• Load wet holes first and dip remaining hoes prior to loading. Adjust product selection according to manufacturer's recommendations
Changes to Conditions after Loading	Dynamic water	• Variable • Preceded by the observation of slumped blast holes • Usually when using non water resistant explosive products	• Record slumped holes • Understand hydrology of pit and plan blasting to avoid interaction between explosives and dynamic water (either natural or from other pit operations) • Use hole liners • Minimise sleep time of shot
	Excessive sleep time leading up to deteriorated product	• Variable	• Fire blasts within manufacturer's recommended sleep time

Contributing Factor	Sub Category	Characteristics of fume	Mitigation
		• Preceded by the observation of slumped blast holes	
Meteorological Conditions	Rainfall on sleeping shot Strong Winds	• Variable • Following rainfall • Usually when using non water resistant explosive products • May be preceded by the observation of slumped blast holes	• Review rainfall forecasts for planned sleep time of shot and select products according to manufacturer's recommendations • Minimise sleep time for non-wet hole products if rain is predicted • Bench design for water runoff • Seal product column with water resistant product • Seal top of stemmed holes with gas bags • Seal top of stemmed holes with drill cuttings to minimise water ingress • Consistent energy matched blast design for wet-hole products • Use hole savers to minimise runoff from bench entering holes • A pre-blast meteorological assessment will be completed leading up to the scheduled time of the blast. The pre-blast meteorological assessment will consider wind speed and direction and the potential for temperature inversions that may influence the impact of blasts on the community • Where conditions are determined to be unfavourable, the blast will be delayed, postponed or cancelled until favourable meteorological conditions are observed
Blast Design	Explosive desensitisation in deep holes	• Persistent • In deep holes only	• Reduce bench height • Ensure adequate relief in deep holes • Follow manufacturer's recommendations on product selection and blast design for deep holes, for example decking where appropriate • Phase 1 depth of drilled holes on the site does not exceed 40m and is therefore not considered a contributor to fume

Contributing Factor	Sub Category	Characteristics of fume	Mitigation
	Intra-hole explosive desensitisation in decked holes	- Persistent - When using decks only	Appropriate separation of explosives decks
	Initiation of significant explosive quantities in a single blast event	Intensity of post blast fume proportional to explosives quantity used	- Reduce blast size in order to reduce total explosive quantity being initiated in the one blast event - Reduce powder factor
Geological Conditions	Excessive confinement in weak/soft strata	- Persistent - In specific areas known to contain weak/soft strata only	- Free-dig where possible (drill holes often fail) - Understand geology of each shot and design blast (timing and product) to ensure adequate relief in weak/soft strata, for example incorporation of a free face, reduction of powder factor, modified timing, etc - Minimise blast size and depth
	Product seeping into cracks	- Variable - In specific areas known to contain a high incidence of faulted/fractured ground only	- General practice is to stand off faulted fractured ground where practicable - Follow manufacturer's recommendations on product selection - Use hole liners - Maintenance of accurate drill records which are used to map geological conditions - Record and monitor holes which are slumped or require excessive product to reach stemming height, but where water is not present
	Dynamic water in holes	- Variable - Preceded by the observation of slumped blast holes - Usually when using non-water resistant explosive products	- Use the Explosives Product Selection Matrix as provided in Section 4.3.1 - Minimise sleep time of shot - Follow manufacturer's recommendations on product selection - Measure recharge rates of if dewatering, and choose products according to manufacturer's recommendations

Contributing Factor	Sub Category	Characteristics of fume	Mitigation
			- Record slumped holes and use this information to build understanding of pit hydrology - Understand hydrology of pit and plan blasting to avoid interaction between explosives and dynamic water (either natural or from other pit operations) - Use hole liners
	Moisture in clay	- Persistent - In clay strata only	Maintain a low powder factor, giving consideration to the water resistance of the products used and how this may impact sleep time. Hole liners may be required for ANFO
	Blast hole deterioration between drilling and loading	- Variable - Traceable to specific geological areas	- Minimise time between drilling and loading - Use blast hole cameras to ascertain hole condition in critical areas - Use hole savers - Mine planning to ensure benches are unaffected by back break from earlier blasts, for example presplits, buffers, etc - Optimise drilling practices to minimise hole damage through rock cracking, etc - Use drilling mud to stabilise hole (confirm chemical compatibility with explosive first)
Contamination of Explosives in the Blast Hole	Product mixes with mud/sediment at the bottom of hole	- Variable - Blasts containing wet/dewatered holes only	- Optimise drilling practices to minimise hole damage - Ensure appropriate loading practices are followed during charging - Ensure primer is positioned in undiluted product - Insert gas bag to separate mud/sediment from explosive charge - Use hole savers
	Interaction of product with drilling muds	- Persistent - Blasts where drilling mud is used in conjunction with a given product	- Confirm compatibility of drilling mud with explosives before use - Ensure that drilling muds and other chemicals used on bench are managed through change management systems

Contributing Factor	Sub Category	Characteristics of fume	Mitigation
	Penetration of stemming material into top of explosive column (fluid/pumpable products only)	• Variable • Blast charged fluid/pumpable explosive products only	• Use appropriate stemming material • Ensure product has gassed completely before stemming • Seal top of explosives prior to stemming
	Water entrainment in product	• Variable • Blast containing wet/dewatered blast holes and/or overloaded holes that have been washed out with water only	• Load wet holes first and dip remaining holes prior to loading. Adjust product selection according to manufacturer's recommendation. • Eliminate top loading into wet holes • Ensure primer is positioned in undiluted product • Use of gas bags in dewatered holes, ensuring water does not creep above the gas bag • Seal top of the explosives column to prevent water ingress • Use hole liners • Reduce excessive hose lubrication during charging • Measure water recharge rate after dewatering and adjust product selection according to manufacturer's recommendations • Select products for wet holes according to manufacturer's recommendations • Ensure procedures exist around hose handling to eliminate water entrainment during loading • Load low holes last where practical • Use suitable, safe dewatering techniques

Appendix F - AEISG Post-Blast Fume Rating Guideline

Level	Typical Appearance
Level 0 No NO _x gas	
Level 1 Slight NO _x gas	
1A Localised	
1B Medium	
1C Extensive	
Level 2 Minor yellow/orange gas	
2A Localised	
2B Medium	
2C Extensive	
Level 3 Orange gas	
3A Localised	
3B Medium	
3C Extensive	
Level 4 Orange/red gas	
4A Localised	
4B Medium	
4C Extensive	
Level 5 Red/purple gas	
5A Localised	
5B Medium	
5C Extensive	

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 above. The extent of the NOx gases also needs to be assessed and this should be done on a simple scale from A to C where:

A = Localised (i.e. NOx Gases localised across only a few blast holes)

B = Medium (i.e. NOx Gases from up to 50% of blast holes in the shot)

C = Extensive (i.e. Extensive generation of NOx Gases across the whole blast)

Pantone colour numbers have been included in the following Field Colour Chart to ensure colours will be produced correctly thereby ensuring a reasonable level of standardisation in reporting NOx gas events across the blasting industry. These are presented in **Table 9-4**.

Table 9-4: Field Colour Chart for Blast Fume Category Assessment

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 gas		Pantone 161C (RGB 99, 58, 17)

Source: AEISG, 2011, 2nd Edition

Appendix G - Approval from Roads and Maritime Services

Refer to **Road Occupancy Licence No 2036250**

Road Occupancy Licence No 2036250 (glencore.net)

Appendix H - Approval from Singleton Council

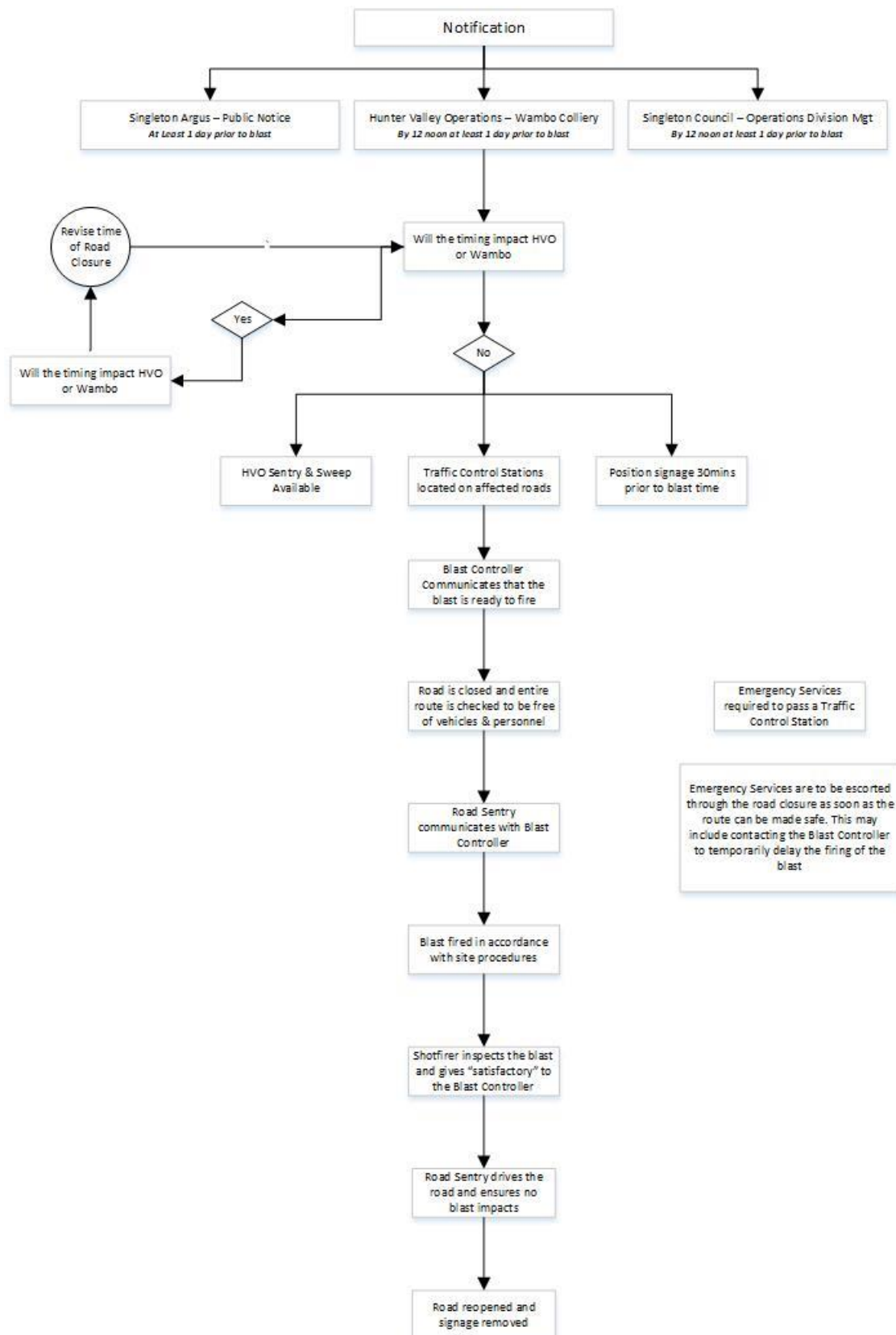
Refer to **Section 138 Approval for Use of Council Road**

Section 138 Approval for Use of Council Road (glencore.net)

Appendix I - Traffic Management Plan

Refer to **Traffic Management Plan – Blasting**, project doc no: UWJVB001
Traffic Management Plan – Blasting (glencore.net)

Appendix J - Road Closure Flow Chart



Appendix K - Traffic Control Plan – Phase 2

