UNITED WAMBO
JOINT VENTURE

GLENCORE

Water Management Plan

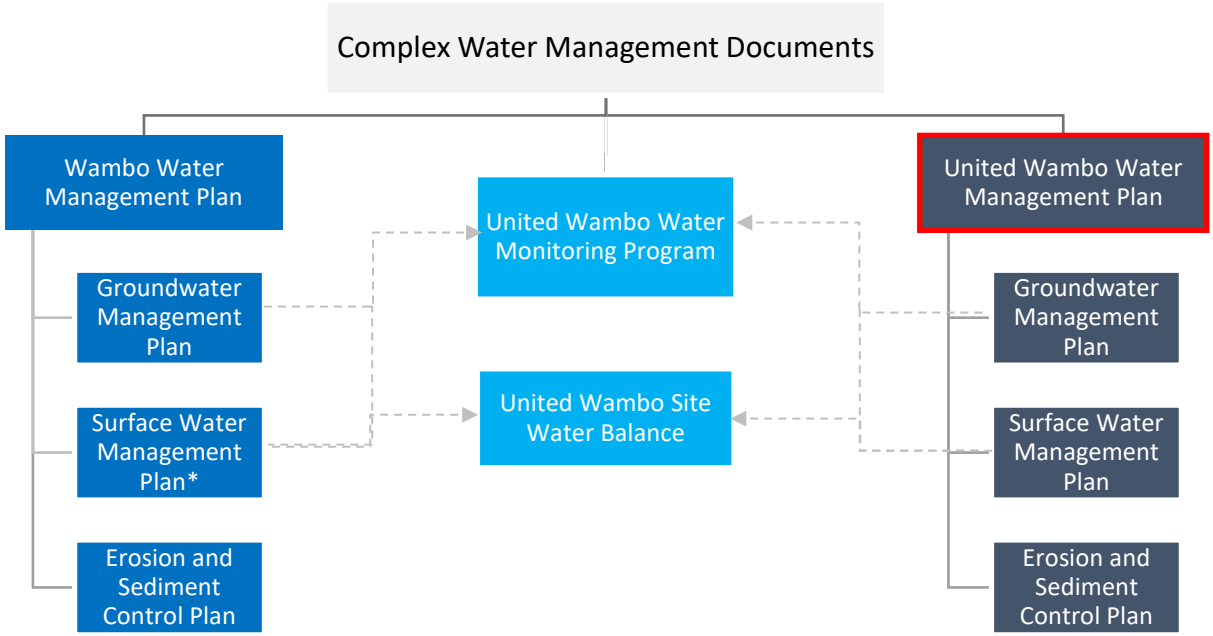
Important information about this Water Management Plan

This Water Management Plan (WMP) applies to **Phase 2** mining operations at the United Wambo Open Cut Coal Mine, as defined in the Development Consent SSD7142, dated 29 August 2019, i.e.

> *The phase of the development that comprises mining operations at United open cut and Wambo open cut mine, within the blue operational area identified in Figure 2 of Appendix 2 (of SSD7142).*

Water management associated with the Wambo Coal Mine (i.e. underground mining, coal handling and train loading activities) is described in the Wambo Water Management Plan.

The figure below shows the water management documents relevant to this Water Management Plan (WMP). Both United Wambo and Wambo have standalone Water Management Plans, Surface Water Management Plans, Groundwater Management Plans and Erosion and Sediment Control Management Plans. Due to interactions with water monitoring and the overall site water balance, there is a combined United Wambo Open Cut and Wambo Water Monitoring Program (WMProg). This WMP should be read in conjunction with the United Wambo WMP sub plans (refer to figure below) and the combined WMProg and SWSB.



Key:

Document applies to both operations
Document applies to Wambo Phase 2 operations – controlled by Wambo Coal Pty Ltd
Document applies to United Wambo Phase 2 operations – controlled by United Wambo JV

* Wambo SWMP incorporates the North Wambo Creek Diversion Management Plan

Executive Summary

This Water Management Plan (WMP) has been developed to address all water related requirements of SSD 7142, including Modification 1 and Environment Protection Licence (EPL) 3141 and EPL 529 as relevant to open cut mining operations associated with the United Wambo Open Cut Coal Mine Project (United Wambo). This WMP is part of a set of documents that have been developed to manage surface and groundwater impacts for United Wambo. The WMP should also be read in conjunction with the following sub-plans:

- Erosion and Sediment Control Plan;
- Surface Water Management Plan; and
- Groundwater Management Plan.

The key management and mitigation measures contained within the WMP are included in ***Table 1***.

Table 1: Water Management and Mitigation Measures

No.	Mitigation / Management Measure	Section	Timing
1	Water management structures will be constructed and managed in accordance with: • Landcom 2004. Managing Urban Stormwater – Soils and Construction, Volume 1, 4th Edition; and • Department of Environment and Climate Change (DECC) 2008. Managing Urban Stormwater - Soils and Construction, Volume 2E – Mines and Quarries.	***Section 10.1***	All water management structures
2	Prior to the removal of U2, clean water from the Redbank Creek catchment upstream of mining will need to be managed to avoid capture in the pit. Options that will be assessed during Stage 2 will include the following: • construction of upstream dam/s to capture and pump to downstream discharge location; and • construction of drains to convey water around the north of the United pit The Water Management System (WMS) for Stage 3 of the Project will be developed in consultation with DPIE Water and detailed in a revised Water Management Plan prior to commencement of Stage 3.	***Section 10.1.3***	Prior to the removal of Dam U2
3	In the event a dirty or mine water pipeline is located in a clean water catchment, additional controls will be implemented to mitigate offsite discharges. Differential flow meters or pressure sensors will be installed to detect potential losses. This system is to be linked by telemetry to readily detect and mitigate potential pipeline failure incidents. The system will cease pumping at a pre-defined trigger level, which minimises spillage risk.	***Section 10.1.4***	Construction of new pipelines in clean water catchment

No.	Mitigation / Management Measure	Section	Timing
4	Pipelines will be buried across creeks and drainage lines and should be double skinned or sleeved to minimise physical damage and or to contain potential leakages. Where burial is not practical or for existing pipelines that are suspended across creeks, measures are to be implemented to confirm that they are to be adequately supported to prevent damage from creek flows and or flood debris.	***Section 10.1.4***	All pipelines across drainage lines
5	Surplus water from United Wambo will be discharged as required and in accordance with EPL 529 and consistent with the provisions of the HRSTS. Discharges will be monitored prior to release to ensure compliance with the requirements of the HRSTS and in accordance with EPL conditions.	***Section 0***	As required
6	Wastewater from onsite facilities, including sewage, is collected and treated on site by a number of aerated wastewater treatment plants, which are licensed by Singleton Council.	***Section 10.1.9***	As required
7	The site water balance will be recalculated on an annual basis and reported in the Annual Review.	***Section 10.2***	Annually
8	The water balance model will be updated throughout the mine life to forecast supply reliability as part of the water management planning process. In the event of reductions in the forecast reliability, due to low rainfall conditions, water conservation measures (such as the use of synthetic dust suppressants) will be implemented.	***Section 10.5***	As required
9	Results from monitoring undertaken as part of the WMProg will be compared to groundwater model predictions, as part of the Annual Review process.	***Section 10.4***	Annually
10	The groundwater model will be validated every 5 years, using data collected from the water monitoring program (refer WMProg). This process will be coordinated by Wambo and reported on in both sites' Annual Reviews.	***Section 10.4***	Every 5 years
11	The site salt balance is reviewed on an annual basis, in association with the review of the site water balance, and the results are reported in the Annual Review.	***Section 10.3***	Annually
12	Generic training on the aspects of the WMP will be provided to all employees and contractors through the GCAA Generic Surface Induction and the Site Familiarisation process. Regular workforce communication days and toolbox talks allow for discussion of the objectives and requirements of this and any other relevant Plans.	***Section 10.6***	All inductions

No.	Mitigation / Management Measure	Section	Timing
13	Selected site personnel, whose duties directly involve the management of water at United Wambo, will undertake specific training in regard to site Operational Procedures which incorporate water management measures. This training will be undertaken annually and when there is a change in personnel in key roles.	***Section 10.6***	As required
14	As part of the ongoing water balance, monitoring the groundwater inflows to the mining pits and underground will be reviewed quarterly. This will be undertaken by review of available data (including flow metering data or pump hours, site daily rainfall data and site survey data) to estimate groundwater inflows to each pit at United Wambo and the United Underground. Groundwater inflows will be compared to predicted inflows as outlined in the ***United Wambo Groundwater Management Plan***.	***Section 11.2***	Quarterly
15	The frequency of pipeline inspections will be determined through risk assessment, however, all major operational pipelines and high-risk pipelines are to be inspected weekly when in use, as a minimum. Minor pipelines and low risk pipelines within the mine containment system are to be inspected on a risk-based approach. Inspections are also to be completed prior to commissioning or recommissioning a pipeline. Inspection frequency is risk-based, depending on water quality being transferred and the environment in which the pipeline is located.	***Section 0***	As required
16	Water monitoring will be undertaken in accordance with the SWMP, GWMP and WMProg.	***Section 11.4***	As required
17	All water related complaints will be handled in accordance with the Complaints Management Protocol.	***Section 11.5***	As required

No.	Mitigation / Management Measure	Section	Timing
18	The United Wambo E&C Manager will be responsible for reporting any significant findings regarding the implementation of this Plan in the Annual Review, including: • any amendments to licensing or statutory approvals; • a summary of any complaints or incidents relating to the performance of the Water Management System over the reporting period; • a summary of monitoring results collected over the reporting period and assessment against the relevant performance measures and criteria; • a summary of water extracted from Wollombi Brook and the Hunter River during the relevant water reporting period/s; • an evaluation of any trends in monitoring results over the life of the operation; • any non-compliance recorded during the reporting period and the actions taken to ensure compliance; • identification of any discrepancies between the predicted and actual impacts of United Wambo and an analysis of the potential cause of any significant discrepancies; and • a summary of the management actions to be implemented over the next year to improve the environmental performance of the site.	***Section 12.1.1***	Annually
19	The Annual Review will be provided to DPE and other relevant agencies and will be made available on the United Wambo website.	***Section 12.1.1***	Annually
20	United Wambo will collect and report data required in accordance with the GCAA requirements outlined in the GCAA Water Accounting Framework Procedure.	***Section 12.1.3***	Monthly
21	Any incident which occurs within the site boundary or is associated with United Wambo operations will be immediately reported by the employee or contractor who has been associated with or witnessed the incident.	***Section 12.1.4***	Every incident
22	As part of the Annual Review process, the site water balance, surface water take and groundwater model will be validated by comparing predicted results to monitoring results collected over the life of the development.	***Section 12.2***	Annually

Table of Contents

Figures

Tables

1. Project Description

The United Wambo Open Cut Coal Mine (United Wambo) is situated approximately 15 kilometres west of Singleton, near the village of Warkworth, New South Wales (***Figure 1-1***). United Wambo is a 50:50 joint venture between neighbouring mines operated by United Collieries Pty Limited (United), owned 95 per cent by Abelshore Pty Limited, a wholly owned subsidiary of Glencore Coal Pty Limited (Glencore) and five per cent by the Construction, Forestry, Maritime, Mining and Energy Union (CFMMEU), and managed by Glencore and Wambo Coal Pty Limited (Wambo), a subsidiary of Peabody Energy Australia Pty Limited (Peabody).

The Project includes open cut mining operations in two areas:

- the proposed United Open Cut (United Pit); and
- ongoing mining of the approved Wambo Open Cut (Wambo Pit) with a proposed minor surface boundary extension in addition to a depth increase to maximise coal recovery.

The project will enable the extraction of an additional approximately 150 million tonnes (Mt) of run-of-mine (ROM) coal over 23 years, delivering up to 10 million tonnes per annum (Mtpa) of ROM coal from the combined operations of the United and Wambo Open Cuts. The project will deliver ROM coal to the Wambo coal handling and preparation plant (CHPP), along with coal deliveries from the Wambo underground. All coal is transported by rail from Wambo to the Port of Newcastle for export. Total production deliveries to the Wambo CHPP will be limited to the currently approved production rate of 14.7 Mtpa ROM.

In addition to integrated open cut mining at United and Wambo, the Project will require changes to existing mining and public infrastructure within the Project Area including:

- ongoing use of the Wambo CHPP, mine infrastructure area and related facilities for the life of the Project;
- ongoing use of the Wambo train loading facility for the life of the Project;
- ongoing use of, upgrades to, and expansion of, the existing Wambo and United mining infrastructure; and
- realignment of a two kilometre section of the Golden Highway and the relocation of sections of 330 kV and 66 kV transmission lines to maximise coal recovery from the United Open Cut.

Open cut mining is managed by United on behalf of the joint ventures, whilst Wambo manages the CHPP and train loading facilities as well as Wambo's continued underground operations.

Figure 1-1: Project Locality

2. Purpose and Objectives

This Water Management Plan (WMP) has been developed to address all water related requirements of SSD 7142 and Environment Protection Licence (EPL) 3141 and EPL 529 as relevant to open cut mining operations at United Wambo.

The key objectives of water management at United Wambo are to:

- satisfy regulatory requirements, including meeting required performance criteria;
- segregate clean waters away from active mining areas, where possible, to reduce the volume of mine affected water requiring subsequent storage and treatment;
- segregate mine impacted water and runoff from undisturbed and revegetated areas with better water quality to minimise the volume of mine impacted water that requires reuse;
- reuse mine impacted water within the WMS to reduce reliance on raw/clean water; and
- minimise adverse effects on downstream waterways (including hydraulic and water quality impacts).

3. Scope

This WMP applies to all Phase 2 operational activities at United Wambo and addresses the relevant conditions of United Wambo's development consent SSD 7142, mining and exploration leases and licences as detailed in ***Section 5***.

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

The WMP excludes the operations at the Wambo mine, (i.e. CHPP, train loading facility and underground mine). These activities will continue to be managed by Wambo in accordance with the relevant development consent conditions and associated management plans for Phase 2.

This document provides the framework for the management of water onsite at United Wambo.

3.1 Relationship with Other Documents

This WMP is part of a set of documents that have been developed to manage surface and groundwater impacts for United Wambo (refer to ***Figure 3-1***). The WMP should also be read in conjunction with the following sub-plans:

- Erosion and Sediment Control Plan;
- Surface Water Management Plan; and
- Groundwater Management Plan.

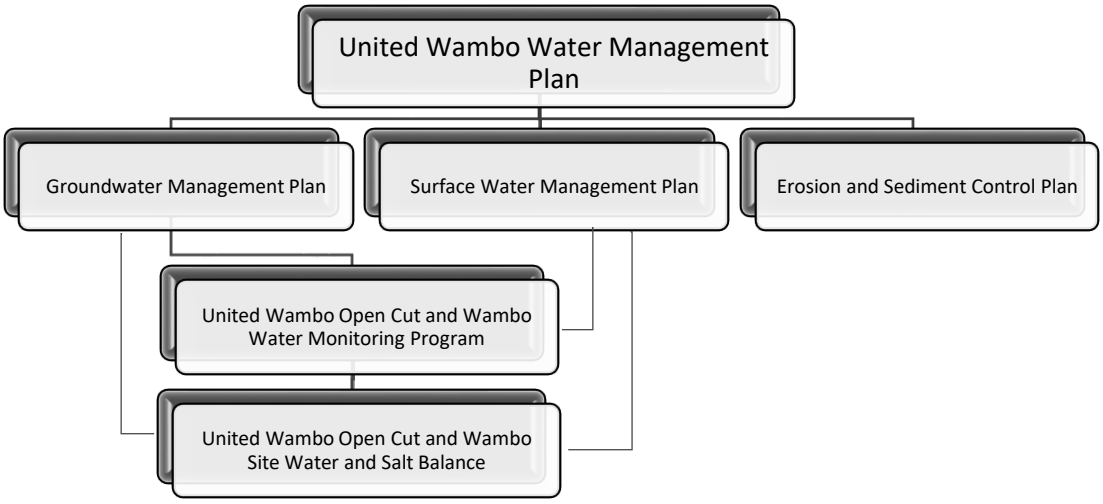


Figure 3-1: Water Management Plan Structure

This WMP also forms part of United Wambo's Environmental Management System (EMS) and should be read in conjunction with the United Wambo Environmental Management Strategy.

All incidents reported at United Wambo, including water-related incidents, are managed in accordance with the United Wambo Pollution Incident Response Management Plan (PIRMP).

4. Integration with Existing Wambo Water Management System

The water management system for United Wambo has been designed to build on the existing United WMS and integrate with the existing water management systems at Wambo.

Water management at the Wambo underground, CHPP, and train loading facilities will continue to be undertaken in accordance with the existing Wambo Site Water Management Plan documents.

5. Statutory Requirements

5.1 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 Department of Planning, Industry and Environment (DPIE), on 29 August 2019. SSD 7142 was modified in November 2021 to account for changes in the stockpiling of ROM coal. SSD 7142 stipulates requirements related to this WMP (refer to ***Table 5-1***). Water management performance measures are specified by SSD 7142 under Condition B49 and are listed in ***Table 5-2*****.**

Table 5-1: SSD 7142 Requirements for Water Management Plan

Condition	Condition Details	WMP Section
B52	The Applicant must prepare a Water Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:	This document
	a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary;	***Section 0***
	b) be prepared in consultation with DPE Water and the EPA;	***Section 0***
	c) describe the measures to be implemented to ensure that the Applicant complies with the water management performance measures (see Table 4 of SSD 7142 reproduced as Table 5-2 below);	***Section 0 and 10***
	d) utilise existing data from nearby mines and build on existing monitoring programs, where practicable;	***Section 8***
	e) include a:	
	• Site Water Balance that includes details of: - predicted annual inflows and outflows on the site; - sources and security of water supply for the life of the development (including authorised entitlements and licences); - water storage capacity; - water use and management on the site, including any water transfers or sharing with neighbouring mines; - water use and management on the site, including any water transfers or sharing with neighbouring mines; - licensed discharge points and limits; and - reporting procedures, including the annual preparation of an updated site water balance;	***Section 10.2***
	• Salt Balance that includes details of: - sources of saline material on the site; - saline material and saline water management on the site; - measures to minimise discharge of saline water from the site; and - reporting procedures, including the annual preparation of an updated salt balance;	***Section 10.3***

Condition	Condition Details	WMP Section
	• Erosion and Sediment Control Plan that: - is consistent with the requirements of *Managing Urban Stormwater: Soils and Construction* – Volume 1: Blue Book (Landcom, 2004) and Volume 2E: Mines and Quarries (DECC, 2008); - identifies activities that could cause soil erosion, generate sediment or affect flooding; - describes measures to minimise soil erosion and the potential for the transport of sediment to downstream waters, and manage flood risk; - describes the location, function and capacity of erosion and sediment control structures and flood management structures; and - describes what measures would be implemented to maintain (and, if necessary, decommission) the structures over time;	***Erosion and Sediment Control Plan***
	• Surface Water Management Plan that includes: - detailed baseline data on surface water flows and quality of watercourses and/or water bodies potentially impacted by the development, including: • stream and riparian vegetation health; • channel stability (geomorphology); and • water supply for other surface water users; - a detailed description of the surface water management system; - detailed plans, design objectives and performance criteria for water infrastructure, including: • any approved creek diversions or restoration works associated with the development; • water runoff diversions and catch drains; • water storages and sediment dams; • emplacement areas; • backfilled voids and any final voids for the development (see also Table 6); and • reinstated drainage networks on rehabilitated areas of the site; - detailed performance criteria, including trigger levels for identifying and investigating any potentially adverse impacts associated with the development for: • downstream surface water flows and quality;	***Surface Water Management Plan and United Wambo Open Cut and Wambo Water Monitoring Program***

Condition	Condition Details	WMP Section
	• channel stability; • downstream flooding impacts; • stream and riparian vegetation heath; • water supply for other water users and • post-mining water pollution from rehabilitated areas of the site; - a program to regularly monitor: • compliance with the relevant performance measures listed in Table 4 of SSD 7142 and the performance criteria established above; • controlled and uncontrolled discharges and seepage/leachate from the site; • surface water inflows, outflows and storage volumes to inform the Site Water Balance; and • the effectiveness of the surface water management systems and the measures within the Erosion and Sediment Control Plan; - reporting procedures for the results of the monitoring program; and - a plan to respond to any exceedances of the performance measures or performance criteria, and repair, mitigate and/or offset any adverse surface water impacts of the development;	
	• Groundwater Management Plan, which is consistent with Groundwater Monitoring and Modelling Plans – Introduction for prospective mining and petroleum activities (DPI Water, 2014) and the National Water Quality Management Strategy (DoEE, 2015) and includes: - detailed baseline data of groundwater levels, yield and quality for groundwater resources potentially impacted by the development, including groundwater supply for other water users and groundwater dependent ecosystems; - a detailed description of the groundwater management system; - groundwater performance criteria, including trigger levels for identifying and investigating any potentially adverse groundwater impacts associated with the development, on: • regional and local aquifers (alluvial and hardrock); • groundwater supply for other water users, such as privately-owned licensed groundwater bores;	***Groundwater Management Plan and United Wambo Open Cut and Wambo Water Monitoring Program***

Condition	Condition Details	WMP Section
	• groundwater dependent ecosystems; and • aquatic habitat and stygofauna; - a program to monitor and evaluate: • compliance with the relevant performance measures listed in Table 4 of SSD 7142, and the performance criteria established above; • water loss/seepage from water storages into the groundwater system; • groundwater inflows, outflows and storage volumes to inform the Site Water Balance; • any hydraulic connectivity between the alluvial and hardrock aquifers; and • the effectiveness of the groundwater management systems; - reporting procedures for the results of the monitoring program; - a plan to respond to any exceedances of the groundwater performance criteria and repair, mitigate and/or offset any adverse groundwater impacts of the development; and - a program to periodically validate the groundwater model for the development, including an independent review of the model every three years, and comparison of monitoring results with modelled predictions; and	
	• a protocol to report on the measures, monitoring results and performance criteria identified above in the Annual Review referred to in condition E11.	***Section 12***
E5	**Management Plan Requirements** The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	
	a) a summary of relevant background or baseline data;	***Section 8*** and ***Surface Water Management Plan***
	b) details of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • any relevant limits or performance measures and criteria;	***Section 5*** ***Section 6*** ***Table 5-2***

Condition	Condition Details	WMP Section
	• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	
	c) any relevant commitments or recommendations identified in the document/s listed in condition A2(c);	Entire document
	d) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;	Entire document
	e) a program to monitor and report on the: • impacts and environmental performance of the development; and • effectiveness of any management measures set out pursuant to paragraph d);	***Section 11*** ***Section 12***
	f) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts to reduce levels below relevant impact assessment criteria as quickly as possible;	***Surface Water Management Plan*** ***Groundwater Management Plan***
	g) a program to investigate and implement ways to improve the environmental performance of the development over time;	***Section 12***
	h) a protocol for managing and reporting any: • incident, non-compliance or exceedance of any impact assessment criterion and performance criterion; • complaints; or • failure to comply with other statutory requirements; and	***Section 12*** ***Section 11.5 (Complaints)***
	i) a protocol for periodic review of the plan.	***Section 12***
	Note: The Secretary may waive some of these requirements, if they are unnecessary or unwarranted, for particular management plans.	

Table 5-2: Water Management Performance Measures

Feature	Performance Measure	Relevant Section of Plan
Water management – general	• Maintain separation between clean, dirty and mine water • Minimise the use of clean and potable water • Maximise water recycling, reuse and sharing opportunities • Minimise the use of make-up water from external sources • Design, install, operate and maintain water management infrastructure in a proper and efficient manner	***Section 9.1*** ***Section 10***
Alluvial aquifers (including Wollombi Brook alluvium)	• Negligible impacts to the alluvial aquifer beyond those predicted in the document/s listed in condition A2(c), including: - negligible change in groundwater levels; and - negligible impact to other groundwater users • Maintain appropriate setbacks in accordance with the Aquifer Interference Policy (DPI, 2012)	***Groundwater Management Plan***
Erosion and sediment control works	• Design, install and maintain erosion and sediment controls in accordance with the guidance series *Managing Urban Stormwater: Soils and Construction* – Volume 1 (Landcom, 2004) and 2E Mines and Quarries (DECC, 2008) • Design, install and maintain any infrastructure within 40 metres of watercourses in accordance with the guidance series for Controlled Activities on Waterfront Land (DPI Water, 2012) • Design, install and maintain any creek crossings generally in accordance with the Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013) and *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings* (NSW Fisheries, 2003)	***Erosion and Sediment Control Plan*** ***Surface Water Management Plan***
Clean water diversion and storage infrastructure	• Design, install and maintain the clean water system to capture and convey the 100 year ARI flood event • Maximise, as far as reasonable, the diversion of clean water around disturbed areas on the site, except where clean water is captured for use on the site	***Surface Water Management Plan***
Flood Levees	• Design, install and maintain appropriate flood levees to protect mining areas from a 1,000 year ARI flood event and to ensure no adverse effect on roads or privately-owned land	***Surface Water Management Plan***

Feature	Performance Measure	Relevant Section of Plan
Sediment dams	• Design, install and maintain sediment dams in accordance with the guidance series *Managing Urban Stormwater: Soils and Construction* – Volume 1 (Landcom, 2004) and 2E Mines and Quarries (DECC, 2008)	***Surface Water Management Plan*** ***Erosion and Sediment Control Plan***
Mine water storages (including underground water storages)	• Design, install and maintain mine water storage infrastructure to avoid unlicensed or uncontrolled discharge of mine water • Above-ground mine water storages designed to contain the 100 year ARI storm event and minimise permeability	***Surface Water Management Plan***
Tailings storages	• Design and maintain tailings storage areas to encapsulate and prevent the release of tailings seepage/leachate	***Section 9.1.3***
Overburden emplacements	• Design, install and maintain emplacements to encapsulate and prevent migration of tailings, acid forming and potentially acid forming materials, and saline and sodic material • Design, install and maintain out-of-pit emplacements to prevent and/or manage long term saline seepage	***Section 9.1.3***
Chemical and hydrocarbon storage	• Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards	***Section 9.1.3***
Creek diversion and restoration works	• Diverted creek lines are hydraulically and geomorphologically stable • Incorporate erosion control measures based on vegetation and engineering revetments • Incorporate persistent/permanent pools for aquatic habitat • Revegetate with suitable native species	***Surface Water Management Plan***
Aquatic, riparian and groundwater dependent ecosystems (including GDE1 and GDE2)	• Negligible environmental consequences beyond those predicted in the document/s listed in condition A2(c) • Maintain or improve baseline channel stability • Develop site-specific in-stream water quality objectives in accordance with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) and Using the ANZECC Guidelines and Water Quality Objectives in NSW (DEC, 2006)	***Surface Water Management Plan***

5.2 Protection of the Environment Operations Act 1997

Activities that do, or may, lead to pollution of waters in NSW are regulated by the NSW Environment Protection Authority (EPA) under the *Protection of the Environment Operations Act 1997* (POEO Act). Where discharge of waters is permitted, it is strictly controlled by licence conditions such that discharges do not result in significant impacts on water resources.

United Wambo operates under EPL 3141 and Wambo operates under EPL 529 issued by the EPA under the authority of the POEO Act. Condition L1.1 of both EPL 3141 (United) and EPL 529 (Wambo) requires compliance with Section 120 of the POEO Act, which prohibits pollution of waters.

Under EPL 529, Wambo may discharge water into the Hunter River system in accordance with the Hunter River Salinity Trading Scheme (HRSTS) through a designated Licenced Discharge Point (LDP). The HRSTS is a cap-and-trade system designed to facilitate saline discharges into the Hunter River by its many industrial and agricultural users, without compromising sustainable water quality. The HRSTS is administered under the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002.

There is currently one LDP in the Wambo EPL 529. As of July 2020, Wambo currently holds 30 credits under the HRSTS.

There is currently no LDP nominated in the United EPL 3141 and United holds no credits under the HRSTS.

5.3 Water Management Act 2000

United and Wambo hold a number of Water Access Licences (WALs) under the *Water Management Act 2000* for the Water Sharing Plan for the Hunter Regulated River Water Source 2016 and the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009. ***Table 5-3*** presents the details of the WALs held by United and Wambo.

Table 5-3: Existing Water Access / Surface Water Licences for United Collieries and Wambo Coal

Licence No.	Water Source	Category	Holder	Share Component	Tenure Type
WAL718	Hunter Regulated River Water Source	Regulated River (High Security)	Wambo	1,000 units	Continuing
WAL8599	Hunter Regulated River Water Source	Regulated River (High Security)	Wambo	6 units	Continuing
WAL8600	Hunter Regulated River Water Source	Regulated River (General Security)	Wambo	868 units	Continuing
WAL8604	Hunter Regulated River Water Source	Supplementary Water	Wambo	240 units	Continuing
WAL10541	Hunter Regulated River Water Source	Regulated River (High Security)	United	300 units	Continuing
WAL18445	Hunter Unregulated and Alluvial Water Sources (Lower Wollombi Brook Water Source)	Unregulated River	United	200 units	Continuing
WAL18549	Hunter Unregulated and Alluvial Water Sources (Lower Wollombi Brook Water Source)	Unregulated River	United	100 units	Continuing
WAL18437	Hunter Unregulated and Alluvial Water Sources (Lower Wollombi Brook Water Source)	Unregulated River	Wambo	350 units	Continuing
WAL 23897	Hunter Unregulated and Alluvial Water Sources (Lower Wollombi Brook Water Source)	Aquifer	Wambo	70 units	Continuing

United and Wambo also hold WALs under the *Water Management Act 2000* for the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016 for the operation of groundwater extraction as summarised in ***Table 5-4***.

Table 5-4: Groundwater Extraction Licences

Licence No	Description	Category	Holder	Share Component	Tenure Type
WAL42373	Dewatering	Aquifer	Wambo	1549 units	Continuing
WAL41532	Dewatering	Aquifer	Wambo	98 units	Continuing
WAL41510	Dewatering	Aquifer	United	300 units	Continuing

United and Wambo hold a number of bore licences for groundwater monitoring bores under the *Water Act 1912*. Groundwater monitoring bores are detailed in the ***United Wambo Groundwater Management Plan***. Monitoring of these bores is included in the **WMProg**.

6. Glencore Coal Assets Australia Requirements

The Glencore Coal Assets Australia (GCAA) Water Management Protocol (GCAA-625378177-10320) outlines the following principles focussing on effective water management which is critical to supporting operations. Water management planning assists in managing a number of aspects, such that:

- environmental obligations are met;
- GCAA can demonstrate to external stakeholders that the local and regional surface and groundwater resources are used efficiently;
- operations are protected from flooding; and
- adequate water supplies are available for mining and processing operations.

Water management planning is linked to the mine planning process so that the water management infrastructure is provided in advance of mining operations and the water related risks are identified, managed and monitored.

7. Stakeholder Consultation

As required by B52(b) of SSD 7142, this WMP (and sub-plans) has been prepared in consultation with the Department of Planning, Industry & Environment – Water Group (DPIE Water) and Environment Protection Authority (EPA), and submitted to the Secretary of DPIE 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 WMP on 21 September 2018. The EPA noted that they do not undertake consultation for management plans and, as such, offered no comment in relation to these plans aside from ensuring that the plans consider the conditions of any Environment Protection Licence conditions in force at the time. The EPL 3141 conditions relating to water management are described in ***Section 5.2***.

The WMP was provided to DPIE Water for consultation on 9 September 2019. Following receipt of feedback, the WMP was reviewed and updated prior to resubmission to the Secretary for approval on 11 December 2019.

The WMP and subordinate documents was reviewed and submitted to DPIE for approval prior to commencing Phase 1B. Approval of the WMP for was granted on 13 July 2020.

Feedback and correspondence in relation to the WMP is attached as ***Appendix A - Stakeholder Consultation***.

8. Baseline Data

8.1 Assessment of Environmental Aspects

A comprehensive list of environmental impact assessments undertaken for United Wambo is provided in the Environmental Management Strategy.

The most recent water assessments undertaken are:

- the United Wambo Open Cut Coal Mine Project – Surface Water Assessment (Umwelt, 2016a), included as Appendix 11 of United Wambo Open Cut Coal Mine Project – Environmental Impact Statement (EIS) (Umwelt, 2016b); and
- the United Wambo Open Cut Coal Mine Project – Groundwater Impact Assessment (AGE, 2016) included as Appendix 12 of the EIS.

The Surface Water and Groundwater Impact Assessments are summarised in Section 6.8 of the EIS.

Additional information is also provided in the United Wambo Open Cut Coal Mine Project – Response to Submissions (RTS) (Umwelt, 2017a) and United Wambo Open Cut Coal Mine Project – Response to Request for Further Information (RtRfFI) (Umwelt, 2017b) and correspondence with the Independent Planning Commission (IPC).

These documents are available at:

- *http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7142*; and
- *https://www.ipcn.nsw.gov.au/projects/2018/11/united-wambo-open-cut-coal-mine-project-ssd-7142*.

8.2 Existing Water Environment

8.2.1 Surface Water Catchment Context

The Project Area is located within the catchments of Wollombi Brook and Waterfall Creek, both tributaries of the Hunter River. Wollombi Brook is located to the east of the Project Area and flows into the Hunter River approximately five kilometres north-east of the Project Area. Waterfall Creek is a minor tributary of the Hunter River and flows into the Hunter River approximately four kilometres north-west of the Project Area.

The majority of the Project Area lies within the lower part of the Wollombi Brook catchment. The total catchment area of Wollombi Brook is substantial (approximately 1850 km^2) and approximately 99 per cent of the catchment area lies upstream of the Project Area (refer to ***Figure 8-1***). The Wollombi Brook catchment in the vicinity of the Project Area includes sub-catchments of Wambo Creek, North Wambo Creek and Redbank Creek (refer to ***Figure 8-2***).

Waterfall Creek, a sub-catchment of the Hunter River, is located in the north of the Project Area.

The United and Wambo Water Management Systems are also located within the Project Area. The extent of the existing WMSs is shown on ***Figure 8-2***.

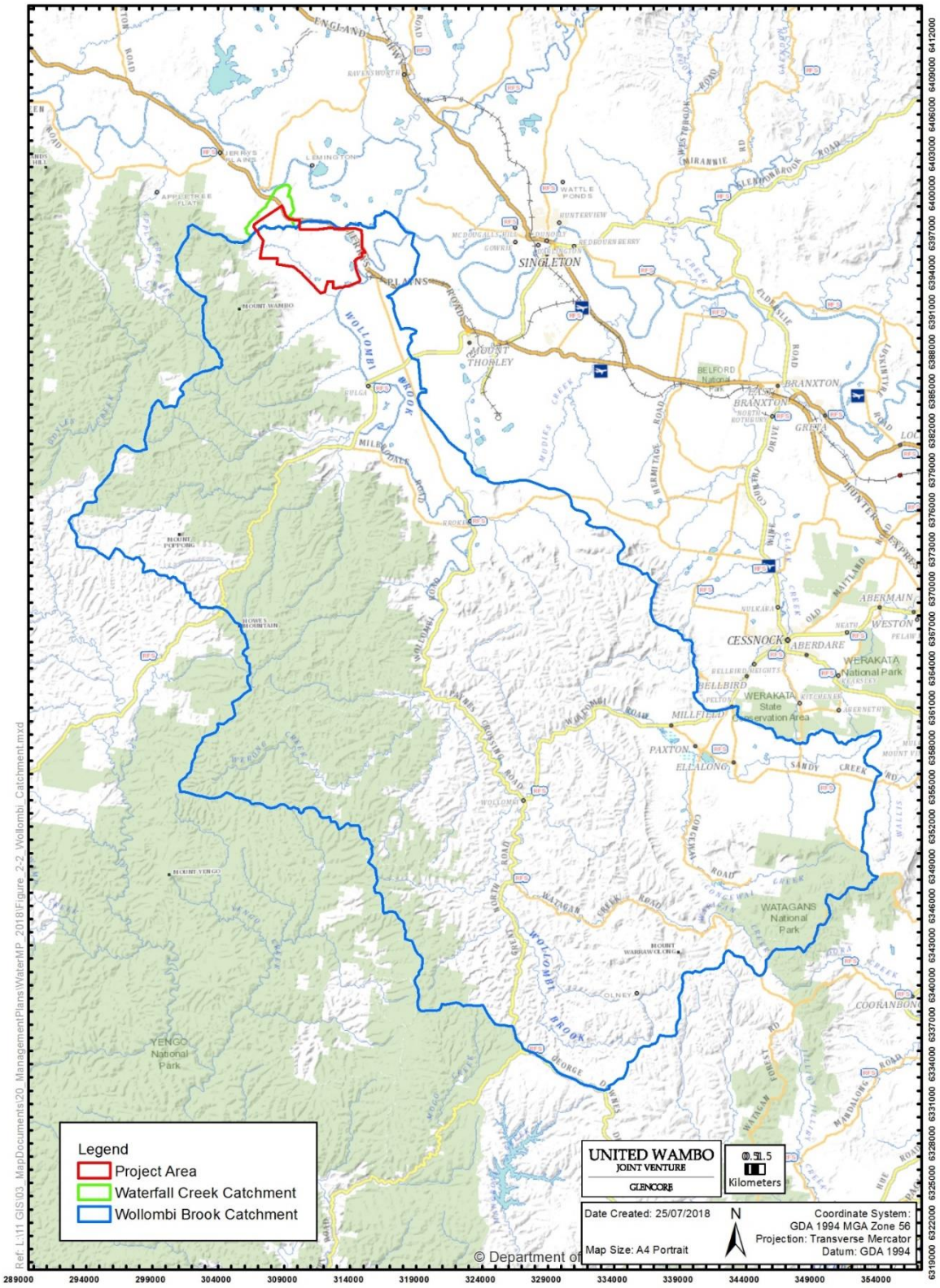


Figure 8-1: Wollombi Brook Catchment Context

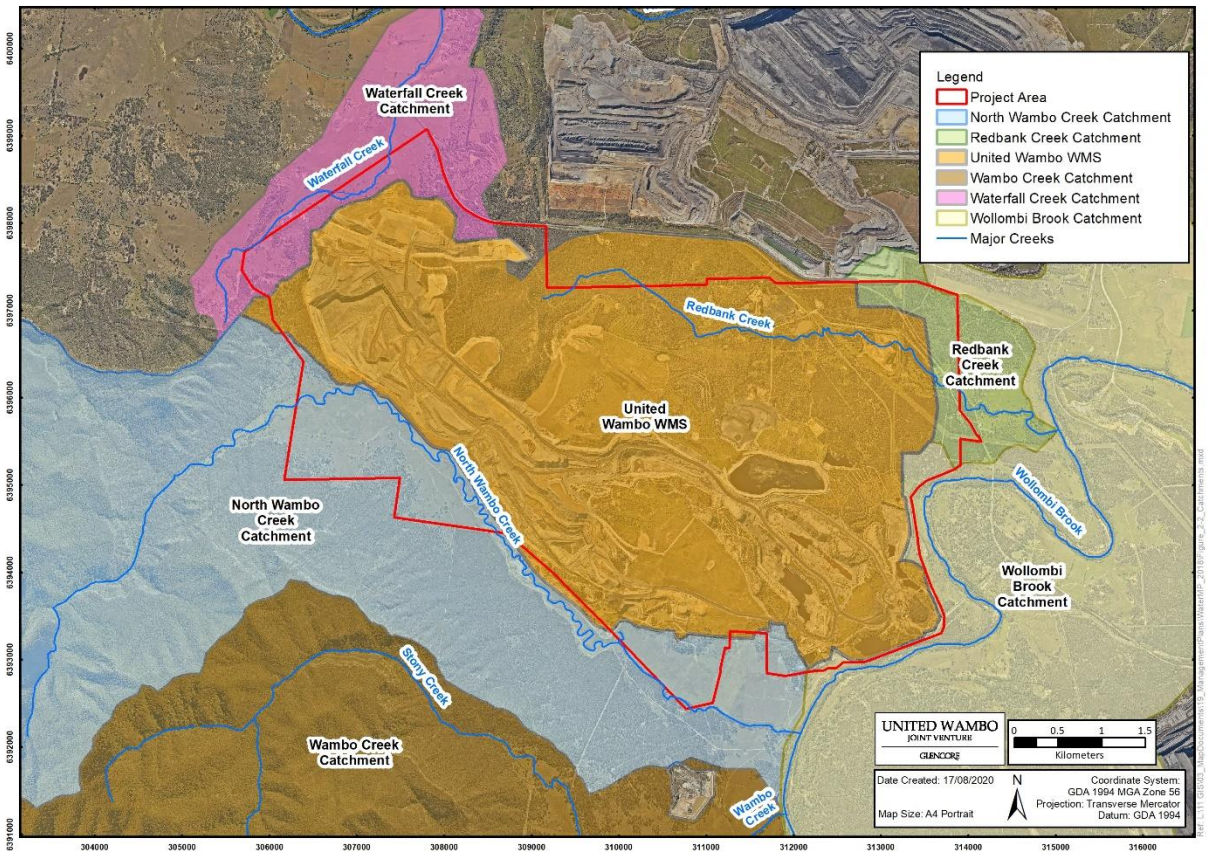


Figure 8-2: Project Area Catchment Context

Wambo Creek, including its tributary, Stony Creek, flows in a north-easterly direction and joins Wollombi Brook approximately two kilometres upstream of the Project Area. North Wambo Creek flows in a generally south-easterly direction through and along the southern flank of the Project Area, joining Wollombi Brook approximately one kilometre south of the Project Area. A section of North Wambo Creek has previously been diverted as part of the approved Wambo Open Cut mining operations.

Redbank Creek flows through the centre of the United site and into a clean water catch dam, with United holding WAL18445 to use water from this dam for mining operations. Redbank Creek's confluence with Wollombi Brook is located to the east of the Project Area.

Waterfall Creek is a minor drainage line that flows away from the Project Area in a north-easterly direction to the Hunter River.

The catchment boundaries for watercourses within and surrounding the Project Area are shown in ***Figure 8-2***. Previous mining operations within the Project Area have modified local catchments through the capture of runoff from mining areas within the existing WMSs and diversion of upslope runoff around the mining operations.

Detailed baseline data with regard to surface water flows and quality in the vicinity of the project is presented in the ***United Wambo Surface Water Management Plan***.

8.2.2 Groundwater Resource Context

Two broad types of aquifers occur in the vicinity of the Project Area.

Quaternary alluvium (including 'highly productive' and 'less productive' alluvium)

The Quaternary alluvium in the vicinity of the Project Area occurs along Wollombi Brook and parts of its tributaries, and along the Hunter River to the north (refer to Figure 8-3). The Hunter River alluvium flows in an easterly direction, while groundwater within the Wollombi Brook alluvium flows in a north to north-easterly direction towards the Hunter River.

Recharge to the Quaternary alluvium occurs via 'diffuse' recharge from rainfall and 'focussed' recharge through the stream bed. The alluvium can also be recharged by upward leakage from the underlying stratigraphy, particularly along Wollombi Brook.

The available data for the alluvium indicates that it is largely unsaturated within the more elevated tributaries, with the alluvial groundwater largely restricted to the thicker sequences of sand and gravel (highly productive alluvium) along the Hunter River and Wollombi Brook. While the alluvium is an unconfined unit, the upper sequences of the alluvium (approximately upper eight metres) are largely clay rich and less permeable than the basal sands and gravels.

Groundwater levels within the Quaternary alluvium along Wollombi Brook and Hunter River in the vicinity of active mining are generally four metres and 10 metres below surface, respectively. It is likely that localised downward leakage (losing conditions) occur from the Quaternary alluvium, particularly where the more permeable coal seams subcrop beneath the alluvium and where active mining is present.

Permian coal measures

The Permian coal measures comprise coal seams interbedded with low permeability sandstone and siltstone. The majority of groundwater is present within the more permeable coal seams, which is due to secondary porosity through cleats and fractures.

The Wittingham Coal Measures are saturated across their extent with groundwater levels generally 30 metres below the surface, ranging between 80 mAHD to the south-west beneath the escarpment, down to 50 mAHD near the Hunter River. The measures are recharged by downward leakage from overlying strata, which includes the Quaternary alluvium. The coal measures are also recharged from rainfall where the coal measures outcrop (i.e. reach the surface) to the north and east of the Project Area.

Detailed baseline data with regard to groundwater levels and quality in the vicinity of the project is presented in the ***United Wambo Groundwater Management Plan***.

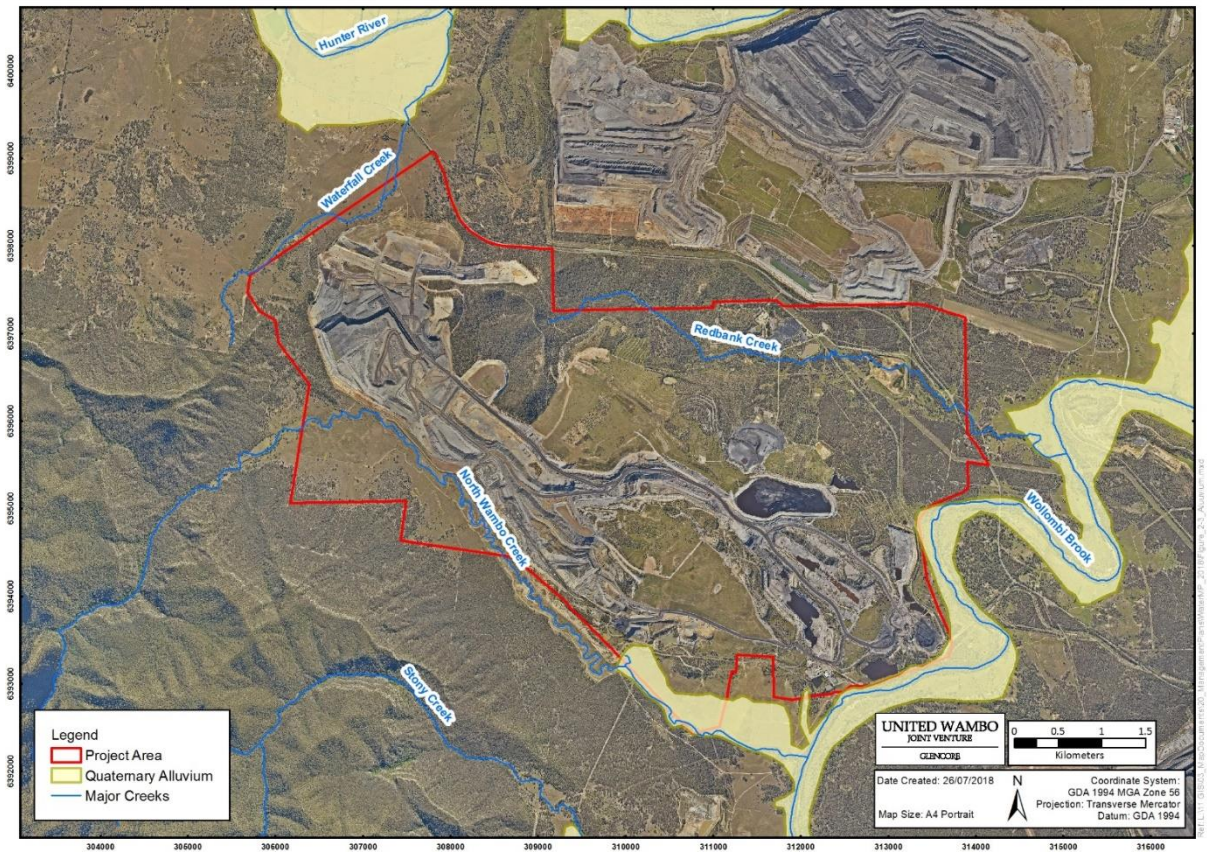


Figure 8-3: Quaternary Alluvium Extent

9. Planning

9.1 Water Management Strategy

United Wambo categorises water into three types to effectively manage water and to mitigate any potential for environmental harm to occur. Each type of water requires different management measures to minimise the risk of contamination of downstream drainage systems. A description of the water quality and potential sources for the three categories of water are summarised in ***Table 9-1***.

Table 9-1: Water Categories and Design Criteria

Water Category	Description	Target Design Criteria
Clean Water	Runoff from undisturbed or rehabilitated areas	Intercept, convey and/or release, where practicable, to downstream environment
Dirty Water	Runoff from disturbed areas, such as active overburden emplacement areas or overburden emplacement areas where vegetation is not fully established.	Managed in line with the Blue Book (Managing Urban Stormwater: Soils and Construction Volume 1 and Volume 2E)
Mine Water	Water exposed to coal or used in coal processing and runoff within mining infrastructure areas or coal stockpile areas Mine water includes water associated with groundwater inflows into open cut pits	Mine water storages to have sufficient freeboard to contain runoff for events up to and including the 1% 24 hour AEP (annual exceedance probability) storm event

9.1.1 Clean Water Management

The existing clean water management system includes a series of clean water drains and dams around the perimeter of operational areas in order to minimise the volume of runoff from the upstream catchments entering active mining areas. As mining progresses, the clean water controls will be augmented with the construction of new drains and dams as needed.

The design basis for additional clean water dams is as follows:

- surge capacity will be provided for a design storm event of 100-year ARI, 24-hour event in addition to operating capacity; and
- spillways will be designed for conveyance of the 100-year ARI peak flow with 300-millimetre freeboard.

9.1.2 Dirty Water Management

The existing dirty water management system includes a series of catch drains and sediment dams located to capture and manage runoff from disturbed areas. The dirty water management system will be constructed in accordance with *Managing Urban Stormwater: Soils and Construction* (the Blue Book), Volumes 1 and 2E – Mines and Quarries (Landcom 2004 and DECC 2008). The dirty water management system is designed to manage runoff from the five day, 95th percentile rainfall event.

As mining progresses, runoff from disturbed areas will be managed within the water management system and reused or, if water quality meets required guidelines (refer ***United Wambo Surface Water Management Plan***), released to downstream waterways under the HRSTS. During high or prolonged rainfall events that exceed dam design capacity, dams may spill into the downstream environment.

Additional information on the management of dirty water and infrastructure design standards, including design criteria, is contained within the ***Erosion and Sediment Control Plan*** and ***Surface Water Management Plan***.

9.1.3 Mine Water Management

Mine water consists of water that has potential to be in contact with coal or carbonaceous material and, therefore, has the potential to be saline. Mine water also includes runoff from mine infrastructure areas and groundwater inflows.

Mine water will be contained in storages (including open cut pits and underground voids), suitably designed, installed and maintained to convey and contain runoff from the 1% AEP, 24 hour storm event (equivalent to the 100-year, 24-hour ARI storm event). The water management system is designed to minimise the risk of discharges of mine water to downstream watercourses.

The design basis for additional mine water storages will be as follows:

- surge capacity will be provided for a design storm event of 100-year ARI, 24-hour event in addition to operating capacity; and
- spillways will be designed for conveyance of the 100-year ARI peak flow with 300-millimetre freeboard.

Tailing storage areas will be suitably designed, installed and maintained to encapsulate and prevent the migration of tailings seepage offsite. Overburden will be monitored for saline seepage as per the ***United Wambo Surface Water Management Plan***.

Oil-water separators treat water exposed to hydrocarbons within the infrastructure areas. Any chemical and hydrocarbon products are stored in bunded areas in accordance with the relevant Australian Standards.

9.2 Further Studies

Condition B51 of SSD 7142 requires a Groundwater Dependent Ecosystem Study to be undertaken within 12 months of the commencement of development under the consent.

9.3 Hold Points

No hold points have been identified relating to water management at United Wambo.

10. Implementation

10.1 Water Management Strategy

The water management system will be constructed and modified as and when required, so as to support the infrastructure and mine development. The proposed strategy for water management for clean and dirty water for United Wambo has been determined for the following stages:

- Stage 1 WMS Years 1-2 (Phases 1A and 1B defined in development consent SSD 7142) - **complete**;
- Stage 2 WMS Years 3-6 (Phase 2); and
- Stage 3 WMS Year 7 onwards (Phase 2).

Water management structures will be constructed and managed in accordance with the Blue Book:

- Landcom 2004, *Managing Urban Stormwater – Soils and Construction*, Volume 1, 4th Edition; and
- Department of Environment and Climate Change (DECC) 2008, *Managing Urban Stormwater - Soils and Construction*, Volume 2E – Mines and Quarries.

Further detail on the water management system is included in Section 7 of the **SWMP**.

10.1.1 Stage 1 WMS: Years 1 – 2 (2019 – 2020)

During Stage 1 the United Wambo WMS covered only the United operational areas. The existing Wambo WMS will remain for this period, in accordance with the existing Wambo Water Management Plan. As of commencement of Phase 2 in November 2020, this stage has been completed.

10.1.2 Stage 2 WMS: Years 2 – 6 (2020 – 2024)

At the commencement of Stage 2, United Wambo becomes responsible for all open cut mining activities across United and Wambo. Wambo will maintain responsibility for the UG and CHPP.

Water will be managed across the complex with shared water storages and infrastructure.

Water from the complex will be discharged via the Wambo licensed discharge point in accordance with Wambo EPL 529 under the HRSTS.

The proposed surface water management plan for Stage 2 - 2020 to 2024 is presented in ***Figure 10-1***. The stage plan shown is a snapshot of the end of Stage 2.

Clean Water

The Northern Drain will be established and will convey water from north of the United Open Cut back into Redbank Creek downstream of the operation.

Dirty and Mine Water

Construction of U2 has been completed and contains surface runoff from undistrubed and disturbed upstream catchment areas. U2 has been designed to capture a 100-year, 24-hour duration storm event. U2 has been constructed with an overflow channel into the existing United Boxcut, providing a combined surge capacity of 430ML. U2 is dewatered to U3 or pumped directly to water storages at Wambo. U2 is also a water source for the United dust suppression system water tanks.

Construction of U3 has been completed and will contain surface runoff from the overburden emplacement areas. U3 has been designed to capture a 100-year, 24-hour duration storm event. U3 has been constructed with a surge capacity of 223 ML.

An emergency overflow culvert has been constructed out of Dam U3 at the north-western corner, to allow the dam to flow into the United Open Cut should the design storm event be exceeded.

Runoff from overburden emplacement and rehabilitation areas at United Wambo will be captured via a series of constructed drains and dams. The dams will be dewatered to the major water storages.

Erosion and sediment control will be implemented as required for all proposed disturbance areas.

10.1.3 Stage 3 WMS: From Year 7 (Post 2025)

U2 will be mined through by the United Open Cut in approximately 2024. Prior to the removal of U2, clean water from the Redbank Creek catchment upstream of mining will need to be managed to avoid capture in the pit.

Options that will be assessed during Stage 2 will include the following:

- construction of upstream dam/s to capture and pump to downstream discharge location; and
- construction of drains to convey water around the north of the United pit.

The final WMS will be developed in consultation with DPE Water and detailed in a revised Water Management Plan prior to commencement of Stage 3.

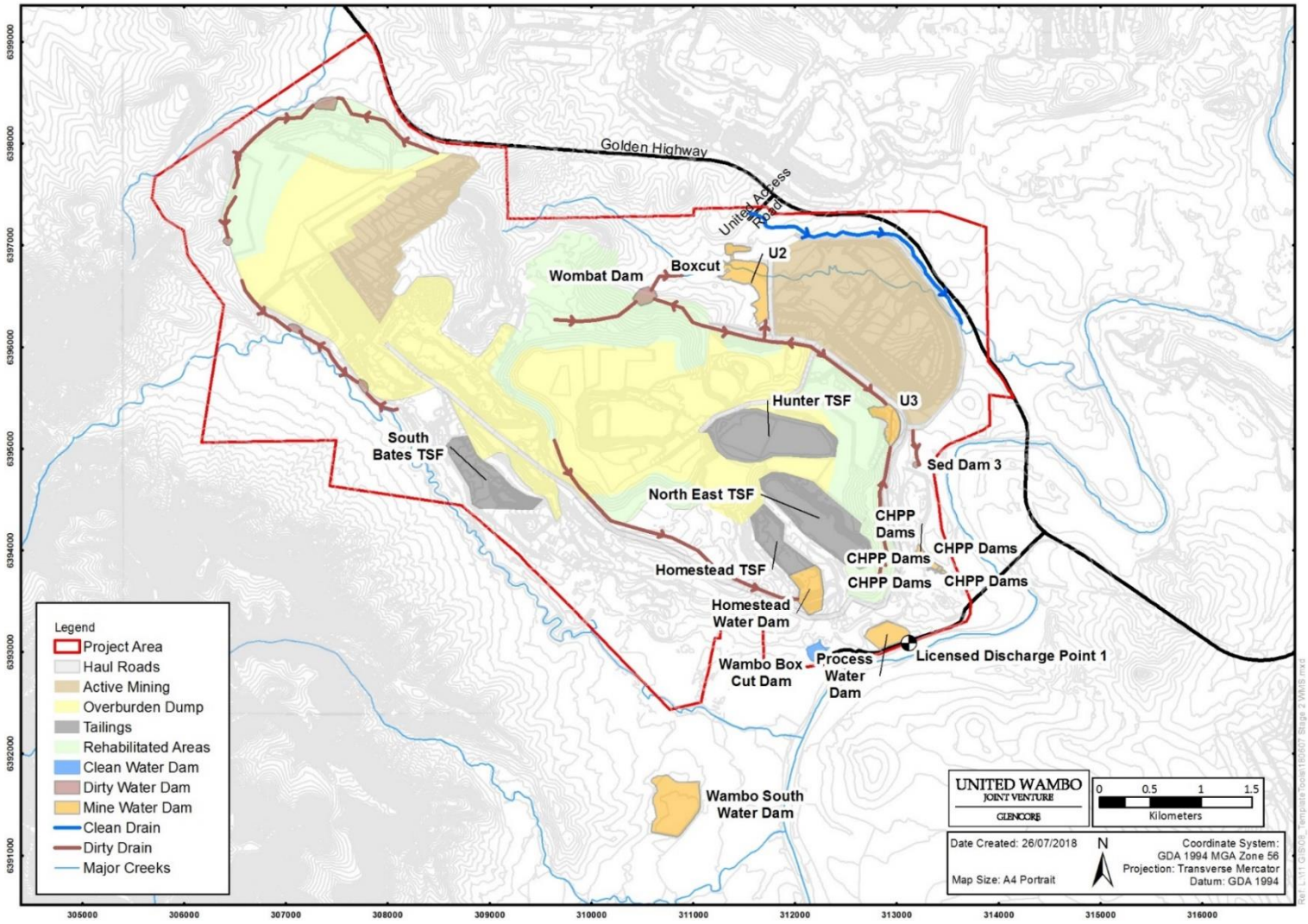


Figure 10-1: Stage 2 Water Management System

10.1.4 Additional Water Management Infrastructure

Water is transferred around the site using pump and pipeline infrastructure. The pipeline network is dynamic and may change over time based on need and location of mining and in-pit water.

Where possible, all sections of mine water pipelines will run through mine water catchments so that any leaks in the pipes in these areas will flow into mine water storages.

In the event that a dirty or mine water pipeline is located in a clean water catchment, additional controls will be implemented to mitigate offsite discharges. Differential flow meters or pressure sensors will be installed to detect potential losses. This system is to be linked by telemetry to readily detect and mitigate potential pipeline failure incidents. The system will cease pumping at a pre-defined trigger level, which minimises spillage risk.

Pipelines should be buried across creeks and drainage lines and should be double skinned or sleeved to minimise physical damage and/or to contain potential leakages. Where burial is not practical or for existing pipelines that are suspended across creeks, measures are to be implemented to confirm that they are to be adequately supported to prevent damage from creek flows and or flood debris.

10.1.5 Flood Protection Levee

Flood modelling undertaken of the Wollombi Brook during the preparation of the Surface Water Impact Assessment (Umwelt 2016) indicated that the inundation extent of a one per cent AEP flood event includes an area of the footprint of the United Open Cut. The flood inundation within the footprint is due to backwater from Wollombi Brook entering the lower reaches of Redbank Creek during flood events. To protect the United Open Cut from flooding and provide safety to the mining operations, United Wambo has constructed a flood levee. Refer to Sections 8 and 9 of the SWMP for more detail on the flood levee.

10.1.6 Erosion and Sediment Controls

Erosion and sediment control measures will be implemented and undertaken in accordance with the ***United Wambo Erosion and Sediment Control Plan***.

The objective of the Erosion and Sediment Control Plan is to ensure that appropriate structures and programs of work are in place to:

- identify activities that could cause erosion and generate sediment;
- describe the location, function and capacity of erosion and sediment control structures required to minimise soil erosion and the potential for transport of sediment downstream;
- ensure erosion and sediment control structures are appropriately maintained;
- fulfil the statutory conditions of the project approval; and
- meet the requirements of the Blue Book (Landcom 2004 and DECC 2008) and the Draft Guidelines for the Design of Stable Drainage Lines on Rehabilitated Mine sites in the Hunter Coalfields (DIPNR undated).

10.1.7 Water Extraction and Discharges

United Wambo will extract water from the Hunter River and Wollombi Brook as required and approved under the existing WALs (refer ***Section 5.3***).

Surplus water from United Wambo will be discharged as required and in accordance with EPL 529 and consistent with the provisions of the HRSTS. Discharges will be monitored prior to release to ensure compliance with the requirements of the HRSTS and in accordance with EPL conditions.

Management and monitoring of water extraction and discharge is detailed in the ***United Wambo Surface Water Management Plan***.

10.1.8 Water Transfers

A key objective of the United Wambo water management system is to allow for water sharing between the United and Wambo operations to optimise the overall water balance through maximising water recycling, minimising external water demand and water discharge and to provide operational flexibility. The water management system outlined in ***Section 10.1*** has been designed to facilitate this.

Water can also be imported to and exported from the United Wambo water management system from the neighbouring Hunter Valley Operations (HVO). Water will be imported and exported on an as needs basis subject to commercial agreements.

10.1.9 Wastewater Treatment

Wastewater from onsite facilities, including sewage, is collected and treated on site by a number of aerated wastewater treatment plants, which are licensed by Singleton Council.

10.2 Site Water Balance

A site water balance was developed as part of the United Wambo Open Cut Coal Mine Project Environmental Impact Statement (Umwelt, 2016). The site water balance was modelled as an integrated system including both the United Wambo Project and the Wambo Underground, CHPP and rail facility. Inflows to the water balance included groundwater flows from the open cuts and underground.

The site water balance has been updated prior to commencing Phase 2 to incorporate the United Wambo and Wambo water management systems.

The site water balance will be recalculated on an annual basis and reported in the Annual Review.

10.2.1 Water Sources

The sources of water supply to United Wambo are:

- direct rainfall onto the surface of water storages;
- runoff captured from the footprint of the mining disturbance area by the water management system;
- tailings decant – this is water liberated from tailings slurry as it settles in within a tailings storage facility;
- water imported from other mining operations (mine water);
- groundwater inflows to the open cut mining pits;

- groundwater inflows to the underground mining areas;
- dewatering boreholes to existing underground workings;
- water extracted from the Hunter River and Wollombi Brook under licence; and
- potable water trucked to site from a private supplier.

10.2.2 Water Use and Management

The water uses on site include:

- gross water requirements for the CHPP, including water lost to product, coarse rejects and tailings and washdown water;
- water exported to other mines;
- dust suppression of haul roads and stockpiles etc; and
- potable water used at the United and Wambo administration buildings and bathhouses.

The main water losses are attributable to evaporation from the surface of water storage dams/pits and tailings dams.

Wastewater from onsite facilities, including sewage, is collected and treated on site by a number of aerated wastewater treatment plants, which are licensed by Singleton Council.

Managing water demand and maximising reuse of water onsite, so as to minimise the import/use of potable/clean water, is an important aspect of the water management system.

10.2.3 Offsite Water Transfers and Discharges

Refer to ***Figure 10-1: Stage 2 Water Management System***.

10.2.4 Water Balance Predictions

A detailed water balance assessment was completed for the United Wambo by Hydro Engineering and Consulting Pty Ltd (HEC) and forms an appendix to the Surface Water Assessment (Umwelt 2016a). Given the integrated nature of the United Wambo and Wambo water management systems, the water balance assessment has included consideration of water use and make in the Wambo and United pits as well as the Wambo underground, CHPP and train loading facility.

The water balance model developed for the Surface Water Assessment has been updated by SLR prior to Phase 2 to reflect the Stage 1 to Stage 3 water management system layouts. The modelled median site water balance is summarised in ***Table 10-1***.

Table 10-1: Predicted Site Water Balance

Component	Project (ML/Year)
Inflows	
Rainfall/Runoff	2,968
Groundwater Ingress (Underground)	527
Groundwater Ingress (Open Cut)	292
Wollombi Brook Extraction	99
Hunter River Extraction	381
Tailings	2,045
Outflows	
CHPP Demand	3,181
Evaporation	810
HRSTS Release	166
Dust Suppression	1,687
Other Demands/Losses	342
Total Inflows	**6,312**
Total Outflows	**6.177**
Balance (Inflow – Outflow)	**134**

The performance of the Wambo and United Wambo combined WMS has been reviewed and water balance modelling results (**Error! Reference source not found.**) indicate the following:

- the 95th percentile (95%) results indicate that the WMS is has a positive water balance gaining approximately 340 ML/yr. (water year) based on an annualised water balance for the life of mine;
- the median (50%) results indicate that the WMS has a positive water balance of approximately 112 ML/yr. (water year) based on an annualised water balance for the life of mine; and
- the 5th percentile (5%) results indicate that the WMS has a moderately negative water balance (-47 ML/yr.) based on an annualised water balance for the life of mine.

The water balance model results indicate the proposed WMS is capable of managing stored inventories during the median, 5th percentile (dry) and 95th percentile (wet) climate conditions. Under the 5th percentile (dry) climate conditions, water supply will be accessed from the from the existing Wambo and United WALs to maintain surface water inventories for site processes. The majority of external water supply is sourced from the Wambo Underground boreholes during these conditions. A combination of surface water storages and underground water storages (post 2022) will cater for stored inventories under the 5th percentile (wet) climate conditions.

The site water balance will be recalculated on an annual basis and reported in the Annual Review.

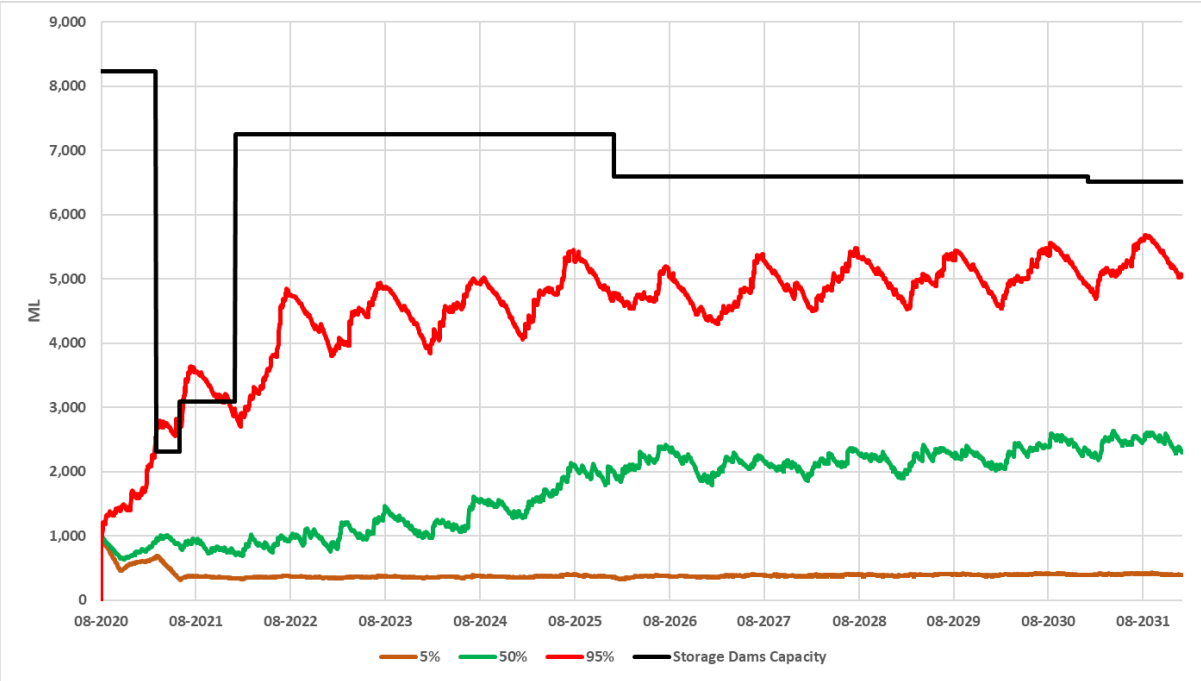


Figure 10-2: Inventory Forecast

10.3 Site Salt Balance

A site salt balance has been developed as an extension of the site water balance for United Wambo (refer ***Section 10.2***). The salt balance model allows the salt load and salinity of water exported from United Wambo to be predicted, which is an important consideration for the management of water on-site. Given the integrated nature of the United Wambo and Wambo water management systems, the water balance assessment has included consideration of water use and make in the Wambo and United pits as well as the Wambo underground, CHPP and train loading facility.

Salt transfers were simulated within the site water balance model in parallel with the water transfers. The site salt balance provides the expected salt loads and concentration of salt associated with each water transfer within the model. The site salt balance is reviewed on an annual basis, in association with the review of the site water balance, and the results are reported in the Annual Review (refer ***Section 12.1.1***).

10.3.1 Saline Material

Saline material is any material moved on site that has the potential to generate saline water. Salt is chemically released by weathering and then has the potential to be transported by water. The sources of saline material at United Wambo are:

- overburden and interburden;
- ROM coal;
- product coal;
- coarse coal rejects; and
- tailings.

Saline material has the potential to generate saline water while it is exposed to the surface. Saline material will be managed though storage and emplacement such that the saline water that is

generated is contained in the WMS. The details of the management of the different source of saline material are summarised in ***Table 10-2***.

Table 10-2: Management of Saline Material

Source	Management
Overburden and interburden	Emplaced in dumps that are constructed such that runoff is contained in the water management system before being capped and revegetated
ROM coal	Stored in stockpiles that are constructed such that runoff is contained in the water management system before being processed in the CHPP Currently managed by Wambo
Product coal	Stored in stockpiles that are constructed such that runoff is contained in the water management system before being exported off site Currently managed by Wambo
Coarse coal rejects	Emplaced in dumps that are constructed such that runoff is contained in the water management system capped and revegetated
Tailings	Emplaced in tailings dams that are constructed such that runoff is contained in the water management system capped and revegetated Currently managed by Wambo

10.3.2 Saline Water

The sources of saline water at United Wambo are:

- runoff – in addition to the salt released by weathering of the saline material, salt also accumulates by deposition from rainfall in soil. The salt on the surface of the soil or material is dissolved by rainfall and enters the WMS dissolved in runoff;
- groundwater inflows into open cut pits;
- water imported from other mines;
- water imported from the Hunter River and Wollombi Brook; and
- direct rainfall onto water storages.

As salt lost via evaporation is negligible, salt will typically concentrate in the water stored and used at United Wambo. Once dissolved, the salt remains in solution as it is transferred through the WMS, unless the water is discharged under the EPL and Hunter River Salinity Trading Scheme (HRSTS).

Salt passes through the CHPP in solution and either remains with the product or coarse reject material or is pumped as tailings slurry in proportion to the water volumes. Salt dissolved in the tailings slurry is either retained in the tailings or transferred in solution with decant water in proportion to the water volumes. Salt dissolved in water used for dust suppression accumulates on the haul roads as the water evaporates. The salt is redissolved when runoff occurs and re-enters the WMS.

The sources of saline water are shown in ***Table 10-3*** along with representative salinity values. Typical salinity has been defined for runoff into each storage based on values used in the United Wambo EIS Water Balance Assessment (HEC, 2016).

Table 10-3: Typical Salinity of Site Runoff and Salt Sources

Runoff Catchment Source	Typical Salinity (mg/L)
C11 Void and Chitter Dam	4,600
CHPP Dams and Milk Can Dam	3,500
Homestead and Main Homestead	4,600
Hunter Tailings and Tailings Bleed Water	9,600
MIA Dam	600
Wambo Open Cut and United Open Cut	4,000
North East Tailings	2,750
Process Water Dam	4,300
South Bates	4,000
South Wambo Dam	400
West Cut Water Dam	3,700
U2 and U3	1,000
Imports from Hunter River and Wollombi Brook	400
Groundwater inflows	6,000

10.3.3 Salt Balance Predictions

The predicted mean salinity of all water stored on site is shown in ***Figure 10-3***.

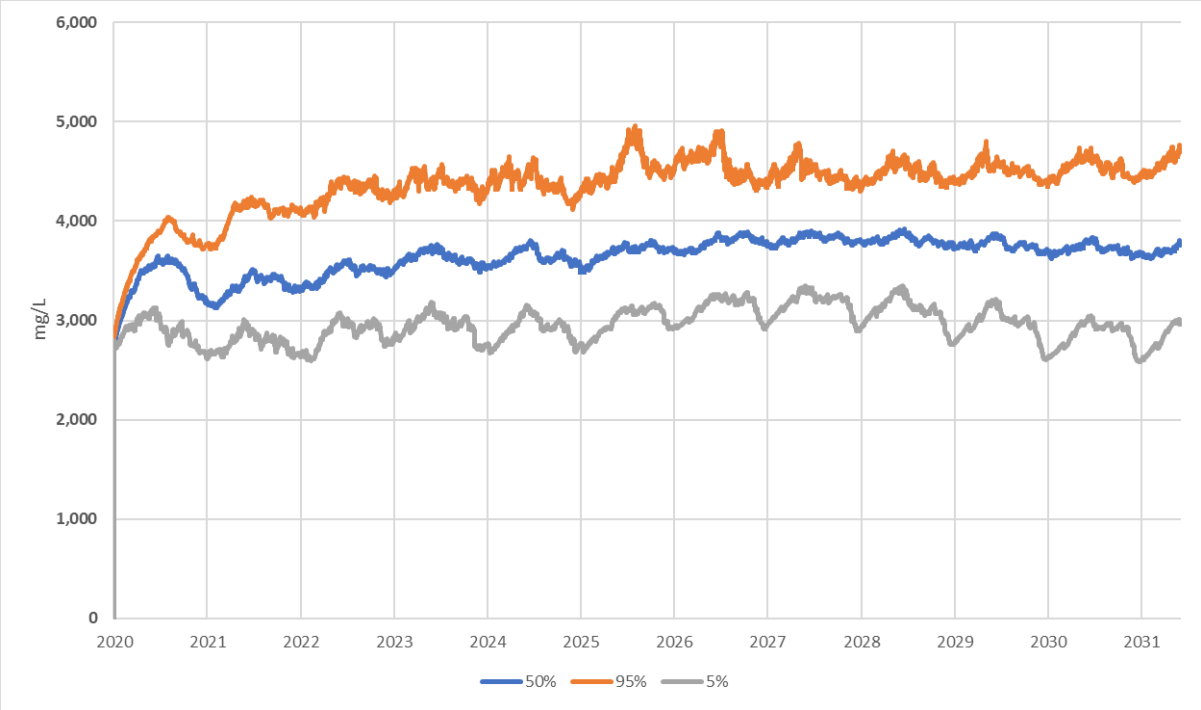


Figure 10-3: Predicted Mean salinity of Stored Water

Median salinity can be expected to increase over time and stabilise at approximately 8,000 mg/L throughout the operational forecast. An improvement in reported water quality is likely as catchments ae rehabilitated.

10.4 Groundwater Model

Groundwater modelling for the United Wambo Open Cut Project was undertaken by AGE as part of the Groundwater Impact Assessment (AGE, 2016). This modelling predicts the take of groundwater due to the Project (including Wambo operations). This modelling was peer reviewed by Dr Noel Merrick. Based on groundwater modelling predicted impacts are considered less than the Level 1 minimal impact considerations (refer **GWMP**).

Results from monitoring undertaken as part of the ***WMProg*** will be compared to groundwater model predictions, as part of the Annual Review process.

The groundwater model will be validated every five years, using data collected from the water monitoring program (refer **WMProg**). This process will be coordinated by Wambo and reported on in both sites' Annual Reviews.

10.5 Security of Supply

United Wambo receives water from rainfall and catchment runoff captured in surface storages, groundwater inflows, water imported from other mines and licenced extraction from the Hunter River and Wollombi Brook.

The site water balance model indicates that United Wambo is predicted to have a high level of water supply reliability. This indicates that the mine plan, associated water management infrastructure and available existing WALs should be able to provide a reliable supply of water in the majority of climatic scenarios. The water balance model will be updated throughout the mine life to forecast supply reliability as part of the water management planning process. In the event of reductions in the forecast reliability due to low rainfall conditions, water conservation measures (such as the use of synthetic dust suppressants) will be implemented.

10.6 Training and Communication

General training on the aspects of the WMP will be provided to all employees and contractors through the GCAA Generic Surface Induction and the Site Familiarisation process.

Regular workforce communication days and toolbox talks allow for discussion of the objectives and requirements of this and any other relevant Plans.

Selected site personnel whose duties directly involve the management of water at United Wambo, will undertake specific training in regard to site Operational Procedures, which incorporate water management measures. This training will be undertaken annually and when there is a change in personnel in key roles. Examples of site personnel that may require training are as follows:

- personnel involved in water management, including pumping and moving pipelines;
- personnel involved in the construction and maintenance of erosion and sediment controls;
- personnel involved in supervisory roles; and
- personnel involved in ground disturbance activities.

11. Measurement and Evaluation

11.1 Water and Salt Balance

United Wambo will monitor rainfall, water usage, fresh water imported to site, the transfers of water around site and the volume of water stored in designated storages on the site.

The monitoring data is used to update the site water balance annually and track water inventory. The results from the site water balance are reported in the Annual Review (refer to ***Section 12.1***).

11.2 Groundwater Inflows

As part of the ongoing water balance, monitoring the groundwater inflows to the mining pits and underground will be reviewed quarterly. This will be undertaken by review of available data (including flow metering data or pump hours, site daily rainfall data and site survey data) to estimate groundwater inflows to each pit at United Wambo and the United Underground.

Groundwater inflows will be compared to predicted inflows as outlined in the ***United Wambo Groundwater Management Plan***.

11.3 Water Structure Inspections

Routine inspections of water structures, including dams, drop structures, diversion drains and erosion and sediment control structures, as well as inspections following significant rainfall events (greater than 25 mm in 24 hours), will be conducted by United Wambo personnel. Water structures are inspected to assess the capacity, structural integrity and effectiveness and identify any maintenance requirements.

Further detail is presented in the ***United Wambo Erosion and Sediment Control Plan***.

The frequency of pipeline inspections will be determined through risk assessment, however, all major operational pipelines and high-risk pipelines are to be inspected weekly, when in use, as a minimum. Minor pipelines and low risk pipelines within the mine containment system are to be inspected on a risk-based approach. Inspection are also to be completed prior to commissioning or recommissioning a pipeline. Inspection frequency is risk-based, depending on water quality being transferred and the environment in which the pipeline is located.

11.4 Water Monitoring

Water monitoring is undertaken on key water storages and receiving waterways around United Wambo. Refer to the ***United Wambo Surface Water Management Plan*** and ***WMProg*** for further detail.

Water monitoring is undertaken for groundwater levels and quality as part of the groundwater monitoring program. Refer to the ***United Wambo Groundwater Management Plan*** and ***WMProg*** for further detail.

Monitoring results are reported in the Annual Review (refer ***Section 12.1***) and made available on the United Wambo website.

11.5 Complaints Management Protocol

United Wambo operates a dedicated complaints hotline. The details of this hotline are advertised in the newsletter and on the United Wambo website.

A procedure for handling complaints has been implemented as part of the United Wambo EMS to ensure a consistent approach to handling any complaint. All legitimate complaints will be thoroughly investigated by the United Wambo Environment and Community (E&C) Manager. With respect to complaints regarding surface water the investigations will include, as a minimum:

- records of the timing and general location of the issue initiating the complaint;
- details of the meteorological conditions at the time of the issue initiating the complaint;
- identification of any potential contributing factors; and
- a review of any monitoring results relevant to the complaint.

Where the complaint is potentially attributable to United Wambo, appropriate mitigation and management strategies will be developed, implemented and monitored for the effectiveness of the strategies undertaken.

Feedback to the complainant will be provided within 24 hours of receiving the complaint.

Details of complaints relating to surface water will be provided to relevant mine planning and production personnel, to assist in the improvement of management practices, where relevant. A summary of the complaints received by the community will be reported in the Annual Review.

12. Review and Improvement

12.1 Reporting

12.1.1 Annual Review

The United Wambo E&C Manager will be responsible for reporting any significant findings regarding the implementation of this Plan in the Annual Review, including:

- any amendments to licensing or statutory approvals;
- a summary of any complaints or incidents relating to the performance of the Water Management System over the reporting period;
- a summary of monitoring results collected over the reporting period and assessment against the relevant performance measures and criteria;
- a summary of water extracted from Wollombi Brook and the Hunter River during the relevant water reporting period/s;
- an evaluation of any trends in monitoring results over the life of the operation;
- any non-compliance recorded during the reporting period and the actions taken to ensure compliance;
- identification of any discrepancies between the predicted and actual impacts of United Wambo and an analysis of the potential cause of any significant discrepancies; and
- a summary of the management actions to be implemented over the next year to improve the environmental performance of the site.

The Annual Review will be provided to DPE and other relevant agencies and will be made available on the United Wambo website.

12.1.2 EPL 3141 Annual Return

United Wambo will prepare and submit an Annual Return in the approved form comprising a certified Statement of Compliance and a signed Monitoring and Complaints Summary to the EPA at the end of each EPL reporting period.

The Annual Return for the reporting period will be supplied to the EPA by registered post not later than 60 days after the end of each reporting period. United Wambo will retain a copy of the Annual Return for a period of at least four years after the Annual Return was due to be supplied to the EPA.

12.1.3 Water Accounting Framework

The Minerals Council of Australia (MCA) has developed the Water Accounting Framework (WAF) to report on the water use in a consistent manner across the mining industry. GCAA has adopted the WAF as the water reporting tool for all operations and has committed to the MCA to provide water reporting data using this tool. The WAF is consistent with Global Reporting Initiative and broadly consistent with the water reporting component of Glencore Corporate Practice (GCP). United Wambo will collect and report data required in accordance with the GCAA requirements outlined in the GCAA Water Accounting Framework Procedure.

12.1.4 Reporting of Incidents

Any incident which occurs within the site boundary or is associated with United Wambo operations, will be immediately reported by the employee or contractor who has been associated with, or witnessed, the incident. The method for reporting incidents is outlined in the United Wambo Pollution Incident Response Management Plan and the United Wambo Environmental Management Strategy.

In accordance with condition R2 of EPL 3141 and the United Wambo Pollution Incident Response Management Plan, United Wambo must notify the EPA of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident. Notifications will be made by telephoning the Environment Line service on 131 555. United Wambo will also provide written details about the notification to the EPA within seven days of the incident.

12.1.5 Reporting of Non-Compliances

Within seven days of becoming aware of a non-compliance with any of the conditions of SSD 7142, United Wambo must also notify DPE of the non-compliance. The notification must be in writing to *compliance@planning.nsw.gov.au* and identify the development (United Wambo Open Cut Coal Mine Project (SSD 7142)), set out the condition of SSD 7142 that the development is non-compliant with, why it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

12.1.6 Reporting of Results

A comprehensive summary of the water monitoring results will be made publicly available on the United Wambo website.

Information on the website will be updated quarterly, as required by SSD7142.

12.2 Validation of Predictions

As part of the Annual Review process, the site water balance and groundwater model will be validated by comparing predicted results to monitoring results collected over the life of the development.

12.3 Plan Review

This Water Management Plan and associated documents will be reviewed in accordance with SSD 7142 and the United Wambo EMS that states that this must occur within three months of:

- the submission of an Annual Review under Condition E11 of SSD 7142;
- the submission of an environmental incident report under Condition E9 of SSD 7142;
- the submission of an Independent Environmental Audit under E12 of SSD 7142; or
- any modification to the conditions of consent (unless the conditions require otherwise).

The review process is also to reflect changes in environmental legislation and guidelines and changes in technology or operational procedures. If any significant modifications to the WMS are required as an outcome of the review, relevant government agencies will be consulted regarding the changes and the revised Plan will be submitted to DPE for approval by the Secretary within four weeks.

13. 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.

13.1 Relevant Legislation

The following legislation is relevant to this Plan:

- *Environmental Planning and Assessment Act 1979;*
- *Fisheries Management Act 1994;*
- *Local Government Act 1993;*
- *Protection of the Environment Operations Act 1997*;
- *Water Management Act 2000*;
- Water Sharing Plan for the Hunter Regulated River Water Source 2016; and
- Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009.

13.2 Related Documents

Related documents, listed in ***Table 13-1*** below, are *documents* directly related to or referenced from within this document.

Table 13-1: Related documents

Number	Title
GCAA-625378177-10320	GCAA 11.03 Water Management Protocol
GCAA-625378177-10596	GCAA 11.03 Water Accounting Framework Procedure
GCAA-625378177-10248	GCAA 11.02 Pipeline Management Protocol
UWOC-1689771511-360	United Wambo Environmental Management Strategy
UWOC-1689771511-374	United Wambo Pollution Incident Response Management Plan
	United Wambo Open Cut and Wambo Water Monitoring Program
UWOC-1689771511-370	United Wambo Groundwater Management Plan
UWOC-1689771511-364	United Wambo Surface Water Management Plan
UWOC-1689771511-369	United Wambo Erosion and Sediment Control Plan

13.3 Reference Information

Reference information, listed in ***Table 13-2***, is *information* that is directly referred to for the development of this document.

Table 13-2: Reference information

Reference	Title
Umwelt 2016a	*United Wambo Open Cut Coal Mine Project – Surface Water Assessment* (Umwelt, 2016a)
AGE 2016	*United Wambo Open Cut Coal Mine Project – Groundwater Impact Assessment* (AGE, 2016)
Umwelt 2016b	*United Wambo Open Cut Coal Mine Project – Environmental Impact Statement* (EIS) (Umwelt 2016b)
Umwelt, 2017a	*United Wambo Open Cut Coal Mine Project – Response to Submissions* (RTS) (Umwelt, 2017a)
Umwelt, 2017b	*United Wambo Open Cut Coal Mine Project – Response to Request for Further Information* (RtRfFI) (Umwelt, 2017b).
UN1800049-1	*United Wambo Open Cut Surface Water Management – Operating Strategy* (Arkhill Engineers, 2018).

13.4 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 13-3***.

Table 13-3: Change information

Version	Date	Change Details
1.0	September 2019	New document developed by Engeny and United
1.1	December 2019	Document updated by United to address agency comments. Reviewed by Engeny
2.0	May 2020	Glencore format change, updated template. Minor changes to document including sentence structure and definitions, references in Appendix A.
3.0	August 2020	Review for Phase 2 operations.
4.0	April 2022	Reviewed and updated in accordance with Condition E7 – Modification 1

14. Accountabilities

Table 14-1 outlines the accountabilities associated with this WMP.

Table 14-1: Accountabilities

Role	Accountabilities for this document
Operations Manager	Provide adequate resources for the implementation of this Plan
Environment & Community Manager	Implement the WMP (and sub-plans) Responsible for ensuring that monitoring, periodic environmental inspections and visual assessments after high rainfall events are undertaken Provide that the Training and Communication, Monitoring and Review and Improvement requirements of this Plan are met Investigate and report all incidents involving the failure or damage to Water Management Structures
Environment & Community Coordinator/Officer	Assist the E&C Manager as required in implementation of this Plan Investigate and report all incidents involving the failure or damage to Water Management Structures
Task Coordinators	Provide that the requirements of this Plan are met through compliance with United Wambo and GCAA procedures. Report all incidents involving the failure or damage to Water Management Structures
All contractors	Undertake works in accordance with the objectives and principles of this Plan (where relevant) Report all incidents involving the failure or damage to Water Management Structures
All personnel	Undertake works in accordance with the objectives and principles of this Plan (where relevant) Report all incidents involving the failure or damage to Water Management Structures

Appendix A - Stakeholder Consultation

Department	Comment	Response /Change
DPIE	Individual management plans need to make it clear what phases of the development and mining activities they apply (Phases 1A, 1B, 2 and 3 as defined in Development Consent SSD7142). ***Section 1.3 of the Water Management Plan*** indicates that the plan applies to "all operational activities at United Wambo", however, ***Section 4*** indicates that the Wambo site Management Plan documents will continue to apply during Phase 1A and 1B. It is not clear if this is the intention for the other sub-water related management plans.	Further discussion and explanation on Phases of the development the management plan applies to have been provided in the Scope of each Management Plan
DPIE	Provide evidence that the plans have been prepared by a suitably qualified and experienced person/s endorsed by the Planning Secretary (condition B52a)	Letter of endorsement has been added to the Appendix
DPIE Water Management Plan	***Section 10.1.1*** to ***Section 10.1.3*** – clarify how the "stages" referred to in these sections relate to the "phases" of the project as defined in the consent.	***Section 10.1.1*** updated to reflect that Stage 1 generally aligns with Phase 1A and 1B, Stage 2 and Stage 3 align with Phase 2

Appendix B - DPIE Letter of Endorsement

Planning, Industry & Environment

Planning and Assessment
Resource Assessments
Contact Melanie Hollis
Phone 8217 2042
Email melanie.hollis@planning.nsw.gov.au

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

Dear Ms Farnon

United Wambo Open Cut Coal Mine (SSD 7142)
Water Management Plan

I refer to your letter dated 10 December 2019, requesting the Planning Secretary's endorsement of suitably qualified and experienced persons to prepare the Water Management Plan (WMP) in accordance with condition B52(a) of SSD 7142.

The Department has reviewed the credentials of Ms Susan Shield and Ms Liz Webb and considers that they are suitably qualified and experienced to prepare the WMP.

The Planning Secretary therefore endorses the following personnel to prepare the WMP:

- Ms Liz Webb (EMM Consulting) - Groundwater Management Plan component; and
- Ms Susan Shield (Engeny Water Management) -- Water Management Plan including Site Water Balance, Salt Balance, Surface Water Management Plan and Erosion and Sediment Control Plan

Should you have any enquiries in relation to this matter, please contact Melanie Hollis.

Yours sincerely,

11/12/2019

Matthew Sprott
Director
Resource Assessments
as nominee of the Secretary

Planning, Industry & Environment

Ms Aislinn Farnon
Approvals Manager
United Wambo Coal JV Project

By Email: Aislinn.Farnon@glencore.comm.au

13/07/2020

Dear Ms Farnon

United Wambo Open Cut Coal Project (SSD 7142)
Environmental Management Plans

I refer to your recent correspondence submitting several updated environmental management documents for Phase 1B of the United Wambo Open Cut Coal Project (SSD 7142).

The Department has carefully reviewed the following documents and is satisfied that they adequately satisfy the requirements of SSD 7412 in relation to Phase 1B operations:

- Noise Management Plan (condition B5);
- Air Quality and Greenhouse Gas Management Plan (condition B29);
- Water Management Plans (condition B52);
- Biodiversity Management Plan (condition B71);
- Construction Environmental Management Plan (condition C10); and
- Environmental Management Strategy (condition E1).

Accordingly, the Planning Secretary has approved the above documents for Phase 1B of the United Wambo Open Cut Coal Project. Please ensure that the approved management plans and strategy are placed on the project website at your 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