ULAN
COAL
GLENCORE

Water Management Plan

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Owner:	Environment and Community Manager

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Preparation of Water Management Plan (WMP) and associated Plans

Project approval was granted for the Ulan Coal - Continued Operations Project by the Minister for Planning on 15 November 2010 (Project Approval (PA 08_0184). UCMPL has since been granted approval to modify the November 2010 Project Approval on the 7 December 2011 (i.e. MOD 1) and 29 May 2012 (MOD 2). An appeal against the Project Approval pursuant to Part 3A Division 2 Section 75L (since repealed) of the *Environmental Planning & Assessment Act 1979* (EP&A Act) was also undertaken in the NSW Land and Environment Court between 2011 and 2012 between the Hunter Environment Lobby Inc. and the Minister for Planning (No. 10998 of 2010). The court upheld the Project approval of November 2010, subject to the inclusion of a number of additional and updated conditions. The court issued orders are dated 5 April 2012.

Condition 34(a) of Schedule 3 of the project approval requires that a WMP be prepared by suitably qualified and experienced persons whose appointment has been approved by the Secretary.

In accordance with Condition 34 (a), Schedule 3 of the project approval, Ulan Coal Mines Proprietary Limited (UCMPL) received notification from the Secretary of the Department of Planning, Industry and Environment that the Department approved the appointment of Susan Shield, Technical Engineering Manager at Umwelt (Australia) Pty Limited, as suitably qualified and experienced to prepare the WMP (refer to **Appendix A** for correspondence).

This WMP was initially prepared by Susan Shield of Umwelt (Australia) Pty Limited in consultation with UCMPL. This version of the WMP has been reviewed and updated by UCLM as required by Schedule 5 Condition 4 of PA08_0184 and the recent granting of Modification 5.

1 Commitment and Policy

Introduction

The Ulan Mine Complex is situated in the central west of New South Wales. It is located in the Mid-Western Regional Council (MWRC) Local Government Area (LGA) near the village of Ulan; approximately 38 kilometres north-northeast of Mudgee and 19 kilometres northeast of Gulgong (**Figure 1.1**). Ulan Coal Mines Proprietary Limited (UCMPL) operates the mine as a joint venture, managed by Glencore Coal Assets Australia (GCAA).

1.1

UCMPL owns or has long term leases over the majority of land within the project area that will be subject to mining activities and required for surface facilities. The area is primarily surrounded by rural landholdings, native bushland and primary industries including agriculture, forestry, mining (including other coal mining operations) and extractive industries. The UCMPL landholdings are located within the headwaters of the Goulburn and Talbragar River catchment areas.

Project Approval (PA 08_0184) was issued by NSW Department of Planning, Industry and Environment (DPIE) (formerly the NSW Planning and Environment (DPE)), on 15 November 2010 for continued operations. PA08_0184 authorises current and proposed mining of the Ulan Mine Complex for the next 21 years, and production of up to 20 Mtpa (million tonnes per annum) of product coal. The approval provides for an open cut and Ulan West and Ulan Underground mines to operate twenty-four hours a day, 7 days per week. Infrastructure and supporting operations include the Bobadeen Irrigation Scheme (BIS) and Bobadeen Basalt Quarry (**Figure 1.2**). The approval was modified as follows:

- Environmental Assessment: Ulan Coal Continued Operations North 1 Underground Mining Area, Minor Modification to Ulan Underground & Ulan West Mine Plans & Proposed Concrete Batching Plant (Umwelt, 2011) - (MOD1) approved 7 December 2011
- Land and Environment Court final orders issued on the 5 April 2012.
- Ulan West Mine Plan and Construction Blasting (Umwelt, 2012) – (MOD2) approved 29 May 2012
- Environmental Assessment: Ulan West Modification (southern extension) (Umwelt 2015) – (MOD 3) Approved 14 March 2016.
- Environmental Assessment: Ulan Continued Operations Project, Longwall Optimisation Project (Ecological, 2018) – (MOD 4), as modified by the Response to Submissions, dated August 2018, approved 17 July 2019.
- Revision of Ulan West Operational Mine Plan – Modification 5 approved 7th August 2020

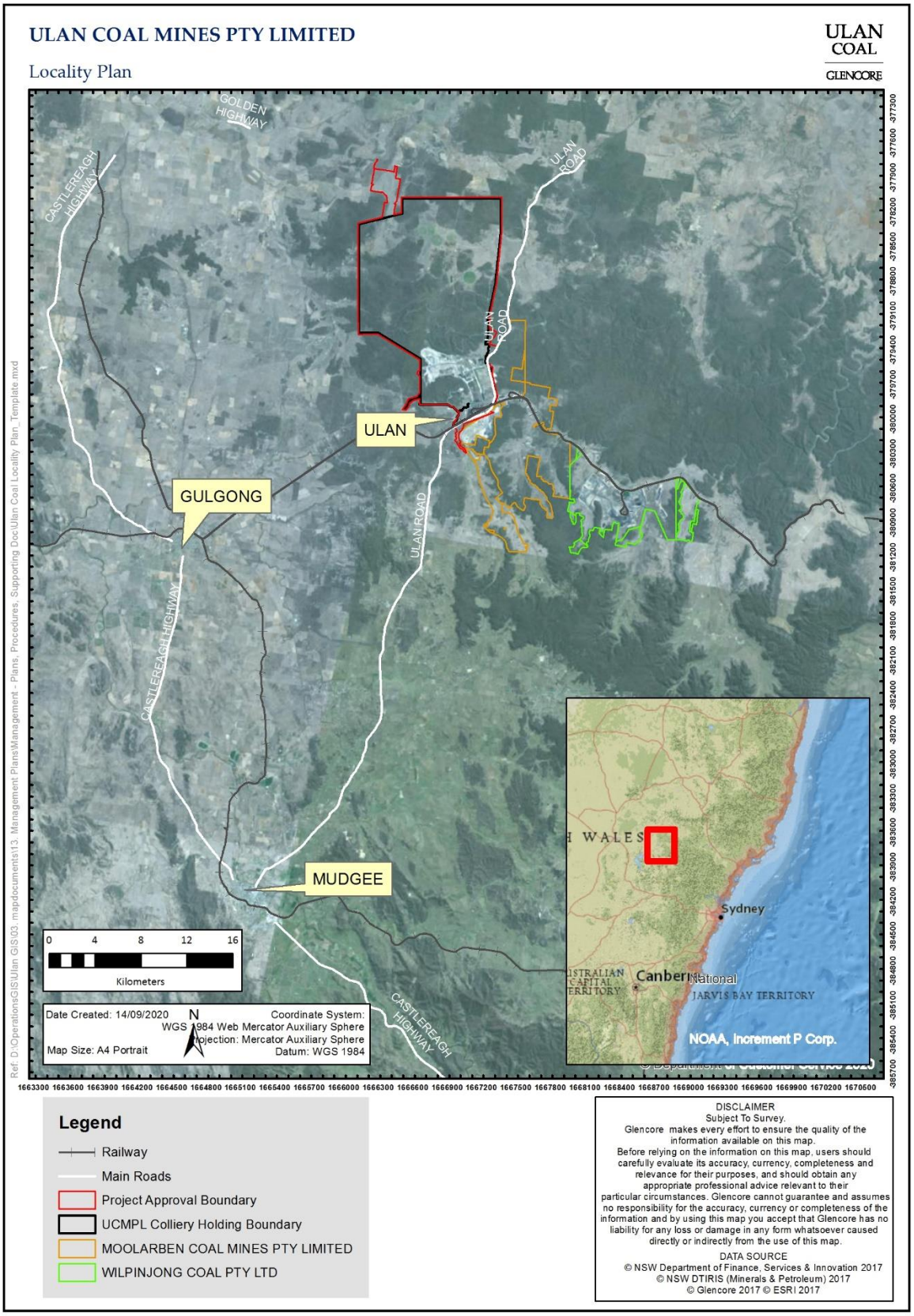

Figure 1.1Location of the Ulan Mine Complex

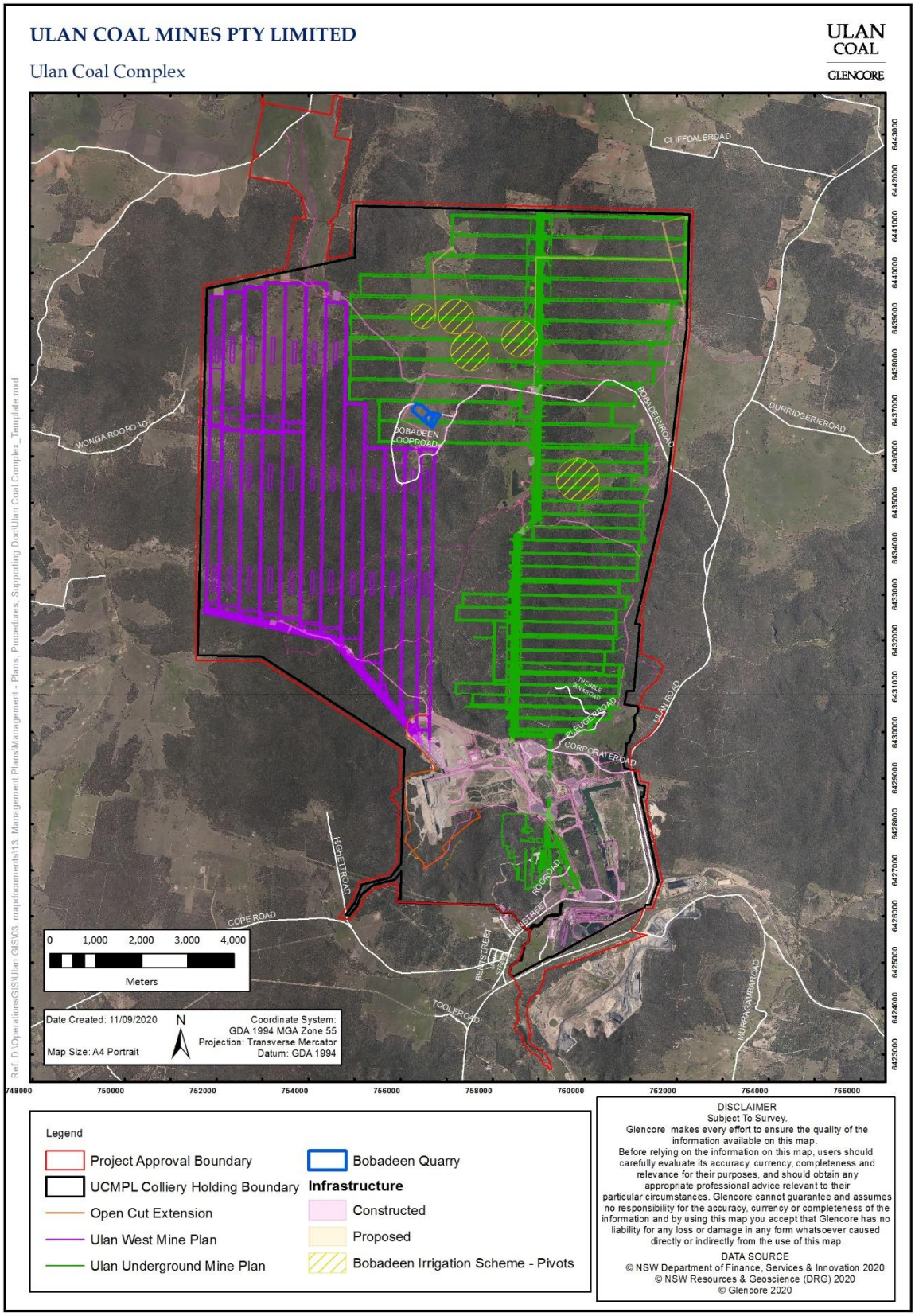

Figure 1.2 Ulan Complex Approved Operations

Purpose and Scope

This WMP was prepared to fulfil the requirements of PA 08_0184EPL 394 and applicable statutory requirements.

The WMP is aligned to the goals and objectives relating to water management that are contained within the *Environmental Management Strategy (EMS) (ULNCX- 111515275- 870)*.

1.2 The WMP provides a framework for the management of water and outlines the interaction between the various policies, plans, programs and procedures. The WMP clarifies requirements for surface water and groundwater management during construction and operational phases.

Structure of the WMP

The WMP meets the requirements of the GCAA Water Management Protocol (GCAA-625378177-10320) and incorporates six key component documents, as shown in **Figure 1.3**:

1.3

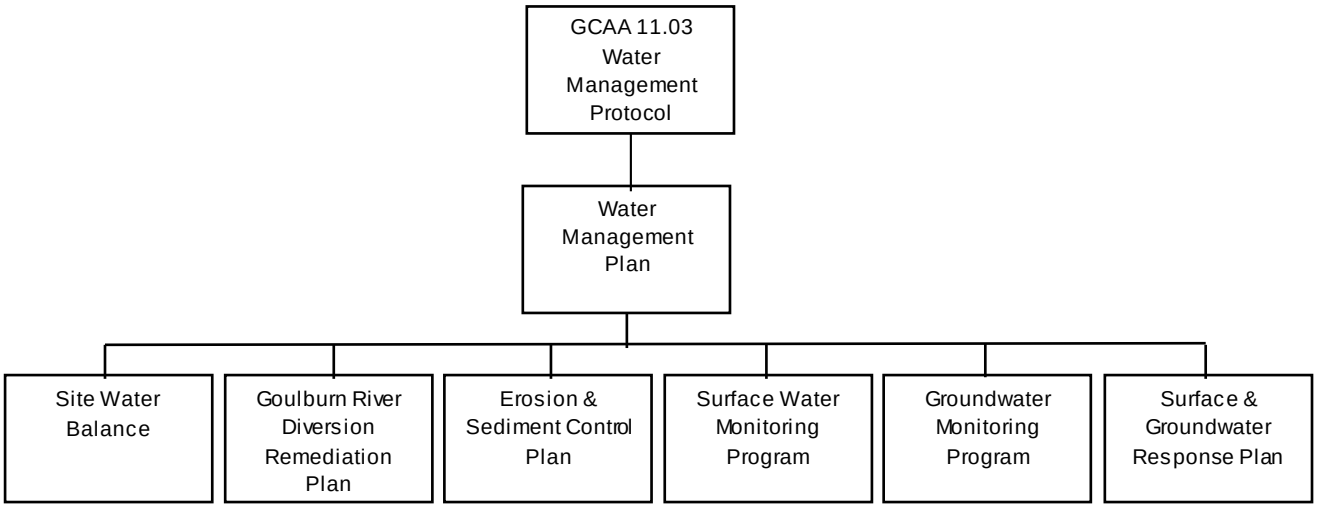

Figure 1.3 Structure of the WMP

1.4

Related Document

Documents within the UCMPL EMS that relate to or provide support to the WMP include:

- Site Water Balance (refer to **Section 3.10** of this WMP)
- Goulburn River Diversion Remediation Plan (GRDRP) (ULNCX-111515275-1641);
- Erosion and Sediment Control Plan (ESCP) (ULNCX- 111515275- 224);
- Surface Water Monitoring Program (SWMP) (ULNCX- 111515275- 1642);
- Groundwater Monitoring Program (GWMP) (ULNCX- 111515275- 1643);
- Surface Water and Groundwater Response Plan (SWGWRP) (ULNCX- 111515275- 1644);
- Bobadeen Irrigation Scheme (BIS) Operating Procedure;
- Moolarben Dam Operations and Maintenance Plan (ULNCX-111515275-1646);
- Moolarben Dam Safety Emergency Plan (ULNCX-111515275-857);
- Mining Operations Plan 2017-2024 (ULNCX- 111515275- 3548);
- Appendix A: Water Management Plan Longwalls 1 – 6 Ulan West (ULNCX-111515275-2777); and
- Biodiversity Management Plan (ULNCX- 111515275- 225);

- Water Management Infrastructure Management Plan;
  - Part A-ULNOC-1105874907-939
  - Part B- ULNOC-1105874907-1024
  - Part C- ULNOC-1105874907-940
  - Part D- ULNOC-1105874907-941);

2 Planning

Project Approval

2.1

PA08_0184 was assessed under Part 3A of the EP&A Act granted on 15 November 2010. Five modifications, as well as changes resulting from a court judgement and associated orders are incorporated in the WMP. **Table 2.1** summarises the conditions of PA08_0184 relevant to the WMP[1] and where in the plan commitments are addressed.

Table 2.1 Project Approval (08_0184) Conditions and Statement of Commitments

Project Approval Condition	Section of this Document
Water Licences 28. The Proponent must obtain all necessary water licences for the project under the *Water Act 1912* or the *Water Management Act 2000*	Section 3.4
Baseflow Offsets 29. The Proponent must offset the loss of any baseflow to the Goulburn and Talbragar Rivers caused by the project to the satisfaction of the Secretary. The offset should be effected by the retirement of water entitlements within the catchments of the Goulburn and Talbragar Rivers unless the Proponent can provide alternative means of offsetting baseflow to the satisfaction of the Secretary, in which case the Proponent may offset any losses by those alternative means. *Notes: As at the date of this approval, baseflow losses for the Goulburn River and Talbragar River are modelled as 0.05 ML/day and 0.13 ML/day respectively. Improved or additional hydrological data may lead to amendments to these modelled losses.*	Refer to GWMP & SWGWRP
Compensatory Water Supply 30. The Proponent must provide compensatory water supply to any owner of privately-owned land whose supply is adversely impacted (other than an impact that is negligible) as a result of the project, in consultation with DoI, and to the satisfaction of the Secretary. The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributed to the project. Equivalent water supply must be provided (at least on an interim basis) within 24 hours of the loss being identified. If the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution. If the Proponent is unable to provide an alternative long-term supply of water, then the Proponent shall provide alternative compensation to the satisfaction of the Secretary.	Section 3.6 (Refer also to GWMP & SWGWRP)
Surface Water Discharges	Section 3.2 and Section 3.8 (Refer also to SWMP)

[1] PA08_0184, Schedule 3, condition 34 requires preparation of a water management plan.

Project Approval Condition	Section of this Document
31. The Proponent must ensure that all surface water discharges from the site comply with the discharge limits (both volume and quality) set for the project in any EPL.	
Water Supply to 'The Drip' 33. The Proponent must ensure that the project has no impact on the water supply to the 'Drip'	Section 4.2 and GWMP
Water Management Plan 34. The Proponent must prepare and implement a Water Management Plan for the project to the satisfaction of the Secretary. This plan must: a) be prepared in consultation with EPA, DoI, DRG and Council by suitably qualified and experienced persons whose appointment has been approved by the Secretary; b) be submitted to the Secretary for approval within 3 months of the date of the final Orders being made by the Land and Environment Court proceedings No. 10998 of 2010; and c) include: • a Site Water Balance; • the Goulburn River Diversion Remediation Plan; • an Erosion and Sediment Control Plan; • a Surface Water Monitoring Program; • a Groundwater Monitoring Program; • a Surface and Ground Water Response Plan The Proponent must implement the plan as approved by the Secretary. *Notes: The effectiveness of the Water Management Plan is to be reviewed and audited in accordance with the requirements in Schedule 5. Following these reviews and audits, the plan is to be revised to ensure it remains up to date (see Condition 4 of Schedule 5).*	This WMP Sections 2.4 and Section 3.6 Appendix A - Section 3.10 and Section 4.3 Section 3.12 Section 3.13 Section 4.1 (Refer also to SWMP) Section 4.2 (Refer also to GWMP) Section 3.14
35. The Site Water Balance must: a) include details of: • sources and security of water supply; • water uses on site; • water management on site; • off-site water transfers; and b) describe what measures would be implemented to minimise potable water use on site.	Section 3.10 and Section 4.3 Section 3.1 Section 3.2 Section 3.11 Section 3.11.2 Sections 3.11.1
6.4.1 A groundwater monitoring program will be implemented for the Project as outlined in Section 5.3, or as otherwise agreed by the Director General in consultation with the water management plan for the project. The groundwater monitoring program will include:	Refer to GWMP entire document
• Continued measurement of groundwater levels, pressures and water quality within the existing regional network of monitoring bores and an expanded network as underground mining progresses to the north and west, specifically considering: ▪ depressurisation monitoring of at least three multi-level piezometer strings equipped with vibrating wire transducers (or equivalent) and distributed within the Permian-Triassic strata; ▪ strata hydraulic conductivity measurement on rock core obtained at these above noted piezometer locations; ▪ daily or more frequent monitoring of pore pressures and piezometric elevations by installed auto recorders in selected new piezometers.	Refer to GWMP (Section 4.0)
• Mine water seepage monitoring, including:	Refer to WMP

Project Approval Condition	Section of this Document
▪ measurement of all water pumped underground and all mine water pumped to surface on a daily basis. Measurement will be undertaken using calibrated flow meters or other suitable gauging apparatus; ▪ routine monitoring of coal moisture content delivered from the working face, ventilation humidity and any build-up of water storage in the goaf.	
• Groundwater monitoring will include: ▪ monthly monitoring of basic water quality parameters pH and EC in pumped mine water. ▪ six monthly monitoring of pH and EC in the regional monitoring network. ▪ annual measurement of total dissolved solids (TDS) and speciation of water samples in selected piezometers to support identification of mixing of groundwater types. ▪ graphical plotting of basic water quality parameters and identification of trend lines and statistics including mean and standard deviation calculated quarterly. Comparison of trends with rainfall and any other identifiable processes that may influence such trends.	Refer to GWMP (Section 4.0)
The monitoring network and monitoring programme will be reviewed on an annual basis to determine ongoing suitability and any proposed changes will be discussed in the Annual Environmental Management Report (AEMR).	Refer to GWMP (Section 5.0)
6.4.2 The results of groundwater monitoring and a comparison of measured and predicted impacts will be reported in the annual review required by the project approval conditions.	Refer to GWMP (Section 4.2.5)
6.4.3 Impacts on the privately owned licensed bores identified in Section 5.3 as being potentially affected, will be assessed by monitoring and in the event that any utilised privately owned bore is significantly adversely affected, an alternative water supply will be provided by UCMPL until such time as the bore is re-established or replaced, or appropriate compensation established, in accordance with project approval requirements.	Refer to GWMP (Section 4.1.4)
6.4.4 The groundwater monitoring results will be analysed (graphically and statistically) as new results become available i.e. quarterly or six monthly. In addition, a monitoring review and verification process will be established as part of the Water Management Plan process, to verify regional groundwater losses as necessary to refine groundwater mitigation strategies.	Refer to GWMP (Section 4.0)
6.4.5 Identification of any changes or long term trends in groundwater outside the predicted impacts will result in an investigation to determine if the trend is a result of the Project operations and if so, identify management strategies to be implemented to address the identified issues as per UCMPL's Internal TARP process (T – trigger; A – Action; R – response; P – Plan).	Refer to GWMP (Section 4.0)
6.4.6 Review of depressurisation of coal measures and comparison of responses with aquifer model predictions will be completed every two years. Expert review will be undertaken by a suitably qualified hydrogeologist, and reported in accordance with the process set out in the Water Management Plan.	Refer to GWMP (Section 4.0)
6.5.1 As described in Section 5.4, UCMPL will implement clean water divisions to minimise the volume of water to be handled within the mine water management system.	Section 3.3 and Refer to ESCP (Section 3.4.3)
6.5.2 The staged remediation strategy for the Goulburn River Diversion will be implemented, generally as described in the Approved Goulburn River Diversion Remediation Plan.	Refer to GRDRP
6.5.3 In addition to the detailed mine water seepage monitoring outlined in Commitment 6.4.1, water usage, rainfall, dam volumes and discharges (including transfers) will be monitored to assist in the management of the mine	Refer to SWMP (Section 4.1)

Project Approval Condition	Section of this Document
water management system. This monitoring will be conducted in a manner that enables the detailed water balance to be maintained and updated at least annually for ongoing operations. The water balance will be used on an ongoing basis for operational management and will also be reported in annual review required by project approval conditions.	
6.5.5 Water which is in excess of UCMPL operational needs will be managed in accordance with the following hierarchy: 1. water sharing; 2. Bobadeen Irrigation; and 3. offsite discharge.	Refer to WMP
6.5.6 UCMPL will undertake a research study on the Talbragar River commenced at least six months prior to any discharge into this waterway. The study is to require UCMPL to satisfy the following: 1. Establish baseline ecological, hydrological and geomorphological conditions of the Talbragar River downstream of the discharge point. 2. develop a flow release protocol at the discharge point to maintain the conditions identified in (1) 3. develop a monitoring program to review the effectiveness of the release protocols.	Future study as required

2.1.2 Environment Protection Licence 394

Environment Protection Licence 394 (EPL 394) was issued under the authority of the *Protection of the Environment Operations Act 1997*. EPL 394 currently contains seven licensed discharge points (LDPs) and two water quality monitoring locations. The LDPs for water are listed in **Table 2.2** and displayed in **Figure 2.1.**

Further details regarding discharge volume and water quality limits at these LDPs are discussed in the SWMP. Additional discharge points and environmental monitoring points may be established in the future to support operational requirements in accordance with Condition 31, Schedule 3 of the Project Approval.

EPL 394 conditions relating to the reporting of environmental incidents and exceedances of criteria are detailed in the SWGWRP.

Table 2.2 EPL 394 LDPs

EPL 394 LDPs	Type of Monitoring Point	Description of Location
1	Discharge quality monitoring. Discharge to waters.	Effluent storage dam
2	Discharge to land and volume monitoring	Millers Dam
3	Discharge quality monitoring. Discharge to waters.	Outlet from Rowans Dam to Ulan Creek
4	Discharge quality monitoring. Discharge to waters.	Drain outlet from Truckfill Dam to unnamed watercourse
6	Discharge quality monitoring. Discharge to waters.	Discharge to Ulan Creek from the Bobadeen Water Treatment Facility
18	Water quality monitoring.	Downstream Goulburn River gauging station water quality monitoring point.
19	Discharge quality monitoring. Discharge to waters.	Discharge to Ulan Creek from the Northwest Sediment Dam (NWSD) Water Treatment Facility
23	Discharge quality monitoring. Discharge to waters.	Ulan West Box clean Water diversion
33	Discharge quality monitoring.	Upstream Goulburn River Gauging Station

Secondary Extraction Approvals

2.2

Extraction and Subsidence Management Plans (EP/SMPs) have been prepared to satisfy the various requirements including conditions of PA 08_0184, mining leases and SMP/Extraction Plan Approvals affecting existing and future mining areas

Approval[2] for the SMP/EP for Longwall Panels LW27-29, W4-W5 by the Director-General of DTIRIS and the Director-General of DPIE was received in May 2013.

Ulan Underground operations currently operates under the SMP/ EP plan titled `LWW4, LWW5 SMP /Extraction Plan Area SMP Approved Plan — Variation', signed by the Mine Manager 12 April 2017, and approved by DPE (Resources & Geoscience) on 19 May 2017.

The EP for Ulan West longwall panels LW1 to LW 6 was granted by the Secretary of DPIE on 25 January 2019. The EP for Ulan West LW1 to LW6 contains an Appendix Water Management Plan for specific management actions for those panels.

The EP for Ulan Underground longwall panels LW30, LWW6-LWW8 was approved on 19 August 2019 This EP contains a Water Management Plan for specific management actions for those panels.

Surface water monitoring and reporting requirements are addressed in the SWMP and groundwater monitoring and reporting requirements are addressed in the GWMP. Assessment and response mechanisms for both surface water and groundwater are discussed in the SWGWRP.

[2] Note this approval replaces the interim approval for LW27 on 7 March 2013.

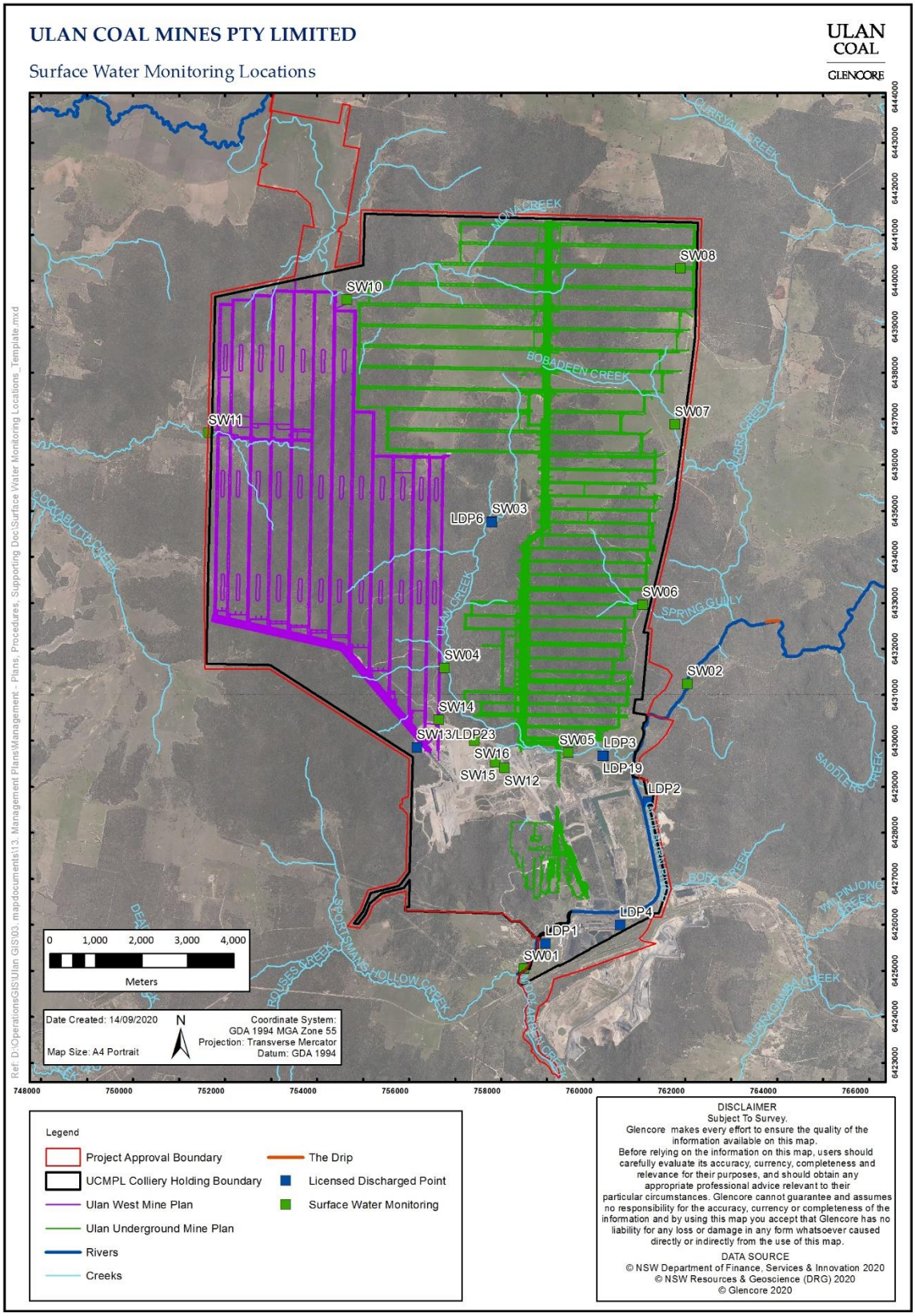

Figure 2.1 Surface Water and EPL Monitoring Sites

Legislation and Guidelines

2.3

Water Management Act 2000 (NSW) (WM Act) and *Water Management (General) Regulations, 2011*	This Act regulates the taking, interception, storage and use of surface water and groundwater within areas subject to water sharing plans. The water sharing pans relevant to the project are: • Alluvial water sources: ○ Goulburn River catchment unit: *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* ○ Talbragar River Catchment unit: *Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012* • Fractured and porous rock sources: ○ West of the great divide: *The Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources 2011* (MDB Porous Rock Groundwater Sources) The two management zones in the Sydney Basin are defined[3] as: defined under as (i) the 'Macquarie-Oxley' zone which includes all porous water bearing strata excluding Permian and Triassic rocks which have been relegated to the 'Other' zone, and (ii) the Other zone which includes Permian and Triassic age rocks. ○ Water take from the deeper strata covered by the Water Sharing Plan for the MDB Porous Rock Groundwater Sources. ○ East of the great divide: *The Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.* The coal measure aquifers in the Hunter Valley portion of the Project Area are covered by this WSP.
Water Act 1912 (NSW)	This Act has been largely replaced by the WM Act, licensing provisions remain in force where the water source is not covered by a water sharing plan. The Ulan operations do not take from any groundwater sources still licensed under the *Water Act 1912*.
Dams Safety Act 1978 (NSW) to be replaced by the Dam Safety Act, 2015 (yet to be enacted)	*The Dams Safety Act 1978* (NSW) requires that large dams that may constitute a hazard to human life and property must be periodically reviewed by the NSW Dams Safety Committee. These dams are known as prescribed dams and are listed in Schedule 1.

[3] *Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources 2011*, Clause 5.1 (b)

Relevant Guidelines and Standards

Applicable policies, principles, regulations and guidelines are:

- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000);
- *Managing Urban Stormwater – Soils and Construction, Volume 1* (Blue Book) (Landcom, 2004); and
- *Managing Urban Stormwater – Soils and Construction, Volume 2E Mines and Quarries* (Landcom, DECC).

2.3.2

Consultation

Consultation was undertaken with DPE, EPA and DPI Water during the preparation of this plan. It was approved on 29 September 2011. Minor revisions were submitted to DPE for comment in June 2012, June 2013 and June 2014. Comments were received 16 September 2014 relating to formatting changes and specific clarification requests and suggestions. The plan was updated and resubmitted in June 2015. The revised plan was approved on 11 November 2015. The plan was revised and resubmitted post MOD3 on 14 June 2016 and was approved on 2 December 2016. The plan was further revised and resubmitted on 30 June 2017 and again in February 2019. DPIE provided feedback in April 2019, resubmission to DPIE in April 2019 with approval received 15 May 2019. This plan will be resubmitted to DPIE for comment detailing the revisions required post approval of Mod 4. After the approval of MOD 5, this plan will be resubmitted for DPIE comment. Revision History and approval dates are provided in **Section 7.3**.

2.4

UCMPL will also consult with National Resource Access Regulator (NRAR) in regards to ongoing water licensing requirements and post mining water take during the life of the operation.

2.5 Baseline Data

2.5.1 Land Use

The operation is situated in a rural area, primarily surrounded by rural landholdings, native bushland and primary industries including agriculture, forestry, mining and extractive industries. Grazing is wide spread throughout the surrounding area while the area to the south and south-west is dominated by rural residential landholdings.

2.5.2

Soils

The soil types occurring within the boundaries of the Ulan Mine Complex generally have low fertility and exhibit moderate to high erosivity. The soils within the Ulan Mine Complex vary in nature and thickness. The thicker, more fertile and alluvial deposits occur in the low lying areas, predominantly associated with watercourses. The north-east of the site is dominated by soils of Jurassic sandstone origin. Soils of Jurassic and Triassic sandstone origin are present throughout the Bobadeen area. Narrabeen sandstones derived soils occur throughout the centre and south-west of the site, whilst poorly developed and shallow soils occur on the higher areas where rocky outcrops occur (refer to **Figure 2.2**).

2.5.3

The soil landscapes present on the site are described in further detail within the *ESCP (ULNCX-111515275-224)*.

Hydrology

The Ulan Mine Complex is located at the headwaters of both the Goulburn River system and the Talbragar River system (refer to **Figure 2.3**). The catchments for these river systems are separated by the Great Dividing Range with the Goulburn River system draining east into the Hunter River Catchment and the Talbragar River system draining west to the Macquarie River Catchment and the Murray-Darling Basin. All of the tributaries within the Ulan Mine Complex boundary draining to the Goulburn River and Talbragar River are ephemeral by nature.

There are eight subcatchment areas of these river systems that lie partly within the boundary of the Ulan Mine Complex. The Spring Gully, Ulan Creek, Bobadeen Creek, Curra Creek, Sportsman's Hollow Creek and Moolarben Creek catchments flow into the Goulburn River system while the Mona Creek and Cockabutta Creek catchments flow into the Talbragar River system (refer to **Figure 2.3**). The Ulan Creek catchment is the largest within the Ulan Mine Complex, comprising approximately 3,720 hectares out of the total area of the Ulan Mine Complex of approximately 13,480 hectares.

Runoff from the footprint of the mining disturbance area within the Ulan Mine Complex is captured by the Ulan Mine Complex water management system. The area serviced by the Ulan Mine Complex water management system is shown on **Figure 3.3** and contains the open cut pits, overburden emplacement areas and infrastructure areas. The current catchment area of the Ulan Mine Complex water management system is approximately 1,520 hectares.

2.5.3.2 Groundwater

The regional groundwater systems were described in extensively in the 2009 groundwater assessment prepared by Mackie Environmental Research (MER) as part of the EA. Section 3.0 of the GWMP describes the existing groundwater conditions and detailed baseline data for the groundwater monitoring program.

2.5.3.3 Surface Water

The surface water regimes were described in extensively in the 2009 surface water assessment prepared as part of the EA. **Appendix 4** of the SWMP describes the baseline data for surface water hydrology water flow, water quality and stream health.

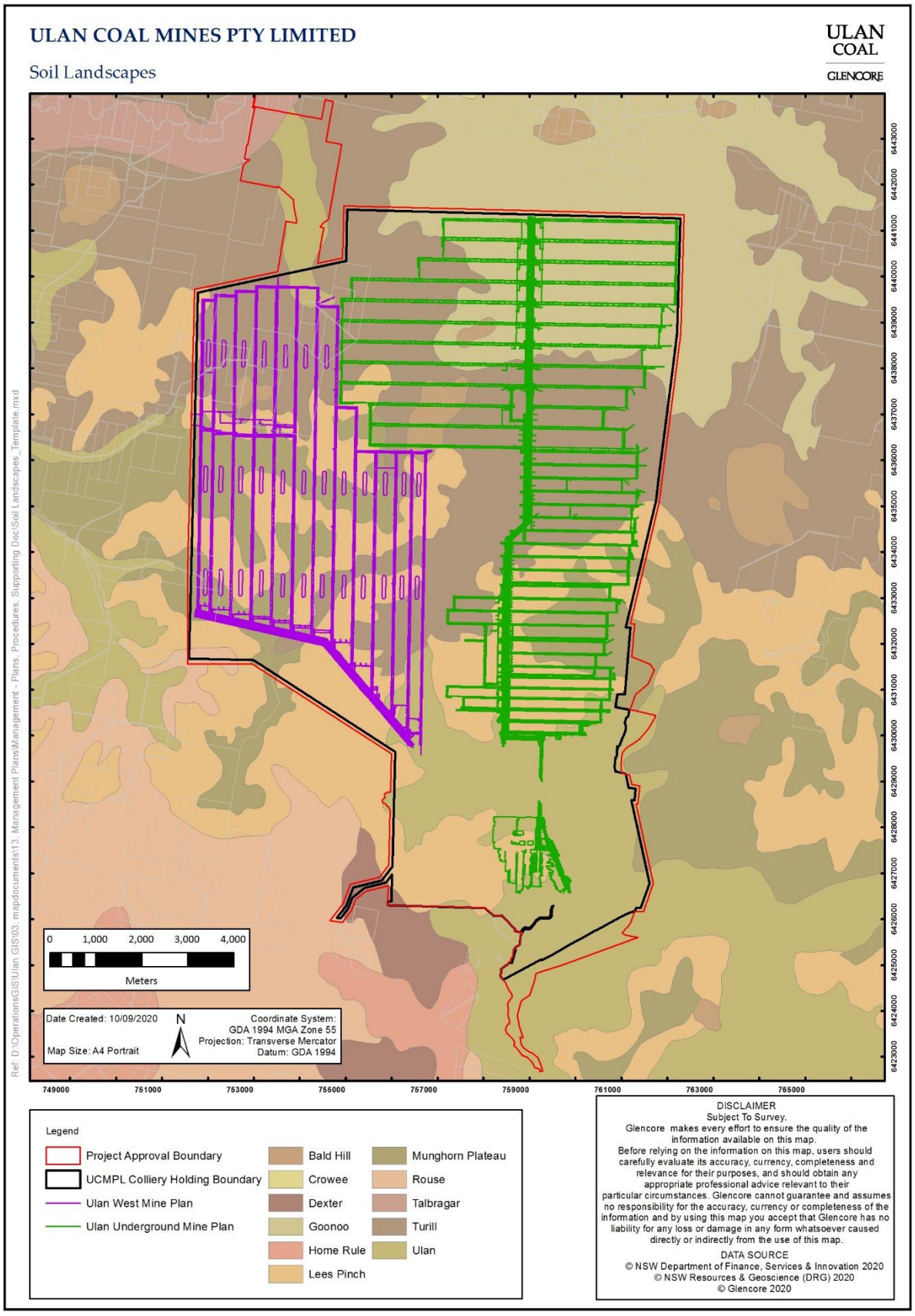

***Figure 2.2** Soil Landscapes*

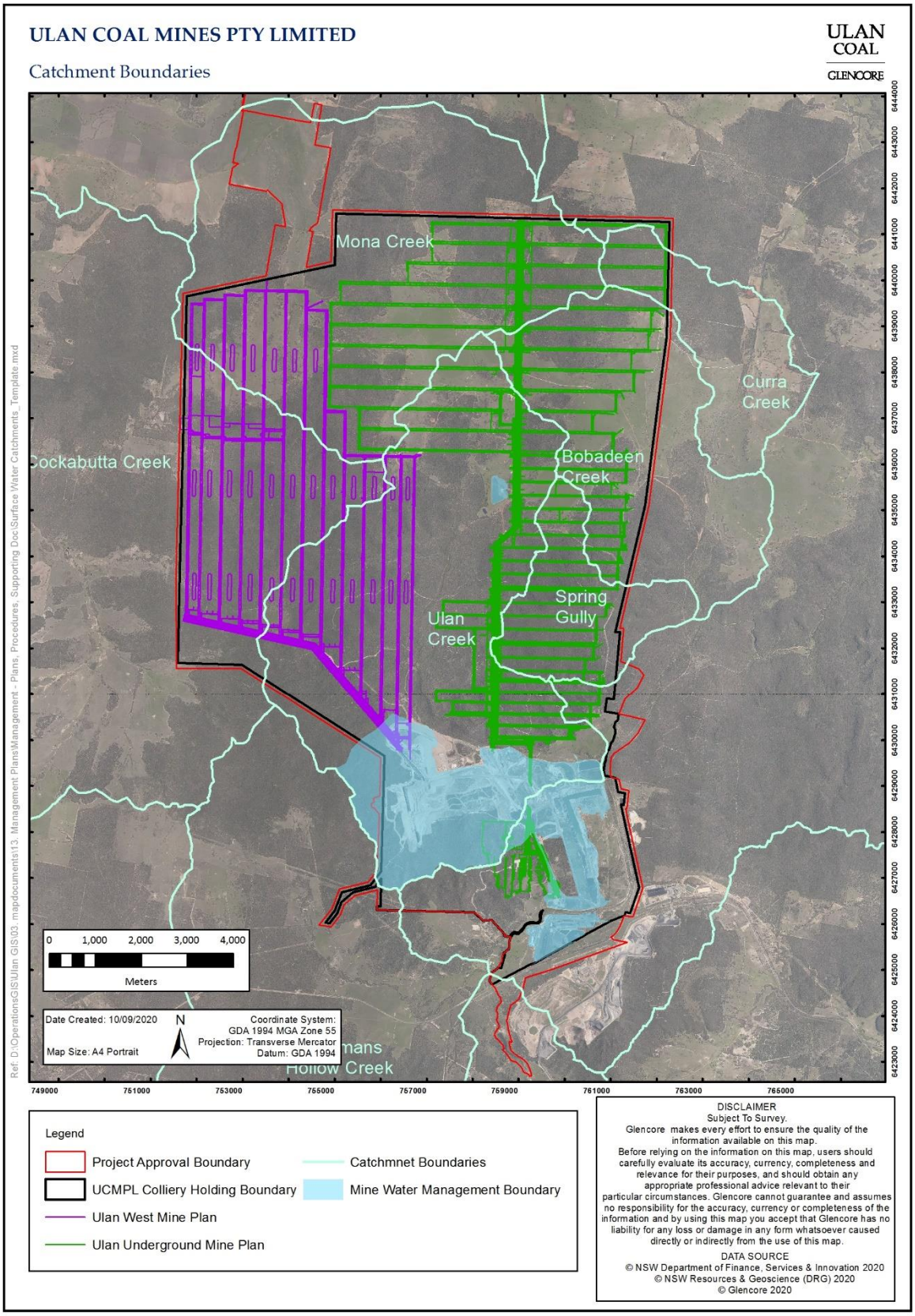

Figure 2.3 Catchment Boundaries

3 Implementation

Overview of the Water Management System

The water management system at the Ulan Mine Complex consists of clean water (i.e. water from undisturbed and/or rehabilitated areas), dirty water (i.e. water from active overburden emplacement areas or areas which are partially rehabilitated) and mine water (i.e. water from coal stockpiles areas, etc.) systems. The infrastructure associated with these systems includes:

3.1

- mine dewatering systems;
- water storages;
- the Bobadeen Irrigation Scheme (BIS);
- water treatment facilities;
- sedimentation and retention basins;
- settling and tailings ponds;
- clean water diversion drains and dirty water catch drains;
- levee banks and earth bunding around stockpiles;
- hardstand areas; and
- re-fuelling areas.

A layout of the key components of the water management system is shown on **Figure 3.2**.

Operations are dewatered by pumping mine water to the surface, where it is stored in either Bobadeen Dam (in the north) or the East Pit (in the south). Surface runoff water from operational areas, plus surplus water from various sit process (e.g. from CHPP) are also directed into the East Pit.

The water is then processed through Water Treatment Facilities, comprising various filtration technologies (microfiltration, ultra-filtration and reverse osmosis), to produce a supply of clean, relatively low EC water.

This clean water is then blended with raw water sources (as required) to produce blended water products of different qualities suitable for various applications including:

- Discharge to Ulan Creek/Goulburn River;
- Irrigation through the Bobadeen irrigation scheme;
- Process water supply to site and to the CHPP;
- Dust Suppression on haul roads and other operational areas;
- Water sharing with Moolarben Coal Operations.

The quality of the various water storages is controlled to meet the quality requirements (both license and operational) for each particular application.

Water Management Principles

3.2

The basic principles governing the management of water are:

- minimise the volume of clean water captured within the Ulan Complex water management system;
- prevent the contamination of clean water by mining and related activities;
- minimise water holding times and recirculation. Reducing the storage time and recirculation minimises the potential to degrade the quality of the water;
- avoid storing water in underground water storages;
- segregate water of differing qualities to minimise the volume of mine impacted water that requires recycling and treatment;
- handle water once, to ensure water movements on site are minimised;
- minimise the volume of water requiring treatment prior to offsite discharge, preferably nil treatment prior to offsite discharge or alternatively maximise the blending ratio;
- reducing the discharge of pollutants from the mine to the environment;
- minimising adverse effects on downstream watercourses, such as the Goulburn River and Ulan Creek (i.e. hydraulic and water quality impacts);
- maximise the volume of water discharged at the current discharge facilities;
- managing the inventory of water on-site in order to meet the requirements of the mining operation;
- incorporate a variable discharge regime by varying the water flow rates between the various discharge structures based on environmental and water requirements;
- manage discharges from the LDP's in accordance with the conditions in EPL 394; and
- undertake monitoring of water management systems to meet, as a minimum, the requirements of the NSW Office of Water (2009) Water Reporting Requirements for Mining Operations.

Water is used for purposes appropriate to the quality of the water available, with blending of water occurring to achieve required water qualities for various applications.

3.3

Clean, Dirty and Mine Water Management

The current activities associated with Ulan Complex are located within the sub-catchments of the Goulburn River System. The open cut pit, operation of two underground mining areas (Ulan No. 3 and Ulan West), clean-water diversions, mining support infrastructure and rehabilitation areas are currently components of the Ulan Dirty Water System. Surface waters associated with sediment dams and rehabilitation report into the Dirty Water System (East Pit). Development of the clean water system (diversion of clean water from rehabilitation areas) and diversion of surface water flows from the opencut and box cut to Ulan Creek completed (**Figure 3.1**).

The mine dewatering pipelines and pumping infrastructure (Pleugers), associated with the Mine Water System transport water to the East Pit for treatment. The majority of the pleuger and pipeline system are located in Clean Water areas, these are managed using risk based controls and internal standards and procedures (**Figure 3.2**). The Bobadeen and NWSD Water Treatment Facilities discharge clean water to Ulan Creek which report to the Goulburn River.

Construction of infrastructure for Ulan West within the Mona and Cockabutta sub-catchments has commenced. Sub-catchments of the Talbragar River System are considered Clean Water areas.

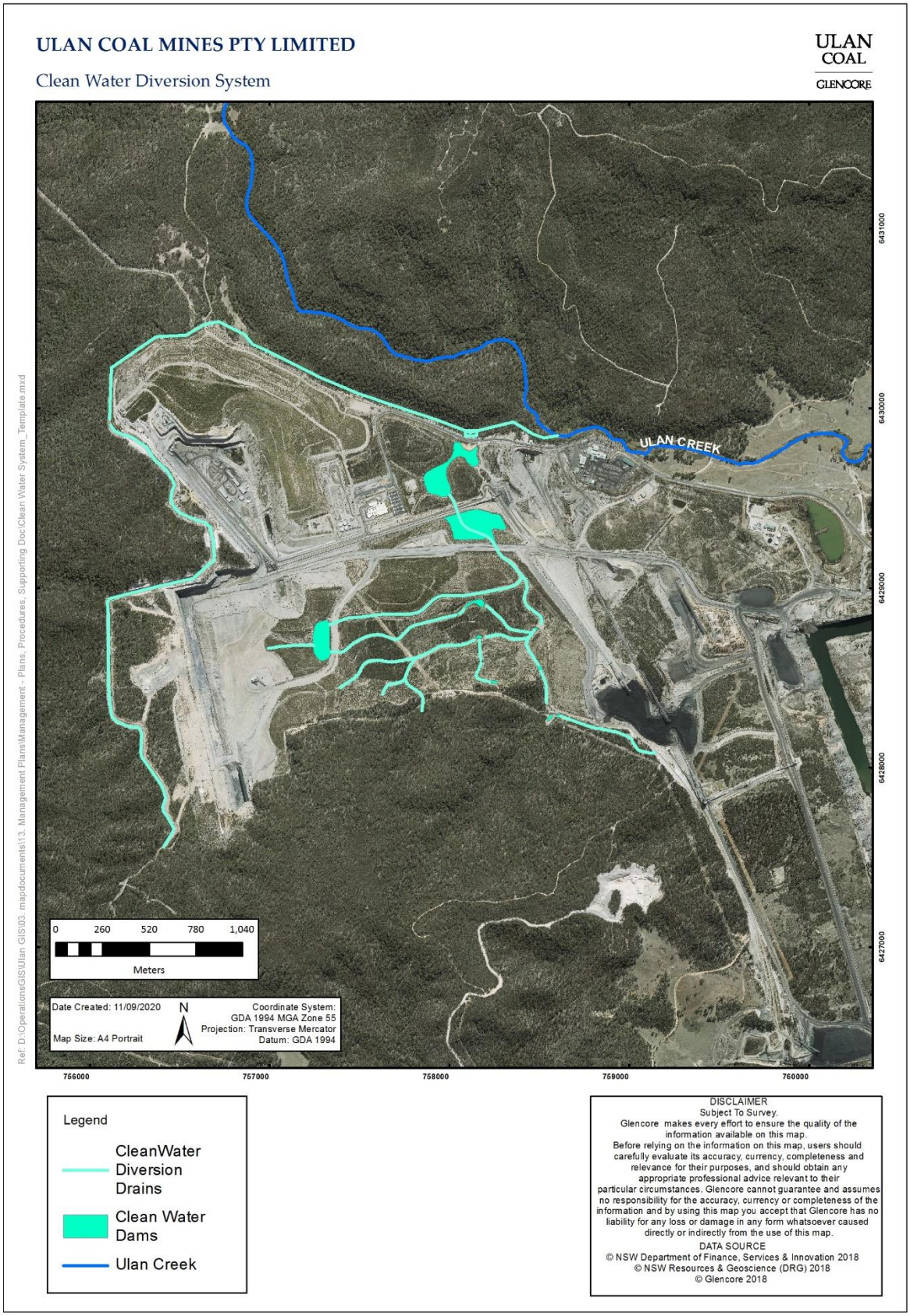

Figure 3.1 Clean Water Diversion Drains

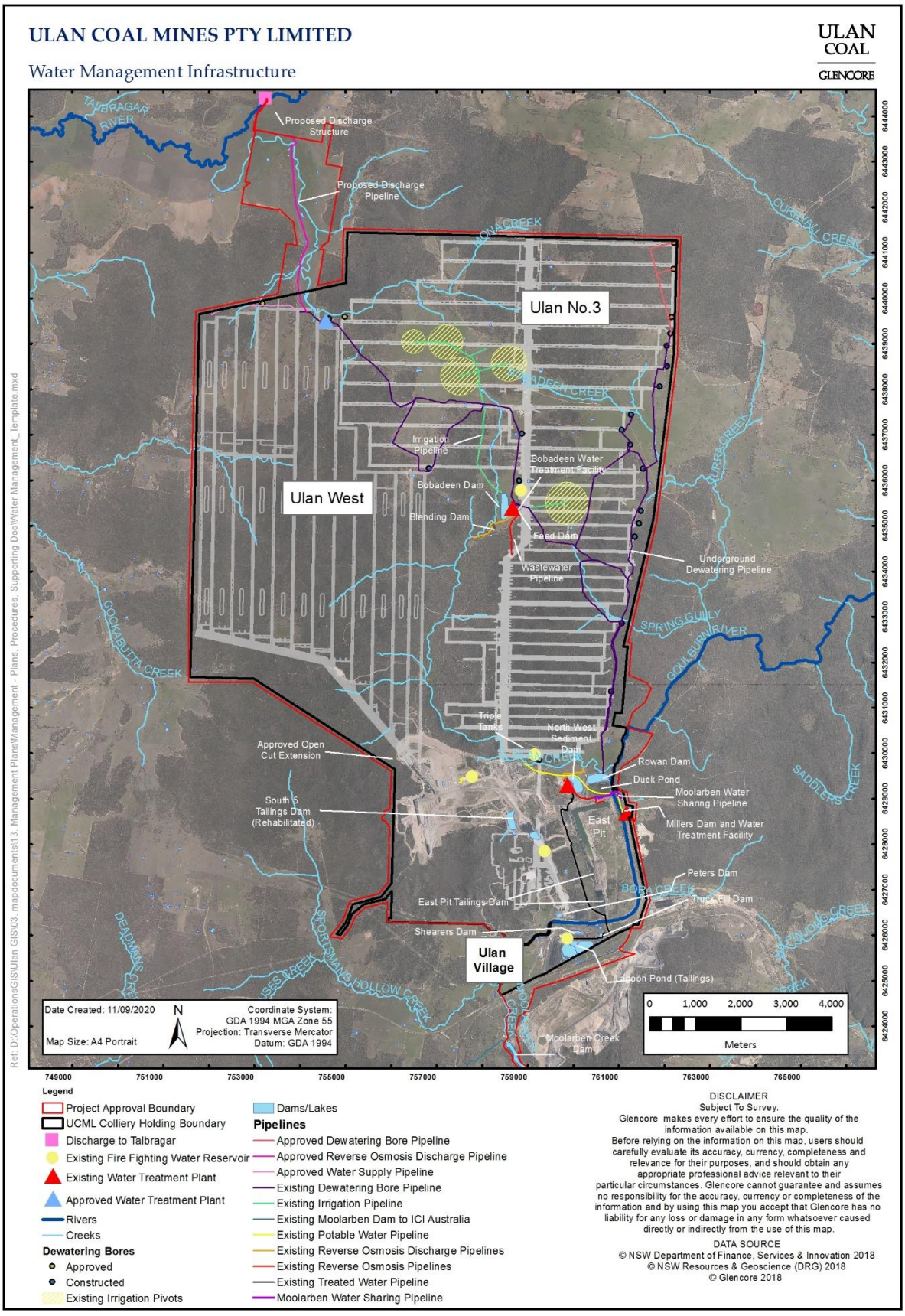

Figure 3.2 Approved Water Management Infrastructure

Underground Water Management

3.4

Along with water collected from disturbed ground catchments within the open cut, a predominant source of water at the Ulan Mine Complex is from underground dewatering activities. Inflows to the underground goafs of Ulan No. 3 underground includes groundwater and seepage from the surface water storage in the East Pit. Groundwater is reticulated via dewatering borehole pumps and surface pipelines to the Bobadeen Water Treatment Facility (WTF) and to the North West Sediment Dam Treatment Facility (refer to **Section 3.7**). Groundwater has previously been reticulated via dewatering borehole pumps and surface pipelines to the Rowans Dam system, however water is not currently being pumped into this system. As a result discharge monitoring has been removed, should it be required monitoring can be reinstated.

Groundwater make within Ulan No. 3 and Ulan West underground workings has been investigated by Mackie Environmental Research (MER) and Australasian Groundwater and Environment Consultants (AGE) as part of the EA and subsequent modifications. The underground dewatering system as well as the surface water facilities include monitoring to account for groundwater make. Further detail in regards to groundwater as well as the monitoring program to be implemented at the Ulan Mine Complex is outlined in the GWMP.

The following Water Access Licences (WAL) are held for groundwater extraction:

Licence number	Water Sharing Plan	Water Source	Allocation (shares)	Extraction
WAL41492	*WSP North Coast Fractured and Porous Rock Groundwater Sources 2016*	Oxley Basin Coast Groundwater Source	7060	Direct Extraction
WAL37192	*Water Sharing Plan for the NSW MDB Porous Rock Groundwater Sources 2011*	Sydney Basin of the Murray Darling Basin Groundwater Source	704	Passive take until implementation of LW6 Infrastructure
WAL41906	*Water Sharing Plan for the NSW MDB Porous Rock Groundwater Sources 2011*	Sydney Basin of the Murray Darling Basin Groundwater Source	2215	Passive take until implementation of LW6 Infrastructure
WAL42900	*Water Sharing Plan for the NSW MDB Porous Rock Groundwater Sources 2011*	Sydney Basin of the Murray Darling Basin Groundwater Source	4031	Passive take until implementation of LW6 Infrastructure
WAL41817	*Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012*	Upper Talbragar River Water Source	50	Passive take – Baseflow loss offset
WAL34921	*Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012*	Talbragar Alluvial Groundwater Source	30	Passive take – Baseflow loss offset
WAL19047	*Water Sharing Plan for the Hunter unregulated and alluvial water sources 2009*	Upper Goulburn River water source	600	Riparian rights, water harvesting and passive take offset for baseflow losses

Water Storages

Water storages at the Ulan Mine Complex include dams, old open cut mining voids (i.e. East Pit) and underground mining voids. The current water storage capacity at the Ulan Mine Complex is in the order of 5,370 ML. PA08_0184 allows the construction of two new tailings dams within the existing East Pit which will reduce the available water storage volume within the East Pit by approximately 3,230 ML in later years of the operation.

3.5 Following the cessation of mining in Ulan No. 3 underground, additional water storage of approximately 1,100 ML will become available within the goafs of the underground mine from 2029.

Monitoring of the on-site water storages is described in the SWMP **Section 4.1.3**.

Table 3.1 Onsite Water Storages

Facility Name	Storage Capacity (ML)	Purpose / Use	Inspection Frequency
Bobadeen Dam	502	Mine Water Storage	Quarterly/ Annual
Blend Dam	20	Discharge Waters	Quarterly/ Annual
Box Cut Sumps	TBD	Mine Water Storage	Weekly
Car Wash Dam	6	Dirty Water Storages	Quarterly/ Annual
CHPP Lagoons	14	Process Waters	Quarterly/ Annual
Compressor Dam	<1	Clean Water Storages	Annual
Duck Pond	-	N/A	Quarterly
East Pit	4220	Mine Water Storage	Weekly/ Annual
Leonard's Dam	25	Process Water	Quarterly/ Annual
Millers	35	Dust Suppression	Quarterly/ Annual
Moolarben Dam	166	Clean Water (offsite)	Weekly/ Annual
North West Sediment Dam	120	Mine Water Storage	Quarterly/ Annual
Peanut Dam	90	Clean Water	Monthly
Peters Dam	27	Dirty Water Storages	Quarterly/ Annual
Rail Loop Sump	4	Dirty Water Storages	Weekly
Rowans Dam	137	Process Water	Quarterly/ Annual
Shearers Dam	63	Dirty Water Storages	Quarterly/ Annual
Truck Fill Dam	14	Dirty Water Storages	Quarterly/ Annual
Wrights Dam	18	Dirty Water Storages	Quarterly/ Annual

3.6

Compensatory Water Supply Arrangements

UCMPL shall provide a compensatory water supply to any owner of privately-owned land whose supply is adversely impacted (other than an impact that is negligible) as a result of the project, in consultation with the NSW Department of Planning, Industry and Environment–Water (DPIE – Water) (formerly the NSW Department of Industry- Water (DOI Water)), and to the satisfaction of the Secretary.

The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributed to the project. Equivalent water supply must be provided (at least on an interim basis) within 24 hours of the loss being identified.

If the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

If UCMPL is unable to provide an alternative long-term supply of water, then UCMPL shall provide alternative compensation to the satisfaction of the Secretary.

Management of Surplus Water

The management of surplus water incorporates;

3.7

- The site water balance (**Section 3.10**) for the Ulan Mine Complex predicts that continued off-site discharge capacity will be required to manage the predicted water surplus. Existing approved EPL 394 LDPs (refer to **Table 3.2**) and operational LDPs and monitoring points (refer to **Table 3.3**) will be operated and maintained in accordance with EPL 394. Additional LDPs will be established as required in accordance with the Project Approval to meet future operational demands. Discharge protocols for are documented in **Section 3.8.**
- The North West Sediment Dam (NWSD) WTF will be used in conjunction with LDP 19 to facilitate the treatment and discharge of treated water from the East Pit. Additionally, the continued use of the Bobadeen WTF discharging water into Ulan Creek at LDP 6 and the Bobadeen Irrigation Scheme (BIS) will remain key components of UCMPL's water management system to manage surplus water.
- The approved, but not constructed Ulan West WTF at Talbragar River (refer to **Figure 3.2**) will be used to facilitate the treatment as the Ulan West mine progresses.
- Additionally, UCMPL has water sharing agreements with Moolarben Coal Mine (MCM) and a Heads of Agreement arrangement with Wilpinjong Coal to facilitating water sharing, if required.
- Exceedance associated with LDP discharges are management in accordance **Section 3.1.3 and Table 3.1 of the SWGWRP**.

The existing and approved key discharge and water sharing facilities are summarised in **Table 3.2**.

Table 3.2 EPL 394 Concentration Limits for Licensed Discharge Points

EPL Point	Location Name	Parameters	Units	50th Percentile	100th Percentile
1	USO Effluent Storage Dam (Discharges to Land)	Electrical Conductivity	µS/cm	N/A	810
		Oil and Grease	mg/L	N/A	10
		pH	pH	N/A	6.5 to 8.5
		Flow	(kL/day)	N/A	85
2	Millers Dam	Electrical Conductivity	µS/cm	N/A	900
		Iron	mg/L	N/A	5
		Zinc	mg/L	N/A	5
		Oil and Grease	mg/L	N/A	10
		pH	pH	N/A	6.5 to 8.5
		Total Suspended Solids (TSS)	mg/L	N/A	50
		Zinc	Mg/L	N/A	5
		Flow	(kL/day)	N/A	600
3	Outlet from Rowans Dam to Ulan Creek	Electrical Conductivity	µS/cm	800	900
		Iron	mg/L	N/A	5
		Oil and Grease	mg/L	N/A	10
		pH	pH	N/A	6.5 to 8.5
		Total Suspended Solids (TSS)	mg/L	N/A	50
		Zinc	mg/L	N/A	5
		Flow	(kL/day)	N/A	10,000
4	Drainage Outlet from Truckfill Dam to unnamed watercourse	Electrical Conductivity	µS/cm	N/A	900
		Iron	mg/L	N/A	5
		Oil and Grease	mg/L	N/A	10
		pH	pH	N/A	6.5 to 8.5
		Total Suspended Solids (TSS)	mg/L	N/A	50
		Zinc	mg/L	N/A	5
		Flow	(kL/day)	N/A	2,000
6	Discharge to Ulan Creek from Bobadeen WTF	Electrical Conductivity	µS/cm	800	900
		pH	pH	N/A	6.5 to 8.5
		Total Suspended Solids (TSS)	mg/L	N/A	50
		Flow	(kL/day)	N/A	15,000
19	Discharge to Ulan Creek from NWSD WTF	Electrical Conductivity	µS/cm	800	900
		pH	pH	N/A	6.5 to 8.5
		Total Suspended Solids (TSS)	mg/L	N/A	50
		Flow	(kL/day)	N/A	30,000

EPL 394 requires surface water monitoring to be undertaken at EPL points 1, 2, 3, 4, 6, 18, 19, 23 & 33 during discharge events (refer to **Figure 2.1**). The EPL Points 1,2,3,4 and 23 are not actively utilised. On the basis that monitoring is an event-based requirement for Points 1,2,3,4 and 23 details of these points are not included here. In the event discharges are planned for these points this WMP will be updated and the latest version posted on the Ulan Website. The surface water monitoring locations, frequencies and parameters of active discharge points are presented in **Table 3.3**.

Table 3.3 Surface Waters monitoring locations, frequency and parameters

Monitoring Point	Location		Parameters (Continuous during Discharge)
6 19	Goulburn River System	Discharge to Ulan Creek from Bobadeen WTF Discharge to Ulan Creek from NWSD WTF	• Discharge Volume (kL/day) • pH • EC (µS/cm) • TSS (mg/L)[1] • Turbidity (NTU)
18	Goulburn River System	Downstream Goulburn River Gauging Station Water Quality Monitoring	• pH • EC (µS/cm)
33	Goulburn River System	Upstream Goulburn River Gauging Station Water Quality Monitoring	• EC (µS/cm)

Notes: [1] Special Frequency means collection of a sample weekly when a discharge occurs on the Scheduled sampling day (EPL 4 Condition M2.3)

Where water enters a watercourse from a LDP, appropriate protection is established at the discharge point and downstream through the use of energy dissipaters and the placement of geo-fabric material, rock checks or other features as per the requirements of *Managing Urban Stormwater: Soils and Construction* (the Blue Book) (Volumes 1 and 2) (Landcom, 2004 and DECC, 2008) to reduce scouring (refer to ESCP). If required, additional planting of grass, small shrubs and riparian species will be undertaken by UCMPL to achieve the required bank stability. Erosion and sediment controls are discussed in **Section 3.13.**

3.8

Discharge Protocol

In accordance with the principles detailed in **Section 3.2** surplus water discharges to surface waters occur as follows:

- Discharge from water treatment facilities at locations listed in EPL 394 (refer to **Table 3.3**
- Discharge from mine water management system at locations listed in EPL 394 (refer to **Table 3.2**); and
- Runoff from areas within the clean water management system (e.g. areas with established rehabilitation) from locations that are licensed under the EPL 394.

During off-site discharges, as outlined above, UCMPL will monitor in accordance with the SWMP and the procedure outlined below:

- Monitor water quality against relevant discharge criteria (refer to SWMP) prior to discharge;
- Ensure suitable controls (e.g. geo-fabric) are in place around and downstream of the discharge point to prevent scouring;
- Once confirmation has been received that the water quality is acceptable for discharge (i.e. within the statutory and trigger parameters outlined in the SWMP, then commence discharge;
- Record the volume of water discharged (as required by the EPL – see SWMP) via flow meter, v-notch weir or recording (if used) pump times and rates;
- Sample discharges at the frequencies specified in the SWMP;

- Where required during discharges, monitor water quality daily upstream and downstream of the discharge location for due diligence purposes (refer to SWMP); and
- Cease discharges if water quality discharge parameters (refer to SWMP) cannot be met.

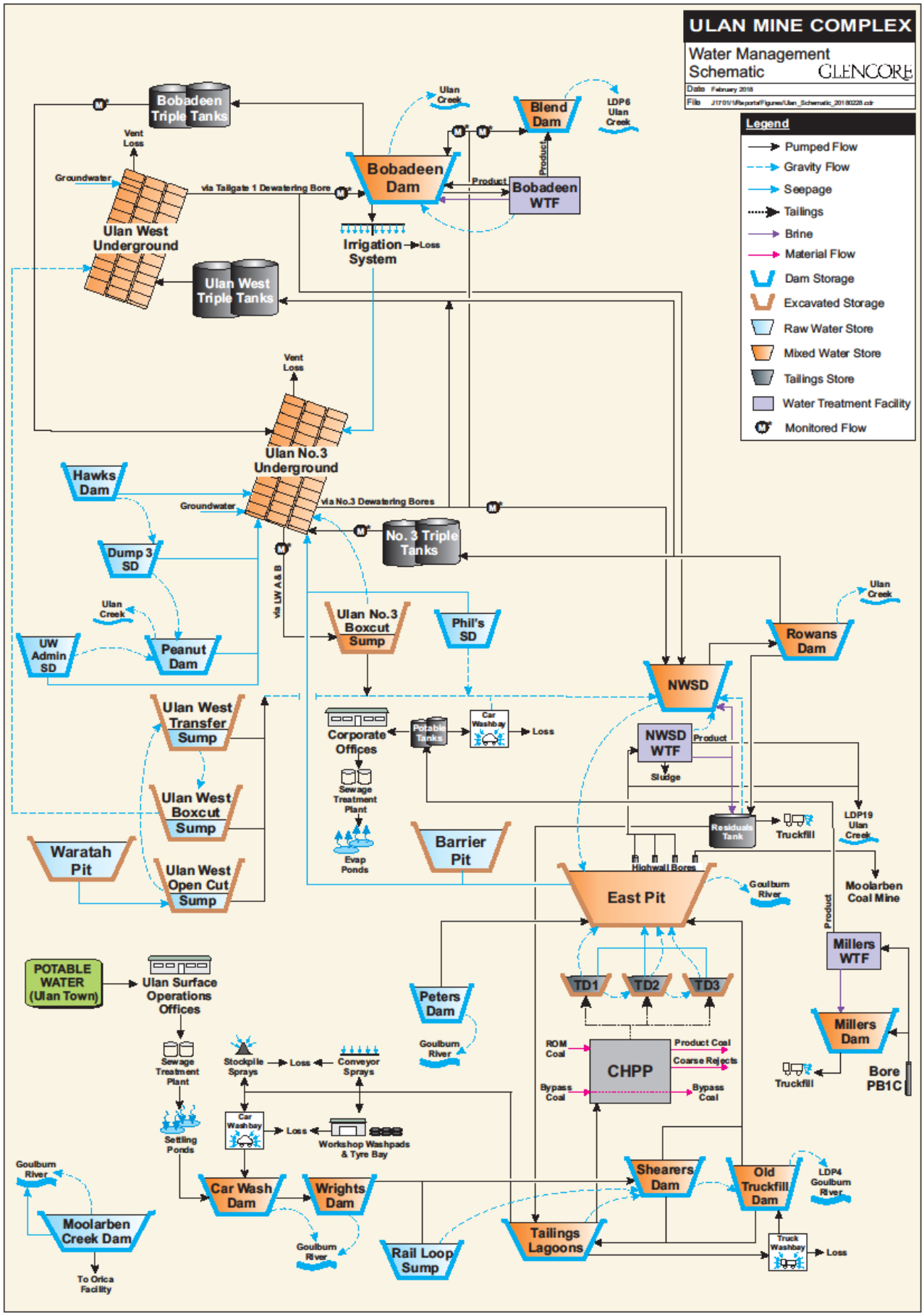

Figure 3.3 2018 Water Balance Schematic

Management of Water Treatment Facility Wastewater

The water management system includes a number of WTF's. The WTF's produce a wastewater that must be disposed of, or managed. Current wastewater volumes are in the order of 6 per cent of the total water discharged from the water treatment facilities (i.e. the combined blend of treated WTF water and mine water) and has a typical water quality in order of 8000 µS/cm and a pH of 7.5.

3.9 Based on the predicted water balance (refer to **Section 3.8 & 3.10**) and current mine water qualities and WTF efficiencies, the volume of wastewater generated in the water treatment facilities will range between approximately 50ML per year and approximately 360 ML per year. The waste products from the WTFs is managed in accordance with Section 2.7.6 of Waste Management Plan and EPL 394.

The wastewater from the WTF's will be blended to produce process quality water for use within the mine water management system.

Site Water Balance

3.10 A revised reporting water balance model was developed during 2007. UCMPL will use the water balance model to determine the monthly water balance for the site. The site water balance is updated annually. It was revised to a GOLDSIM model in 2017. The annual review of the site water balance includes an assessment of the amount of salt (in tonnes) within the system.

The site water balance model comprises a series of modules that represent the catchments and major components of the mine water management system. Each module is balanced individually and then brought together to represent the total water balance for the Ulan Mine Complex. The site water balance takes into account water sources (including rainfall, groundwater and potable water), water demands and losses, the change in inventory of on-site water storages and the discharge or transfer of water off site.

The primary components of the water balance, and associated model, are discussed in **Section 4.3. Figure 3.3** provides a water management schematic detailing the water inputs and outputs of each discrete module within the water management system.

3.11

Water Sources and Water Quality

The main sources of water for the Ulan Mine Complex are rainfall into the open cut mining area and dirty water catchments, direct rainfall onto dam surfaces and groundwater inflows to the underground mining operations. Some of the water flowing into the open cut area may flow through to groundwater, however the majority is captured within the mine water management system.

Potable water needs for the site are provided through the extraction of groundwater from an on-site borehole (PB1C) under licence 20AL214787 (Access for WAL41492). UCMPL extracts in the order of 50 ML to 60 ML of potable water per year from the PB1C bore. The extracted groundwater from PB1C is treated through a small WTF at Millers Dam to achieve a suitable water quality for use as a potable water supply. No potable water is supplied to the site from external reticulated sources. Potable water is trucked to site where required.

Typically the quality of the water is related to the source of the water. Electrical conductivity (EC) is the primary indicator for water quality, as it is the primary limiting factor for reuse.

Since the initial approval of this WMP, UCMPL has:

- appointed a dedicated full time Water Manager;
- convened a series of water workshops involving various internal and external stakeholders to further develop the water management strategy for Ulan Complex;
- undertaken more detailed operational studies regarding the water volumes and associated water qualities to inform infrastructure requirements;

- undertaken detailed reviews of the performance of existing water management infrastructure including: water treatment facilities (WTF's), water storage, transfer, blending and discharge infrastructure;
- commenced installation of additional surface water monitoring systems as required under the SWMP;
- set up internal operation strategies to assist in managing the dynamic nature of the water inventories and water management system requirements;
- constructed clean water diversion around the open cut pit operations;
- undertaken major upgrades of the dewater reticulation pipe work;
- identified the need for additional water treatment infrastructure;
- constructed additional WTF capacity at the approved North West Sediment Dam WTF; and modified the EPL to include a floating discharge limit for the licensed discharge points located on Ulan Creek (i.e. Bobadeen WTF and Rowans Dam).

UCMPL will continue to investigate opportunities optimise the way in which it manages water. As demonstrated previously, this has been achieved by augmentation of the existing infrastructure and licence conditions to enhance the separation, reuse treatment and discharge of water of differing qualities.

Water Demands and Losses

3.11.1

The main water demands at the Ulan Mine Complex are the CHPP, dust suppression and potable water usage. Water used in the CHPP includes water lost to product coal, coarse rejects and fine rejects (tailings). Tailings water from the East Pit tailings dam is partially recovered in the East Pit.

Potable water is used within the staff facilities and bathhouse. Potable water use equates to approximately 2 per cent of the total water demand on site. UCMPL will monitor the use of potable water through preparation of the site water balance and will look for opportunities to reduce the volume where possible.

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

Water Transfer and Disposal

As required, surplus water within the mine water management system is discharged from the authorised discharge locations under EPL 394 (refer to SWMP for locations, flow limits and concentration limits).

The Bobadeen – Water Treatment Facility (WTF) (LDP6), the North West Sediment (NWSD) – Dam Water Treatment Facility (WTF) (LDP19) and Rowans Dam (LDP3), can discharge a combined maximum of 30 mega litres (ML) per day into Goulburn River System. Rowans Dam is currently not being utilised for discharge, however it can be reinstated if required.

3.11.2

Modification to existing discharge points, or additional discharge points and environmental monitoring points may be established in the future to support operational requirements in accordance with Condition 31, Schedule 3 of the Project Approval.

The approved (but not constructed) Ulan West WTF will also provide additional capacity to discharge up to 17.5 ML per day to the Talbragar River, subject to appropriate licensing.

The MCM Water Sharing Agreement provides for the transfer off-site of up to 4 ML per day. This water is transferred to the MCM for use within the MCM water management system.

Under the BIS, approximately 242 hectares of land is irrigated with surplus mine water and used for fodder production and cattle grazing. The irrigation scheme is managed in accordance with the Water Infrastructure Management Plan. This plan was developed in accordance with statutory requirements under EPL394 and is consistent with the *EMS (ULNCX- 111515275- 870)*.

Water transfer and disposal facilities are a key component of the water management system to manage a water surplus for the life of the mine. The discharge infrastructure is designed to provide flexibility and redundancy within the water management system and allows variable water flow rates between the various discharge structures based on environmental requirements and the water requirements of the mining operation.

Where possible, the BIS, Bobadeen WTF, NWSD WTF and the Moolarben Water Sharing Agreement will be used in preference to EPL 394 LDPs 1, 2, and 3 and 4 (refer to 3.2). It also noted that in part the preferred discharge approach is determined by the grade of water being discharged off site.

3.11.3

Historical Water Balance

A summary of recent water balances are shown in **Table 3.4**. The net water balance shown in **Table 3.4** is the difference between the water sources, losses and discharges for the period under consideration. This balance takes into account the changes in the volume of water that is stored around the Ulan Mine Complex (i.e. the water inventory).

A simplified schematic of the water balance model for the Ulan Mine Complex for is shown on **Figure 3.4**.

Table 3.4 Recent Water Balance Summary

Year	Groundwater inflow		Discharge	
	ML	ML/day	ML	ML/day
2018	5133	14.1	4421	12.1
2017	5812	15.9	4608	12.6
2016	5809	15.9	8019	22.0
2015	4806	13.2	6132	16.8
2014	3841	10.5	3827	10.5
2013	3302	9.0	3998	11.0
2012	3281	9.0	4005	11.0
Licenced	**10714**	**29.4**	**10950**	**30**

Future Water Balance

The future water balance provides information on the future demand and supply peaks for the mining operation and identifies the storage and discharge requirements for the mine water management system over the life of the mine.

The estimated future water balance for the Ulan Mine Complex is based on the water balance compiled within the Goldsim model, with groundwater inflows as forecast by the groundwater model, which are considered conservative.

3.11.4

Water discharge is a key component of the water management strategy for the operation.

The estimated future water balances for Years 8 to 9 of the future operations, based on the commencement of approved mining in 2011 and including both the approved future underground and open cut mining operations are provided in **Table 3.5.** Note the Groundwater Model and Water Balance are currently being re-calibrated. **Table 3.5** will be updated post calibration.

Table 3.5 Ulan Mine Complex Estimated Future Water Balance

Item	Year 8 2018	Year 9 2019	Year 10 2020
Gross water sources (ML)	8475	7942	8178
Gross water losses (ML)	-8599	7825	-7433
Gross water balance (ML)	-124	117	745
Average daily gross water balance (ML/day)	-0.3	0.3	2.04

3.11.5 Reporting Water Balance

The water and salt balance is compiled from flow meters, water level gauges and flow gauges, survey levels on water storage dams, meteorology data and coal processing data,

The water balance is reported in the Annual Review.[4] Reporting outcomes include:

- an estimate of the volume of rainfall runoff collected in each of the catchment areas in the Water Management System;
- an estimate of the volume of water sourced from the surrounding groundwater systems;
- an estimate of the seepage/leachate of water, including from any tailings dams, water storages or backfilled voids on site, interactions with the Goulburn River and Ulan Creek and between the open cut and underground operations;
- the volume of water transferred to or from other mining operations under a water sharing arrangement;
- water discharged to Ulan Creek and the Talbragar River;
- water discharged through the BIS;
- an estimate of the salt (in tonnes) in the system; and
- potable water usage.

At the end of each year the following tasks will be undertaken:

- a review of the groundwater monitoring results against the groundwater predictions; and
- preparation of a predictive water balance for the next two years periods based on the recalibrated groundwater model and the mine plans for the next five years.

The preparation of the predictive water balance will include a review of the rainfall yield model and the water loss models (i.e. evaporation and coal moisture).

[4] PA08_0184, Schedule 5, Condition 3 specifies reporting requirement.

The review will include a review of the water discharge strategy to ensure that it is consistent with the discharge requirements identified in the site water balance and that there is sufficient capacity within the system to support the future water discharge requirements of the mining operation.

Goulburn River Diversion Remediation

The Goulburn River Diversion, which was completed in 1982, was approved as part of previous open cut operations. The channel diverts approximately a 3.7 kilometre length of the Goulburn River along the southern and eastern boundaries of the site.

3.12 There have been a number of concerns raised by government and community stakeholders regarding the Goulburn River diversion, including adverse impacts on water quality from sediment and erosion of the river banks, interaction with previously mined areas and loss of river base flows. In response to these concerns, UCMPL commissioned a study during the EA to identify and understand the issues and has subsequently, developed the *GRDRP (ULNCX-111515275-1641)* to address the identified issues.

The approved GRDRP was reviewed during 2013 in consultation with regulatory and other relevant agencies, Community Consultative Committee and the Aboriginal Representative Group and finalised and re-approved in 2013. The objectives of the Goulburn River Diversion remediation are to:

- improve the overall aesthetic appearance of the diversion, particularly for sections of the diversion which are highly visible from Ulan Road;
- improve the surface drainage controls, vegetation establishment and erosion control;
- increase the geomorphic features and ecological integrity of the diversion where feasible;
- strive for a positive improvement on water quality exiting the diversion; and
- seek community and government acceptance of the proposed stability works.

The remediation work was completed in 2017 and 2018.

3.13

Erosion and Sediment Control

Erosion and sediment control will be undertaken in accordance with *ULNCX- 111515275- 224 Erosion & Sediment Control Plan* (ESCP). The ESCP provides a framework for the management of erosion and sedimentation.

Erosion and sediment controls will be implemented to mitigate the impacts of construction and mining operations on nearby watercourses and the surrounding environment. Standard erosion and sediment control techniques will be used in accordance with the requirements of *Managing Urban Stormwater: Soils and Construction* (the Blue Book Volumes 1 and 2E) (Landcom, 2004 and DECC, 2008).

The objective of the ESCP is to ensure that appropriate structures and programs of work are in place to:

- fulfil the statutory requirements of PA08_0184 and EPL 394;
- 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; and
- meet the requirements of the Blue Book (Landcom, 2004 and DECC, 2008).

Further site specific controls relating to the management of sediment laden runoff, and the procedure for discharging such water are outlined in the ESCP.

Surface Water and Groundwater Response Plan

3.14

The objective of the SWGWRP is to provide appropriate trigger, action, response plans (TARPs) and response protocols in the event that mining operations result in adverse impacts to the surrounding surface water and/or groundwater environment(s). It also provides information on the trigger mechanisms, summarises the potential water management issues that may arise and provides information on the appropriate TARP or response procedures to be used.

The SWGWRP provides TARPs or response protocols for the following events:

- impact assessment criteria (trigger level) exceedance;
- EPL 394 criteria exceedance (non-compliance);
- surface water and groundwater impacts on adjacent private landowners;
- variations from the predictions made in the groundwater model;
- potential impacts on groundwater dependant ecosystems;
- unauthorised off-site discharges;
- environmental Incident: Unforeseen Hazard, Unplanned Event or Unauthorised Discharge; and
- community complaints (relating to surface water and groundwater).

A number of events listed above, may be the result of subsidence. Subsidence related impacts may include deterioration of stream health and stability, loss of hard rock baseflows, impact to privately owned bores and impacts to Groundwater Dependent Ecosystems[5]. Management of potential subsidence related impacts are detailed in Appendix 4 of the *Subsidence Monitoring Program (ULNCX-111515275-1804)*, *Appendix A: Water Management Plan for LW1 to 6 Ulan West (ULNCX-111515275-2777) and Appendix A : Water Management Plan for LW30, LWW6-LWW8*.

3.15

Training

Effective implementation and maintenance of the WMP depends on the competency of the workforce and its contractors. General awareness training is provided to all new employees and contractors as part of the Ulan Site Specific Induction program in accordance with the following Training and Competency Management Standards.

- ULNUG-849165555-5762 Training and Competency Management Plan
- ULWUG-729531900-105 Training and Competency Management Plan
- ULNOC-1105874907-1747 Training and Competency Management Plan

Additional training (for example erosion and sediment control training for task coordinators and/or supervisors) will be provided to employees and contractors (as required) and subject to the Training Needs Analysis detailed in the EMS. This training will be targeted to provide employees and contractors specific skills and knowledge to enable them to manage the Water management system in accordance with this management plan.

[5] No Groundwater Dependent Ecosystems (GDE) were identified in the Project Approval area (2009 EA and subsequent modification assessments)

4 Measurement and Evaluation

Surface Water Monitoring

Surface water monitoring will be undertaken in accordance with the SWMP. The SWMP outlines the baseline and ongoing monitoring, impact assessment criteria (trigger levels) and investigation and reporting protocols for potential surface water impacts.

To fulfil the principals of the WMP, the SWMP:

4.1

- details the integrated surface water monitoring strategy;
- provides detailed historical baseline data on surface water quality in creeks and other waterbodies that could potentially be affected by the mining operation;
- provides details of the monitoring program regarding surface water flows and quality, and stream health, channel stability;
- outlines relevant surface water impact assessment criteria (trigger levels) and establishes a protocol for the assessment and response to monitoring data;
- provides information of compliance monitoring and measurement of water discharges from the site;
- provides methods to assess compliance with conditions of PA08_0184, EPL 394 and legislation relating to surface water; and
- outlines the reporting requirements for the results of the monitoring program.

If an exceedance of any surface water trigger levels or EPL limit is identified, then the SWGWRP shall be activated as detailed in **Section 3.14**

4.2 Groundwater Monitoring

Groundwater monitoring will be undertaken in accordance with the GWMP. The GWMP outlines the baseline, ongoing and future monitoring requirements, impact assessment criteria (trigger levels) and investigation and reporting protocols for potential groundwater impacts.

To fulfil the principals of this WMP, the GWMP:

- provides historical baseline monitoring data for the surrounding aquifers and regional groundwater;
- provides information on regional groundwater levels;
- provides information on the water quality in the surrounding aquifers;
- provides an estimate of the groundwater contribution to the water balance through groundwater inflow to the open cut and underground workings;
- provides details on the groundwater levels and quality in surrounding privately owned boreholes;
- provides information on the monitoring program for 'The Drip';
- provides information on the monitoring program for impacts on hardrock baseflows;
- outlines relevant groundwater impact assessment criteria (trigger levels);
- establishes a protocol for the assessment and response to monitoring data; and
- provides methods to assess and maintain compliance with the conditions of the PA08_0184, EPL 394 and legislation relating to groundwater.

If an exceedance of any groundwater impact assessment criteria is identified, then the SWGWRP shall be activated as detailed in **Section 3.14**

The UCMPL Groundwater model is reviewed biennial with the most recent calibrated model developed in 2016 as part of the Modification 4 Groundwater Impact Assessment by MER (2015). The model developed predicts future groundwater inflows to Ulan No.3 and the Ulan West Mine. The predicted inflows are compared to the estimated inflows from the site water balance, which are presented as the

monthly average. Water balance values are based on water years. A groundwater model re-calibration was commissioned in 2018.

Water Balance Data

As part of the water management system and surface water and groundwater monitoring programs above, the following water related information will be collected. The information will be used to assist ongoing the refinement of the water balance. The information collected includes:

- daily rainfall;

4.3

- data collected in 'real time' from Citect SCADA system (i.e. from flow meters, dam water levels, water quality probes etc.);
- catchment areas, boundaries and status (i.e. natural/undisturbed, disturbed or rehabilitated) reporting to the clean/dirty water management systems;
- CHPP water usage;
- water used for dust suppression, including on haul roads, conveyors and at Run of Mine (ROM) and product stockpiles;
- administration and bathhouse water usage;
- groundwater extracted at PB1C (i.e. potable water);
- groundwater make (including both open cut and underground workings);
- water discharged off site;
- on-site transfers between dams and water storages and to the BIS;
- daily water levels in the major on-site water storages;
- production data, including ROM, product, coarse reject and tailings tonnage and moisture contents; and
- tailings densities at outlet from CHPP and annual in situ densities in the tailings dam.

This monitoring data will be collected from calibrated gauges, such as flow measuring devices on pumping systems and existing monitoring points, survey levels on dams and, where appropriate, v-notch weirs on sediment dam spillways.

4.4

Inspection and Maintenance Requirements

The inspection and maintenance requirements of the WMP are to be undertaken in accordance with the EMS. The requirements of the EMS include both routine/ongoing inspection requirements and episodic requirements that result from the dynamic nature of the mining operation.

4.4.1

The specific inspections and maintenance requirements for each component of the water management system are addressed in the following sections.

Erosion and Sediment Controls

The ESCP outlines the inspection and maintenance requirements for erosion and sediment controls and structures that have been implemented. The plan states that ESCs will be reviewed by GDP permit holders during project execution, as a general condition of GDPs. The Environment and Community Team undertake a monthly GDP inspection which identifies and inspects the GDPs where temporary ESCs are in place (active ESCs). When the temporary ESCs are removed the inspections will be reduced to a frequency that is appropriate, if it is still needed. Active ESCs will be inspected after as per the ESCP (*ULNCX- 111515275- 224)*.

Inspections include, but are not limited to:

- water and sediment levels in sediment dams and sumps;
- scouring and erosion of drainage structures and drainage lines;

- integrity of all installed structures including diversion drains, channels, bunds, chutes, sediment fences, energy dissipaters, access roads and wheel washes; and
- recommended maintenance works.

Mine Water Management System

Water management infrastructure including storages and tailings dams, will be inspected and maintained in accordance with the EMS.

4.4.2

The management of current and proposed water infrastructure located on surface and in underground mine operations is described in the Water Infrastructure Management Plan (Part A-ULNOC-1105874907-939, Part B- ULNOC-1105874907-1024, Part C- ULNOC-1105874907-940, Part D-ULNOC-1105874907-941) (WIMP), including monitoring and control systems to prevent or minimise uncontrolled discharge.

Where identified through site risk assessment, high risk dams and water storages will be reviewed annually for their structural integrity or more frequently if required under specific approvals. The requirements for inspection of the dams within the water management system are documented in the EMS i.e. Workplace Inspection Checklists.

Equipment used in the measurement of water quantities and quality such as flow meters, online instrumentation and hand held analytical meters shall be tested and calibrated by suitably qualified persons. Calibration certificates and records shall be kept for a period of at least seven years in accordance with the *Document Control Procedure (ULNUG-849165555-5689, ULNOC-1105874907-2299, and ULWUG-729531900-128).*

4.5 Reporting

External and internal reporting is undertaken in accordance with the reporting requirements of the EMS. Reporting requirements for this WMP are presented in **Table 4.1** below.

Table 4.1 Reporting Requirements

Requirement	Trigger	Agency
Annual Environment Review[6]	Project Approval	DPEDPE – Resources Regulator DPE – Resources & Geoscience EPA DOI Water MWRC
Incident Reporting[7]	Immediately, following any occasion of incident	In accordance with Pollution Incident Response Management Plan (ULNCX-111515275-2432)
Quarterly Environmental Monitoring Summaries ^	Project Approval – 2 times yearly as per monitoring	UCMPL Website www.ulancoal.com.au
EPL 14 day Reports*	EPL 394	UCMPL Website www.ulancoal.com.au
EPL Annual Return	EPL 394	EPA
Community Complaints Register	Project Approval- Update Monthly	UCMPL Website www.ulancoal.com.au

[6] Submissions of the AR to must occur electronically to water.referrals@dpi.nsw.gov.au
[7] Incident reports to DPI Water must occur electronically to water.referrals@dpi.nsw.gov.au

Requirement	Trigger	Agency
Subsidence Status Management Report	Quarterly i.e. in March, July, August and November	DPE – Resources & Geoscience DOI Water OEH Each operator of infrastructure
End of Panel Report	Within 4 months of completion of a longwall panel	DPE – Resources & Geoscience UCMPL Website
Annual Subsidence Report	Annually by the 31st March	DPE – Resources & Geoscience UCMPL Website

*Monitoring results provided in these reports will include the monthly max, min and mean average 24 hours values from real time monitoring and max, min and mean values for required weekly grab samples.

^ Monitoring results provided in these reports will include graphical representation of grab samples and 24 hours values from real time monitoring. Monitoring results for groundwater drawdown figures and water properties will be reported for each piezo (monitoring well) in the North Monitoring Network and the Bobadeen Monitoring Network.

Monitoring results provided in the annual review will include annual max, min and average values for each surface water monitoring location. 24 hour average real time monitoring results for parameters PH, EC and total flow for the licensed water discharge points will be provided as an appendices to the report. Groundwater monitoring will be provided by graphical representation.

Reports will provide an assessment of compliance with relevant performance measures and indicators.

A summary of the water monitoring results, similar to those reported in the quarterly Environmental Monitoring Summaries, will be presented at the Ulan Coal Community Consultative Committee.

4.6 Community Complaints

Community complaints received by UCMPL are managed in accordance with ULNCX-111515275-3376 Complaints Procedure which requires recording complaints, complaint investigation and follow up actions. A 24 hour, 7 day a week community and employee information telephone line 1800 647 630 and email address ulancommunity@glencore.com.au are available to receive comments and complaints from the community.

5 Review and Improvement

Ongoing monitoring and review on the performance and implementation of this SWMP will be undertaken in accordance with Section 5 of the *EMS (ULNCX-111515275-870)*.

The Environment and Community Manager (or delegate) will review this monitoring program and resubmit to DPIE at least every three years, or earlier if required. The SWMP will reflect changes in environmental requirements, technology and operational procedures. Updated versions of the approved monitoring program will be made publicly available on UCMPL's website at http://www.ulancoal.com.au

On an annual basis and after submission of the Annual Review report, UCMPL shall review, and if necessary revise, the strategies, plans, and programs required under Project Approval 08_0184 to the satisfaction of the Secretary within 3 months of:

a) the submission of an annual review under Condition 3 (Schedule 5);

b) the submission of an incident report under Condition 6 (Schedule 5);

c) the submission of an audit report under Condition 8 (Schedule 5); and

d) any modification to the conditions of this approval, (unless the conditions require otherwise).

In addition, the performance of this program in achieving the objectives and targets will be reviewed annually. This review shall enable the identification of non-compliance and the formulation corrective action where targets are not being met.

6 Accountabilities

Role	Accountabilities for this document
Operations Manager	• Approve appropriate resources for the effective implementation of the Water Management Plan. • Ensure the effective implementation of strategies designed to reduce surface water and groundwater impacts from the operation. • Ensure any potential or actual surface water and groundwater monitoring issue is reported in accordance with legal requirements and the corporate standard. • Authorise internal and external reporting requirements of the Water Management Plan. • Approve subsequent revisions of the Water Management Plan.

Environment and Community Manager	• Provide that sufficient resources are allocated for the implementation of the Water Management Plan. • Ensure appropriate resources are budgeted for to enable appropriate monitoring of water (surface water and groundwater). • Ensure that water management considerations are undertaken in the installation of all new infrastructure to be installed at the operation, where applicable. • Identify water management risks and impacts to the environment and assess resources required to mitigate identified risks and impacts within the site. • Ensure that water management controls are implemented in accordance with the Water Management Plan. • Ensure that the results of monitoring are evaluated and reported to senior management and to relevant personnel for consideration as part of ongoing mine planning. • Ensure any potential or actual water management issue is reported in accordance with legal requirements and the corporate standard. • Provide visible and proactive leadership in relation to the water management. • Ensure that operational changes consider the potential impacts on surface water and groundwater in the surrounding environment and adjacent private landholders. • Ensure all internal and external reporting requirements are met, including incident reporting in accordance with EMS. • Ensure all reporting complies with internal and external monitoring standards, protocols and regulations. • Proactively engage government and community as required. • Coordinate the ongoing review of the Water Management Plan. • Review and approve external reports e.g. Annual Review Report, prior to final approval by the Operations Manager. • Maintain responsibility for Moolarben Creek Dam, as the nominated Dam Owner's Representative under the NSW Dams Safety Act 1978. • Maintain responsibility for water licenses for monitoring and extraction purposes. • Ensure operation of the Bobadeen Irrigation Scheme is undertaken in accordance with EPL 394 and the operating procedure. • Contact point for Community Complaints in accordance with ULNCX-111515275-3376– Complaints Procedure. • Ensure effective management of all community complaints.

Role	Accountabilities for this document
Water Manager	• Ensure management of UCMPL's water management system is undertaken in accordance with the Water Management Plan and the Water Infrastructure Management Plan (Part A-ULNOC-1105874907-939, Part B- ULNOC-1105874907-1024, Part C- ULNOC-1105874907-940, Part D- ULNOC-1105874907-941). • Implement and manage changes to UCMPL's water management system through UCMPL's Change Management process.

Role	Accountabilities for this document
Environment & Community Coordinator	• Manage and maintain the water monitoring programs in accordance with the Water Management Plan and the SWMP and GWMP. • Ensure monitoring equipment is operated in accordance with relevant industry standards and protocols. • Ensure that all monitoring records are effectively maintained on site in accordance with the EMS. • Coordinate the collation and evaluation of monitoring data. • Conduct periodic environmental inspections in accordance with the EMS. • Ensure any potential or actual water management issue, including incidents and non-compliance is reported to the ECM. • Coordinate incident investigation processes including associated reporting requirements, in accordance with the EMS. • Coordinate the implementation of corrective actions and evaluate their effectiveness. • Provide visible and proactive leadership in relation to water management. • Participate in the ongoing review of the Water Management Plan. • Coordinate the review of the site water model and water balance. • Upload copies of updated management plans to the UCMPL website. • Conduct periodic environmental inspections of UCMPL's buffer lands to identify any water management issues. • Ensure any potential or actual water management issue, including incidents and non-compliance is reported to the ECM. • Manage access and lease agreements for ongoing management of water management system. • Proactively engage government and community as required. • Coordinate effective operation of the Bobadeen Irrigation Scheme in accordance with EPL 394 and the Water Management Plan. • Regularly report performance of the Bobadeen Irrigation Scheme to ECM and ECC (for external reporting).

Role	Accountabilities for this document
Environment & Community Officer	• Provide copies of updated management plans to CCC members and upload to the UCMPL website. • Update monitoring data on the UCMPL internet site. • Regularly report environmental performance to ECM. • Prepare internal and external reports for review by ECM. • Ensure that all monitoring records are effectively maintained on site in accordance with the EMS. • Coordinate the collation and evaluation of monitoring data.
Project Manager	• Provide that sufficient resources are allocated for the implementation of the Water Management Plan, as required. • Ensure adequate resources are budgeted for in relation to water monitoring or erosion and sediment control for their task/project. • Implement and manage changes to UCMPL's water management system through UCMPL's Change Management process. • Ensure the any work requiring ground disturbance is approved prior to disturbance in accordance with EMS (where relevant). • Ensure that operational changes consider the potential impacts on surface water and groundwater in the surrounding environment and adjacent private landholders. • Monitor that team members and contractors carry out work appropriate monitoring and maintenance tasks. • Ensure any potential or actual water management issue is controlled, or otherwise isolated. • Ensure any potential or actual water management issues, including environmental incidents, are reported to the ECM. • Conduct environmental inspections including monitoring of erosion and sediment control structures prior to and following high rainfall events. • Provide input to management on the adequacy and effectiveness of the Water Management Plan. • Complete maintenance and repair work on equipment, including erosion and sediment control structures as identified in field inspections. • Provide visible and proactive leadership in relation to water management. • Ensure personnel working at the operation are aware of any water monitoring obligations for their task/project.

Role	Accountabilities for this document
Surface Projects Coordinator	• Provide that sufficient resources are allocated for the implementation of the Water Management Plan, as required. • Ensure adequate resources are budgeted for in relation to water monitoring or erosion and sediment control for their task/project. • Implement and manage changes to UCMPL's water management system through UCMPL's Change Management process. • Ensure the any work requiring ground disturbance is approved prior to disturbance in accordance with EMS (where relevant). • Ensure that operational changes consider the potential impacts on surface water and groundwater in the surrounding environment and adjacent private landholders. • Monitor that team members and contractors carry out work appropriate monitoring and maintenance tasks. • Ensure any potential or actual water management issue is controlled, or otherwise isolated. • Ensure any potential or actual water management issues, including environmental incidents, are reported to the ECM. • Conduct environmental inspections including monitoring of erosion and sediment control structures prior to and following high rainfall events. • Provide input to management on the adequacy and effectiveness of the Water Management Plan. • Complete maintenance and repair work on equipment, including erosion and sediment control structures as identified in field inspections. • Provide visible and proactive leadership in relation to water management. • Ensure personnel working at the operation are aware of any water monitoring obligations for their task/project.

Role	Accountabilities for this document
All Supervisors	• Provide that sufficient resources are allocated for the implementation of the Water Management Plan, as required. • Ensure adequate resources are budgeted for in relation to water monitoring or erosion and sediment control for their task/project. • Implement and manage changes to UCMPL's water management system through UCMPL's Change Management process. • Ensure the any work requiring ground disturbance is approved prior to disturbance in accordance with EMS (where relevant). • Ensure that operational changes consider the potential impacts on surface water and groundwater in the surrounding environment and adjacent private landholders. • Monitor that team members and contractors carry out work appropriate monitoring and maintenance tasks. • Ensure any potential or actual water management issue is controlled, or otherwise isolated. • Ensure any potential or actual water management issues, including environmental incidents, are reported to the ECM. • Conduct environmental inspections including monitoring of erosion and sediment control structures prior to and following high rainfall events. • Provide input to management on the adequacy and effectiveness of the Water Management Plan. • Complete maintenance and repair work on equipment, including erosion and sediment control structures as identified in field inspections. • Provide visible and proactive leadership in relation to water management. • Ensure personnel working at the operation are aware of any water monitoring obligations for their task/project.
All Employees & Contractors	• Ensure the effective implementation of the Water Management Plan with respect to their work area. • Ensure any potential or actual water management issues, including environmental incidents, are reported to the Project Manager, Supervisor or Task Coordinator. • Seek approval from the Project Manager, Supervisor or Task Coordinator prior to making changes to the water management system.

7 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.

Definitions

Definitions within this document, listed in below.

Table 7.1 Definitions

7.1

Term	Definition
µs/cm	microSiemens per centimetre is the standard measure of electrical conductivity and is used to indicate the salinity level of water
AER	Annual Environmental Review
AHD	Australia Height Datum. Used to indicate elevation.
Alluvium	Sediment deposited by a flowing stream, e.g. clay, silt, sand etc.
Aquifer	A water bearing rock formation
ARI	Average Recurrence Interval. Expresses the rarity of a rainfall event and is used to indicate intensity.
BIS	Bobadeen Irrigation Scheme
Blue Book	Managing urban Stormwater: Soils and Construction, Volumes 1 and 2 (Landcom 2004 and DECC 2008)
Bore	A hole formed by boring or augering.
CHPP	Coal Handling and Preparation Plant
DA	Development Approval
Dams Safety Act	*Dams Safety Act 1978*
Dams Safety Committee	Dams Safety Committee
DECC	Department of Environment and Climate Change
DI	Department of Industry
DLWC	Department of Land and Water Conservation
DPIE	Department of Planning, Industry and Environment
DPIE Water	Department of Planning, Industry and Environment - Water
DPI	Department of Primary Industries
DRE	Division of Resources and Energy, within DI
EA	Environmental Assessment
EC	Electrical conductivity
ECC	Environment and Community Coordinator
ECM	Environment and Community Manager
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	Environment Protection Authority
EPL	Environment Protection Licence

Term	Definition
ESCP	Erosion and Sediment Control Plan
Groundwater	Sub-surface water which is within the saturated zone and can supply wells and springs. The upper surface of this saturated zone is called the water table.
(G)CAA	(Glencore) Coal Assets Australia
GWMP	Groundwater Monitoring Program
kL	Kilolitres or thousands of litres
LGA	Local Government Area
MCM	Moolarben Coal Mine
ML	Megalitres or millions of litres
MWRC	Mid West Regional Council
Mtpa	Million tonnes per annum
NRAR	Natural Resources Access Regulator
NWSD	North West Sediment Dam
LW	Longwall
OEH	Office of Environment and Heritage
PA	Project Approval
pH	A measure of acidity.
Piezometer	A small diameter bore lined with a slotted tube used for determining the standing water level of groundwaters.
POEO Act	*Protection of the Environment Operations Act 1997*
ROM	Run of Mine
SCADA	Supervisory Control and Data Acquisition
SMP	Subsidence Management Plan
SWGWRP	Surface Water and Groundwater Response Plan
SWMP	Surface Water Monitoring Program
Tailings	Fine residual waste material separated in the coal preparation process.
TARP	Trigger Action Response Plan
TSS	Total Suspended Solids
UCMPL	Ulan Coal Mines Proprietary Limited
WTF	Water Treatment Facility
WM Act	*Water Management Act 2000*
WMP	Water Management Plan
WSP	Water Sharing Plan

7.2

Reference Information

Reference information, listed in below, is information that is directly related to the development of this document or referenced from within this document.

Table 7.2 Reference List

Reference	Title
Legislation	*Protection of the Environment Operations Act 1997*

Reference	Title
	Water Management Act 2000
	Water Act 1912
	Environmental Planning and Assessment Act 1979
	Dams Safety Act 1978
Australian Standards	AS/NZS 5667.1:1998. Water Quality – Sampling – Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples.
	AS/NZS 5667.10:1998 Water Quality – Sampling – Guidance on Sampling of Waste Waters.
UCMPL	Environmental Management Strategy (ULNCX- 111515275- 870)
	Biodiversity Management Plan (ULNCX- 111515275- 225)
	Integrated Mining Operations Plan 2010 to 2017 (ULNCX- 111515275- 3548)
	Water Infrastructure Management Plan (Part A-ULNOC-1105874907-939, Part B-ULNOC-1105874907-1024, Part C- ULNOC-1105874907-940, Part D- ULNOC-1105874907-941)
	Surface Water Monitoring Program (ULNCX- 111515275- 1642)
	Groundwater Monitoring Program (ULNCX- 111515275- 1643)
	Surface Water and Groundwater Response Plan (ULNCX- 111515275- 1644)
	Goulburn River Diversion Remediation Plan (ULNCX-111515275-1641)
	Erosion and Sediment Control Plan (ULNCX- 111515275- 224)
	Moolarben Dam Operations and Maintenance Plan (ULNCX-111515275-1646)
	Moolarben Dam Safety Emergency Plan (ULNCX-111515275-857)
	Bobadeen Irrigation Scheme Operating Procedure
External	AGE (2018 Ulan Coal Mine Limited Groundwater Impact Assessment for s75W Modification (Mod 4)). Report Prepared for Ulan Coal.
	ANZECC/ARMCANZ, 2000. National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality.
	Department of Environment and Conservation (DEC), 2004. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW.
	Department of Industry, Planning and Natural Resources (DIPNR) (2005). Guidelines for Management of Stream/Aquifer Systems in Coal Mining Developments – Hunter Region.
	Department of Industry, Planning and Natural Resources (DIPNR), undated. Draft Guidelines for the Design of Stable Drainage Lines on Rehabilitated Mine sites in the Hunter Coalfields.
	Department of Environment and Climate Change (DECC), (2004). Managing Urban Stormwater: Soils and Construction – Volume 1.
	Department of Environment and Climate Change (DECC), (2008). Managing Urban Stormwater: Soils and Construction – Volume 2A Installation of services.
	Department of Environment and Climate Change (DECC), (2008). Managing Urban Stormwater: Soils and Construction – Volume 2C Unsealed Roads.
	Department of Environment and Climate Change (DECC), (2008). Managing Urban Stormwater: Soils and Construction – Volume 2D Main Road Construction.
	Department of Environment and Climate Change (DECC), (2008). Managing Urban Stormwater: Soils and Construction – Volume 2E Mines and Quarries.
	Eco Logical (2018) Ulan Continued Operations Project – Modification 4 Longwall Optimisation Project Environmental Assessment. Report prepared for Ulan Coal.
	Engeny Water Management (2018) Ulan Coal Mines Pty Limited Modification 4 Surface Water Impact Assessment. Report prepared for Ulan Coal.
	Mackie Environmental Research (MER), 2009. Ulan Coal – Continued Operations Groundwater Assessment. Prepared for Ulan Coal Mines Pty Limited.

Reference	Title
	Murphy, B.W. and Lawrie, J.W., 1998. Soil Landscapes of the Dubbo 1:250 000 Map Sheet. Department of Land & Water Conservation of NSW, Sydney.
	Umwelt (Australia) Pty Limited, 2009. Ulan Coal – Continued Operations EA. Prepared for Ulan Coal Mines Pty Limited.
	Umwelt (Australia) Pty Limited, 2011. Ulan Coal Continued Operations North 1 Underground Mining Area, Minor Modification to Ulan No.3 & Ulan West Mine Plans & Proposed Concrete Batching Plant.
	Umwelt (Australia) Pty Limited, May 2012. Environmental Assessment Modification to Ulan Coal Continued Operations, Ulan West Mine Plan (Approved Panels 1 – 4) and Construction Blasting.
	URS, 2009. Goulburn River Diversion - Long Term Stability Strategy, prepared for Ulan Coal Mines Pty Limited.
	Yoo, E K, Tadros, N Z, and Bayly, K W, 2001. A Compilation of Geology of the Western Coalfield. Geological Survey of New South Wales, Report GS2001/204 (unpublished).

Change Information

7.3 Full details of the document history are recorded in the document control register, by version. A summary of the current change is provided in below. Example detail shown below.

Table 7.3 Change Information

Version	Date	Review team (consultation)	Change Summary
1.0	13 March 2014		New document
1	31 December 2010	XCN IT	Transfer into new Intranet platform
2	31 March 2011	Jamie Lees, Cheryl Henriques, Matt Newton (Umwelt), Susan Shield (Umwelt)	Review of Water Management Plan following Project Approval 08-0184 being granted by the DoP.
3	1 April 2011	Cheryl Henriques	Formatting – no change to content
4	19 July 2011	Susan Shield (Umwelt) Jamie Lees, Cheryl Henriques	Update to plan following DPE comments
5	21 July 2011	Cheryl Henriques	Formatting – no change to content
5.1	15 June 2012	Susan Shield (Umwelt), Robyn Stoney, Ian Flood, Rachel Murray	Update of plan required by Annual Review, Court Orders, approval of MOD 1 and MOD2, and EPL 394 variation.
5.2	10 June 2013	Tara Stokes, Robyn Stoney	AER 2012 Management Plan Review Removed table 3.2 from Section 3.9.3 duplication of EPL criteria provided in sub plan SWMP. Note required in this section.
5.3	24 June 2014	Susan Shield, Ian Flood, Robyn Stoney and Stephen Bragg	Update Figures and Tables and table of contents; Formatting; Align document to Glencore requirements; Update legislative requirements; Revise water balance predictions; and Relocate SMP/EP Conditions to Appendix 2.

6	20 June 2015	Robyn Stoney, Stephen Shoesmith, Stephen Bragg	Address DPE comments (16/09/2014) including: • clarification of clean and dirty water management areas, separated by catchment; • update status of water improvement projects; • re-order source and fate information to introductory material; • updated forecast information for water balance management; • consistent wording with conditions of approval; and • correction of administrative errors, references within text and to PA08_0184 conditions. Reformat WMP to GCCA Template for management plans.
6.1	9 June 2016	Tom Frankham	Update in response to Modification 3
7.0	2 December 2016	Tara Stokes	Document approved by DPE change of effective date and published version 6.1
7.3	30 June 2017	Tara Stokes Robyn Stoney	Dam inspection frequency added per DPE Dam Audit (Nov 2016)
8.0	3 July 2017	Tara Stokes	Update to SW Monitoring locations figure (Version published but not approved by DPIE)
8.7	05 July 2018	Kristy Bennetts	Section 4.2 Updated to reflect GW vs Water Balance reporting process Administrative updates
8.10	February 2019	Lucy Stuart	Update of Water Balance, consistency with sub plans and other administrative updates.
9.0	April 2019	Robyn Stoney, Robbie Mills	Minor revision following DPIE feedback April 2019. Version approved 15/05/2019
9.1	September 2019	Lucy Stuart and EMM	Minor revisions based on the approval of MOD 4. Figure updates, updated water licence section as table of allocated water.
9.2	August 2020	Jake Hawkins	Updated Ulan Coal Mines Pty Limited (UCML) to Ulan Coal Mines Pty Limited (UCMPL) – in text and figures, and Department of Planning and Environment (DP&E) to Department of Planning, Industry and Environment (DPIE) as advised by the EPA (5 August 2020).
9.3	September 2020	Jake Hawkins	MOD 5 administrative changes, inclusion of MOD5 approval and updated operations plan layout.

Appendix A - Correspondence History

a) Extensive consultation with government authorities was undertaken during the preparation of *the Ulan Coal – Continued Operations EA* (Umwelt, 2009) including project briefings, a Planning Focus Meeting and separate meetings with relevant government authorities to discuss specific issues. The consultation undertaken during the preparation of the EA is described in Section 3 of the EA (Umwelt 2009).

b) Consultation with NSW Office of Water (NOW), Office of Environment and Heritage (OEH), Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) and MWRC occurred prior to submission of this WMP through a detailed presentation on the 23 March 2011.

c) In accordance with Condition 34(a), Schedule 3 of the Project Approval, this WMP was submitted to DPIE, NOW, OEH and MWRC concurrently for review and comment on 31 March 2011.

d) On 16 May 2011, representatives of UCMPL met with DPIE to discuss the Department's comments on this plan. Following further consultation with DPIE and NOW on Friday 15 July 2011, it was agreed that UCMPL would resubmit the revised WMP to both departments concurrently. The WMP was approved on 29 September 2011.

e) In preparation for the June 2014 review, UCMPL received comments from the DPIE in regards to the WMP, GWMP, SWMP and ESCP.

f) Copies of the updated WMP were provided to Environment Protection Authority (EPA), DPI Water, DRE and MWRC for comment.

g) This version of the WMP was updated due to the approval of Mod 4 and Mod 5 and will be submitted to DPIE and other regulatory bodies as required.

h) **Section 9.2** of this WMP provides an historical summary of all amendments to the approved WMP. Copies of all relevant correspondence in relation to the development of this plan are available in Ulan's Compliance Management System CMO.