WATER MANAGEMENT PLAN

Version	Issue Date	Approval Date	Section Revised	Reason for Revision	Review Team
1	Apr 2010		All	Original Water Management Plan	J Thomas, Aquaterra, Worley Parsons
2	June 2013		All	General Review and Update	Environmental Department
3	July 2015	July 2015	All	Document developed in accordance with PA 05_0117 and PA 08_0135	MCO, WRM Water & Environment (SWB & SWMP), Dundon Consulting (GWMP)
4	Feb 2018	March 2018	All	General Review and Update	MCO
5	Feb 20		All	To Incorporate approved modifications to Stage 1 (Mod 14) and Stage 2 (Mod 3)	MCO, WRM Water and Environment (SWB), HydroSimulations (GWMP)

Approved:_____ Date:_____

Title: Moolarben Coal Operations-General Manager

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1.0 INTRODUCTION

The Moolarben Coal Complex is located approximately 40 kilometres (km) north of Mudgee in the Western Coalfield of New South Wales (NSW) (Figure 1).

Moolarben Coal Operations Pty Ltd (MCO) is the operator of the Moolarben Coal Complex on behalf of the Moolarben Joint Venture (Moolarben Coal Mines Pty Ltd [MCM], Sojitz Moolarben Resources Pty Ltd and a consortium of Korean power companies). MCO and MCM are wholly owned subsidiaries of Yancoal Australia Limited (Yancoal).

Mining operations at the Moolarben Coal Complex are currently approved until 31 December 2038 and would continue to be carried out in accordance with NSW Project Approval (05_0117) (Moolarben Coal Project Stage 1) as modified and NSW Project Approval (08_0135) (Moolarben Coal Project Stage 2) as modified.

Mining operations at the Moolarben Coal Complex are undertaken in accordance with the various approvals under the Commonwealth *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act).

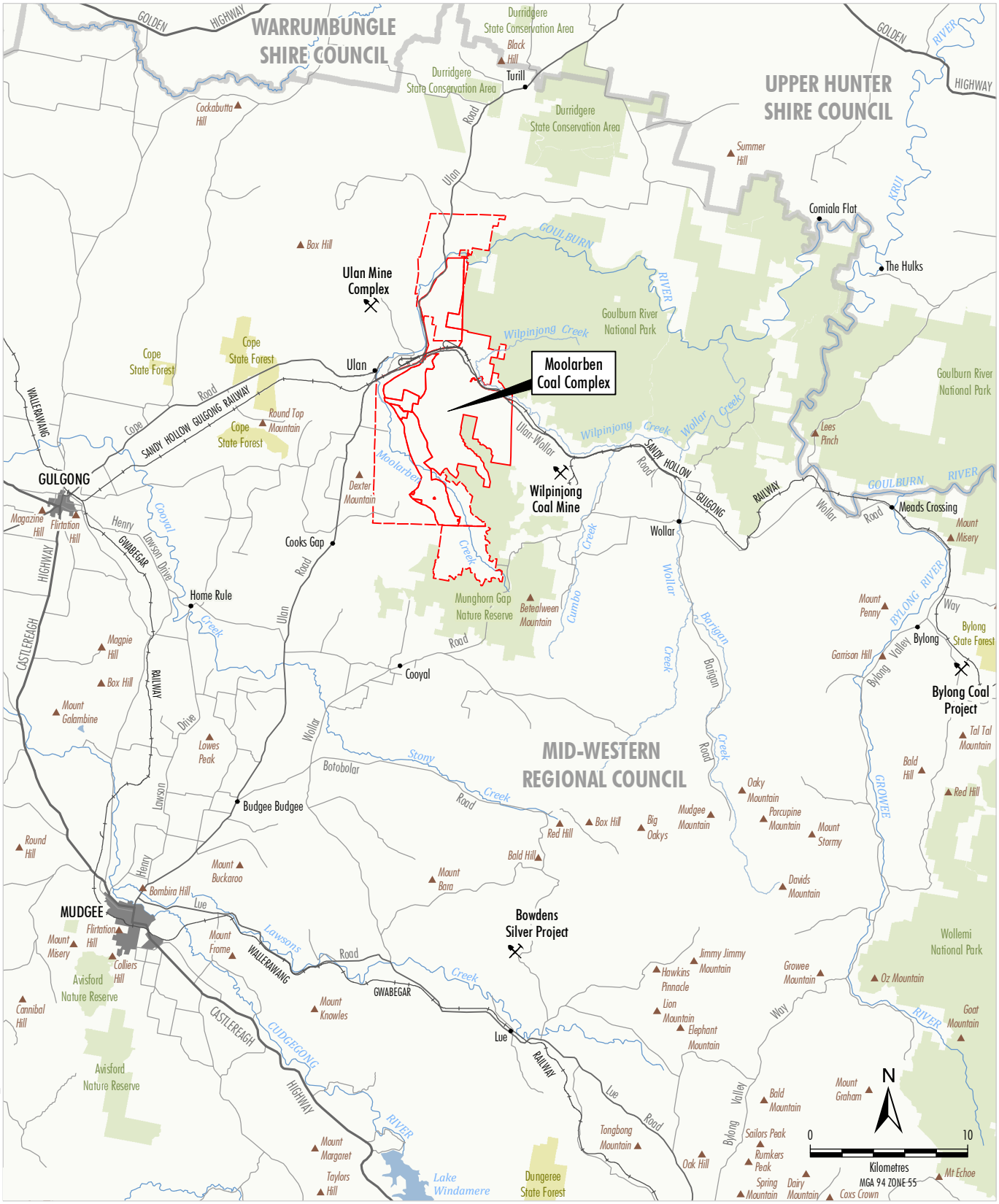
The current mining operations at the Moolarben Coal Complex are conducted in accordance with the requirements of the conditions of Mining Lease (ML) 1605, ML 1606, ML 1628, ML 1691 and ML 1715 granted under the *Mining Act, 1992*.

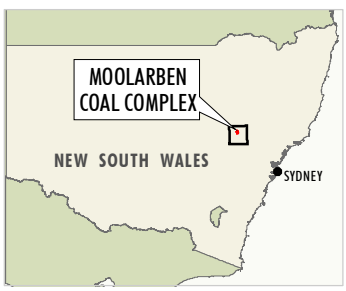
Stage 1 at the Moolarben Coal Complex has been operating for several years and at full development will comprise three open cut mines (OC1, OC2, and OC3), a longwall underground mine (UG4), and mining related infrastructure (including coal processing and transport facilities) (Figure 2).

Stage 2 at the Moolarben Coal Complex has commenced and at full development will comprise one open cut mine (OC4), two longwall underground mines (UG1 and UG2), and mining related infrastructure (Figure 2).

Stages 1 and 2 at the Moolarben Coal Complex operate concurrently in accordance with the limits stipulated in NSW Project Approval (05_0117) and NSW Project Approval (08_0135), and are summarised as follows:

- The total run-of-mine (ROM) coal extracted from the Moolarben Coal Complex (open cut and underground mining) is no more than 24 million tonnes in any calendar year, comprising:
    - No more than 16 million tonnes of ROM coal from the open cut mining operations in any calendar year, considering:
        - No more than 10 million tonnes of ROM coal from Stage 1 open cut mining operations in any calendar year.





LEGEND
- State Forest
- NSW National Parks and Wildlife Service
- Local Government Boundary
- Exploration Licence Boundary
- Mining Lease Boundary
- Mining Operation

Source: NSW Land & Property Information (2017); NSW Department of Industry (2017); Office of Environment and Heritage NSW (2017)

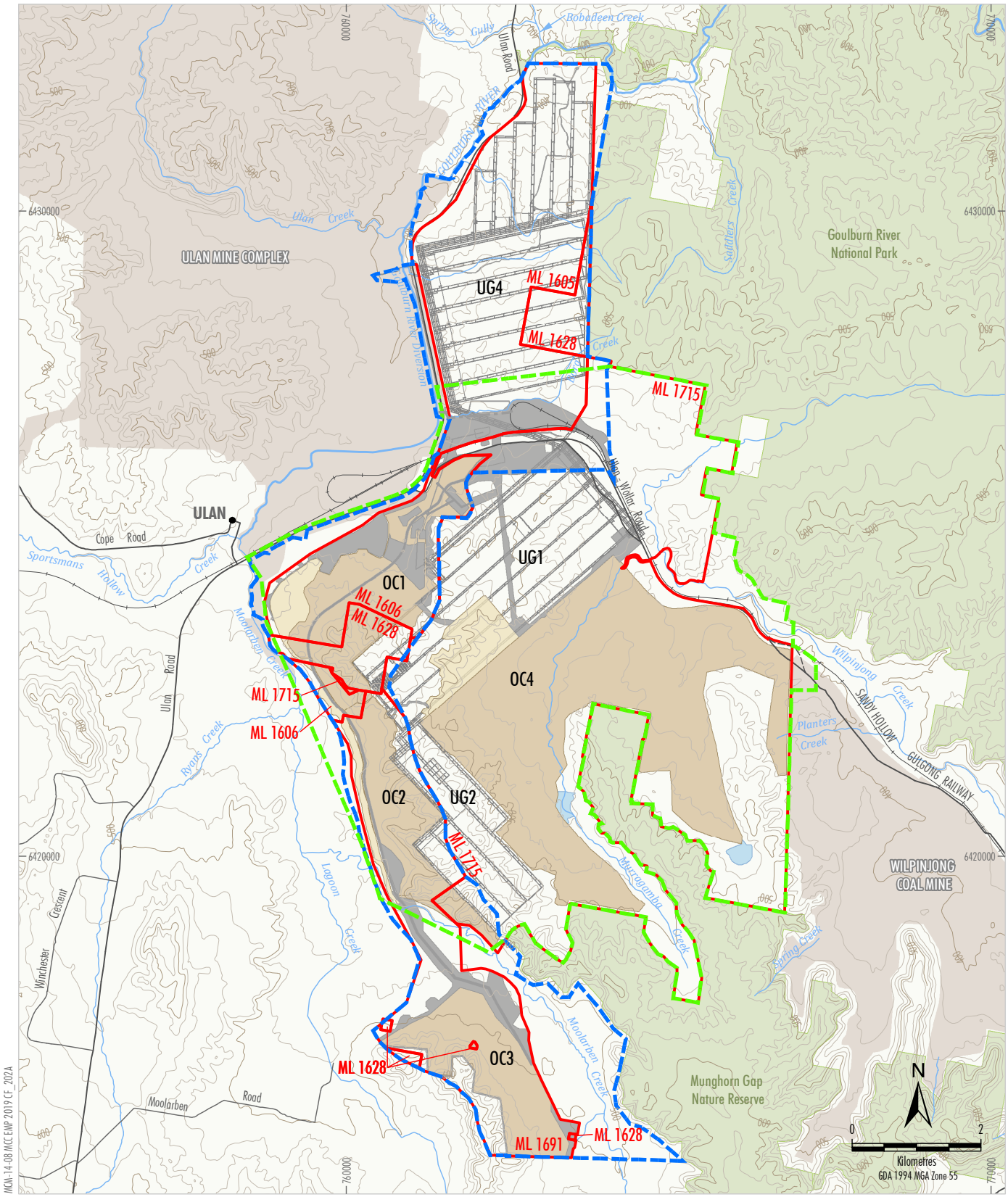
MOOLARBENCOAL

MOOLARBEN COAL COMPLEX

Regional Location

MCM-14-08 MCC EMP 2019 CF_201A

Figure 1



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LEGEND

- NSW National Parks and Wildlife Service
- Other Mining Operations
- Mining Lease Boundary

Existing/Approved Development

- Open Cut Mining Area
- Out-of-pit Emplacement
- Surface Infrastructure Area
- Clean Water Diversion Infrastructure
- Underground Longwall Layout
- Haul Road
- Road Realignment (not yet constructed)
- Approved Stage 1 Project Boundary
- Approved Stage 2 Project Boundary

Source: MCO (June 2017); NSW Dept of Industry (2017); NSW Land & Property Information (2017); Office of Environment and Heritage NSW (2017)

MOOLARBENCOAL

MOOLARBEN COAL COMPLEX

Approved Moolarben Coal Project (Stage 1 and Stage 2) General Arrangement

Figure 2

        - No more than 16 million tonnes of ROM coal from Stage 2 open cut mining operations in any calendar year.
    - No more than 8 million tonnes of ROM coal from the underground mining operations in any calendar year.
- No more than 16 million tonnes of coal from the Moolarben Coal Complex can be processed (washed) in any calendar year.
- No more than 22 million tonnes of coal can be transported from the Moolarben Coal Complex in any calendar year.
- All product coal is transported from the Moolarben Coal Complex by rail with:
    - No more than 8 laden trains leaving the site each day (on average when calculated over any calendar year); and
    - No more than 11 laden trains leaving the site each day.

1.1 Operational status

Open cut and underground mines are in operation with activities focused in Open Cut 1, Open Cut 2, Open Cut 3, Open Cut 4 and Underground 1. The mining will progress to other approved mines in the future.

Construction/development activities are currently focused on works to facilitate open cut mining progression and development and progression of underground mining operations at the Moolarben Coal Complex.

Construction works in support of Open Cut mining progression include mine infrastructure areas, offices, water management works, coal handling, haul roads, diversions, water storages, and other ancillary works.

Construction works in support of Underground mining progression include mine infrastructure areas, materials handling and processing, water management infrastructure and underground mining surface facilities.

1.2 Purpose and Scope

This Water Management Plan (WAMP) has been prepared by MCO to satisfy the requirements under NSW Project Approval (05_0117) (as modified) and the NSW Project Approval (08_0135) (as modified).

This WAMP applies to all employees and contractors at the Moolarben Coal Complex and covers all areas within the Stage 1 and Stage 2 Project Boundaries (as defined in Appendix 2 of NSW Project Approval 05_0117 and NSW Project Approval 08_0135).

This WAMP has been prepared to manage surface water and groundwater related impacts associated with open cut and underground mining, operation of the Coal Handling and Processing Plant (CHPP) and the supply of water to the operations.

1.3 Structure of the WAMP

This WAMP is a component of the overarching Environmental Management Strategy for the Moolarben Coal Complex (Figure 3).

In accordance with Condition 33, Schedule 3 and Condition 29, Schedule 3 of the NSW Project Approvals (05_0117 and 08_0135, respectively), the WAMP includes the following three documents:

- Site Water Balance (SWB) (MCO, 2020a) (Appendix 1).
- Surface Water Management Plan (SWMP) (MCO, 2020b) (Appendix 2).
- Groundwater Management Plan (GWMP) (MCO, 2020c) (Appendix 3).

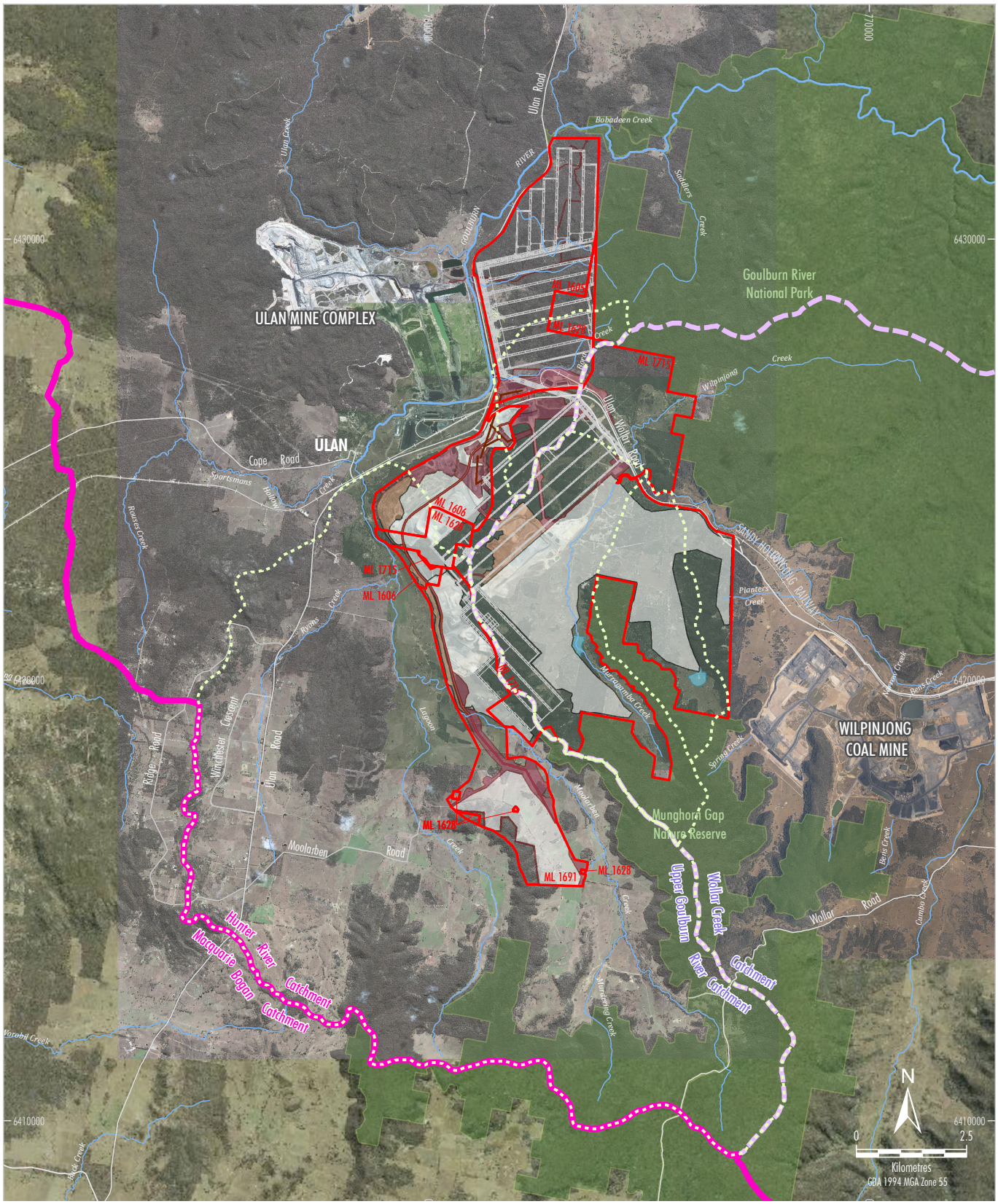
A brief overview of the documents above is provided in Table 1.

Table 1: Overview of WAMP Documents

Document	Description
Site Water Balance	Overview of water management system, water balance modelling methodology, assumptions and results.
Surface Water Management Plan	Surface water baseline data, management measures, performance criteria, monitoring program and response plan.
Groundwater Management Plan	Groundwater baseline data, performance criteria, monitoring program, response plan and groundwater model validation.

The remainder of the WAMP is structured as follows:

Section 2: Outlines the statutory requirements applicable to the WAMP.
Section 3: Outlines water management systems at the Moolarben Coal Complex.
Section 4: Provides details for the review and improvement of environmental performance process.
Section 5: Describes the management and reporting of incidents, complaints and non-compliances.



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LEGEND

- Mining Lease Boundary
- Existing/Approved Development
  - Open Cut Mining Area
  - Out-of-pit Emplacement
  - Surface Infrastructure Area
  - Clean Water Diversion Infrastructure
  - Underground Longwall Layout
  - Haul Road
  - Road Realignment (not yet constructed)
- Local Catchment Boundary
- Catchment Divide (Hunter River and Macquarie-Bogan)
- Sub-catchment Divide (Upper Goulburn River and Wollar Creek)

Source: MCO (2017); NSW Dept of Industry (2016); Office of Environment and Heritage NSW (2016) Orthophoto Mosaic: MCO (April 2016 - May 2014); Department Finance, Services & Innovation (2017)

MOOLARBENCOAL

MOOLARBEN COAL COMPLEX

Regional Drainage Network

Figure 3

1.4 Suitably Qualified Experts

The Secretary of the NSW Department of Planning & Environment (DP&E) (now the NSW Department of Planning, Industry and Environment (DPIE)) approved Dr David Newton (WRM Water & Environment), Mr Peter Dundon (Dundon Consulting) and Dr Noel Merrick as suitably qualified and experienced experts for the preparation of the WAMP.

Relevant sections/appendices of the WAMP have been prepared/reviewed by Dr David Newton (SWB and SWMP), Mr Peter Dundon (GWMP) and Dr Noel Merrick (GWMP).

1.5 Consultation

The WAMP was prepared in consultation with the Department of Primary Industries Water (DPI Water) (now the Department of Planning, Industry and Environment (DPIE) - Natural Resources Access Regulator (NRAR))), the NSW Environment Protection Authority (EPA) and the NSW DPIE. Feedback from these agencies has been incorporated into the WAMP.

As described in Section 1.4, this WAMP has been prepared by suitably qualified persons approved by DP&E.

2.0 STATUTORY AND PROJECT APPROVAL REQUIREMENTS

MCO's statutory obligations are contained in:

- the conditions of the NSW Project Approval (05_0117) (as modified) and NSW Project Approval (08_0135) (as modified);
- the conditions of the Commonwealth Approvals (EPBC 2007/3297, EPBC 2013/6926, EPBC 2017/7974 and EPBC 2008/4444);
- relevant licences and permits, including conditions attached to Environment Protection Licence (EPL) 12932, mining leases and water licences; and
- other relevant legislation.

2.1 EP&A Act Project Approval

Condition 33, Schedule 3 and Condition 29, Schedule 3 of the NSW Project Approvals (05_0117 and 08_0135, respectively) require the preparation of a Water Management Plan. Tables 2 and 3 present these requirements and indicate where they are addressed within this WAMP.

Table 2: Water Management Plan Requirements in NSW Project Approval 05_0117

NSW Project Approval Condition	WAMP Section
Water Management Plan	
33. The Proponent shall 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 DoI Lands and Water, NRAR and the EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary and be revised and submitted to the Secretary for approval by 31 October 2016;	Section 1.5
(a1) include reference to the National Water Quality Management Strategy;	Section 2.4.3
(a2) include detailed performance criteria and describe measures to ensure that the Proponent complies with the Water Management Performance Measures (see Table 11);	Section 2.1.1
(b) in addition to the standard requirements for management plans (see Condition 3 of Schedule 5), this plan must include a:	
(i) Site Water Balance that:	SWB (Appendix 1)
…	
(ii) Surface Water Management Plan, that includes:	SWMP (Appendix 2)
…	
(iii) Groundwater Management Plan, that includes:	GWMP (Appendix 3)
…	
(iv) a protocol that has been prepared in consultation with the owners of the Ulan and Wilpinjong mines to: • *minimise cumulative water quality impacts;* • *review opportunities of increased water sharing between these projects;* • *co-ordinate water quality and flow monitoring programs as far as practicable;* • *undertake joint investigations/studies in relation to complaints/exceedences of trigger levels where cumulative impacts are considered likely; and* • *co-ordinate modelling programs for validation, re-calibration and re-running of groundwater models.*	Section 2.4.4

Table 3: Water Management Plan Requirements in NSW Project Approval 08_0135

NSW Project Approval Condition	WAMP Section
Water Management Plan	
29. The Proponent shall 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 DoI Water, NRAR and the EPA, by suitably qualified and experienced persons whose appointment has been approved by the Secretary;	Section 1.5
(b) be submitted to the Secretary for approval prior to the commencement of any development on site;	
(c) include reference to the National Water Quality Management Strategy;	Section 2.4.3
(d) include detailed performance criteria and describes measure to ensure that the Proponent complies with the Water Management Performance Measures (see Table 10);	Section 2.1.1
(e) in addition to the standard requirements for management plans (see condition 3 of Schedule 6), this plan must include a:	
(i) Site Water Balance that:	SWB (Appendix 1)
…	
(ii) Surface Water Management Plan, that includes:	SWMP (Appendix 2)
…	
(iii) Groundwater Management Plan, that includes:	GWMP (Appendix 3)
…	
(iv) a protocol that has been prepared in consultation with the owners of the Ulan and Wilpinjong mines to:	Section 2.4.4
• *minimise cumulative water quality impacts;*	
• *review opportunities of increased water sharing between these projects;*	
• *co-ordinate water quality monitoring programs as far as practicable;*	
• *undertake joint investigations/studies in relation to complaints/exceedences of trigger levels where cumulative impacts are considered likely; and*	
• *co-ordinate modelling programs for validation, re-calibration and re-running of groundwater models.*	

Condition 3, Schedule 5 of Project Approval (05_0117) and Condition 3, Schedule 6 of Project Approval (08_0135) outline general management plan requirements that are applicable to the preparation of the WAMP. Table 4 presents these requirements and indicates where they are addressed within this WAMP.

Condition 32, Schedule 3 of Project Approval (05_0117) and Condition 28, Schedule 3 of Project Approval (08_0135) outline the water management performance measures applicable to the Moolarben Coal Complex. Attachment A presents these performance measures and indicates where they are addressed within this WAMP.

Table 4: Management Plan Requirements

NSW Project Approval Condition	WAMP Section
3. *The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:*	
(a) detailed baseline data;	SWB, SWMP, GWMP (Appendices 1 to 3)
(b) a description of:	
• *the relevant statutory requirements (including any relevant approval, licence or lease conditions);*	Section 2
• *any relevant limits or performance measures/criteria;*	SWB, SWMP, GWMP (Appendices 1 to 3)
• *the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;*	SWB, SWMP, GWMP (Appendices 1 to 3)
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	SWB, SWMP, GWMP (Appendices 1 to 3)
(d) a program to monitor and report on the:	SWB, SWMP, GWMP (Appendices 1 to 3)
• *impacts and environmental performance of the project;*	
• *effectiveness of any management measures (see c above);*	
(e) a contingency plan to manage any unpredicted impacts and their consequences;	SWB, SWMP, GWMP (Appendices 1 to 3)
(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	SWB, SWMP, GWMP (Appendices 1 to 3)
(g) a protocol for managing and reporting any:	SWB, SWMP, GWMP (Appendices 1 to 3)
• *incidents;*	
• *complaints;*	
• *non-compliances with statutory requirements; and*	
• *exceedances of the impact assessment criteria and/or performance criteria; and*	
(h) a protocol for periodic review of the plan.	Section 4

2.1.1 Water Management Performance Measures

Condition 32, Schedule 3 and Condition 28, Schedule 3 of the NSW Project Approvals (05_0117 and 08_0135, respectively) provide specific water management performance measures for the following features:

- general water management;
- the Drip;
- construction and operation of linear infrastructure;

- sediment dams;
- clean water diversion and storage infrastructure;
- mine water storages;
- tailings, acid forming and potentially acid forming materials;
- in-pit emplacement of tailings, acid forming and potentially acid forming materials;
- chemical and hydrocarbon storage;
- Murragamba and Eastern Creek Realignments;
- aquatic and riparian ecosystems;
- treated water discharge volume;
- treated water discharge quality; and
- storages constructed for the water treatment facility.

These specific water management performance measures and how they have been addressed by MCO are summarised in Attachment A.

2.2 EPBC Act Approval

Commonwealth approvals relevant to the Moolarben Coal Complex include EPBC 2007/3297, EPBC 2013/6926, EPBC 2008/4444 and 2017/7974. EPBC 2007/3297 and EPBC 2013/6926 do not have any specific water related conditions.

Relevant conditions for 2008/4444 have been included in this WAMP and any relevant conditions of 2017/7974 will be included in future revisions of this plan.

2.3 Licences, Approvals and Leases

In addition to the NSW Project Approvals (05_0117 and 08_0135) and Commonwealth Approvals (2007/3297, 2013/6936, 2017/7974 and 2008/4444), all activities at the Moolarben Coal Complex will be conducted in accordance with various other licences, permits and leases which have been issued or are pending issue.

Key licences, permits and leases pertaining to water at the Moolarben Coal Complex include:

- EPL 12932 issued under Part 3 of the NSW *Protection of the Environment Operations Act, 1997* by the EPA in August 2008 (as amended with project progression).
- Groundwater Monitoring Licences issued under the *Water Act, 1912* (refer Table 5).
- Water Access Licences issued under the *Water Management Act, 2000* (refer Table 5).
- Mining Operations Plan approved by the Division of Resources and Geoscience (as amended with project progression).

MCO will obtain and hold volumetric licenses to account for maximum predicted groundwater inflows and surface water take associated with the development and operation of the Moolarben Coal Complex in accordance with the legislative requirements of the *Water Management Act, 2000* and the *Water Act, 1912* (Section 2.4.1). Relevant volumetric licences would remain to be held by MCO (or retired) to account for predicted post-mining Moolarben Coal Complex water take.

Table 5: Relevant Water Licences Held by MCO

Licence Number	Description
WAL36340, WAL37583 and WAL19424	Wollar Creek Water Source – Hunter Unregulated and Alluvial Water Sources
WAL37582 and WAL41888	Upper Goulburn River Water Source – Hunter Unregulated and Alluvial Water Sources
WAL39799	Sydney Basin - North Coast Fractured and Porous Rock Groundwater Source
20BL173935	Monitoring and Test Bores

2.4 Other Legislation and Requirements

2.4.1 Water Management Act, 2000 and Water Act, 1912

The *Water Management Act, 2000* incorporates the provisions of various prior Acts relating to the management of surface and groundwater in NSW. It provides a single statute for regulation of water access, use and works (e.g. pumps or bores) that affect the licensing of surface water and alluvial and non-alluvial groundwater in the vicinity of the Moolarben Coal Mine Complex.

The *Water Act, 1912* incorporates provisions that relate to groundwater monitoring and test bores.

2.4.2 National Water Quality Management Strategy

The National Water Quality Management Strategy is a joint national approach to improving water quality in Australian and New Zealand waterways.

The process for water quality management is based on national guidelines that are implemented at State, Regional and Local levels. The national water quality guidelines are the basis for development of the State and Local water management plans and objectives.

The Australian and New Zealand Environment and Conservation Council water quality guidelines have been considered where applicable in both the SWMP (Appendix 2) and the GWMP (Appendix 3) for the Moolarben Coal Complex.

2.4.3 Regional Water Supply and Monitoring Investigation

In accordance with the conditions of the original Stage 1 Project Approval (05_0117), MCO engaged a qualified and independent expert to undertake a Regional Water Supply and Monitoring Investigation in consultation with the EPA, NSW Office of Water (NOW) (now DPIE - Water), the Department of Trade and Investment, Regional Infrastructure and Services, Ulan Coal Mines Pty Ltd (UCML) and Wilpinjong Coal Pty Ltd (WCPL). The Regional Water Study was submitted to the Department of Planning and Infrastructure (now DPIE) in November 2009.

The study considered:

- the feasibility and potential environmental benefits of increased water sharing between the three mining operations in the region;
- the potential for developing regional surface and groundwater monitoring programs to:
  - rationalise the surface and groundwater monitoring programs of the three mining operations in the region; and
  - improve the monitoring of the individual and cumulative surface and groundwater impacts of these mining operations.
- measures to reduce the surface and groundwater impacts of mining in the region; and
- any potential changes to existing licences and/or approvals that could facilitate the implementation of these measures.

Based on the results of this study and consultation with relevant government agencies, the following actions have been implemented:

- Review of the monitoring network and rationalisation of monitoring points identified several areas where monitoring could be reduced and/or data shared between three mines, without compromising the regional management of the groundwater and surface water resources. The recommended regional monitoring network is consistent with the three individual mines' surface water and groundwater monitoring plans. UCML, MCO and WCPL participate in ongoing sharing of monitoring data where appropriate.
- Water sharing between UCML and MCO is undertaken. Details on the water sharing agreement between UCML and MCO is described in the SWB (Appendix 1).
- Ongoing discussion and consultation between UCML, MCO and WCPL in order to integrate monitoring rationalisation, and that any changes in water inflows and/or water demand are factored into developing optimal water sharing arrangements throughout the life of all three mines.
- Contemporary groundwater modelling undertaken for the Moolarben Coal Complex has considered cumulative impacts associated with the Ulan Mine Complex and Wilpinjong Coal Mine.

2.4.4 Hunter-Central Rivers Catchment Action Plan 2013-2023

The Hunter-Central Rivers Catchment Action Plan 2013-2023 has been developed by the Hunter-Central Rivers Catchment Management Authority (2013) to set strategic goals, targets and outcomes for maintaining and improving the health and productivity of the Hunter-Central Rivers Catchment. The 2013-2023 plan is a further development on the goals and targets of the previous (and first) catchment action plan. The plan provides direction for actions at all levels of government, industry and community to maintain or improve the long-term viability of healthy and productive natural systems within the catchment region.

The goals, targets and outcomes of the Hunter-Central Rivers Catchment Action Plan 2013-2023 have been considered where relevant in the preparation of this WAMP.

3.0 WATER MANAGEMENT OVERVIEW

3.1 Water Management System and Site Water Balance

Water demands at the Moolarben Coal Complex include:

- water used in the CHPP, including water retained in coal products and rejects and water for dust suppression (including stockpiles);
- haul road dust suppression;
- underground water use; and
- miscellaneous water usage such as potable water, vehicle wash down, irrigation, evaporation and mining infrastructure area water usage.

These water demands are met through a combination of the following water sources:

- runoff captured from the footprint of the mining disturbance area by the water management system;
- groundwater pit inflows (including underground mines);
- recycled water from the coal processing water circuit;
- water imported from the Ulan Mine Complex under agreement with UCML; and
- water supply from groundwater borefields/advanced dewatering.

The Water Management System also includes water disposal including effluent irrigation and licensed discharges.

A detailed description of the Moolarben Coal Complex water management system and an overview of the supporting site water balance modelling is provided in the SWB (Appendix 1).

3.2 Surface Water Overview

The Moolarben Coal Complex is located in the Upper Goulburn River and Wollar Creek catchments (both sub-catchments to the larger Goulburn River and Hunter River catchments), which have catchment areas of approximately 2,455 square kilometres (km^2) and 532 km^2, respectively. Both catchments drain to the Goulburn River which flows in an easterly direction, eventually joining the Hunter River approximately 150 km downstream of the Moolarben Coal Complex.

Moolarben Creek is a tributary of the Upper Goulburn River sub-catchment and flows along the western boundary of the Moolarben Coal Complex.

Wilpinjong Creek is a tributary of Wollar Creek sub-catchment and flows along the east and north-east of the Moolarben Coal Complex into Wollar Creek, before joining the Goulburn River approximately 26 km downstream of the Moolarben Coal Complex.

A detailed description of surface water management and monitoring at the Moolarben Coal Complex is provided in the SWMP (Appendix 2).

3.3 Groundwater Overview

The Moolarben Coal Complex is located in the Western Coalfields on the north-western edge of the Sydney-Gunnedah Basin, which contains sedimentary rocks of Triassic and Permian age (including coal measures). The dominant outcropping lithologies over the Moolarben Coal Complex are the Triassic Narrabeen Group (Wollar Sandstone) and the Permian Illawarra Coal Measures. The siltstones and sandstones of the Triassic Narrabeen Group form elevated, mesa-like plateaus associated with the Goulburn River National Park and the Munghorn Gap Nature Reserve.

A detailed description of groundwater management and monitoring at the Moolarben Coal Complex is provided in the GWMP (Appendix 3).

3.4 Roles and Responsibilities

Overall responsibilities for implementing the suite of environmental management plans across the Moolarben Coal Complex are described in Appendix E the Environmental Management Strategy (EMS). The roles and responsibilities of site employees and contractors relating to water management are summarised in Table 6.

Table 6: Roles and Responsibilities

Role	Responsibility
General Manager	Provide adequate resources to implement the requirements of the suite of Water Management Plans.
Environment and Community Manager	Preparation, implementation and maintenance of the WAMP.
	Communication of the WAMP to relevant personnel and contractors
	Conduct regulatory and stakeholder reporting, notifications and consultations in accordance with the WAMP, including non-compliances or exceedances.
	Manage the response to all water related complaints and incidents.
	Oversee investigations and response protocol implementation.
	Oversee discharges in accordance with EPL conditions.
	Coordinate review of the groundwater model and monitoring network.
Environment and Community Superintendent	Communication of the WAMP to relevant personnel and contractors
	Provide water management advice in accordance with the WAMP.
	Coordinate investigations and response protocol implementation.
	Approve area specific erosion and sediment control plans through the process.
	Oversee monitoring as outlined in the WAMP (surface, groundwater, stream health, channel stability, dams, water transfer, discharge etc.).
	Oversee the installation, maintenance and calibration of monitoring equipment (e.g. water quality and flow meters).

Role	Responsibility
Environment and Community Coordinator	Provide water management advice in accordance with the WAMP.
	Coordinate the installation, maintenance and calibration of monitoring equipment (e.g. water quality and flow meters).
	Coordinate monitoring as outlined in the WAMP (surface, groundwater, stream health, channel stability, dams, water transfer, etc.).
	Review water monitoring data against trigger levels.
	Coordinate groundwater and surface water response protocols.
	Prepare data and reviews for internal/external reporting, including annual review.
	Conduct inspections of erosion and sediment controls and water infrastructure.
	Conduct 6 monthly potential acid mine drainage monitoring.
Technical Services Managers	Implementation of, and compliance with, the WAMP in mine designs, including budgeting and resources.
	Include water management in life of mine planning and mine designs.
	Design water management structures in accordance with WAMP requirements.
	Coordinate inspections and maintenance of Mine Water storages.
	Coordinate monitoring of dam water levels.
Open Cut Operations Manager	Implementation of, and compliance with, the WAMP in the Open-Cut operations, including budgeting and resources.
	Communicate Water Management Plan requirements to relevant personnel and contractors.
	Operate, maintain and calibrate (where relevant) water infrastructure in the Open-cut areas in accordance with the WAMP (pumps, pipes, dams, meters, transfers, etc.).
	Dispose rejects in accordance with the WAMP.
	Coordinate weekly water structure inspections and monitoring in open-cut areas.
CHPP Manager	Implementation of, and compliance with, the WAMP in the CHPP, including budgeting and resources.
	Communicate Water Management Plan to relevant personnel and contractors.
	Coordinate and oversee supply of water from the Ulan Mine Complex.
	Coordinate inspections and monitoring of water structures in the CHPP area.
	Operate, maintain and calibrate (where relevant) water structures in the CHPP area in accordance with the WAMP (water treatment, pumps, pipes, dams, meters, transfers, etc.).
	Perform monthly inspection of pipeline from the Ulan Mine Complex to the Moolarben Coal Complex CHPP.

Role	Responsibility
Maintenance Manager	Implementation of, and compliance with the WAMP in maintenance operations, including budgeting and resources.
	Operate and maintain washbays, chemical and fuel storages in accordance with the WAMP.
Underground Operations Manager	Implementation of, and compliance with the WAMP in the underground operations, including budgeting and resources.
	Coordinate and oversee supply of water from the dewatering/production borefield.
	Operate, maintain and calibrate (where relevant) water structures in the underground area in accordance with the WAMP (pumps, pipes, dams, meters, transfers, etc.).
	Monitoring groundwater usage and dewatering from underground operations.
Project Managers	Implementation of, and compliance with the WAMP in project areas, including budgeting and resources.
	Development, implementation and maintenance of project erosion and sediment control plans.
	Communicate the WAMP requirements to relevant personnel/ contractors.
	Design and construct water management structures in accordance with the WAMP.
	Operate and maintain water structures in project areas in accordance with the WAMP (e.g. pumps, pipes, dams, meters, transfers, etc.).
	Perform regular inspections and maintenance of erosion and sediment controls.
All Employees & Contractors	Report incidents and defective water management systems or water wastage (e.g. leaking pipes).

4.0 REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

4.1 Annual Review

In accordance with Condition 4, Schedule 5 and Condition 4, Schedule 6 of the Project Approvals (05_0117 and 08_0135, respectively) MCO conducts an annual review of MCO operations prior to 31 March each year.

These annual reviews specifically address the following aspects of Condition 4, which directly relate to water management:

- include a comprehensive review of the monitoring results and complaints records of MCO operations over the previous calendar year, which includes a comparison of these results against the:
  - relevant statutory requirements, limits or performance measures/criteria;
  - monitoring results of previous years; and
  - relevant predictions in the Environmental Approval (EA);
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the monitoring data over the life of the project;
- identify any discrepancies between the predicted and actual impacts of MCO operations, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the project.

The annual review will also include relevant monitoring data, analysis of trends in consideration of natural fluctuations and possible mining induced changes and the volume of water extracted from groundwater production bores.

The annual reviews are made publicly available on the Moolarben Coal website in accordance with Condition 11, Schedule 5 and Condition 11, Schedule 6 of the Project Approvals (05_0117 and 08_0135, respectively).

4.2 Plan Revision

In accordance with Condition 5, Schedule 5 and Condition 5, Schedule 6 of the Project Approvals (05_0117 and 08_0135, respectively) the WAMP (including SWB, SWMP and GWMP) will be reviewed, and if necessary revised to the satisfaction of the Secretary, within 3 months of the submission of:

(a) an Annual Review in accordance with Condition 5, Schedule 5 and Condition 5, Schedule 6 of the Project Approvals (05_0117 and 08_0135, respectively);

(b) an incident report in accordance with Condition 7, Schedule 5 and Condition 7, Schedule 6 of the Project Approvals (05_0117 and 08_0135, respectively);

(c) an audit in accordance with Condition 9, Schedule 5 and Condition 9, Schedule 6 of the Project Approvals (05_0117 and 08_0135, respectively);

(d) any modification to the conditions of the Project Approvals.

The WAMP will be made publicly available on the Moolarben Coal website, in accordance with Condition 11, Schedule 5 and Condition 11, Schedule 6 of the Project Approvals (05_0117 and 08_0135, respectively).

In addition to, or in conjunction with, the above review requirements the SWMP will be revised (as required) on an ongoing basis throughout the life of the Moolarben Coal Complex in consideration of:

- changes to legislation, regulation and guidance;
- changes to mine planning, supplies or discharge (that has a material effect on water management);
- adaptive management and continual improvement; or
- relevant agency feedback.

5.0 REPORTING SYSTEMS

In accordance with Condition 3, Schedule 5 and Condition 3, Schedule 6 of the NSW Project Approvals (0117 and 08_0135, respectively), MCO has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- impact assessment criteria and/or performance criteria that result in a non-compliance as a result of the Moolarben Coal Complex.

These protocols are summarised below and are described in detail in the Environmental Management Strategy.

5.1 Incidents

An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment and/or breaches or exceeds the limits or performance measures/criteria in the NSW Project Approvals.

In the event that an incident associated with the Moolarben Coal Complex occurs, which causes or threatens to cause material harm to the environment, the incident will be managed in accordance with relevant regulatory approvals and statutory obligations.

The reporting of incidents will be conducted in accordance with Condition 7, Schedule 5 and Condition 7, Schedule 6 of the NSW Project Approvals (05_0117 and 08_0135, respectively). MCO will notify the Secretary of the DP&E, and any other relevant agencies immediately after MCO becomes aware of the incident which causes or threatens to cause material environmental harm. For any other incident associated with the project, MCO will notify the Secretary and any other relevant agencies as soon as practicable after becoming aware of the incident.

In the event of a pollution incident, a notification will also be conducted as per the processes outlined in the Pollution Incident Response Management Plan (prepared as part of MCO's holding EPL 12932), in accordance with the protocol for industry notification of pollution incidents under Part 5.7 of the *Protection of the Environment Operations Act, 1997*.

Within seven days of the date of the incident, MCO will provide the Secretary of the DP&E and any relevant agencies with a detailed report on the incident. The report will:

- describe the date, time and nature of the incident;
- identify the cause (or likely cause) of the incident;
- describe what action has been taken to date; and
- describe the proposed measures to address the incident.

5.2 Complaints

MCO maintains a Community Response (Complaints) Line (Phone Number 1800 556 484) that is dedicated to the receipt of community complaints. The Community Response Line is publicly advertised and operates 24 hours per day, seven days a week, to receive any complaints from neighbouring residents or other stakeholders. The Community Response Line is advertised in the local media and is also available on the Moolarben Coal Website and in the community newsletters.

MCO has developed a Community Complaints Procedure which details the process to be followed when receiving, responding to and recording community complaints. The Community Complaints Procedure is supported by a Complaints Database.

Investigations will commence within 24 hours of the receipt of a complaint to determine the likely cause of the complaint (i.e. meteorological conditions and nature of mining activities). This investigation will be used to develop appropriate mitigation measures which will be presented to the complainant. Further information on complaints management can be found in the EMS.

5.3 Non-Compliances

MCO will notify the Secretary of the DPIE, and any other relevant agencies of any water related non-compliance associated with the Moolarben Coal Complex immediately after MCO becomes aware of the incident. Within seven days of the date of the incident, MCO will provide the Secretary of the DPIE and any relevant agencies with a detailed report on the incident.

In addition, within two weeks of obtaining monitoring results showing an exceedance of the criteria detailed in the NSW Project Approvals (05_0117 and 08_0135) and completion of the protocol for determining an exceedance is a non-compliance (as outlined in each management plan), MCO shall, in accordance with Condition 3, Schedule 4 and Condition 3, Schedule 5 of the NSW Project Approvals (05_0117 and 08_0135, respectively) notify affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the Moolarben Coal Complex is again complying with the relevant criteria.

A review of MCO's compliance with all conditions in the NSW Project Approvals, mining leases and all other approvals and licences will be undertaken prior to (and included within) each Annual Review. The Annual Review will be made publicly available on the Moolarben Coal Website in accordance with Condition 11, Schedule 5 and Condition 11, Schedule 6 of the NSW Project Approvals (05_0117 and 08_0135, respectively).

5.4 Exceedance of Performance Criteria

Details regarding the response protocol, including reporting procedures, for the exceedance of performance criteria (e.g. as determined by investigations following exceedance of investigation trigger levels or ranges) is described in Section 8 of the SWMP and Section 8 of the GWMP.

5.5 Supply of Groundwater Data

In accordance with Condition 6 of EPBC 2008/4444, upon request, MCO will provide groundwater monitoring data to the (Commonwealth) Department of the Environment and Energy, NSW government agencies and the operators of Ulan and/or Wilpinjong mines (or other adjacent mining operations). The following protocol for provision of groundwater monitoring data will apply:

- A request for the provision of data is to be made in writing to MCO's Environment and Community Manager, including details of the specific data requested and proposed use of the data.
- MCO's Environment and Community Manager will review the request for compliance with Condition 6 of EPBC 2008/4444.
- Data to be provided may be in the form of Annual Review documentation or other format as agreed by MCO's Environment and Community Manager.

(Note, the above data provision protocol will not affect the existing data sharing agreement MCO has with UCML or WCPL).

6.0 REFERENCES

Australian and New Zealand Environment Conservation Council (2000), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council/Agriculture and Resource Management Council of Australia and New Zealand.

EMM (2013), Moolarben Coal Project Stage 1 Optimisation Modification Environmental Assessment, May 2013.

Hansen Bailey, HB (2012), *Moolarben Coal Project Stage 2 – Preferred Project Report*, January 2012.

Landcom (2004*), Managing Urban Stormwater – Soils and Construction – Fourth Edition*, March 2004, NSW Government.

Moolarben Coal Operations Pty Ltd (2020a) *Site Water Balance.*

Moolarben Coal Operations Pty Ltd (2020b) *Surface Water Management Plan.*

Moolarben Coal Operations Pty Ltd (2020c) *Groundwater Management Plan.*

NOW (2009), Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009.

NSW (2004). *Approved Methods for the Sampling and Analysis of Water Pollutant in NSW*. Department of Environment and Conservation and Environmental Protection Agency. ISBN 1-74137-051-5. Document reference DEC 2004/35. March 2004.

NSW Department of Environment and Climate Change, DECC (2008), *Managing Urban Stormwater – Soils and Construction – Volume 2E Mines and Quarries*, June 2008.

Attachment A - Relevant Water Management Performance Measures
Project Approvals (05_0117 and 08_0135)

Table A-1: Stage 1 Project Approval (05_0117) Water Management Performance Measures

NSW Project Approval Condition		Relevant Reference
Water Management – General	• Minimise cumulative water impacts with the other mines in the region	Section 2.4.4
	• Maximise water sharing with the other mines in the region	Section 2.4.4
	• Minimise the use of clean water on site	SWB (Appendix 1)
The Drip	• Nil	GWMP (Appendix 3)
Construction and operation of linear infrastructure	• Design, install and maintain erosion and sediment controls generally in accordance with the series Managing Urban Stormwater: Soils and Construction including Volume 1, Volume 2A -Installation of Services and Volume 2C – Unsealed Roads	SWMP (Appendix 2)
	• Design, install and maintain the infrastructure within 40 m of watercourses generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (DPI 2007), or its latest version	SWMP (Appendix 2)
	• Design, installation and maintenance of creek crossings generally in accordance with the *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW Fisheries, 2003) and *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings* (NSW Fisheries 2003), or their latest versions	SWMP (Appendix 2)
Mine Sediment Dams	• Design, install and maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction - Volume 1 and Volume 2E Mines and Quarries*	SWMP (Appendix 2)
Clean water diversion & storage infrastructure	• Use best endeavours to upgrade the existing clean water systems to capture and convey the 100 year ARI flood	SWMP (Appendix 2)
	• Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site	SWMP (Appendix 2)
Mine water storages	• Mine water storage infrastructure Is designed to store a 50 year ARI 72 hour storm event	SWMP (Appendix 2)
	• On-site storages (including failings dams, mine infrastructure dams, groundwater storage and treatment dams) are suitably lined to comply with a permeability standard of $< 1 \times 10^{-9}$ m/s	SWMP (Appendix 2)
Tailings, acid forming and potentially acid forming materials	• In-pit emplacement, encapsulation or capping to prevent the migration of pollutants beyond the pit shell	SWMP (Appendix 2)
In-pit emplacement of tailings, acid forming and potentially acid forming materials	• Emplacement, encapsulation and capping to prevent or minimise the migration of pollutants beyond the pit shell of seepage from out of pit emplacement areas	SWMP (Appendix 2)
	• Adequate freeboard within the pit void to minimise the risk of discharge to surface waters	SWMP (Appendix 2)

Table A-1: Stage 1 Project Approval (05_0117) Water Management Performance Measures (continued)

NSW Project Approval Condition		Relevant Reference
Chemical and hydrocarbon storage	• Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standard	SWMP (Appendix 2)
Aquatic and riparian ecosystem, including the relevant sections of Moolarben Creek, Bora Creek and Goulburn River	• Maintain or improve baseline channel stability • Develop site-specific in-stream water quality objectives in accordance with ANZECC 2000 and Using the ANZECC Guidelines and Water Quality Objectives in NSW procedures (DECC 2006), or its latest version	SWMP (Appendix 2) SWMP (Appendix 2)
Treated Water Discharge Volume	• Up to 10 ML/day for the following periods (unless the Secretary agrees otherwise): ○ until the commencement of mining operations in UG4; and ○ following completion of mining operations in UG4 • Up to 15 ML/day during mining operations in UG4 • Greater than 15 ML/day during prolonged wet periods, with the approval of EPA.	SWMP (Appendix 2)
Treated Water Discharge Quality	• Electrical conductivity limit of 685 µS/cm (100th percentile discharge limit) for up to 10ML/day until 30 June 2022 (unless the Secretary agrees otherwise) • After 30 June 2022 (unless the Secretary agrees otherwise) an alternative electrical conductivity limit for treated water discharges as determined under condition 32A	SWMP (Appendix 2)
Storages constructed for the Water Treatment Facility	• Brine and feedwater storages designed to store a 100 year ARI 72 hour storm event • Brine storages are suitably lined to comply with a permeability standard of < 1 x 10^{-9} m/s over 1000mm or equivalent standard	SWMP (Appendix 2)

Table A-2: Stage 2 Project Approval (08_0135) Water Management Performance Measures

NSW Project Approval Condition		Relevant Reference
Water Management – General	• Minimise cumulative water impacts with the other mines in the region	Section 2.4.4
	• Maximise water sharing with the other mines In the region	Section 2.4.4
	• Minimise the use of clean water on site	SWB (Appendix 1)
The Drip	• Nil impact on the water supply to the Drip	GWMP (Appendix 3)
Construction and operation of linear infrastructure	• Design, install and maintain erosion and sediment controls generally in accordance with the series *Managing Urban Stormwater: Soils and Construction including Volume 1, Volume 2A -Installation of Services* and Volume 2C – *Unsealed Roads*	SWMP (Appendix 2)
	• Design, install and maintain the infrastructure within 40 m of watercourses generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (DPI 2007), or its latest version	SWMP (Appendix 2)
	• Design, installation and maintain creek crossings generally in accordance with the *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW Fisheries, 2003) and *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings* (NSW Fisheries 2003), or their latest versions	SWMP (Appendix 2)
Mine Sediment Dams	• Design, install and maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction - Volume 1 and Volume 2E Mines and Quarries*	SWMP (Appendix 2)
Clean water diversion & storage infrastructure	• Design, install and maintain the clean water system to capture and convey the 100 year ARI flood	SWMP (Appendix 2)
	• Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site	SWMP (Appendix 2)
Mine water storages	• Mine water storage infrastructure Is designed to store a 100 year ARI 72 hour storm event	SWMP (Appendix 2)
	• On-site storages (including failings dams, mine infrastructure dams, groundwater storage and treatment dams) are suitably lined to comply with a permeability standard of $< 1 \times 10^{-9}$ m/s	SWMP (Appendix 2)
Tailings, acid forming and potentially acid forming materials	• In-pit emplacement, encapsulation or capping to prevent the migration of pollutants beyond the pit shell	SWMP (Appendix 2)
	• Adequate freeboard within the pit void to minimise the risk of discharge to surface waters	SWMP (Appendix 2)
Chemical and hydrocarbon storage	• Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards	SWMP (Appendix 2)

Table A-2: Stage 2 Project Approval (08_0135) Water Management Performance Measures (continued)

NSW Project Approval Condition		Relevant Reference
Murragamba and Eastern Creek realignments	• Increase the overall length of the creek diversions and reduce the overall average bed slope compared to the existing creek alignments	SWMP (Appendix 2)
	• Mimic the existing meandering plan form of the low flow channel	SWMP (Appendix 2)
	• Include creek corridors which are designed to contain flood flows up to the 1 in 100 year ARI	SWMP (Appendix 2)
	• Include low flow channels which are designed to contain a rainfall event of a 1 in 1 year ARI	SWMP (Appendix 2)
	• Include riffle/drop structures that are designed for a 1 in 20 year ARI peak flow	SWMP (Appendix 2)
	• Incorporate erosion control measures based on vegetation and engineering revetments	SWMP (Appendix 2)
	• Incorporate persistent/permanent pools for aquatic habitat	SWMP (Appendix 2)
	• Incorporate seepage control/flow loss measures through sections of the creek lines to be constructed over mine waste backfill	SWMP (Appendix 2)
	• Revegetate with suitable native riparian vegetation species to restore aquatic biodiversity throughout the realignments	SWMP (Appendix 2)
Aquatic and riparian ecosystem. Including the relevant sections of Murragamba Creek, Eastern Creek and Wilpinjong Creek	• Maintain or Improve baseline channel stability	SWMP (Appendix 2)
	• Develop site-specific in-stream water quality objectives in accordance with ANZECC 2000 and Using the *ANZECC Guidelines and Water Quality Objectives In NSW procedures* (DECC 2006), or its latest version	SWMP (Appendix 2)

Appendix 1 – Site Water Balance

Appendix 2 – Surface Water Management Plan

Appendix 3 – Groundwater Management Plan