



Moolarben Coal Complex  
UG1 Optimisation Modification

Environmental Assessment

APPENDIX F

SURFACE WATER  
ASSESSMENT REVIEW





# Moolarben Coal Complex

## UG1 Optimisation Modification

### Surface Water Assessment Review

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Moolarben Coal Operations Pty Ltd  
0926-07-B8, 5 May 2015

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<b>Report Title</b>	Moolarben Coal Complex - UG1 Optimisation Modification - Surface Water Assessment Review
<b>Client</b>	Moolarben Coal Operations Pty Ltd
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For and on behalf of WRM Water & Environment Pty Ltd  
Level 9, 135 Wickham Tce, Spring Hill  
PO Box 10703 Brisbane Adelaide St Qld 4000  
Tel 07 3225 0200



Matthew Briody  
Senior Water Engineer

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# 1 Introduction

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## 1.1 BACKGROUND

The Moolarben Coal Complex is an approved open cut and underground coal mine in the Western Coalfields of NSW, approximately 40 kilometres north of Mudgee. WRM Water & Environment Pty Ltd (WRM) was engaged by Moolarben Coal Operations Pty Limited (MCO) to undertake a surface water impact assessment for the Moolarben Coal Complex UG1 Optimisation Modification (hereafter referred to as the 'proposed Modification'). Refer to Figure 1.1 for a locality plan.

This surface water assessment review forms part of an Environmental Assessment which has been prepared by MCO to support an application to modify Project Approval (05\_0117) and Project Approval (08\_0135) for the Modification.

## 1.2 OVERVIEW OF PROPOSED MODIFICATION

UG1 is included in the Stage 2 Preferred Project Report which was approved by the NSW government on 30 January 2015.

The elements of the proposed Modification comprise:

- recovery of approximately 3.7 million tonnes of additional run-of-mine (ROM) coal over the life of the mine;
- an extension of UG1 longwall panels in the north east by approximately 150 to 500 metres (m);
- an extension of two UG1 longwall panels in the south-west by approximately 75 m;
- relocation of the approved UG1 central main headings to the north-east;
- relocation of underground access to UG2 and UG4;
- longwall extraction of the portion of coal that forms the approved (central) main headings;
- an increase in the coal seam extraction height by approximately 300 millimetres (mm) to a maximum extraction thickness of 3.5 m;
- an increase to longwall panel void width from approximately 305 to 311 m;
- construction of a ROM coal conveyor and associated transfer points between the UG1 pit top facilities in OC1 and the coal handling and preparation plant (CHPP) to transport underground ROM coal;
- extension to the underground product coal stockpile in the CHPP area and relocation and expansion of the underground ROM coal stockpile at the UG1 pit top facilities;
- an increase in the maximum underground ROM coal production rate up to 8 million tonnes per annum (Mtpa) from UG1, UG2 and UG4 (combined);
- an increase in the maximum total site ROM coal rate to 21 Mtpa (i.e. 13 Mtpa from open cut operations and 8 Mtpa from underground operations);
- an increase in average daily rail departures from five to seven and increase in peak daily rail departures to nine;
- construction of Remote Services Facilities and rear air intake shaft and associated fans above the extended UG1 longwall panels; and
- relocation of the underground Mine Infrastructure Area and site administration offices.

The approved Moolarben Coal Complex and proposed Modification elements are shown on Figure 1.2.

The scope of work for the surface water impact assessment includes the following components:

- Assess the impact of the proposed Modification on the surface water catchments and drainage around the north-east longwall extension area and rear of the panels in the south-west;
- Review the potential subsidence impact on the surface water environment as a result of the proposed Modification;
- Review the potential impacts on the surface water environment associated with additional infrastructure for the proposed Modification; and
- Review the potential impact on the Moolarben Coal Complex water balance.

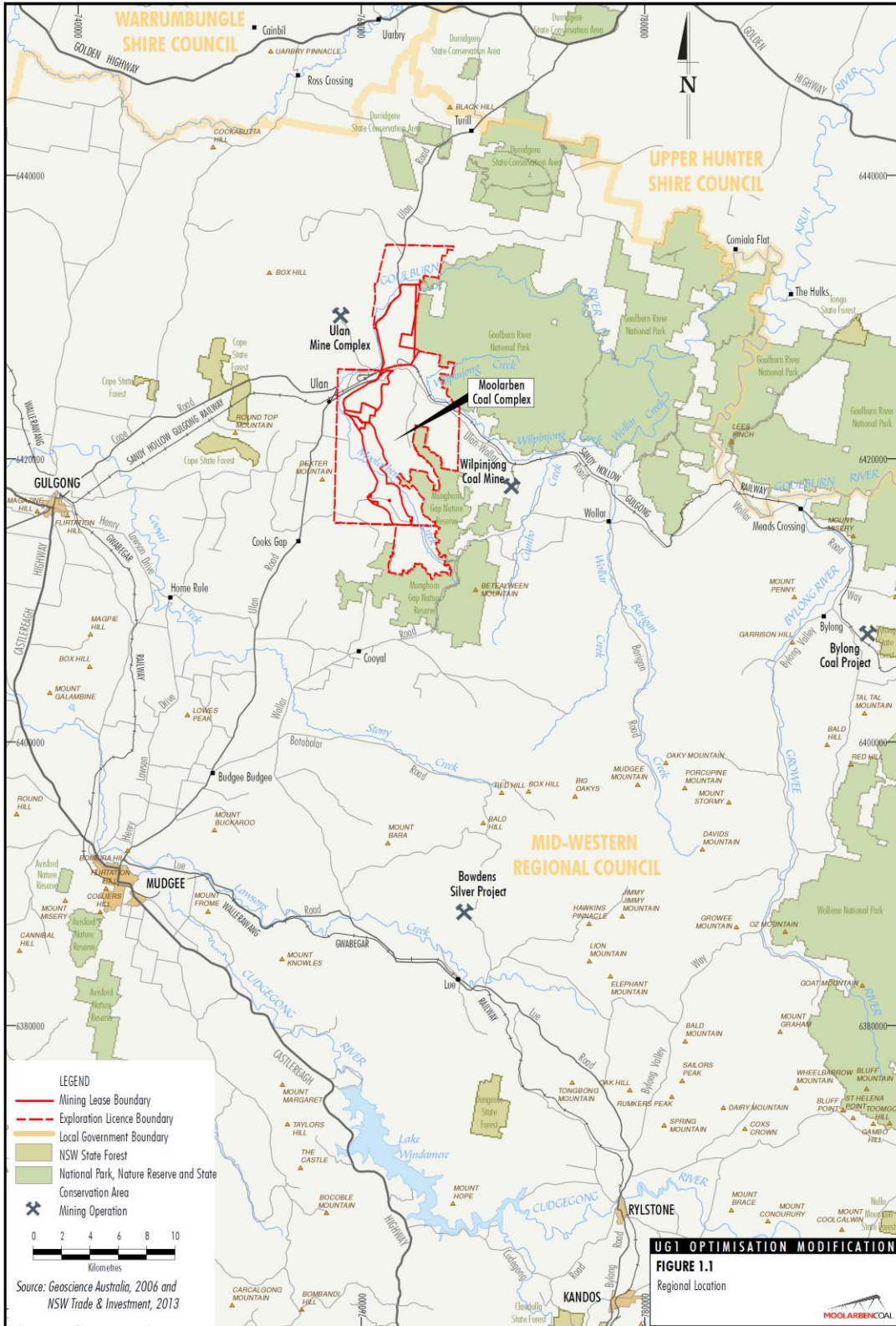


Figure 1.1 - Regional Location



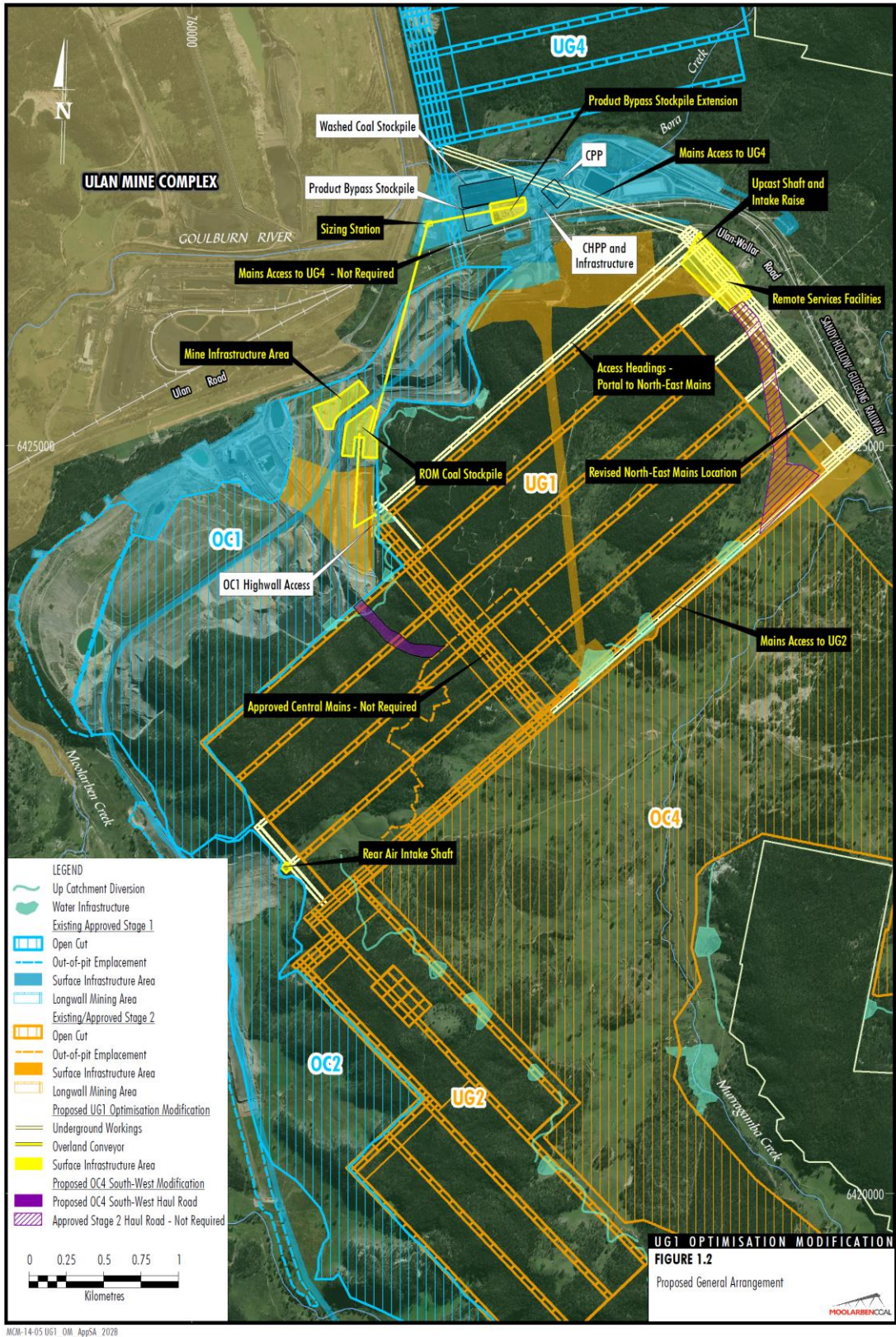


Figure 1.2 - Proposed General Arrangement

## 2 Existing Surface Water Environment

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### 2.1 PREVIOUS STUDIES

A description of the existing surface water environment at the Moolarben Coal Complex is provided in the report “Moolarben Coal Complex - Stage 1 Optimisation Modification - Surface Water Impact Assessment” (WRM, 2013a). Details of the existing surface water environment are provided in that report, including the following:

- Regional drainage network;
- Local drainage network;
- Climatic conditions;
- Streamflow;
- Surface water quality; and
- Environment Protection Licence (EPL) release conditions.

# 3 Overview of Moolarben Coal Complex Water Management System

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## 3.1 PREVIOUS STUDIES

A description of the existing and proposed Stage 1 and Stage 2 of the Moolarben Coal Complex water management system is provided in the following reports:

- “Moolarben Coal Project - Stage 1 Optimisation Modification - Surface Water Impact Assessment” (WRM, 2013a).
- “Moolarben Coal Project - Stage 1 Optimisation Modification - Surface Water Impact Assessment - Addendum Report” (WRM, 2013b).

Details of the existing and proposed Moolarben Coal Complex water management system are included in those reports, including the following:

- Key objectives of the surface water management strategy;
- Sources of water supply;
- Site water demands;
- Details of the existing surface water management infrastructure; and
- Details of the proposed surface water management infrastructure for Stage 1 and Stage 2 operations.

MCO has lodged an application to relocate a haul road at the Moolarben Coal Complex (i.e. the OC4 South-West Modification). WRM assessed the potential impacts to surface water resources in the *Moolarben Coal Project OC4 South-West Modification Surface Water Assessment Review* (WRM, 2015).

## 3.2 PROPOSED CHANGES TO THE MOOLARBEN COAL COMPLEX WATER MANAGEMENT SYSTEM

The proposed Modification only results in minor changes to the Moolarben Coal Complex water management infrastructure. These changes are primarily associated with the Remote Services Facilities and are summarised as follows:

- Construction of a small sediment dam within the Remote Services Facilities footprint to capture runoff from the Remote Services Facilities area; and
- Construction of drainage around the Remote Services Facilities.

Minor drainage works around the rear air intake shaft, Mine Infrastructure Area and coal stockpiles may also be required.

# 4 Impact Assessment

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## 4.1 POTENTIAL IMPACTS

The potential impacts of the proposed Modification on surface water resources include:

- Impacts of changes to catchment areas and drainage around the north-east and south-west longwall extension areas, the Mine Infrastructure Area in OC1 and coal conveyors and stockpiles;
- Impact of changes in subsidence (compared to the approved Moolarben Coal Complex) on the surface water environment;
- Impact on the mine site water balance from the change in catchment areas; and
- Changes to water demand and underground mine inflows.

These potential impacts are discussed in the following sections.

## 4.2 CHANGE IN DISTURBANCE AREAS

The proposed Modification results in three key changes in disturbance area associated with:

- the Remote Services Facilities;
- the coal conveyor; and
- the rear air intake shaft and associated fan.

In addition to the changes outlined above, the proposed Modification includes the change of use of two areas within the approved disturbance area, specifically:

- relocation and extension of coal stockpiles; and
- construction of the Mine Infrastructure Area in OC1.

### 4.2.1 Remote Services Facilities

The proposed Remote Services Facilities are located in the north-east longwall extension area (refer to Figure 1.2). The Remote Services Facilities footprint that is located outside of approved disturbance areas is approximately 8.1 hectares (ha) (Figure 1.2). Part of this footprint is located within the catchment area of the approved dam WP14 (which drains to Wilpinjong Creek), and part is within the direct catchment area of Wilpinjong Creek.

The proposed Remote Services Facilities removes approximately 2.9ha of the total WP14 catchment area and 5.2ha from the direct Wilpinjong Creek catchment. The existing sediment dam WP14 is dewatered back to WP15. A plan showing the relative locations of the Remote Services Facilities and WP14 is provided in Figure 4.1.

At the discharge point of WP14, the total catchment of the receiving watercourse is 1,930ha. The total reduction in catchment (5.2ha) area represents 0.3% of the Wilpinjong Creek catchment at this location. As such, the change in catchment area to receiving waters due to the Remote Services Facilities will have a negligible impact on the receiving environment.

### 4.2.2 Rear Air Intake Shaft

It is proposed to construct a rear air intake shaft and associated fan on the south-western edge of the longwall panels, with a proposed footprint of 0.25ha during construction, reducing to approximately 0.02ha during operations.

Given the small footprint of the shaft and the nature of the structure (the shaft vent is above the natural ground level) disturbance impacts will be managed using best practice management procedures for erosion and sediment control and there will be negligible impact on the receiving environment.

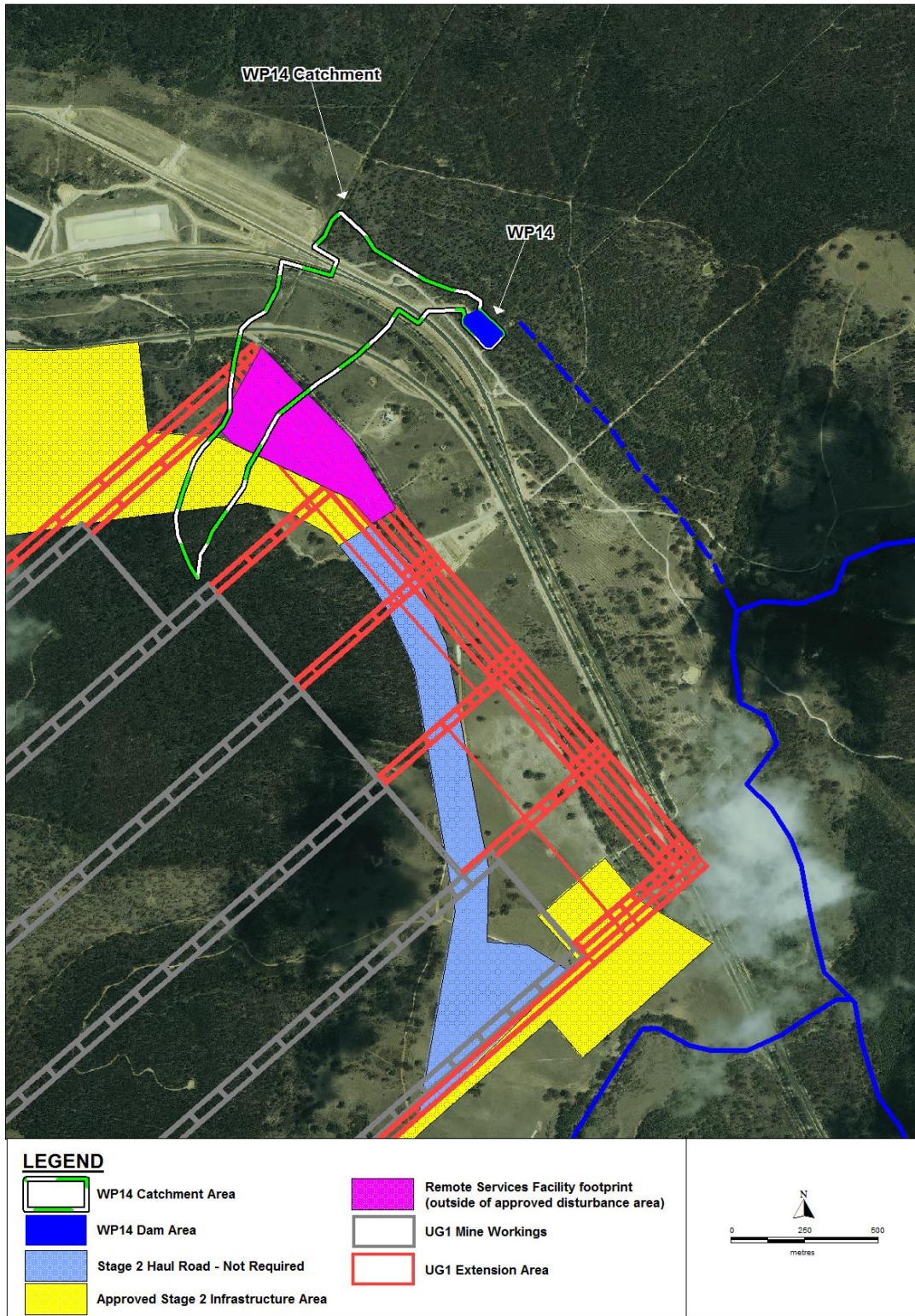


Figure 4.1 - Change in Catchment Area

### 4.2.3 Mine Infrastructure Area

It is proposed to construct a Mine Infrastructure Area within the existing OC1 disturbance footprint (Figure 1.2). The proposed Mine Infrastructure Area will be managed within the existing OC1 water management system and will have no impact on the receiving environment.

### 4.2.4 Coal Conveyor and Stockpiles

It is proposed to construct a coal conveyor between OC1 and the CHPP and associated stockpiles (Figure 1.2). All of the stockpiles and the majority of the coal conveyor would be located within existing/approved disturbance areas. The proposed coal conveyor and stockpiles would be managed in accordance with an approved Water Management Plan (WMP) and would have no adverse impact on the receiving environment.

## 4.3 SUBSIDENCE

### 4.3.1 Overview

Key elements of the modification associated with the underground mining operations include:

- Longwall panels to be lengthened in the north-east by approximately 150 to 500 m.
- Two longwall panels to be lengthened in the south-west by approximately 75 m.
- Relocation of central mains to the north-east.
- Increasing the total coal seam extraction height by approximately 300 mm to a maximum extraction height of 3.5 m.
- Increase to longwall panel width by approximately 6 m.

The impact of the proposed Modification on the predicted subsidence has been undertaken by Mine Subsidence Engineering Consultants (2015), and the results of these investigations were provided to WRM to review the potential impact on the surface water environment. Note that the impact assessment has only been undertaken in comparison to the predicted subsidence for the approved UG1 operations.

### 4.3.2 Impact assessment

As shown on Figure 4.2, the proposed UG1 Modification underground mining operations do not intersect Murragamba Creek or Moolarben Creek, and only underlie minor drainage lines in relatively steep topography between the two watercourses.

Review of the post-mining surface model for the approved UG1 mining area (not including the Modification) indicates a number of small areas where ponding may be caused or increased by subsidence. The topographical depressions with potential for ponding for the approved Moolarben Coal Complex range from 0.2m to 3.2m in depth, with maximum areas of approximately 0.3ha.

The post-mining surface model for the UG1 Modification mining area shows a minor increase in depth for these topographical depressions (approximately 0.2m), and approximately five additional areas of potential ponding, albeit at very shallow depths and surface areas (maximum of 0.4m depth and maximum surface area of 0.4 ha).

The key area of change is located at the north-eastern extent of the UG1 mining area, where panels are extended under the proposed Modification. A comparison of the estimated potential ponding extents with and without the proposed Modification are provided in Figure 4.3 and Figure 4.4.

It is expected there will be no significant change to water availability in the soil profile as a result of subsidence.



Figure 4.2 - Proposed Modification - Local Waterways

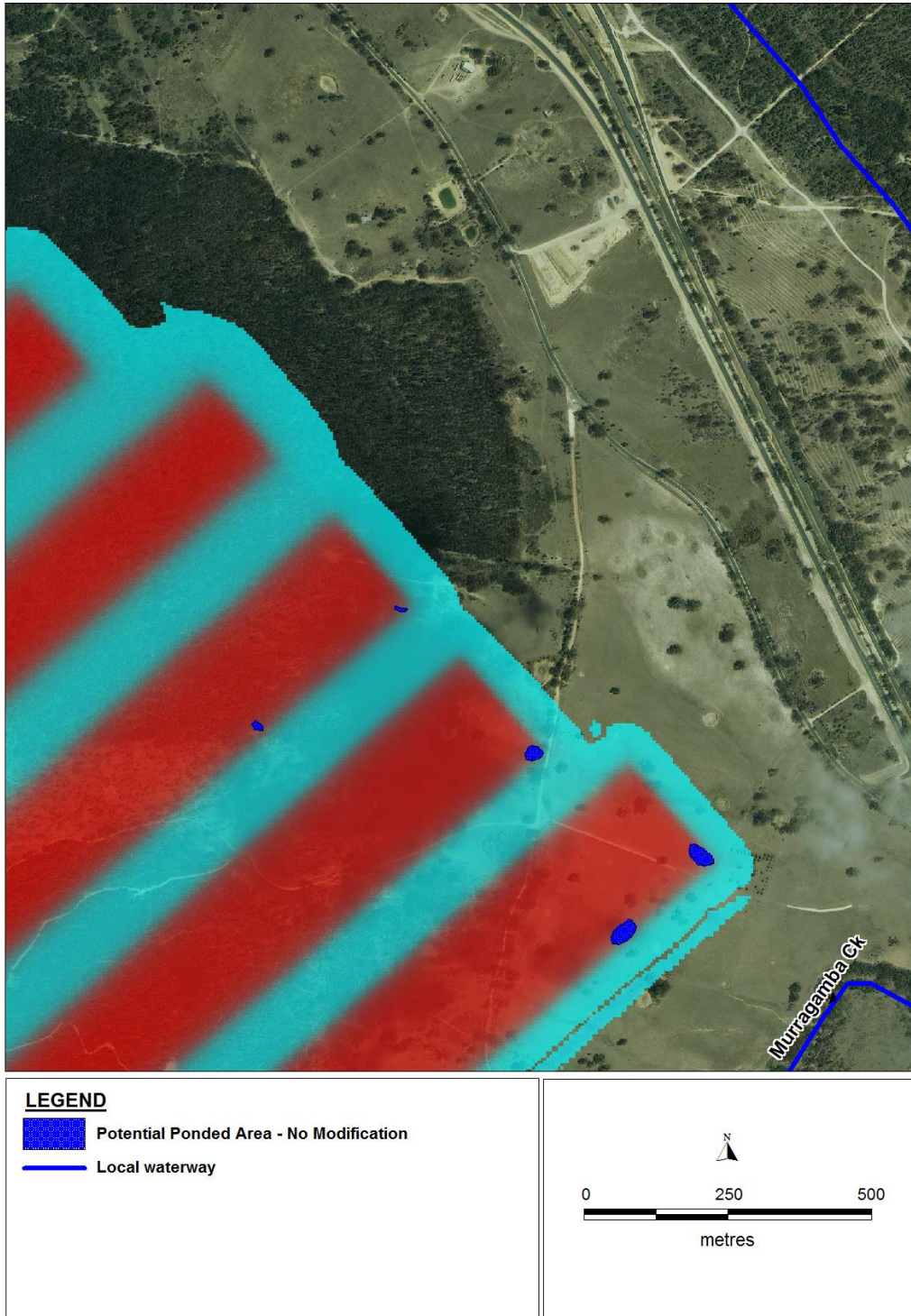
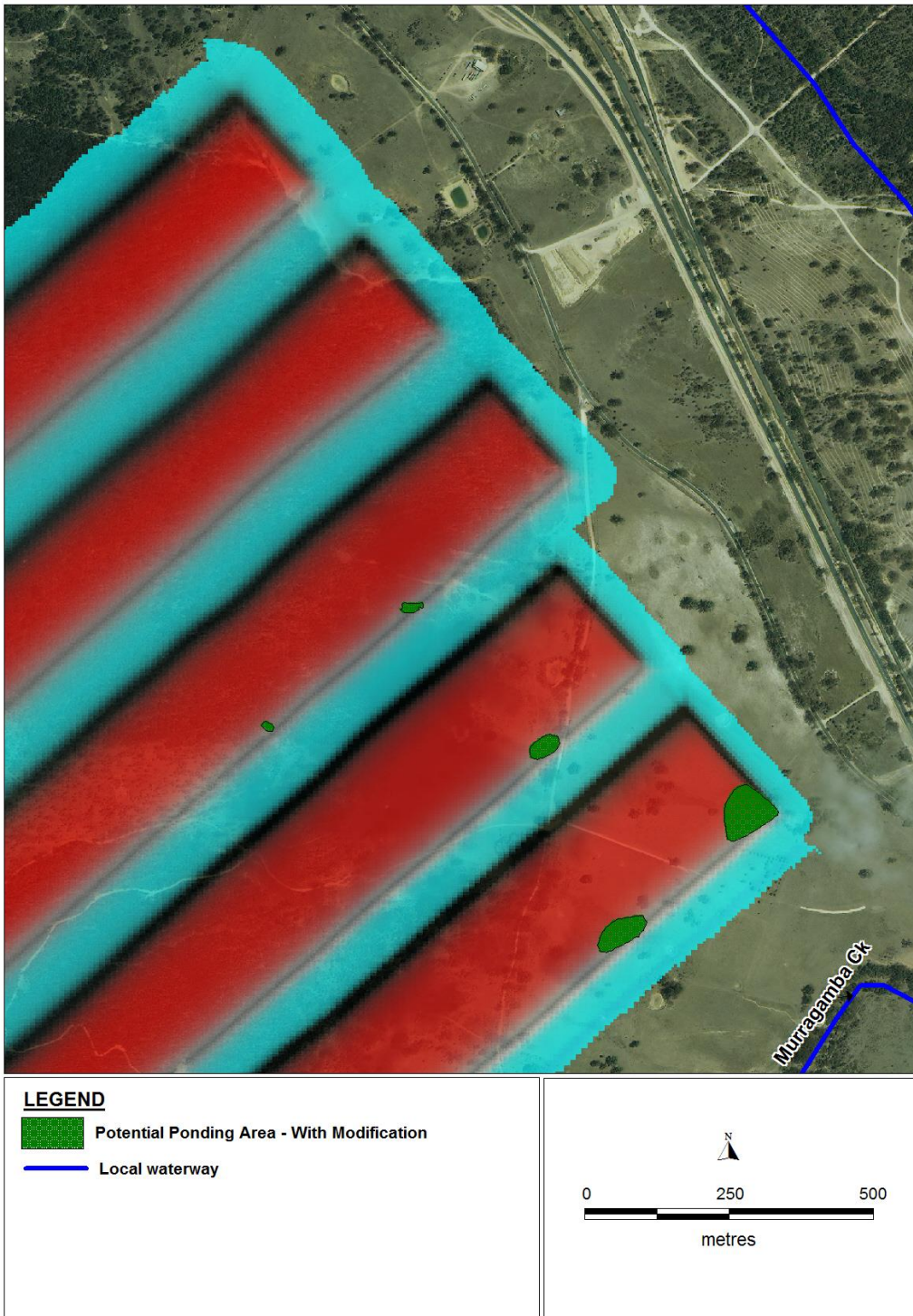


Figure 4.3 - Approved Moolarben Coal Complex and Proposed Modification - Ponding (no Modification)





**Figure 4.4 - Approved Moolarben Coal Complex and Proposed Modification - Ponding (with Modification)**

## 4.4 SITE WATER BALANCE

The potential impact of the proposed Modification on the site water balance has been assessed for the following:

- Changes to disturbance areas;
- Increase in UG1 ROM coal mining rate;
- Underground water demands; and
- Underground mine water inflows.

The modelled performance of the Stage 1 and Stage 2 water management system at the Moolarben Coal Complex (without the proposed Modification) is provided in the following report:

- *“Moolarben Coal Project - Stage 1 Optimisation Modification - Surface Water Impact Assessment”* (WRM, May 2013a).

### 4.4.1 Changes to Disturbance Areas

As described in Section 4.2, with the exception of the Remote Services Facilities, the surface disturbance areas associated with the proposed Modification are to be located within the catchment areas of the existing Stage 1 water management system.

There would be an additional 5.2ha of surface runoff captured from the Remote Services Facilities (Section 4.2.1). The minor increase to the catchment areas captured within the water management system would have a negligible impact on the site water balance and the performance of the existing and proposed MCO water management infrastructure.

### 4.4.2 Increase in UG1 ROM Coal Mining Rate

Part of the proposed Modification includes increasing the maximum underground ROM coal mining rate from 4Mtpa to 8Mtpa.

As ROM coal from the underground is not washed in the MCO CHPP, there will be no increase in CHPP water requirements due to the proposed Modification.

There will be a minor increase in stockpile dust suppression demand associated with the proposed extension and expansion of the underground ROM and product coal stockpiles; however this will only result in a very minor increase in the overall annual site demand.

### 4.4.3 Underground Water Demands

Previous water balance investigations (WRM, 2013a) have assumed a net underground water usage of 160 megalitres per year (ML/year). The increase in mining rate from 4Mtpa to 8Mtpa may result in an increase to underground water demands of approximately 50% (i.e. an additional demand of up to 80ML/year) which would represent an increase of less than 5% of the annual site demand.

The site has access to significant volumes of water including surplus mine water sourced from Ulan Mine Complex under agreement and from groundwater production bores, which can readily supply the additional water volume. Hence, the increased water demand will have no adverse impact on other licensed water users.

Further, the additional underground demands (up to 80ML/year) would be almost fully compensated by the increase in UG1 groundwater inflows (up to 69ML/year - see Section 4.4.4).

### 4.4.4 UG1 Mine Inflows

Groundwater inflows for the proposed Modification have been estimated by HydroSimulations (2015). It is expected that the peak inflows into UG1 (only) would be approximately 69ML/year (or 0.2ML/day) higher than without the Modification. This minor change in groundwater inflows will have no adverse impact on the site water balance or the management of water onsite.

## 5 Management and Monitoring

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Surface water impacts associated with Stage 1 and Stage 2 operations are managed under MCO's approved WMP, developed in consultation with the NSW Office of Water and NSW Environment Protection Authority. The primary objectives of the WMP, with respect to surface water, are to:

- Ensure that the water quality leaving the mine site meets the appropriate quality standards under the EPL;
- Define the structures, strategies and procedures to be implemented to ensure that all environmental impacts associated with site water management are minimised;
- Define a program to monitor and assess impacts on surface water;
- Define how the mine will mitigate and respond to potential impacts from mining activities on surface water;
- Divert upslope clean surface water runoff around disturbed areas where feasible;
- Maximise the reuse of treated dirty water onsite;
- Maximise water sharing with other mines; and
- Ensure that groundwater make is stored and treated on-site and re-used as needed.

A subsidence management strategy will be developed, as part of the Extraction Plan, to monitor and manage the potential impacts of subsidence on the surface water environment. Potential management measures may include the implementation of minor engineering works to drain the small ponded areas identified in Section 4.3. As the potential impact of the UG1 Modification on subsidence is small (when compared to the approved UG1 operations), this strategy remains unchanged under the UG1 Modification.

The WMP describes the monitoring and management of surface water, including details of management response actions across the Moolarben Coal Complex. The WMP and relevant sub-plans will be reviewed and updated as required to accommodate the proposed Modification.

## 6 Summary of Findings

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The surface water impact assessment has considered the potential impacts of the proposed Modification on surface water resources. Overall, the impacts of the Modification on surface water resources are small or negligible compared to the approved Moolarben Coal Complex. A summary of the assessed impacts on the surface water management system is as follows:

- The change in disturbance area associated with the proposed Mine Infrastructure Area and stockpiles (located within existing/approved disturbance areas) will be managed within the existing OC1 water management system.
- The Remote Services Facilities footprint will be managed within the existing water management system, with the addition of a small sediment dam.
- The minor increase in potential ponding as a result of subsidence will be managed through the Extraction Plan process, including implementation of remediation measures if required.
- The increase in water demand of less than 5% associated with the increased underground mining rate can be supplied from existing licensed sources and will have no adverse impact on other licensed water users. It would also be almost fully compensated by the predicted increase in UG1 mine inflows.
- The increase in mine inflows to UG1 of up to 69ML/year (or 0.2ML/day) (peak) can be managed via the existing surface water management system and will have no adverse impact on the management of water onsite.

The potential impacts which result from the proposed Modification will be managed under the existing surface water management system and in accordance with the WMP. The WMP and relevant sub-plans will be reviewed and updated as required to accommodate the proposed Modification.

## 7 References

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- HydroSimulations, 2015      *Moolarben Underground Mine UG1 Optimisation Modification Groundwater Modelling Assessment.*
- Mine Subsidence Engineering Consultants, 2015      *Stage 2 of the Moolarben Coal Project: Revised Predictions of Subsidence Parameters and Revised Assessments of Subsidence Impacts resulting from the Proposed UG1 Optimisation Modification.*
- WRM, 2013a      *Moolarben Coal Project - Stage 1 Optimisation Modification - Surface Water Impact Assessment*, Report prepared by WRM Water and Environment, Ref. 0926-01-C, May 2013.
- WRM, 2013b      *Moolarben Coal Project - Stage 1 Optimisation Modification - Surface Water Impact Assessment - Addendum Report*, Report prepared by WRM Water and Environment, Ref. 0926-03-A3, October 2013.
- WRM, 2015      *Moolarben Coal Project - OC4 South-West Modification Surface Water Assessment Review*, Report prepared by WRM Water and Environment, Ref. 0926-05-E4, February 2015.