

# MANGOOLA OPEN CUT

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GLENCORE

*Plan for*

## Water Management

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6	January 2017	Mangoola Coal NSW EPA DPI Water Stephen Downes as per approved appointment by the Secretary on 10/02/2017	Revision included: <ul style="list-style-type: none"> <li>• Inclusion of relevant regulatory requirements;</li> <li>• Revision of management strategy to meet harvestable rights requirements;</li> <li>• Response to Independent Environment Audit 12<sup>th</sup> December 2016 and Joint Agency High Risk Dam Audit 1<sup>st</sup> September recommendations</li> <li>• General update of operational information.</li> </ul>
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10	January 2020	Mangoola Coal  Stephen Downs as per approved appointment by the Secretary on 10 February 2017	<p>Document reference 3.6.3 updated to align with EPL 12894 variation approved 2 August 2019.</p> <p>Section 3.5 and Table 3.2 updated to reflect 2019 revision of Harvestable Rights.</p> <p>Updated with recommendations from Mangoola's Independent Environmental Audit 2019</p> <ul style="list-style-type: none"> <li>• Include evidence of consultation as per Schedule 3 Condition 28 (a)</li> <li>• Remove stock and domestic water licenses from Appendix G</li> <li>• Include Water Balance Model reporting requirements – Section 9.</li> </ul> <p>Updated Water Access License conditions in Appendix B Table G.</p> <p>Updated Appendix C – Erosion and Sediment Control Plan</p> <p>Updated Appendix D – Surface Water Monitoring Plan</p> <p>Updated Appendix F – Surface Water Groundwater Response Plan</p>
11	May 2020	Mangoola Coal  Stephen Downs as per approved appointment by the Secretary on 10 February 2017	<p>Updated Section 3.2 to include the saline seepage interception system as part of the RWD.</p>

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# 1 Introduction

Mangoola Coal Operations Pty Limited (Mangoola Coal) operates an open cut coal mine located near Wybong, approximately 20 kilometres west of Muswellbrook and approximately 10 kilometres north of Denman in the Muswellbrook Local Government Area (refer to Figure 1.1).

## 1.1 Project Description

In accordance with Project Approval (PA) 06\_0014, Mangoola Coal has a maximum production rate of 13.5 million tonnes per annum (Mtpa) of run of mine (ROM) coal over a mine life of 21 years. The primary mining method utilises hydraulic excavators loading rear dump trucks assisted by dozer push and cast blasting of overburden where appropriate. Dump trucks haul ROM coal to the coal handling facilities along haul roads. The general mining sequence includes the stripping of topsoil, removal of overburden, extraction of coal resource, in pit overburden emplacement and progressive rehabilitation.

Mining operations, coal handling and washing, rail load out and all associated activities operate on a 24 hours per day, seven days per week basis with the exception of the mobile gravel crushing plant which is restricted to 7am to 6pm Monday to Friday and 8am to 1pm on Saturdays with no operations on public holidays or Sundays. In accordance with PA 06\_0014 and EPL 12894 conditions, Mangoola shall only carry out blasting on site between 9.00 am and 5.00 pm Monday to Saturday inclusive. Blasting is only allowed on Sundays, public holidays, or at any other time under certain circumstances and with the written approval of the EPA.

A detailed description of the Mangoola Coal Project and, the subsequent modifications, is provided in Chapter 3 of the Modification 6 Environmental Assessment (EMGA Mitchell McLennan 2013). An overview of the water assessment findings can be found in Chapter 11 and Chapter 16 of the EA.

The conceptual mine plan scenarios utilised in the 2013 EA includes:

- Year 2 (end 2015) – coal extraction in the north-east area of the mine (the Northern Pit) and progressing in a south-easterly direction towards the mine infrastructure area. The overburden emplacement area is established behind the general progression of the pit;
- Year 5 (end 2018) – coal extraction in the north-west area (the Main Pit) and southern area (the Southern Pit) of the mine. The Main Pit progresses in a south-west direction around Anvil Hill and the Southern Pit in a north-west direction; and
- Year 10 (end 2023) – one active pit in the south-western area of the mine (the Southern Pit). The majority of the mined land is rehabilitated by this time and represents the end stage of the mine life.

## 1.2 Purpose and Scope

This Water Management Plan (WMP) has been prepared to fulfil the requirements of PA 06\_0014 and EPL 12894 under which Mangoola Coal operates and to fulfil other relevant statutory requirements that are applicable to Mangoola Coal (refer to Section 1.5).

## 1.3 Objectives

The primary objectives of this WMP are to:

- Provide a site water balance
- Ensure that the quality of water leaving the site meets the appropriate quality standards (refer to **Section 3.7** and **Appendix D**);
- Define the structures, strategies and procedures to be implemented to ensure that all environmental impacts associated with site water management are minimised, based on the principle of separating water streams into dirty, clean and saline water (refer to **Section 3**, **Appendix C** and **D**);

- Define a program to monitor and assess impacts on surface water and groundwater (refer to **Appendix D** and **E**); and
- Define how the mine will mitigate and respond to potential impacts on surface water and groundwater (refer to **Appendix F**).

## 1.4 Structure of the Water Management Plan

In accordance with the conditions of PA 06\_0014, this WMP includes four additional plans:

- Erosion and Sediment Control Plan (ESCP) (**Appendix C**);
- Surface Water Monitoring Plan (SWMP) (**Appendix D**);
- Groundwater Monitoring Plan (GWMP) (**Appendix E**); and
- Surface Water and Groundwater Response Plan (SWGWRP) (**Appendix F**).

These additional plans are contained within the appendices listed above supported by the overarching WMP.

## 1.5 Regulatory Requirements

### 1.5.1 Project Approval

Approval for Mangoola Coal was gained under the EP&A Act from the Minister for Planning on 7 June 2007. Since then, seven modifications to PA 06\_0014 have been granted. The current PA 06\_0014 conditions relating to water management, and where they are addressed within this document is included in **Table A** in **Appendix B**.

### 1.5.2 Environment Protection Licence

Mangoola Coal holds EPL 12894 which contains seven monitoring points in relation to surface water, including three monitoring points for discharge events under the HRSTS, and groundwater management. EPL 12894 conditions related to water management are outlined in **Table B** in **Appendix B**. EPL 12894 licensed water monitoring points are listed in **Table C** in **Appendix B**.

### 1.5.3 Mining Lease 1626

Mangoola Coal holds Mining Lease (ML) 1626 for the Mangoola Coal operations and the conditions related to water management are outlined in **Table D** in **Appendix B**.

### 1.5.4 Exploration Lease 5552

Mangoola Coal holds Exploration Lease (EL) 5552 for an area north of the current operations. The conditions related to water management are outlined in **Table E** in **Appendix B**.

### 1.5.5 Assessment Lease 9

Mangoola holds Assessment Lease (AL) 9 for the external buffer area surrounding current operations. The conditions related to water management are outlined in **Table E** in **Appendix B**.

### 1.5.6 Water Act 1912

All surface and groundwater associated with Mangoola Coal is now governed under the Water Management Act 2000 with the commencement of the North Coast Fractured and Porous Rock Groundwater Sources Water Sharing Plan on the 1 July 2016 as detailed in Section 1.5.7.

Previously, the groundwater associated with the hardrock aquifers (i.e. coal seams) at Mangoola Coal was governed under the Water Act 1912. Mangoola Coal holds a Part 5 licence under the Water Act 1912 for the extraction of groundwater via the open cut pits and the monitoring of boreholes. Mangoola Coal holds water licence 20BL172598 for the extraction of 700ML per 12 month period averaged over 24 months commencing 1 July. The conditions of this water licence are outlined in Table F in Appendix B. This licences will eventually be transferred to water access licences under the Water Management Act 2000, however until this occurs Mangoola Coal will continue to comply with the conditions of the licence under the Water Act 1912.

## 1.5.7 Water Management Act 2000

The surface waters of Mangoola Coal and the alluvial, colluvial and hardrock groundwater of Big Flat Creek, Anvil Creek and Clarks Gully are governed by the Water Management Act 2000. Extraction from the Hunter River is also governed by the Water Management Act 2000.

The majority of Mangoola Coal lies within the Wybong Creek catchment (refer to Section 2.5) and as such is managed under the Unregulated and Alluvial Water Sources Water Sharing Plan 2009. In accordance with Schedule 3, Condition 25 of PA 06\_0014 Mangoola Coal will not use any licensable water from the Wybong Creek Water Source for mining purposes other than that incidentally collected by approved mining operations. The proposed water management system will result in the incidental collection of runoff from several operational areas with clean runoff where diversions are not feasible. Mangoola will transfer unused water allocation from existing surface water licenses within the Wybong Creek catchment where there is a shortfall in harvestable rights provisions for this incidental collection (refer to Section 3.6).

Mangoola also has three water access licences (WAL 11085, 37027 and 37028) under the Hunter Unregulated and Alluvial Water Sources Water Sharing Plan 2009 for the extraction of groundwater from the Wybong Creek aquifer. These are all listed as miscellaneous works approvals. The conditions of these water access licences are outlined in **Table G** in **Appendix B**.

All water extraction from the Hunter River is undertaken in accordance with the water access licences held by Mangoola Coal. Works Approval 20WA211008 applies to all water access licences held by Mangoola Coal for Hunter River water extraction. The conditions of this water licence are outlined in Table H in Appendix B. Water Access Licenses (WAL) connected with this works approval are listed in Table 1.1 below.

**Table 1.1 WAL for Hunter River supply to mining operations**

WAL	Water Use Approval	Reference Number	Lot//DP	Share Component	Category
503	20WA211008	20AL200112	12//594674	159	General Security
644	20WA211008	20AL200456	12//594674	3	High Security
645	20WA211008	20AL200457	12//594674	432	General Security
691	20WA211008	20AL200578	12//594674	50	General Security
735	20WA211008	20AL200676	12//594674	72	General Security
822	20WA211008	20AL200912	12//594674	3	High Security
823	20WA211008	20AL200913	12//594674	310	General Security
824	20WA211008	20AL200915	12//594674	175	General Security
830	20WA211008	20AL200933	12//594674	306	General Security
897	20WA211008	20AL201085	12//594674	55	General Security
933	20WA211008	20AL201156	12//594674	43	General Security
1159	20WA211008	20AL201722	12//594674	159	General Security
1349	20WA211008	20AL202949	12//594674	8	Supplementary
6571	20WA211008	20AL201639	12//594674	111	General Security



6576	20WA211008	20AL201869	12//594674	600	General Security
9061	20WA211008	20AL203156	12//594674	6	High Security

WAL	Water Use Approval	Reference Number	Lot//DP	Share Component	Category
9062	20WA211008	20AL203157	12//594674	18	General Security
9986	20WA211008	20AL203182	12//594674	5	High Security
9987	20WA211008	20AL203183	12//594674	82	General Security
11216	20WA211008	20AL203370	12//594674	86	General Security
13083	20WA211008	20AL203454	12//594674	100	General Security
-	20BL172598 <sup>*1</sup>	-	-	700	Hard Rock Aquifer Interference

<sup>\*1</sup>To be converted to WAL.

As described in Section 1.5.6 the groundwater associated with the hardrock aquifers (i.e. coal seams) at Mangoola Coal is governed under by the Water Management Act 2000 and is managed under the North Coast Fractured and Porous Rock Groundwater Sources Water Sharing Plan which commenced on 1 July 2016. All licences currently held under the Water Act 1912 relating to this water are to be transferred by the DPI-Water to water access licences under the Water Management Act 2000. Until this has been completed Mangoola Coal continues to comply with conditions of the existing licences under the Water Act 1912.

A full list of WAL held by Mangoola is included in **Appendix G**.

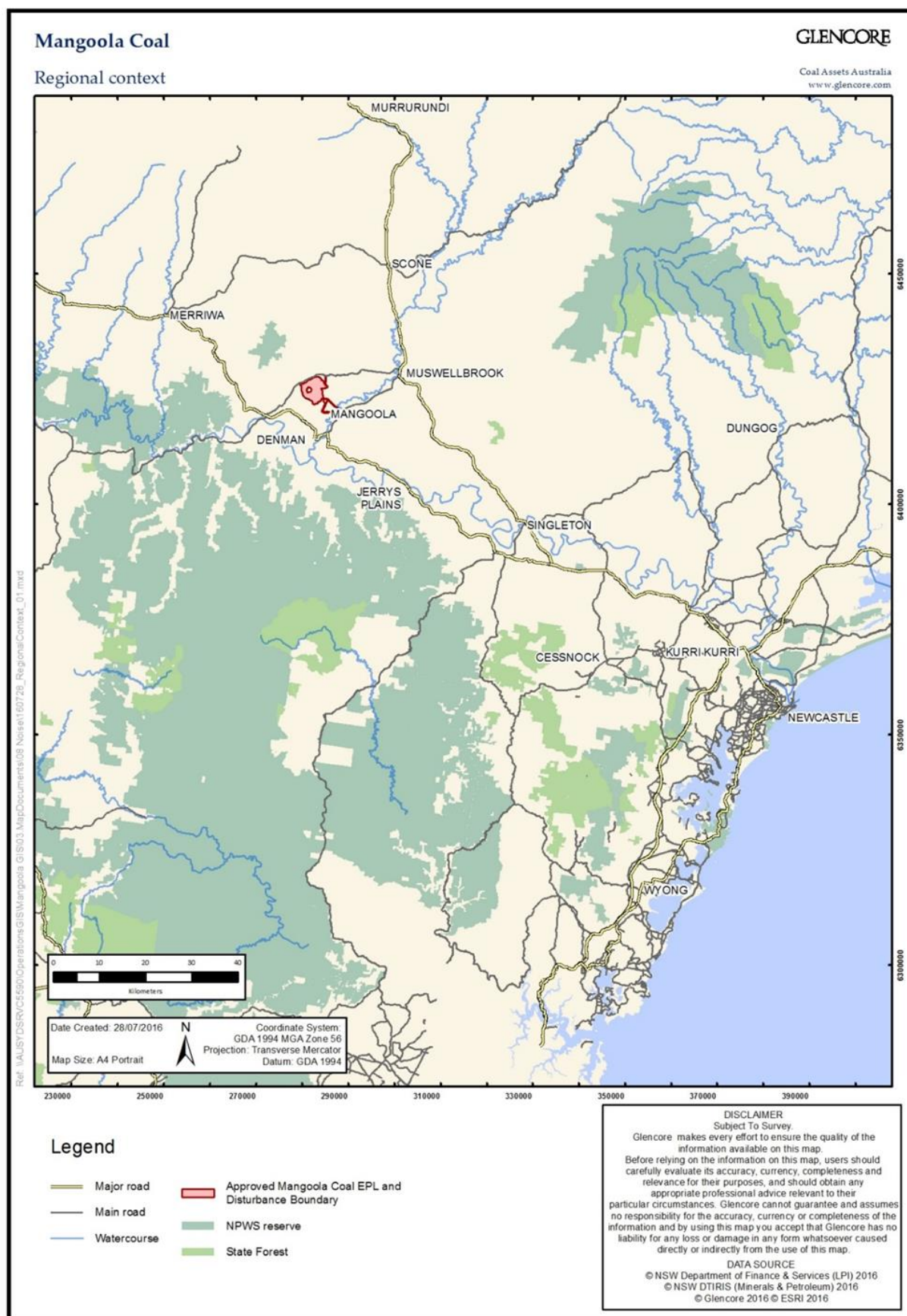


Figure 1.1

## 1.5.8 Dam Safety Act 2015

Mangoola Coal has a number of dams listed as prescribed dams according to the Dams Safety Act 2015, these are the Pit Water Dam, Raw Water Dam, Tailings Dam 1 and Tailings Dam 2. Specific management requirements are addressed in the respective Dam Safety Emergency Plans and Operation and Maintenance Manuals developed for each dam.

## 1.5.9 Guidelines

The following guidelines have been utilised during the preparation of this WMP and accompanying documents:

- 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);
- Managing Urban Stormwater – Soils and Construction, Volume 2E Mines and Quarries (DECC 2008).
- NSW Aquifer Interference Policy (2012)
- NSW Guidelines for controlled activities on waterfront land (2012)

## 1.5.10 Council Approval

Mangoola Coal holds Muswellbrook Shire Council approval WTA No: 5/2010 for the operation of an on-site sewage management system.

## 1.5.11 Agency Consultation

As per Schedule 3, Condition 28(a) of PA 06\_0014, this Water Management Plan has been prepared in consultation with the Department of Primary Industries (DPI) Water (formerly NSW Office of Water) and the EPA.

The evidence of consultation with both DPI and the EPA regarding the WMP can be found in **Appendix A**.

## 1.6 Roles and Responsibilities

The relevant roles and responsibilities associated with this management plan are outlined in Table 1.2 below.

**Table 1.2 – Roles and Responsibilities**

Role	Responsibility
Operations Manager	<ul style="list-style-type: none"> <li>ensure that sufficient resources are allocated for the implementation of this management plan.</li> </ul>
Environment and Community Manager (ECM) or delegate i.e, Environment and Community Coordinator (ECC) or Environment and Community Officer (ECO)	<ul style="list-style-type: none"> <li>facilitate the effective implementation of this plan;</li> <li>ensure that the results of monitoring are systematically evaluated and reported to relevant personnel;</li> <li>ensure all internal and external reporting requirements are met;</li> <li>develop and implement a system to monitor compliance against this plan; and</li> <li>maintain a copy of this management plan on the Mangoola Coal website;</li> <li>manage and respond to community complaints/enquiries relating to water management;</li> <li>conduct inspections to check compliance against this plan;</li> <li>monitor corrective actions from inspections or non-compliance and ensuring they are closed out and effective;</li> <li>coordinate incident investigation processes including associated reporting requirements; and</li> <li>provide adequate training to employees and contractors regarding their responsibilities under this plan.</li> </ul>
Department Managers	<ul style="list-style-type: none"> <li>maintain water management infrastructure;</li> <li>report hazards and incidents related to this plan to the E&amp;C Department; and</li> <li>communicate effectively with the Mangoola Coal E&amp;C Department to manage water quality associated with activities on site.</li> </ul>
All employees and contractors	<ul style="list-style-type: none"> <li>prepare, implement and maintain activity specific water management and erosion control sediment plans that conform directly with the requirements of this plan and associated documents;</li> <li>undertaking all activities in accordance with this plan; and</li> <li>report all water pollution incidents associated with their activities immediately.</li> </ul>

## 1.7 Definitions

The terminology and acronyms utilised within this WMP and appendices is defined in Table 1.3.

**Table 1.3 – Terminology Utilised Within the WMP**

Term	Definition
µs/cm	microSiemens per centimetre - The standard measure of electrical conductivity and is used to indicate the salinity level of water
ARI	Average Recurrence Interval- The average, or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration
AEMR/AR	Annual Environmental Management Report as per ML1626/Annual Review prepared as per Schedule 5, Condition 6 of PA 06_0014.
AHD	Australia Height Datum. Used to indicate elevation.
Alluvial	Sediment deposited by a flowing stream or floods in a valley typically consisting of silt, sand, clay and gravel.
Aquifer	A water bearing rock formation
ANZECC	Australia and New Zealand Environment Conservation Council
Blue Book	Managing Urban Stormwater: Soils and Construction, Volumes 1 and 2 (Landcom 2004 & DECC 2008)
BOD	Biochemical Oxygen Demand
Bore/ Borehole	A hole formed by boring or auguring
COD	Chemical Oxygen Demand
Colluvium	Soil or debris that accumulates at the base of a slope by mass-wasting or sheet erosion typically comprising of unsorted angular fragments close to the source.
C-factor	A factor relating to the vegetation coverage as outlined in Managing Urban Stormwater Volume 1: Soils and Construction (The Blue book) (Landcom 2004)
Dirty water	Water which has come into contact with area disturbed by operations and has the potential to have a high sediment load but has not come into contact with coal or saline water.
EA	Environmental Assessment
EC	Electrical Conductivity
ESCP	Erosion and Sediment Control Plan
GWMP	Groundwater Monitoring 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.
High Rainfall Event	Greater than 20 millimetres of rainfall within a 24hr period
HRSTS	Hunter River Salinity Trading Scheme
Incident	A set of circumstances that: causes or threatens to cause material harm to the environment; and/or breaches or exceed the limits or performance measures/criteria in this plan or associated approval
kL	Kilolitres or thousands of litres, e.g. 3 kL is the same as 3,000 litres.

Term	Definition
ML	Megalitres or millions of litres, e.g. 5 ML is the same as 5,000,000 litres.
N	Nitrogen
P	Phosphorous
pH	A measure of acidity.
Piezometer	A small diameter bore lined with a slotted tube used for determining the standing water level for groundwater, particularly relating to dams
Potable water	Water that is considered safe for human consumption.
Saline Water	Water from the project's saline water management system as described in the Environmental Assessment.
SWMP	Surface Water Monitoring Plan
SWGWRP	Surface Water and Groundwater Response Plan
Tailings	Fine residual waste material separated during the coal preparation process.
TARP	Trigger Action Response Plan
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
V:H	Vertical: Horizontal

## 2 Pre-mining Environment

### 2.1 Land Use

Land use in the broader area surrounding Mangoola Coal includes residential, tourism, agricultural and mining activities and is typical of the land use throughout much of the Upper Hunter Valley. Much of the higher and steeper land in the region has not been cleared and is used either for low intensity grazing or for conservation purposes (refer to Figure 2.1). The land uses immediately surrounding Mangoola Coal are predominantly a combination of rural residential, grazing and agriculture.

### 2.2 Topography

The topography of the area surrounding Mangoola Coal varies from lower slopes towards the Hunter River, through undulating and hilly lands to rocky outcrops. A notable topographical feature within the mining area is Anvil Hill which rises 70 metres above the surrounding area to a height of approximately 285m AHD (refer to Figure 2.2). Anvil Hill is located at the centre of the mining area and consists of two hills connected by a saddle. Anvil Hill is located within the Anvil Hill Offset Area in the centre of the disturbance boundary.

### 2.3 Soils

A total of eleven soil units were identified within the disturbance boundary and surrounds during baseline studies, as shown on Figure 2.3.

The Yellow Solodics, associated with the Sandy Hollow and Castle Rock soil landscapes, are the dominant soil unit of the approved disturbance area. The Sandy Hollow soil landscape covers the



smooth and gentle rises and slopes in the central Goulburn Valley, the south-eastern part of Merriwa Plateau and the northern part of the southern mountains (Kovac and Lawrie, 1991). The main soils found within this landscape are red and yellow Solodic Soils on the upper and midslopes with yellow and brown Solodic Soils on the lower slopes. Red Earths occur midslope directly adjacent to sandstone benches with Siliceous Sands (Kovac and Lawrie, 1991). Alluvial soils occur along major drainage lines. Moderate gully erosion (<1.5 metres) can occur within this landscape in drainage lines, with minor sheet and rill erosion potentially occurring on slopes (Kovac and Lawrie, 1991). This soil profile dominates the Anvil Creek and Big Flat Creek catchments within the approved disturbance areas for Mangoola Coal.

The Castle Rock soil landscape covers the undulating low hills and footslopes around the Castle Rock on areas of colluvium (Kovac and Lawrie, 1991). The main slopes are very stony yellow Solodic Soils on the footslopes and black Solodic Soils on the flatter areas with Alluvial Soils in the drainage lines. The lower areas have severe salting problems. Minor to severe sheet erosion, with gully erosion in many of the drainage lines, can occur. This can be exacerbated by salting on the flats (Kovac and Lawrie, 1991). This profile is the dominant soil profile within the portion of Sandy Creek catchment within the Mangoola Coal disturbance area.

In addition, laboratory testing conducted on construction materials for the Pit Water Dam (located within the Sandy Hollow soil profile within the Anvil Creek Catchment), indicated that soils in the area are highly dispersive, and thus more susceptible to erosion (ATC Williams 2009). As such, it is considered that there is potential for dispersive soils to occur over the majority of the site.

## 2.4 Hydrology

Mangoola Coal is located within the catchments of Sandy Creek and Big Flat Creek, including the sub catchment areas Anvil Creek and Clarks Gully. Anvil Creek and Clarks Gully are tributaries of Big Flat Creek. Big Flat Creek is a tributary of Wybong Creek, which in turn is a tributary of the Goulburn River.

A small part of the site is located in the Sandy Creek catchment. Sandy Creek is a fifth order (category three) stream and flows in the southerly direction to the Hunter River.

The approved mining area covers approximately 42 per cent of the Big Flat Creek catchment, including the entire catchment of both Anvil Creek and Clarks Gully. The operations will disturb less than 3 per cent of the Wybong Creek catchment, and less than 1 per cent of the Sandy Creek catchment.

There are no surface or groundwater extraction points downstream of Mangoola on Big Flat Creek or within 2 km downstream of Mangoola on Sandy Creek. Historically, there were 13 licensed surface water extraction points and ten licensed groundwater extraction points on Wybong Creek (Umwelt 2006). The water take associated with these licences is governed by the rules of the Wybong Water Source in the Hunter Unregulated and Alluvial Water Sources Water Sharing Plan 2009.

The boundaries of the catchments are shown on Figure 2.2.

## 2.5 Water Courses and Catchments

### 2.5.1 Anvil Creek

Anvil Creek is a second order tributary of Big Flat Creek, extending for approximately 6.5 kilometres from its headwaters in the south-east of the catchment, to the east of Anvil Hill, to its confluence with Big Flat Creek in the north-west of the catchment area. The catchment of Anvil Creek covers an area of approximately 1,400 hectares and the pre-mining landscape included forested areas and some grazing land.

Anvil Creek is an ephemeral creek system with flows only occurring in the creek during storm events or after prolonged periods of heavy rain. Anvil Creek is characterised by a well-defined channel ranging in width from five metres in the upper reaches of the creek 22 metres in downstream areas.

Bank height ranges from one metre to three metres with moderate to very steep grades. Erosion is evident within the creek system with undercutting of outer bends recorded.

## 2.5.2 Clarks Gully

Clarks Gully was a minor, second order tributary of Big Flat Creek extending for approximately 3.6 kilometres from its headwaters in the east of the catchment, to the north-east of Anvil Hill, to its confluence with Big Flat Creek in the west of the catchment. The catchment of Clarks Gully covered an area of approximately 365 hectares, with the pre-mining landscape including forested areas and grazing land.

Clarks Gully was an ephemeral creek system with flows only occurring in the creek during storm events or after prolonged periods of heavy rain. Clarks Gully ranged from a narrow, single channel to a broad channel with widths in excess of 35 metres consisting of multiple low flow channels. Bank heights were generally in the order of one to three metres with little evidence of erosion.

## 2.5.3 Big Flat Creek

Big Flat Creek is a fourth order tributary of Wybong Creek and has a catchment area of approximately 5,040 hectares. Big Flat Creek flows in an approximately south-westerly direction to its confluence with Wybong Creek approximately 12 kilometres upstream of the confluence of Wybong Creek and the Goulburn River. The headwaters of Big Flat Creek are located approximately 9.8 kilometres north-east of its confluence with Wybong Creek in woodland areas in the vicinity of Black Jack Mountain.

Big Flat Creek is an ephemeral creek system with flows only occurring in the creek during storm events or after prolonged periods of heavy rain. Big Flat Creek is well defined with top of bank channel widths in the order of 20 metres to 80 metres and bank heights generally in the order of 2 to 6 metres. Erosion of banks and the channel was observed during site inspections and salt scalding of the adjacent floodplain was also evident during baseline studies. Big Flat Creek has been subject to extensive planting as outlined in the Mangoola Biodiversity and Offset Management Plan.



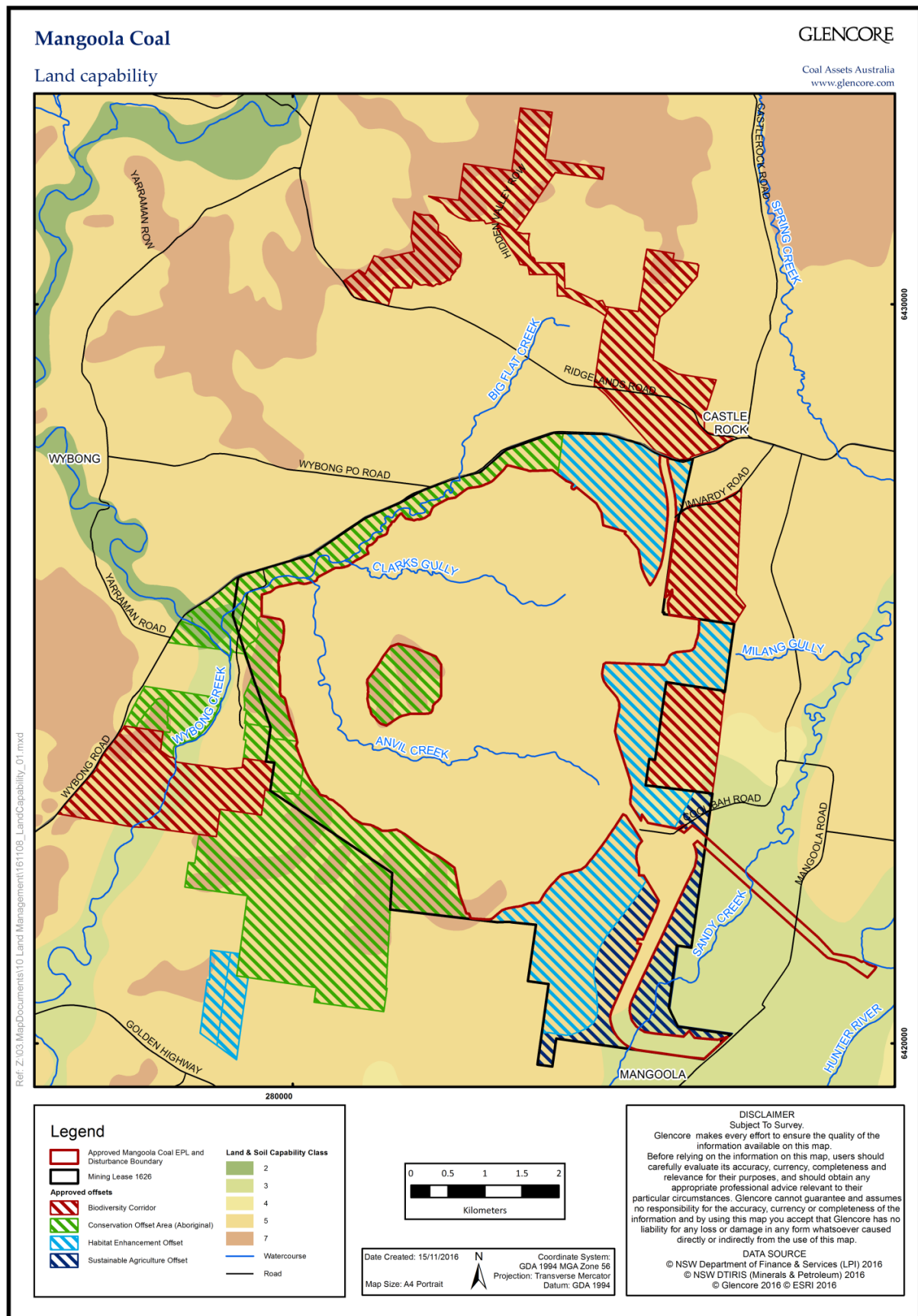


Figure 2.1



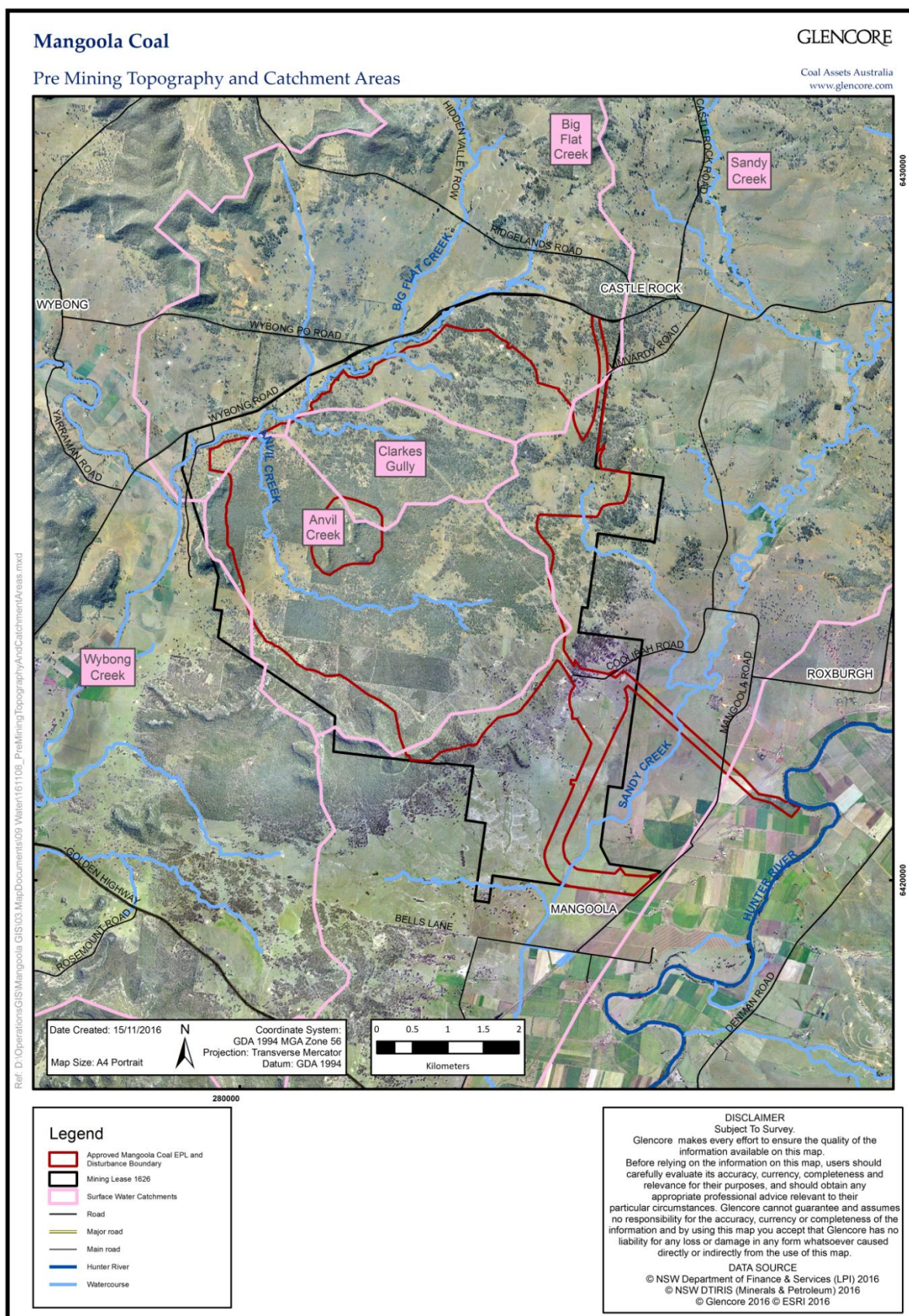


Figure 2.2



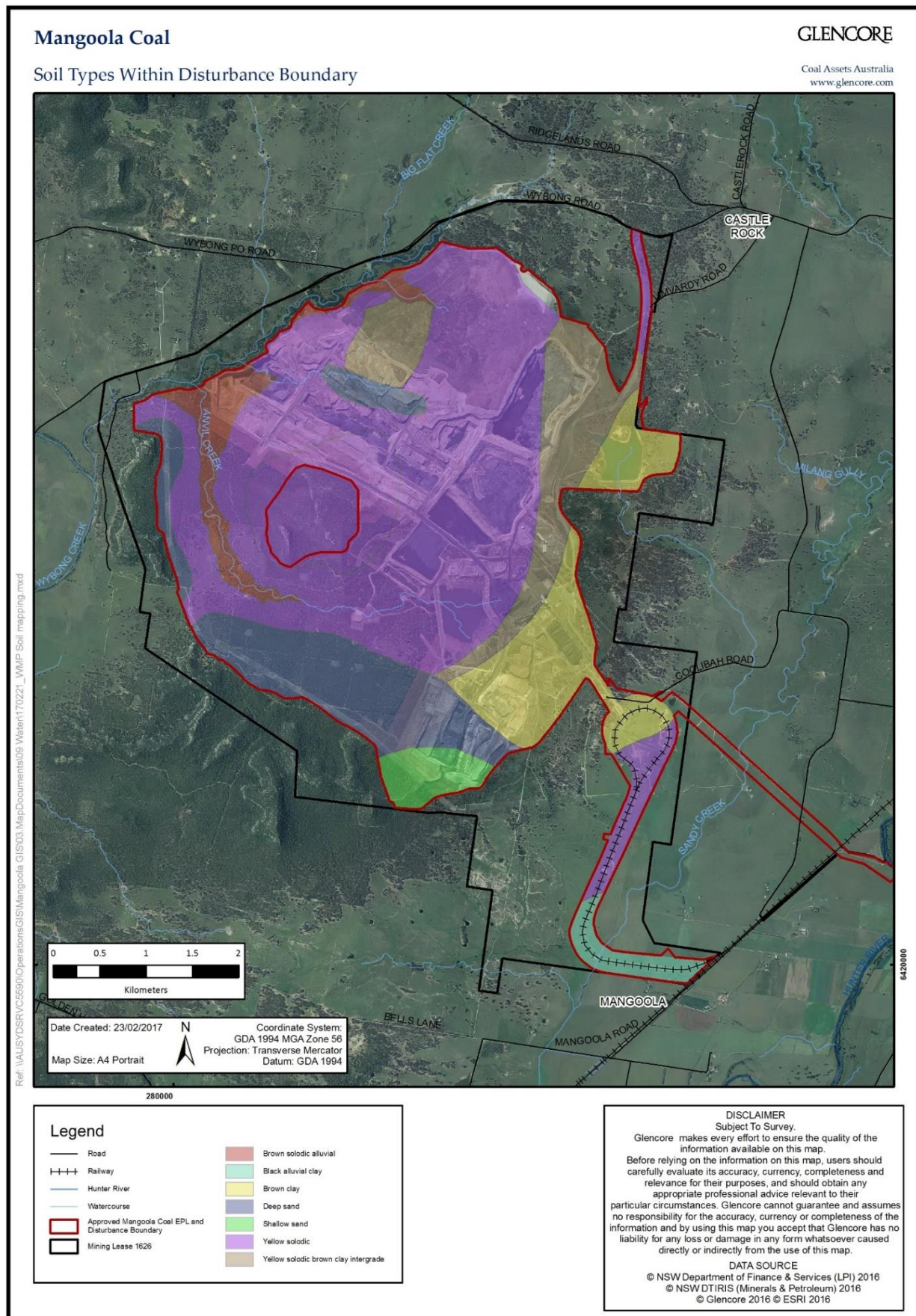


Figure 2.3

## 2.5.4 Wybong Creek

Wybong Creek is a major tributary of the Goulburn River, extending some 90 kilometres from its headwaters in the Liverpool Ranges in the north, to its confluence with the Goulburn River in the south of the catchment. The catchment of Wybong Creek covers an area of approximately 67,370 hectares at its confluence with Big Flat Creek. Wybong Creek has a total catchment area of approximately 80,040 hectares at its confluence with the Goulburn River.

Wybong Creek immediately upstream of its confluence with Big Flat Creek, and between Big Flat Creek and the Goulburn River, ranges in width between 80 and 100 metres. Bank heights in this area range from 2.5 metres to in excess of 20 metres in some locations with typical heights approximately 10 metres to 12 metres.

## 2.5.5 Sandy Creek

Sandy Creek is a fifth order tributary of the Hunter River extending for some 37 kilometres from its headwaters in the north to its confluence with the Hunter River in the south of the catchment area. The catchment of Sandy Creek covers an area of approximately 14,520 hectares and includes floodplain areas, grazing land, woodland and urban areas such as the township of Denman.

# 3 Surface Water Management

The water management system at Mangoola Coal is managed in three separate systems:

- Dirty Water System - generally runoff from areas disturbed by mining operations and associated activities, including overburden emplacement areas (which are not part of the Saline Water System), that have not come into contact with coal or saline water and have potential to have high sediment loads.
- Saline Water System - consists of water that has been in contact with coal and subsequently has the potential to be saline. These areas include the open cut pits, internally draining overburden dump areas, Pit Water Dam (PWD), tailings dams, CHPP, ROM and product stockpile areas, rail loading facilities and coal haul roads. This includes all areas not draining to the Dirty Water System or Raw Water System. Water from this zone is used for process water and dust suppression within the saline water zone; and
- Clean Water System – refers to licensed input from the Hunter River, runoff water from the undisturbed upslope catchment area and water from rehabilitated areas that are fully established and stable.

These three water systems prevent the contamination of the clean water systems, including downstream natural drainage systems, by mining activities. The controls that have been implemented to achieve this are outlined in Sections 3.1 to 3.7.

The layout of the key water management structures is shown in Figure 3.1. The water management system consists of two main water storage dams, Pit Water Dam and Raw Water Dam, and a number of staging/sediment dams. A schematic of the water management system for each of these individual systems is shown on Figure 3.2.

The water management system is designed to exclude the use of any licensable water from the Wybong Creek Water Source for mining purposes in accordance with Schedule 3 Condition 25 of PA 06\_0014. However, this restriction does not apply to water used outside the approved disturbance area for revegetation purposes associated with implementation of management plans under PA 06\_0014, or to any licensable water within the approved disturbance area that is collected as an incidental result of approved mining activities or to manage water quality.



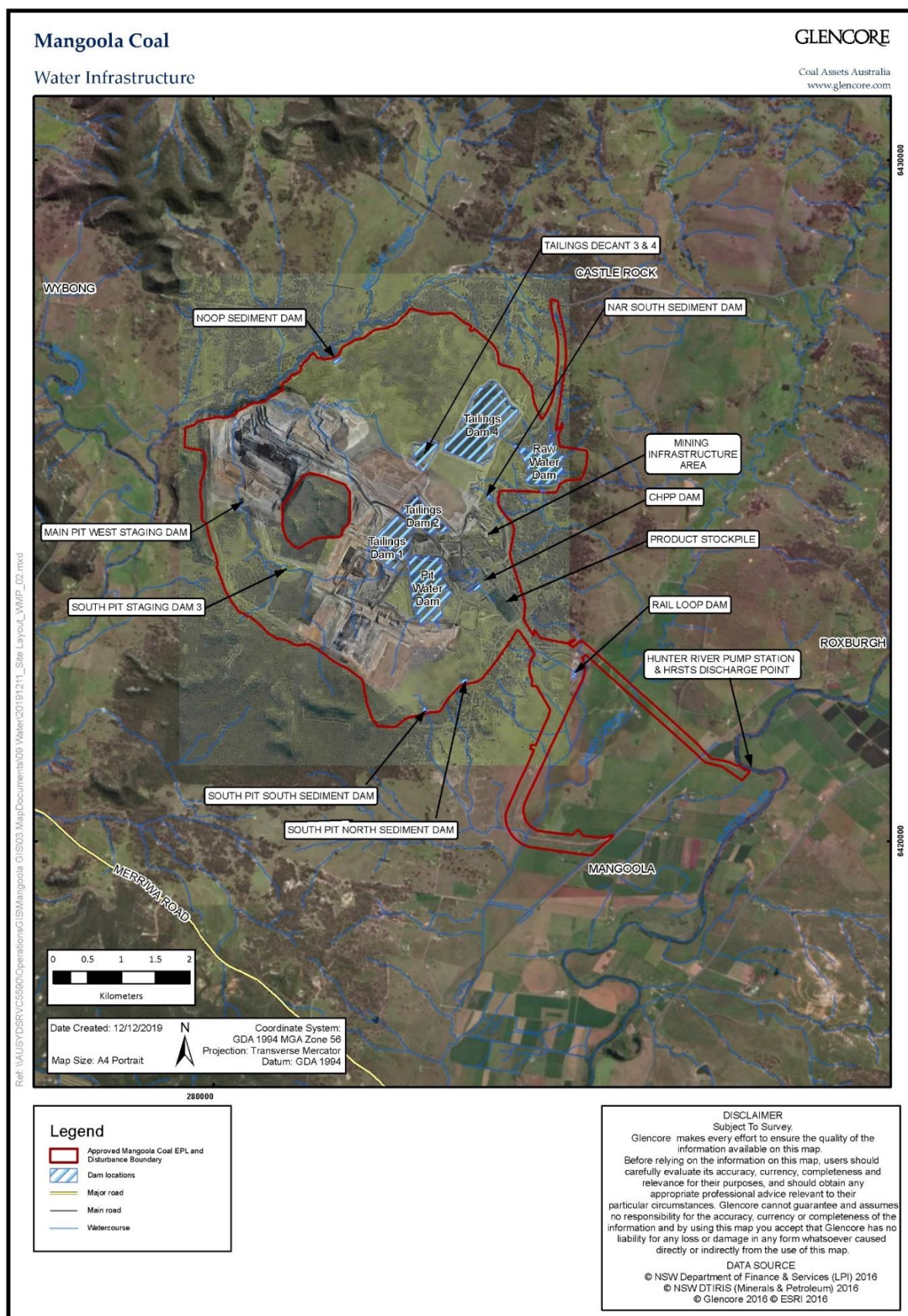


Figure 3.1

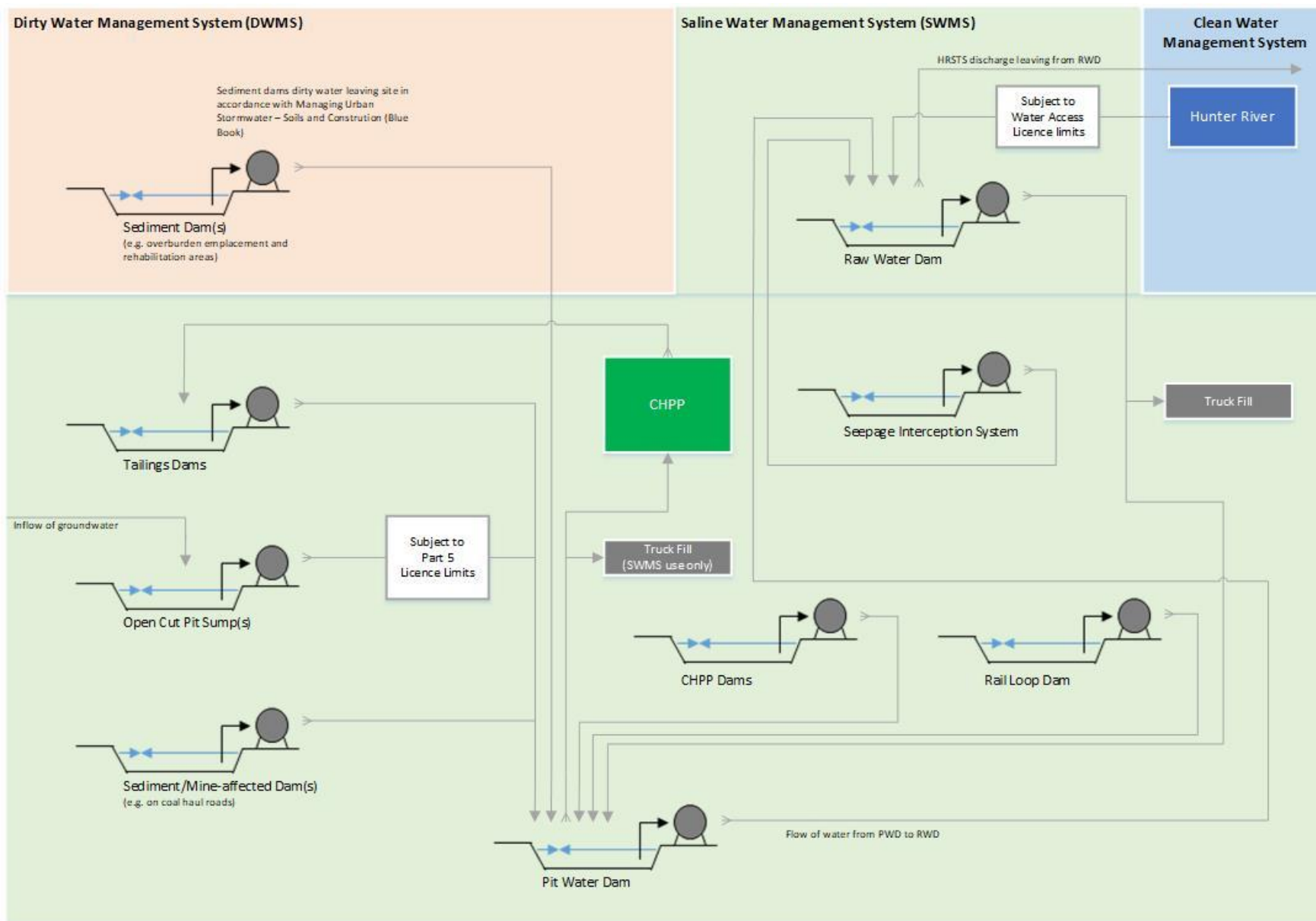


Figure 3.2

Water demands on site are proposed to be met from the following hierarchy of water sources:

1. On-site runoff from within the saline water system for preferential use for dust suppression and CHPP process water within the saline water system;
2. On-site runoff from within the dirty water system for use for dust within the entire site suppression and CHPP process water;
3. Groundwater inflows into the open cut pits for use for dust suppression and CHPP process water within the saline water system;
4. Clean water incidentally collected from undisturbed areas of the site for use for dust suppression and CHPP process water within within the entire site under Harvestable Rights provisions (refer to **Section 3.4**); and
5. Water from the Hunter River using existing water access licences or purchased on the open market.

The water management system has been designed so there are no discharges of saline water from the mine site. However, a Hunter River Salinity Trading Scheme discharge point for Mangoola coal was approved by the DPIE under the Modification 6 assessment process, on 28th April 2014. PA 06\_0014 was amended accordingly (Condition 31 (g) to (i) of Schedule 3) however the conditions only apply once EPL 12894 for Mangoola Coal has been amended to allow discharges into the Hunter River. Investigation of a licensed discharge point is currently underway.

Runoff from overburden dumps and rehabilitated areas are channelled, stored and treated as required in various sediment ponds prior to reuse for dust suppression or discharge offsite in accordance with EPL 12894 (refer to Section 3.6).

Hunter River water required is imported to site, under licence, via the Hunter River pipeline as indicated in Figure 3.1.

## 3.1 Dirty Water System

Runoff from areas disturbed by operations is contained within the dirty water system. Sources of dirty water include overburden emplacement areas and areas where rehabilitation is not established. This water is considered to potentially have high sediment loads, and subsequently captured by sediment dams. Sediment dams are designed with sufficient capacity to treat and/or capture runoff from the design storm event in accordance with the requirements outlined in the ESCP in Appendix C. Dirty water sediment dams are pumped back to the Pit Water Dam. Dirty water is used on site for dust suppression and CHPP operation.

Water levels within the sediment dams are pro-actively managed to maintain stormwater capacity and to minimise spills from storm events (refer to Section 3.6).

To proactively manage water levels within sediment dams, the following is undertaken:

- Sediment dam design is to be in accordance with the **ESCP in Appendix C** of the **WMP**;
- Pumping systems are installed and operational to meet pumping requirements, in accordance with the **ESCP in Appendix C** of the **WMP**; and
- Maintaining freeboard prior to rainfall events.

In accordance with the Blue Book (Landcom, 2004), water to be discharged is to contain less than 50 mg/L of total suspended solids (TSS) and pH, conductivity and total dissolved solids are to be monitored (refer to the SWMP in Appendix D). Water quality is to be confirmed via sampling prior to discharge (refer to Section 3.6).

All water is discharged via designed spillways on dirty water management dams which are designed and operated as per the Blue Book (refer to ESCP in Appendix C).



## 3.2 Saline Water System

The saline water system consists of water that has been in contact with coal, and therefore is likely to be saline. The saline water system consists of:

- groundwater inflows;
- rainfall/runoff into the mine pit;
- runoff from coal haul roads;
- runoff from ROM pads;
- tailings decant water; and
- dirty water runoff from the CHPP, MIA, stockpiles and rail load out area which is pumped back to the Pit Water Dam.

Runoff from within the saline water management system is used for dust suppression within the saline water management system and CHPP operations. The Pit Water Dam has been constructed primarily for the storage of saline water.

The Raw Water Dam is located in the Sandy Creek catchment. Water is pumped from the Hunter River (under licence) via the Hunter River Pump Station to the Raw Water Dam. Water is pumped from the Raw Water Dam to re-supply the Pit Water Dam, when required, to supplement process water for the mining operations. There is also an off-take pipeline from the Hunter River pipeline which is be utilised as required to supply raw water directly to the Pit Water Dam. The Raw Water Dam has a saline seepage interception system which is managed in accordance with Figure 2.9 of the SWGWRP in Appendix F.

The Raw Water Dam is used as a secondary Saline Management System storage dam to increase out of pit water storage during periods of high rainfall.

## 3.3 Clean Water System

The clean water system consists of clean water diversions installed to minimise run off collected in the dirty and saline water systems. The clean water system will also consist of rehabilitated catchments where water quality monitoring indicates that the catchment is adequately rehabilitated in accordance with the Blue Book.

## 3.4 Water Storages

Water at Mangoola Coal is stored in surface dams, open cut pits, tailings dams and sediment dams. The major on-site dam storages are listed in Table 3.1 and identified on Figure 3.1.

**Table 3.1 – Major On-Site Water Storages (>10ML Capacity)**

Storage	Capacity (ML)
Raw Water Dam	2566
Pit Water Dam	1707
CHPP Dam	25.1
Rail Loop Sediment Dam	28.3
Main Pit West Staging Dam <sup>#</sup>	51.6
NOOP Dam	46
South Pit Dam Staging 3 <sup>#</sup>	89
NAR South Sediment Dam	17
Decant Pit (Tailings Dams 3 & 4)	291



Tailings Pit 1	1800
Tailings Pit 2	4000
Tailings Pit 4	14300

# Water storage to be mined through over the life of the Water Management Plan.

## 3.5 Harvestable Rights Provisions

Under the Harvestable Rights regulations, landholders may harvest up to 10 per cent of the average regional runoff on the property. The conceptual surface water management layouts presented to support Modification 4 and Modification 6 (Umwelt, 2010 and WRM, 2013 respectively) presented a series of clean water diversions and sediment dams as part of the conceptual water management system. Both assessments also indicated that the collection of undisturbed/clean water runoff would be managed under Harvestable Rights Provisions.

Due to approved changes to the mine plan it is not feasible to construct the originally proposed clean water diversion drains in Anvil Creek catchment as a result of the topography. As such additional runoff from undisturbed/clean catchments will be incidentally collected by the approved mining operations.

Mangoola conducted a review of harvestable rights entitlement in 2016 based on increased continuous landholdings. An additional review of the Harvestable Rights provision was completed in 2019 to account for the updated version of the NSW Governments Hydroline program. Table 3.2 summarises the 2016 review and the 2019 appendix and highlights a maximum shortfall in harvestable rights during 2018. The shortfall further decreases in 2019 and 2020 with the reduced capture of clean water in the Anvil Creek catchment due to progression of mining.

**Table 3.2 Summary of 2019 Harvestable Rights Review**

Step	Description	Volume		
		2018 <sup>1</sup>	2019	2020
Determine Maximum Harvestable Rights Dam Capacity (MHRDC) as based on the Mangoola land holdings and associated average regional runoff rate published by DPI Water	10,199 ha x 0.7 ML/ha x 10%	714 ML	714 ML	714 ML
Identify existing farm dams that utilise part of the MHRDC (i.e. catchment dams or dams on 1st or 2nd order drainage lines that are not turkeys nest dams, pollution control or flood mitigation dams)	319 dams identified from review of aerial photography, volumes estimated using DPINR (2004) methods	-307 ML <sup>1</sup>	-323 ML	-323 ML
<b>Sub-Total</b>		<b>407 ML</b>	<b>391 ML</b>	<b>391 ML</b>
Identify clean water capture associated mining operations (100% capture at 0.7 ML/ha)	135 ha upstream of Raw Water Dam	-95 ML	-95 ML	-95 ML
	30 ha on Anvil Hill	-21 ML	-21 ML	-21 ML
	708 ha Anvil Creek catchment during 2018	-496 ML	-355 ML	-329 ML

Step	Description	Volume		
		2018 <sup>1</sup>	2019	2020
	507 ha Anvil Creek catchment during 2019			
	470 ha Anvil Creek catchment during 2020			
<b>Sub-Total</b>		<b>-612 ML</b>	<b>-471 ML</b>	<b>-445 ML</b>
<b>Total</b>	<b>-</b>	<b>-205 ML</b>	<b>-80 ML</b>	<b>-54 ML</b>

Schedule 3, Condition 25 of PA 06\_0014 states that:

*“The Proponent shall not use any licensable water from the Wybong Creek Water Source for Mining Purposes.*

*Note: this restriction does not apply to water used outside the project disturbance area for revegetation purposes associated with implementation of the Biodiversity Offset Strategy, or to any licensable water within the project disturbance area that is collected as an incidental result of approved mining activities.”*

The current mine design indicates that the worst-case year for collection of natural/undisturbed catchments into the water management system was 2018, when the operating pit mines through the lower reaches of Anvil Creek. During 2018, a maximum of approximately 706 hectares of undisturbed/natural catchment area within the Anvil Creek catchment was collected within the water management system. This area reduces to 470 hectares during 2020 and continues to reduce until development of the final landform which re-instates Anvil Creek.

Mangoola has licensed the 205 ML shortfall in harvestable rights provisions for water incidentally collected by approved mining by reallocating an unused proportion of the 798 shares held in the Wybong Creek Water Source (Unregulated River). Mangoola has transferred WAL 6296 (86 Shares) and WAL 9344 (164 Shares) to account for the temporary deficit in harvestable rights.

The 2019 analysis confirms the modelled reduction in the capture of clean water from 2018 to 2019. As the clean catchment is reducing in accordance with the approved mine designs, no further action is required.

## 3.6 Water Discharge Management

### 3.6.1 Overview

During normal operation, on-site water storage dams (e.g. sediment dams) are maintained at low levels to ensure that adequate capacity is available in the event of a storm event or period of prolonged rainfall, in accordance with the ESCP (Appendix C). In the event that the freeboard in dams reduces to less than one metre, the following steps are taken to prevent the need for offsite discharge:

- cease water extraction from the Hunter River;
- dirty water management system
  - transfer water between sediment dams to maintain maximum freeboards;
- saline water management system

- transfer water to Pit Water Dam (if sufficient freeboard);
- transfer water to open cut pit; and/or
- transfer water from Pit Water Dam to Raw Water Dam
- Discharge to Hunter River via HRSTS

Should this procedure still not provide sufficient storage capacity, water is to be discharged in accordance with EPL 12894 and the procedure outlined in Section 3.6.2.

### 3.6.2 Controlled Discharge

Prior to rainfall events or during dam construction, it may be practical to treat this sediment-laden water and discharge the treated water to the natural environment. In accordance with the Blue Book (Landcom, 2004), water to be discharged will contain less than 50 mg/L of total suspended solids (TSS) and pH, conductivity and total dissolved solids is to be monitored (refer to the SWMP in Appendix D).

### 3.6.3 Discharge under Hunter River Salinity Trading Scheme

Mangoola Coal has approval under PA 06\_0014 for the discharge of water from site under the Hunter River Salinity Trading Scheme (HRSTS). EPL 12894 has also been varied to include HRSTS requirements; however the discharge of saline water is not authorised by the EPA until Mangoola notifies the EPA in writing that the monitoring and telemetry equipment is installed as per the conditions of EPL 12894 (refer to Condition E1.4).

Following amendment EPL 12894 to include permissible discharge under the HRSTS, Mangoola Coal will amend this plan to include details of when mine water discharge is permitted under the HRSTS scheme from the Mangoola Coal discharge point. Mangoola will implement all reasonable and feasible measures to minimise the need to use the HRSTS discharge point.

### 3.6.4 Uncontrolled Discharge

For all foreseen and unforeseen events related to an uncontrolled discharge, the response will be managed in accordance with the relevant TARP protocol under the SWGWRP (refer to Appendix F).

## 3.7 Wastewater

Sewage treatment at the MIA facility is provided by dedicated Wastewater Treatment Plant (WWTP). The WWTP has a primary and secondary treatment system and is operated in accordance with Muswellbrook Shire Council approval WTA No: 5/2010. Effluent from the WWTP is reused on site for CHPP operation and dust suppression.

## 4 Site Water Balance

### 4.1 Water Balance Overview

The site water balance model for Mangoola Coal is based on current operational information and water flow data. A water balance is a representation of all inflows, outflows and changes in storage for the water management system. It provides an understanding of the need for water supply, storage and releases and the impacts of seasonal and climate change.

The site water balance is compiled to demonstrate compliance with the requirements of PA 06\_0014, EPL 12894 and water licence conditions under which Mangoola Coal operates. The site water balance is based on the following data collected, including but not exclusively:

- daily rainfall;
- catchment areas;
- water usage (e.g. in CHPP);
- water used for dust suppression;
- water imported to site (including Hunter River water and potable water);
- pit water transfers and observations of groundwater make;
- tailings decant volumes;
- regular water levels in the major on-site water storages (refer to Table 3.1) and operational tailings dams;
- Production data; and
- HRSTS discharges (if applicable).

This data is collected from various gauges and meters on pumping systems and water level sensors and survey levels on dams.

The estimate of the volume of water sourced from the hard rock and alluvial aquifers requires supporting information from groundwater monitoring bores, and information provided by a suitably qualified specialist based on a groundwater model that covers the Mangoola Coal area (refer to Appendix E). Section 4.4 outlines how the water balance model is also used to determine if surface water from Big Flat Creek has been captured in the pit.

The site water balance includes an estimated volume of water re-used on site, along with any new or updated reduction measures that have been implemented.

The site water balance is used to manage the risks associated with the management, storage and transfer of water for the operation of Mangoola Coal and the prevention of material harm to the surrounding environment.

Reporting of the water balance is undertaken in accordance with section 9.3 of this document. Reporting is also undertaken in accordance with the Appendix F – Surface Water Groundwater Response Plan for aspects of the water balance model when triggered.

## 4.2 Water Inputs and Outputs

The key water inputs are rainfall runoff, extraction from the Hunter River, groundwater inflow to the pit and tailings return water which is transferred to the Pit Water Dam. The primary water source for site water demands (including the primary site water demands of the CHPP and haul road dust suppression) is the Pit Water Dam. Raw water is transferred to the Pit Water Dam from the Raw Water Dam when water inflows are insufficient to match demands. Raw Water Dam water levels are maintained by pumping from the Hunter River when necessary.

The key water outputs at Mangoola Coal are direct evaporation, CHPP supply and consequent water entrained in product coal and tailings, and water cart usage for haul road dust suppression. Potential key water outputs are uncontrolled or controlled discharges from site dams to the natural environment. Water may be transferred from the Pit Water Dam to the Raw Water Dam and potentially discharged to the Hunter River.

In accordance with Schedule 3 Condition 27A of PA 06\_0014, Mangoola will implement all reasonable and feasible measures on the site to minimise the need to discharge saline water to the Hunter River under the Hunter River Salinity Trading Scheme. Mangoola implements measures to manage surplus saline water by reusing it for coal washing and dust suppression. Discharges to the Hunter River are not required under average climate conditions, only under period of prolonged wet weather.

## 4.3 Water Security and Reliability

To assist in determining the likely future water security and reliability of Mangoola Coal, a predicted water balance model for each of the conceptual mine plans for Years 2, 5 and 10 was undertaken using a daily time-step historical simulation water balance model, GOLDSIM. This model assists in determining the scale of the likely water deficit or surplus that is likely given the anticipated operations. The throughput of bypass coal product has a significant effect on the site water demand for CHPP operations. Accordingly, two primary scenarios were developed to assess the impact of the different water demands. The scenarios modelled for the water balance are presented below:

- Scenario 1 – high water demand. Assumes a maximum of 13.5 Mtpa of ROM coal washed through the CHPP. Maximum water demand would occur under this scenario; and
- Scenario 2 – low water demand. Assumes up to 8 Mtpa of ROM coal washed through the CHPP, with the remaining 5.5 Mtpa of ROM coal bypassing the CHPP as bypass coal product (i.e. unwashed).

These scenarios provide the likely potential upper and lower bounds of site water demand. A summary of the predicted water balance for Mangoola Coal for key mine years is shown in Table 4.1. The site water balance indicates a gross water deficit that is proposed to be met using water extracted from the Hunter River.

**Table 4.1 – Mangoola Coal Predicted Water Balance Summary (Average Rainfall Year)**

	Year 2	Year 5	Year 10	Year 10 – high runoff
<b>1 – high water demand</b>				
Gross Water Inputs	2,677	2,979	2,876	3,062
Gross water Outputs	3,176	3,405	3,309	3,382
Gross Water Deficit	499	425	432	284
<b>2 – low water demand</b>				
Gross Water Inputs	2,141	2,490	2,385	2,699
Gross water Outputs	2,369	2,680	2,585	2,846
Gross Water Deficit	228	189	199	147

As shown in Table 4.1, Mangoola Coal proposes to utilise water from the Hunter River to meet the potential water deficit. This water deficit is supplemented with water stored on site during prolonged dry periods. Mangoola Coal currently holds approximately 2783 Hunter Regulated River water shares from the Hunter River Pumps Station (20WA211008), including 17ML of high security shares and 8ML of supplementary shares.

In addition to recycling water and utilising Hunter River allocation, Mangoola Coal intends to use a number of operational responses to address potential supply shortfalls. One or more of these actions could be investigated in the event of extended drought:

- Review of haul road dust suppression water demand by use of dust suppression agents;
- Review of CHPP water demand by increasing bypass coal (due to the significantly lower unit water demand compared to washed coal);
- Reduce site wide water demand by scaling back production; and/or
- Investigate alternative water supplies.

## 4.4 Big Flat Creek Surface Water

Previous assessment have concluded that surface water from Big Flat Creek will not enter the mine water system. The process to validate this prediction are:

- As part of the annual water balance model update, predictions of pit inflows will be compared with recorded pit pumping records.
- If the water balance cannot be resolved, the bimonthly water quality sampling will be examined using EC and nutrients levels in the Big Flat Creek surface waters, the colluvium and regolith bores in Big Flat Creek compared with the pit water quality.
- If the results indicate that there could have been inflows to the pit from Big Flat Creek a hydrogeologist will be engaged to reassess the groundwater model and the potential from inflows to the pit and surface water allocations will be obtained for the predicted loss.

## 5 Erosion and Sediment Control

Erosion and sediment control is to be undertaken in accordance with the **ESCP** provided in **Appendix C**. The ESCP applies to all activities undertaken by Mangoola Coal within the Mangoola Coal boundary. The purpose of the ESCP is to fulfil the requirements of PA 06\_0014 and EPL 12894 under which Mangoola Coal operates and to fulfil other relevant statutory requirements that are applicable to Mangoola Coal.

The objectives of the ESCP are to ensure that appropriate procedures and programs of work are in place to:

- meet the requirements of Managing Urban Stormwater: Soils and Construction (the Blue Book), Volume 1 and Volume 2 (Landcom 2004 and Department of Environment and Climate Change (DECC) 2008).
- identify activities that could cause soil erosion and generate sediment (refer to **Section 2.2** of the **ESCP**);
- 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 (refer to **Section 3.0** of the **ESCP**); and
- ensure erosion and sediment control structures are appropriately maintained (refer to **Section 4.0** of the **ESCP**).

## 6 Monitoring

### 6.1 Surface Water

Surface water monitoring is to be undertaken in accordance with the SWMP provided in Appendix D. The SWMP outlines the baseline monitoring, impact assessment criteria and investigation and reporting protocols for potential surface water impacts at Mangoola Coal. The purpose of the SWMP is to fulfil the requirements of PA 06\_0014, EPL 12894 and other relevant statutory requirements that are applicable to Mangoola Coal (refer to Section 1.5 of WMP). The key objectives of the SWMP include:

- detail the integrated surface water monitoring strategy for Mangoola Coal (refer to **Section 3.0** of the **SWMP**);
- provide detailed historical baseline data on surface water quality in creeks and other waterbodies that could potentially be affected by Mangoola Coal operations (refer to **Section 2** of the **SWMP**);
- provide methods to monitor and assess stream health and channel stability in creeks (refer to **Section 3.4 and 3.5** of the **SWMP**);
- outline relevant surface water and stream health impact assessment criteria and establish a protocol for the assessment and response to monitoring data (refer to **Section 2.2** of the **SWMP** and **Appendix F**);
- provide methods to assess compliance with conditions of PA 06\_0014, EPL 12894 and legislation relating to surface waters (refer to **Section 4.0** of the **SWMP**);
- outline the monitoring protocol to be implemented in the event of the potential for any release from the site to determine whether the quality is suitable for discharge (refer to **Section 3.7** of the **SWMP**);
- monitor the effectiveness of the Erosion and Sediment Control Plan as it relates to water quality (refer to **Section 3.6** of the **SWMP** and **Appendix C**); and
- outline the reporting requirements for the results of the monitoring program including monitoring of the internal water transfer system comprising of Pit Water Dam, Raw Water



Dam, Tailings Dam and other sediment dams located across the operation (refer to **Section 5.0** of the SWMP).

The SWMP includes monitoring of the following elements of the Mangoola Coal water management system and surrounding creeks:

- surface water quality and flows in upstream and downstream watercourses;
- channel stability in upstream and downstream watercourses;
- stream health conditions in upstream and downstream watercourses;
- on site water management; and
- discharges of water from the site.

If an exceedance of water quality criteria or trigger levels is identified, then the SWGWRP provided in Appendix F is to be activated as detailed in Section 8.0.

\*Note that Schedule 3 Conditions 31 (g) – (i) only apply once the EPL for the project has been amended to allow discharges into the Hunter River.

## 6.2 Groundwater

Groundwater monitoring is undertaken in accordance with the GWMP provided in Appendix E. The GWMP outlines the baseline monitoring, impact assessment criteria and investigation and reporting protocols for potential groundwater impacts at Mangoola Coal. The purpose of the GWMP is to facilitate compliance with the conditions of the PA 06\_0014 and groundwater licences held by Mangoola Coal. The GWMP has also been developed to enable Mangoola Coal to measure, assess and respond to changes to the groundwater regime that may be attributable to the mining activities and are outside of the predicted impacts to groundwater. The key objectives of the GWMP are to:

- provide historical baseline monitoring data for the surrounding aquifers and regional groundwater (refer to **Section 3** of the **GWMP**);
- provide groundwater impact assessment criteria (refer to **Section 4** of the **GWMP**);
- provide a monitoring program for groundwater levels, groundwater quality and groundwater dependent ecosystems (refer to **Section 3** of the **GWMP**);
- provide methods to estimate the groundwater contribution to the Mangoola Coal water balance through inflow into the open cut workings (refer to **Section 3.3** of the **GWMP**);
- provide methods to monitor and assess groundwater pressure response in the surrounding coal measures (refer to **Section 5.1** of the **GWMP**);
- provide methods to monitor and assess groundwater level response in the potential adjacent alluvial aquifers associated with Wybong Creek (refer to **Section 5.1** of the **GWMP**); and
- outline the procedures for reporting results of the monitoring program and model validation (refer to **Section 5** of the **GWMP**).

If an exceedance of any groundwater criteria or trigger levels is identified, then the SWGWRP provided in Appendix E is to be activated as detailed in Section 8.0.

## 7 Inspections and Maintenance

The inspection and maintenance of the water management system is essential to achieving the objectives of this plan. The specific inspection and maintenance requirements for each component of the water management system are addressed in the **ESCP** provided in **Appendix C** and the **SWMP** provided in **Appendix D**.



## 8 Surface Water and Groundwater Response

The **SWGWRP** provided in **Appendix F** has been developed in accordance with Schedule 3, Condition 33 of PA 06\_0014. The purpose of this **SWGWRP** is to outline the response and investigation procedures to be implemented in the event of any adverse impacts or potential impacts on the surrounding surface water and groundwater environment. The objective of the **SWGWRP** is to provide:

- a protocol for the investigation, notification and mitigation of any exceedances of the surface water, stream health and groundwater impact assessment criteria;
- measures to mitigate and/or compensate potentially affected landowners with privately owned groundwater bores within the predicted drawdown impact zone identified in the EA, including provision of alternative supply of water to the affected landowner that is equivalent to the loss attributed to the project;
- measures to mitigate and/or compensate potentially affected landowners for the loss of surface water flows in Sandy Creek, Big Flat Creek and Wybong Creek downstream of the project;
- measures to minimise, prevent or offset groundwater leakage from the Big Flat Creek alluvial aquifer that are inconsistent with the predicted impacts and licenses held by Mangoola Coal Operations;
- measures to mitigate any direct hydraulic connection between the backfilled open cuts and the Big Flat Creek alluvium if the potential for adverse impacts is detected; and
- a contingency plan for isolating the Big Flat Creek alluvium from Anvil Creek alluvium and mining areas in the event that it is required.
- Outline the site procedures to be followed if any potential impacts outside those predicted in the EIS are detected

The **SWGWRP** provides response protocols for the following potential impacts as identified in the EIS:

- exceedances of impact assessment criteria;
- surface water and groundwater impacts on adjacent landowners;
- interception of alluvial aquifers, extraction above predictions and/or extraction above license limits; and
- overflow from water management system and/or unauthorised discharge.

## 9 Reporting and Review

### 9.1 Overview

As per Schedule 5, Condition 5 of PA 06\_0014, Mangoola Coal will publish monthly surface water quality monitoring, bi-monthly groundwater quality monitoring and groundwater level monitoring undertaken in accordance with **SWMP** and **GWMP** to the company website as a regular measure of performance.

## 9.2 Incident Reporting

All hazards, near misses and incidents are reported to the supervisor of the relevant work area immediately. In accordance with Schedule 5, Condition 4 of PA 06\_0014, Mangoola Coal will notify the Secretary and any other relevant agencies as soon as practicable of the incident and provide within seven days a detailed report on the incident. Incident reporting procedures relating an uncontrolled discharge are outlined in the **SWGWRP (Appendix F)**.

Any incidents resulting or having the potential to result in material harm to the environment, as defined by Section 147 of the Protection of the Environment Operations Act New South Wales (1997) are managed in accordance with the Mangoola Coal Pollution Incident Response Management Plan (PIRMP).

## 9.3 Annual Review

The Annual Review is prepared in accordance with Schedule 5, Condition 6 of PA 06\_0014.

Water Balance Modelling is reported as part of the annual review as per Schedule 3, Condition 29 (a) of PA 06\_0014.

## 9.4 Community Complaints

Mangoola Open Cut maintains a centralised location to record details of relevant external stakeholder communications. A Community Response Line (1800 014 339) is in operation 24 hours per day, seven days a week and is regularly advertised in a local newspaper. Complaints are recorded and investigated. Follow up communication with the complainant is undertaken to communicate the outcome of complaint investigations. A monthly summary of complaints is uploaded to the website as per Schedule 5, Condition 11 of PA 06\_0014.

## 9.5 Water Management Plan Review

This WMP and supporting plans are reviewed and resubmitted to DPIE every three years, or earlier if required, for approval by the Secretary. Any changes made to the WMP as a result of the review is made in consultation with EPA and DPI Water. The WMP will reflect changes in environmental requirements, technology and operational procedures. Updated versions of the approved WMP are made publicly available on the Mangoola Coal website ([www.mangoolamine.com.au](http://www.mangoolamine.com.au)) once approved by the Secretary.

In accordance with Schedule 5, Condition 9 of PA 06\_0014, Mangoola Coal will review, and if necessary revise, the strategies, plans, and programs required under PA 06\_0014 to the satisfaction of the Secretary within 3 months of:

- a) the submission for audit under Schedule 5, Condition 7 of PA 06\_0014;
- b) the submission for Annual Review under Schedule 5, Condition 6 of PA 06\_0014;
- c) the submission for incident report under Schedule 5, Condition 4 of PA 06\_0014; and
- d) any modification to the conditions of PA 06\_0014.

Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted to the Secretary for approval.

## 10 References

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## Appendix A - Authority Correspondence

## Appendix B - Regulatory Requirements

**Table A: Project Approval 06\_0014 Conditions**

Project Approval Condition	Section of Document
<b>SCHEDULE 3</b>	
<b>WATER</b>	
<i>Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Proponent is required to obtain the necessary water licences for the project.</i>	1.5.6
<b>Water Supplies</b>	
25. The Proponent must not use any licensable water from the Wybong Creek Water Source for mining purposes.	1.5.7
<i>Note: This restriction does not apply to water used outside the project disturbance area for revegetation purposes associated with implementation of the Biodiversity Offset Strategy, or to any licensable water within the project disturbance area that is collected as an incidental result of approved mining activities.</i>	3.5
26. The Proponent must ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of mining operations to match its available water supply, to the satisfaction of the Secretary.	4.3
<b>Water Pollution</b>	
27. Unless an EPL or the EPA authorises otherwise, the Proponent must comply with Section 120 of the POEO Act and the <i>Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002</i> .	3.6
27.A The Proponent must implement all reasonable and feasible measure on the site to minimise the need to discharge saline water to the Hunter River under the Hunter River Salinity Trading Scheme.	4.2
<b>Site Water Management Plan</b>	
28. The Proponent must prepare and implement a Site Water Management Plan for the project to the satisfaction of the Secretary. This plan must: <ul style="list-style-type: none"> <li>a) be prepared in consultation with EPA and DPI Water by suitably qualified expert/s whose appointment/s have been approved by the Secretary;</li> <li>b) include: <ul style="list-style-type: none"> <li>• a Site Water Balance;</li> <li>• an Erosion and Sediment Control Plan;</li> <li>• a Surface Water Monitoring Plan;</li> <li>• a Ground Water Monitoring Program; and</li> <li>• a Surface and Ground Water Response Plan.</li> </ul> </li> </ul> <p>The Proponent must implement the approved management plan as approved from time to time by the Secretary.</p>	Appendix A  4.0 Appendix C Appendix D Appendix E Appendix F

Project Approval Condition	Section of Document
<b>Site Water Balance</b>  29. The Site Water Balance must: <ul style="list-style-type: none"> <li>a) include details of:               <ul style="list-style-type: none"> <li>• sources and security of water supply;</li> <li>• water use on site;</li> <li>• water management on site;</li> <li>• off-site water transfers;</li> <li>• reporting procedures; and</li> </ul> </li> <li>(b) investigate and describe measures to minimise water use by the project.</li> </ul>	4.0
<b>Erosion and Sediment Control</b>  30. The Erosion and Sediment Control Plan must: <ul style="list-style-type: none"> <li>a) be consistent with the requirements of the Department of Housing's Managing Urban Stormwater: Soils and Construction manual;</li> <li>b) identify activities that could cause soil erosion and generate sediment;</li> <li>c) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;</li> <li>d) describe the location, function, and capacity of erosion and sediment control structures; and</li> <li>e) describe what measures would be implemented to maintain the structures over time.</li> </ul>	<b>Appendix C:</b> 3.0  2.2 3.3  3.4  4.0
<b>Surface Water Monitoring</b>  31. The Surface Water Management and Monitoring Plan must include: <ul style="list-style-type: none"> <li>a) detailed baseline data on surface water flows and quality in creeks and other water bodies that could potentially be affected by the project;</li> <li>b) surface water and stream health impact assessment criteria;</li> <li>c) a program to monitor surface water flows, quality and impacts on water users (upstream and downstream of the project in Anvil Creek, Sandy Creek, Big Flat Creek and Wybong Creek);</li> <li>d) a program to assess stream health conditions in Anvil Creek, Sandy Creek, Big Flat Creek and Wybong Creek;</li> <li>e) a program to monitor channel stability in Anvil Creek, Sandy Creek and Big Flat Creek; and</li> <li>f) reporting procedures for the results of the monitoring program.</li> <li>g) a program to monitor, and a strategy to minimise, any saline water discharges to the Hunter River under the <i>Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002</i>;</li> <li>h) a Saline Dispersion Study for discharges to the Hunter River prepared and implemented to the satisfaction of the EPA; and</li> <li>i) a program to notify all downstream landowners within 2 kilometres of the discharge point prior to discharging saline water to the Hunter River.</li> </ul> <p><i>Note: Conditions (g) – (i) only apply once the EPL for the project has been amended to allow discharges into the Hunter River.</i></p>	<b>Appendix D:</b>  2.0  2.2, 3.5 3.3  3.5  3.4  (WMP 9.0)  3.7.2  3.7.2  3.7.2

Project Approval Condition	Section of Document
<p><b>Groundwater Monitoring</b></p> <p>32. The Groundwater Monitoring Program must include:</p> <ul style="list-style-type: none"> <li>a) detailed baseline data, based on sound statistical analysis, to benchmark the pre-mining natural variation in groundwater levels, yield and quality (including privately owned groundwater bores within the predicted drawdown impact zone identified in the EA);</li> <li>b) groundwater impact assessment criteria (including for monitoring bores and privately owned bores);</li> <li>c) a program for accurately delineating the boundary of the Big Flat Creek alluvial aquifer in any areas intersected by mining, including plans for isolation of the mining pit from the alluvium at least 6 months before mining within 150 metres of the alluvium;</li> <li>d) a program to monitor: <ul style="list-style-type: none"> <li>• impacts on the groundwater supply of potentially affected landowners;</li> <li>• impacts on the Big Flat Creek and Wybong Creek alluvial aquifers;</li> <li>• impacts on groundwater dependent ecosystems and riparian vegetation;</li> <li>• the volume of ground water seeping into the open cut mine workings;</li> <li>• regional ground water levels and quality in the alluvial, coal seam, and overburden/interburden aquifers; and</li> <li>• the groundwater pressure response in the surrounding coal measures.</li> </ul> </li> <li>e) procedures for the verification of the groundwater model; and</li> <li>f) reporting procedures for the results of the monitoring program and model verification.</li> </ul>	<p><b>Appendix E:</b></p> <p>2.0</p> <p>4.0</p> <p>2.1, 5.1</p> <p>3.0</p> <p>5.1 (WMP 9.0)</p>
<p><b>Surface and Ground Water Response Plan</b></p> <p>33. The Surface and Ground Water Response Plan must include:</p> <ul style="list-style-type: none"> <li>a) a protocol for the investigation, notification and mitigation of any exceedances of the surface water, stream health and groundwater impact assessment criteria;</li> <li>b) measures to mitigate and/or compensate potentially affected landowners with privately owned groundwater bores within the predicted drawdown impact zone identified in the EA, including provision of alternative supply of water to the affected landowner that is equivalent to the loss attributed to the project;</li> <li>c) measures to mitigate and/or compensate potentially affected landowners for the loss of surface water flows in Sandy Creek, Big Flat Creek and Wybong Creek downstream of the project;</li> <li>d) measures to minimise, prevent or offset groundwater leakage from the Big Flat Creek alluvial aquifer;</li> <li>e) measures to mitigate any direct hydraulic connection between the backfilled open cuts and the Big Flat Creek alluvium if the potential for adverse impacts is detected;</li> <li>f) a contingency plan for isolating the Big Flat Creek alluvium from Anvil Creek alluvium and mining areas in the event that it is required; and</li> <li>g) the procedures that would be followed if any unforeseen impacts are detected during the project.</li> </ul>	<p><b>Appendix F:</b></p> <p>Figure 2.1, 2.2 &amp; 2.6</p> <p>Figure 2.8</p> <p>Figure 2.3, 2.5</p> <p>Figure 2.7 Figure 2.7</p> <p>Figure 2.7 2.0</p>



Project Approval Condition	Section of Document
<p><b>Schedule 5 Condition 3</b></p> <p>The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:</p> <ul style="list-style-type: none"> <li>(a) detailed baseline data (where available);</li> <li>(b) a description of: <ul style="list-style-type: none"> <li>• the relevant statutory requirements (including any relevant approval, licence or lease conditions);</li> <li>• any relevant limits or performance measures/criteria;</li> <li>• 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;</li> </ul> </li> <li>(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;</li> <li>(d) a program to monitor and report on the: <ul style="list-style-type: none"> <li>• impacts and environmental performance of the project;</li> <li>• effectiveness of any management measures (see c above);</li> </ul> </li> <li>(e) a program to investigate and implement ways to improve the environmental performance of the project over time;</li> <li>(f) a protocol for managing and reporting any: <ul style="list-style-type: none"> <li>• incidents;</li> <li>• complaints;</li> <li>• non-compliances with statutory requirements; and</li> <li>• exceedances of the impact assessment criteria and/or performance criteria; and</li> </ul> </li> <li>(g) a protocol for periodic review of the plan.</li> </ul>	<p>WMP ESCP SWMP GWMP SWGWRP</p>
<p><b>Schedule 5 Condition 4</b></p> <p>The Proponent must immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, the Proponent must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.</p>	<p>WMP 9.2 SWGWRP</p>
<p><b>Schedule 5 Condition 5</b></p> <p>The Proponent must provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval.</p>	<p>WMP 9.1</p>

Project Approval Condition	Section of Document
<p><b>Schedule 5 Condition 6</b></p> <p>By the end of March each year, or other timing as may be agreed by the Secretary, the Proponent must submit a report to the Department reviewing the environmental performance of the project to the satisfaction of the Secretary. This review must</p> <ul style="list-style-type: none"> <li>(a) describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year;</li> <li>(b) include a comprehensive review of monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the: <ul style="list-style-type: none"> <li>• relevant statutory requirements, limits or performance measures/criteria;</li> <li>• monitoring results of previous years;</li> <li>• relevant predictions in the documents listed in condition 2 of Schedule 2;</li> </ul> </li> <li>(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;</li> <li>(d) identify any trends in monitoring data over the life of the project;</li> <li>(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential causes of any significant discrepancies; and</li> <li>(f) describe what measures will be implemented over the next year to improve the environmental performance of the project.</li> </ul>	WMP 9.3

Table B – EPL 12894 Conditions

Condition No.	EPL Condition	Section of Document
O5	<p>Saline water management</p> <p>O5.1 A saline water management system must be established for the containment of any water that has come into contact with coal or coal tailings, including saline groundwater seepage, coal stockpile runoff and runoff from coal haul roads.</p> <p>O5.2 Water from the saline water management system must not be discharged from the site and must not be used in areas that drain to the site's non-saline water management system.</p>	WMP 3.0, SWMP 3.7.2 GWMP 3.4
M1	Monitoring records.	WMP 9.0
M2	Requirement to monitor concentration of pollutants discharged.	SWMP 3.7 GWMP 3.2
M3	Testing methods – concentration limits.	SWMP 2.2 GWMP 4.2
R2	<p>Notification of environmental harm</p> <p>R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.</p> <p>R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.</p>	WMP 9.1

Table C – EPL 12894 Monitoring Points

<b>EPA Identification No.</b>	<b>Type of Monitoring Point</b>	<b>Description of Location</b>
6	Ambient Surface Water Monitoring	Anvil Creek (SW8) – pending variation for relocation to SW07 outside of disturbance boundary
7	Ambient Surface Water Monitoring	Sandy Creek (SW16)
8	Ambient Surface Water Monitoring	Big Flat Creek Tributary (SW3)
9	Ambient Surface Water Monitoring	Wybong Creek (SW4)
10	Groundwater Monitoring	Big Flat Creek (GW4)
11	Groundwater Monitoring	Wybong Creek (GW26)
12	Discharge point under the Hunter River Salinity Trading Scheme; Discharge quality and volume monitoring	Outlet of HRSTS discharge pipe
13	Ambient Surface Water Monitoring	Hunter River – downstream of discharge point
14	Ambient Surface Water Monitoring	Hunter River – upstream of discharge point

Table D – Mining Lease 1626 Conditions

ML1626 Conditions	Section of Document
<b>Environmental Harm</b>  2. The proponent shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation or rehabilitation of the development.	WMP ESCP SWMP GWMP SWGWRP
<b>Prevention of Soil Erosion and Pollution</b>  18. Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or groundwaters. The lease holder must observe and perform any instruction given by the Director-General in this regards.	WMP ESCP

Table E – Exploration Lease 5552 and Assessment Lease No. 9 Conditions

EL5552 & AL9 Conditions	Section of Document
<b>Environmental Harm</b>  2. The licence holder must implement all reasonably practicable measures to prevent and/or minimise harm to the environment that may result from the conduct of any prospecting operations under this exploration licence.	ESCP WMP SWMP GWMP SWGWRP
<b>Erosion and Sediment Control</b>  10. The licence holder must prevent erosion and pollution of watercourses resulting from the conduct of prospecting operations by implementing effective erosion and sediment control measures.	ESCP
11. The planning, design and construction of erosion and sediment control measures must be conducted generally in accordance with Managing Urban Stormwater: Soils and Construction (DECC 2007), as amended or replaced from time to time.	ESCP

EL5552 & AL9 Conditions	Section of Document
<p><b>Groundwater Monitoring and Modelling Plan</b></p> <p>12. Prior to conducting prospecting operations involving the construction and use of boreholes, the licence holder must:</p> <p>a) Prepare a Groundwater Monitoring and Modelling Plan in consultation with the NSW Office of Water;</p> <p>b) Ensure that the Groundwater Monitoring and Modelling Plan:</p> <p>i) describes methods for identifying aquifers, their depths, behaviour, containing layers and connectivity with surrounding aquifers or surface water systems;</p> <p>ii) describes methods for collection of data relevant to the type, quantity and quality of water contained within aquifer systems likely to be encountered during prospecting operations;</p> <p>iii) provides for the future development of a conceptual model of regional groundwater behaviour;</p> <p>iv) provides for the future development of a calibrated computer model of regional groundwater behaviour, to enable the impacts of any proposed mining operations to be assessed;</p> <p>v) describes how records of all data collected will be maintained;</p> <p>vi) describes the staging process for implementation of the plan; and</p> <p>vii) is prepared in accordance with any additional requirements prescribed by the Secretary.</p> <p>c) The Groundwater Monitoring and Modelling Plan must address the requirements identified in b)i) to b)vii) in a level of detail commensurate with the scale, timing and potential impact of proposed operations;</p> <p>d) Have the Groundwater Monitoring and Modelling Plan approved by the Minister; and</p> <p>e) Implement and comply with the approved Groundwater Monitoring and Modelling Plan.</p> <p>Note. The Groundwater Monitoring and Modelling Plan is required to ensure:</p> <p>(a) there is sufficient groundwater data available to assess future operations against the Aquifer Interference Policy (NSW Office of Water, 2012), as amended or replaced from time to time; and</p> <p>(b) 2 years of baseline data is available prior to submitting an application for any future production operations.</p> <p>An application may be made to the Department at any time to vary an approved Groundwater Monitoring and Modelling Plan.</p>	<p>AL9 Groundwater Modelling and Monitoring Plan prepared separately</p>

Table F – Water Licence 20BL172598 Conditions

Water Licence 20BL172598 Condition	Document
1. The licensee must measure the volume of water taken by the work by measuring device(s) as approved by the NSW Office of Water. The licensee must submit the results of monitoring to the NSW Office of Water on an annual basis. The report must compare the volume and quality of ground water extracted, and the extent of depressurisation caused by the work, to predictions of groundwater inflows and depressurisation made in environmental assessment(s) for the project.	GWMP 3.3 WMP 9.0
2. The assessment procedure required in condition 1 must quantify the volume of water, if any, intercepted from connected alluvium to Wybong and /or Big Flat Creek. The licensee is responsible to replace any intercepted connected alluvial groundwater's intercepted by the work, and to satisfy the NSW Office of Water that such alluvial groundwater is replenished or by other means, as agreed to by the NSW Office of Water.	GWMP 3.3 & 5.1
3. The licensee must develop a groundwater management plan (GMP) within 3 months of approval of the licence which details monitoring, contingency and remediation measures for the operation of the work, and to verify environmental impact predictions made within the environmental assessment of the operation. The licensee must undertake all monitoring required by the monitoring plan, approved by the NSW Office of Water.	GWMP SWGWRP
4. Within the GMP required in condition 3 above, the licensee shall submit a groundwater monitoring and contingency schedule and programme of works to the satisfaction of the NSW Office of Water. The GMP must include, but is not limited to:  (A) The release criteria applicable to the objectives of the GMP (B) Quantity and quality parameters to be monitored, sampling frequency (C) Site locations (D) Water table levels, water balance and water quality (E) Analytes to be monitored (F) Procedures for sampling and testing (G) Frequency of readings in relation to all specified parameters (H) Levels of readings indicating source of groundwater inflow and levels within the Mangoola workings (I) Procedures for investigation of any detected contamination of groundwater's (J) Periodic monitoring of groundwater quality (K) Details of a baseline survey to establish groundwater quality prior to commencement of operations (L) Details of groundwater quality limits that would indicate contamination from the operations (M) Details of any hydrological impact upon Wybong and/or Big Flat Creek and any connected alluvial groundwater (N) Describe how the data may be used to determine the impacts of the operation upon the hydrological balance, both within the operational area, and upon Wybong and/or Big Flat Creek (O) A contingency plan in the event that contamination occurs as a result of activities associated with the development.	GWMP          SWGWRP GWMP  GWMP   SWGWRP SWGWRP

Water Licence 20BL172598 Condition	Document
<p>5. The licensee must ensure that an independent environmental audit is carried out at the end of the licence period. The audit must;</p> <p>(A) Be carried out in accordance with ISO 14001 - Guidelines and General Principles for Environmental Auditing and ISO 14001 - Procedures for Environmental Auditing</p> <p>(B) Assess compliance with the requirements of the licence</p> <p>(C) Review actual impacts of the extractions on any aquifers, groundwater dependant eco-systems and any streams in the area</p> <p>(D) Make comparisons between actual and predicted impacts (modelled results)</p> <p>(E) Be conducted by an independent certified auditor, nominated by the licence holder and approved in advance by DNR</p> <p>(F) Be carried out at the cost of the licence holder</p>	GWMP
<p>6. The licensee must ensure that the results of the environmental audit must be presented in a comprehensive report (Environmental Audit Report). The report may include recommendations as to works that could be performed or additional obligations that could be imposed in order to rectify any impacts on groundwater.</p>	GWMP
<p>7. The licensee shall install works to minimise interference with the flow of water within Wybong Creek and /or Big Flat Creek to the satisfaction of the NSW Office of Water. Such works are to be designed in consultation with the NSW Office of Water, and shall be constructed in accordance with the approved design. Installation of any such approved work(s) shall be accompanied by an as -executed report authorised by a practising certified engineer to the NSW Office of Water within one month of construction of such works.</p>	SWGWRP
<p>8. The entitlement issued with this licence is not transferable, and shall lapse at the completion of mining operations.</p>	Noted
<p>9. The licensee shall allow NSW Office of Water or any person authorised by it, full and free access to the works, either during or after construction, for the purpose of carrying out inspection or test works and its fittings and shall carry out any work or alterations deemed necessary by the department for the protection and proper maintenance of the works, or the control of the water extracted and for the protection of the quality and the prevention from pollution or contamination of sub-surface water</p>	Noted
<p>10. The authorised work shall not be used for the discharge polluted water into a river or lake, otherwise than in accordance with the conditions of a licence granted under the Protection of the Environment Operations Act 1997. A copy of the licence to discharge is to be provided to NSW Office of Water.</p>	WMP SWMP
<p>11. Tailwater drainage shall not be allowed to discharge onto adjoining roads, crown land or other persons land, or into any river as defined under The Water Act, or any groundwater aquifer, by surface or sub-surface drains or pipes or any other means.</p>	WMP SWMP
<p>12. NSW Office of Water shall have the right during the currency of this licence to vary at any time the volumetric allocation, or the rate at which this allocation is taken.</p>	Noted
<p>13. The location of the excavation as shown on a plan retained in the office of NSW Office of Water shall not be altered.</p>	Noted
<p>14. The volume of groundwater extracted from the works authorised by bore licences on this property shall not exceed 700 Megalitres in any 12 month period commencing 1st July.</p>	WMP GWMP



Water Licence 20BL172598 Condition	Document
15. The volume of groundwater extracted from the works authorised by this licence shall not exceed X Megalitres for the term of the licence.	1.5.6

Table G - WAL 37027, 37028 &amp; 11085

## Conditions

Water Licence WAL 37027, 37028 & 11085 Condition	Section of Document
<p><b>MW4303-00001 - Take of Water</b></p> <p>If the water supply work nominated on this access licence takes water in Wybong Management Zone in the Wybong Creek Water Source from the alluvial sediments then the work must only be used to take water when flows are in the Very Low Flow Class, which means there is no visible flow in the water source:</p> <ul style="list-style-type: none"> <li>A. at the Manobalai gauge [No. 210147] as shown on the Plan Map and as real time flow data on the Department's website <a href="http://www.water.nsw.gov.au">www.water.nsw.gov.au</a>; or</li> <li>B. at the Wybong Creek gauge [No. 210040] as shown on the Plan Map and real time flow data on the Department's website <a href="http://realtimedata.water.nsw.gov.au/water.stm">http://realtimedata.water.nsw.gov.au/water.stm</a>.</li> </ul>	Nominated supply works is Miscellaneous Works (20MW0650001).
<p><b>MW0112-00001 - Take of Water</b></p> <p>The maximum water allocation that may be carried over in the account for this access licence from one water year to the next year is:</p> <ul style="list-style-type: none"> <li>A. a volume equal to 100% of the share component of the licence; or</li> <li>B. 1ML/unit share of the share component of the licence.</li> </ul>	GWMP 5.3
<p><b>MW0004-00006 - Take of Water</b></p> <p>From 1 July 2016, the total volume of water taken in any three (3) consecutive water years under this access licence must not exceed a volume which is equal to the lesser of either:</p> <p>A. the sum of:</p> <ul style="list-style-type: none"> <li>i. water in the account from the available water determinations in those 3 consecutive water years; plus</li> <li>ii. water in the account carried over from the water year prior to those 3 consecutive water years; plus</li> <li>iii. any net amount of water assigned to or from this account under a water allocation assignment in those 3 consecutive water years; plus</li> <li>iv. any water re-credited by the Minister to the account in those three consecutive water years; or</li> </ul> <p>B. the sum of:</p> <ul style="list-style-type: none"> <li>i. the share component of this licence at the beginning of the first year in those 3 consecutive water years; plus</li> <li>ii. the share component of this licence at the beginning of the second year in those 3 consecutive water years; plus</li> <li>iii. the share component of this licence at the beginning of the third year in those 3 consecutive water years; plus</li> <li>iv. any net amount of water assigned to or from this account under a water allocation assignment in those 3 consecutive water years; plus</li> <li>v. water re-credited by the Minister to the account in those 3 consecutive water years.</li> </ul>	GWMP 5.3

<p>MW0605-00001 - Take of Water</p> <p>Water must be taken in compliance with the condition of the approval for the nominated work on this access licence through with water is to be taken.</p>	<p>Nominated supply works is Miscellaneous Works (20MW0650001).</p>
<p>MW0036-00003 - Take of Water</p> <p>The volume of water taken in any three (3) consecutive water years from 1 July 2010 must be recorded in the logbook at the end of those three water years. The maximum volume of water permitted to be taken in those years must also be recorded in the logbook.</p>	<p>Nominated supply works is Miscellaneous Works (20MW0650001).</p>
<p>MW2338-00001 - Monitoring and Recording</p> <p>The completed logbook must be retained for five (5) years from the last date recorded in the logbook.</p>	<p>Nominated supply works is Miscellaneous Works (20MW0650001).</p>
<p>MW2336-00001 - Monitoring and Recording</p> <p>The purpose or purposes for which water is taken, as well as details of the type of crop, area cropped, and dates of planting and harvesting, must be recorded in the logbook each time water is taken.</p>	<p>Nominated supply works is Miscellaneous Works (20MW0650001).</p>
<p>MW2337-00001 - Monitoring and Recording</p> <p>The following information must be recorded in the logbook for each period of time that water is taken:</p> <ul style="list-style-type: none"> <li>A. date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time; and</li> <li>B. the access licence number under which the water is taken; and</li> <li>C. the approval number under which the water is taken; and</li> <li>D. the volume of water taken for domestic consumption and/or stock watering.</li> </ul>	<p>Nominated supply works is Miscellaneous Works (20MW0650001).</p>
<p>MW2339-00001 - Monitoring and Recording</p> <p>A logbook must be kept, unless the work is metered and fitted with a data logger. The logbook must be produced for inspection when requested by the relevant licensor.</p>	<p>Nominated supply works is Miscellaneous Works (20MW0650001).</p>
<p>MW0051-00002 - Reporting</p> <p>Once the water access licence holder becomes aware of a breach of any condition on this water access licence, the water access licence holder must notify the Minister as soon as practicable.</p> <p>The Minister must be notified by:</p> <ul style="list-style-type: none"> <li>A. email: <a href="mailto:water.enquiries@dpi.nsw.gov.au">water.enquiries@dpi.nsw.gov.au</a>; or</li> <li>B. telephone: 1800 353 104</li> </ul> <p>Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call.</p>	<p>WMP 9.2</p>

Table H – Water Licence 20WA211008 Conditions

Water Licence Condition	Section of Document
<b>Schedule 1 – Approval holders</b>  The holders of this approval are:  MANGOOLA COAL OPERATIONS PTY LIMITED – ACN 127 535 755	Noted
<b>Schedule 2 - Water Supply Works</b>  <b>Part A: authorised water supply works</b>  Subject to the conditions of this approval, in relation to each numbered work in the table, the holders of the approval are authorised to construct and use a water supply work of the type shown at the location specified:  Work 1  Specified work - Pumping Plant x2Work No: w01  Specified location – 12//594674 (part lot)  Management zone (if applicable) – Zone 1A (Hunter River from Glenbawn Dam to Goulburn River Junction)  Water source – Hunter Regulated River Water Source  Water sharing plan – Hunter Regulated River Water Source 2016	WMP 4.2
<b>Schedule 3 - Conditions</b>  <b><i>Hunter Regulated River Water Source</i></b>	
<b><u>Take of water</u></b>	
Any water supply work authorised by this approval must take water in compliance with the conditions of the access licence under which water is being taken.	Noted
Water must be taken through metering equipment that meets the following requirements: <ul style="list-style-type: none"> <li>A. the metering equipment must accurately measure and record the flow of all water taken through the water supply work authorised by this approval;</li> <li>B. the metering equipment must comply with the Australian Standard AS4747: 'Meters for non-urban supply', as may be updated from time to time;</li> <li>C. the metering equipment must be sited and installed at a place in the pipe, channel or conduit between the water source and the first discharge outlet. There must be no flow of water into or out of the pipe, channel or conduit between the water source and the metering equipment; and</li> <li>D. the metering equipment must be operated and maintained in a proper and efficient manner at all times.</li> </ul>	Noted
<b><u>Monitoring and recording</u></b>	
The completed logbook must be retained for five (5) years from the last date recorded in the logbook.	Noted
The purpose or purposes for which water is taken, as well as details of the type of crop, area cropped, and dates of planting and harvesting, must be recorded in the logbook each time water is taken.	Noted

<p>The following information must be recorded in the logbook for each period of time that water is taken:</p> <ul style="list-style-type: none"> <li>A. date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time; and</li> <li>B. the access licence number under which the water is taken; and</li> <li>C. the approval number under which the water is taken; and</li> <li>D. the volume of water taken for domestic consumption and/or stock watering.</li> </ul>	Noted
Where a water meter is installed on a water supply work authorised by this approval, the meter reading must be recorded in the logbook before taking water. This reading must be recorded every time water is to be taken.	Noted
A logbook must be kept, unless the work is metered and fitted with a data logger. The logbook must be produced for inspection when requested by the relevant licensor.	Noted
<b><u>Reporting</u></b>	
<ul style="list-style-type: none"> <li>A. When a water supply work authorised by this approval is no longer to be used permanently, the approval holder must: <ul style="list-style-type: none"> <li>i. notify the relevant licensor in writing of their intention to decommission the work at least 90 days before the start of the decommissioning; and</li> <li>ii. include a work plan for decommissioning in accordance with the Minimum Construction Requirements for Water Bores in Australia 2012, as amended or replaced from time to time; and</li> <li>iii. decommission the work in accordance with the submitted work plan unless the approval holder receives notice in writing from the Minister within 60 days of notifying the relevant licensor, requiring that the work is either not to be decommissioned or be decommissioned in accordance with requirements other than those set in the work plan.</li> </ul> </li> <li>B. Within 60 days of the work being decommissioned, the approval holder must notify the relevant licensor in writing: <ul style="list-style-type: none"> <li>i. confirming that the work has been decommissioned; and</li> <li>ii. providing the name of the driller who decommissioned the work.</li> </ul> </li> </ul>	Noted
<p>Once the approval holder becomes aware of a breach of any condition of this approval, the approval holder must notify the Minister as soon as practicable. The Minister must be notified by:</p> <ul style="list-style-type: none"> <li>A. email: <a href="mailto:water.enquiries@dpi.nsw.gov.au">water.enquiries@dpi.nsw.gov.au</a>; or</li> <li>B. telephone: 1800 353 104.</li> </ul> <p>Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call.</p>	Noted

## Appendix C - Erosion and Sediment Control Plan

The Erosion and Sediment Control Plan is published on the Mangoola Coal website - <https://www.mangoolamine.com.au/en/publications/Pages/management-plans.aspx>

## Appendix D - Surface Water Monitoring Plan

The Surface Water Monitoring Plan is published on the Mangoola Coal website - <https://www.mangoolamine.com.au/en/publications/Pages/management-plans.aspx>



## Appendix E - Groundwater Monitoring Plan

The Groundwater Monitoring Plan is published on the Mangoola Coal website - <https://www.mangoolamine.com.au/en/publications/Pages/management-plans.aspx>

## Appendix F - Surface Water and Groundwater Response Plan

The Surface Water and Groundwater Response Plan is published on the Mangoola Coal website - <https://www.mangoolamine.com.au/en/publications/Pages/management-plans.aspx>

## Appendix G - Mangoola Held WAL

WAL	Share Component	Category	Water Source
503	159	General Security	Hunter River
644	3	High Security	Hunter River
645	432	General Security	Hunter River
691	50	General Security	Hunter River
735	72	General Security	Hunter River
822	3	High Security	Hunter River
823	310	General Security	Hunter River
824	175	General Security	Hunter River
830	306	General Security	Hunter River
897	55	General Security	Hunter River
933	43	General Security	Hunter River
1000	3	High Security	Hunter Regulated River
1001	334	General Security	Hunter River
1057	509	General Security	Hunter River
1159	159	General Security	Hunter River
1239	40	Supplementary	Hunter Regulated River
1349	8	Supplementary	Hunter Regulated River
1387	40	Supplementary	Hunter Regulated River
6260	36	Miscellaneous Works	Wybong Creek
6262	8	Miscellaneous Works	Wybong Creek
6264	30	Miscellaneous Works	Wybong Creek
6272	50	Miscellaneous Works	Wybong Creek
6276	12	Miscellaneous Works	Wybong Creek
6278	117	Miscellaneous Works	Wybong Creek
6294	39	Miscellaneous Works	Wybong Creek

WAL	Share Component	Category	Water Source
6296	86	Miscellaneous Works	Wybong Creek
6298	39	Miscellaneous Works	Wybong Creek
6304	5	Unregulated	Wybong Creek
6305	74	Unregulated	Wybong Creek
6306	52	Unregulated	Wybong Creek
6316	175	Aquifer	Wybong Creek
6317	19	Aquifer	Wybong Creek
6322	5	Aquifer	Wybong Creek
6325	0	Aquifer	Wybong Creek
6327	30	Aquifer	Wybong Creek
6571	111	General Security	Hunter River
6576	600	General Security	Hunter River
7291	63	Miscellaneous Works	Wybong Creek
7292	44	Miscellaneous Works	Wybong Creek
9061	6	High Security	Hunter River
9062	18	General Security	Hunter River
9343	25	Miscellaneous Works	Wybong Creek
9344	164	Miscellaneous Works	Wybong Creek
9986	5	High Security	Hunter River
9987	82	General Security	Hunter River
11085	128	Miscellaneous Works	Wybong Creek
11216	86	General Security	Hunter River
13083	100	General Security	Hunter River
13228	0	Unregulated	Wybong Creek
13229	77	Unregulated	Wybong Creek
18068	5	Aquifer	Hunter Regulated River Alluvial

WAL	Share Component	Category	Water Source
18136	596	Aquifer	Hunter Regulated River Alluvial
18170	219	Aquifer	Hunter Regulated River Alluvial
18214	218	Aquifer	Hunter Regulated River Alluvial
18219	5	Aquifer	Hunter Regulated River Alluvial
18232	5	Aquifer	Hunter Regulated River Alluvial
18690	10	Aquifer	Muswellbrook Water Source
18695	131	Miscellaneous Works	Muswellbrook Water Source
18696	53	Aquifer	Muswellbrook Water Source
18701	28	Unregulated	Muswellbrook Water Source
18718	151	Aquifer	Muswellbrook Water Source
20343	48	Unregulated	Wybong Creek
30247	98	Aquifer	Muswellbrook Water Source
37027	30	Miscellaneous Works	Wybong Creek
37028	96	Miscellaneous Works	Wybong Creek
39800	120	Miscellaneous Works	Sydney Basin-North Coast Groundwater Source
41561	700	Aquifer	Sydney Basin-North Coast Groundwater Source

*\*Licences transferred for harvestable rights*