

WONGAWILLI COLLIERY

SURFACE WATER MANAGEMENT PLAN



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APPENDICES

Appendix A: Wongawilli Colliery Surface Water TARPS
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Appendix A2: Nebo LW1-6 Extraction Plan TARP
Appendix A3: LW11-20 SMP TARP
Appendix B: Wongawilli Colliery Surface Water Management Mitigation

GLOSSARY OF TERMS AND ABBREVIATIONS

Terms	
Incident	A set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in the Project Approval. See "Unintended Event" –Environment Manager is responsible to determine if a report of an "unintended event" represents an "incident" as defined.
Project Approval	Part 3A Major Project approval MP09_0161 as modified
Secretary	The Secretary of the Department of Planning and Environment
Abbreviations	
AEMR	Annual Environmental Management Review
ANZECC	Australian New Zealand Environment Conservation Council
BOD	Biological Oxygen Demand
DECC	Department of Environment and Climate Control
DP&E	Department of Planning & Environment

DRE	Division of Resources and Energy
EA	Environment Assessment
EMS	Environment Management System
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	Environment Protection Authority
EPL	Environment Protection Licence
GL	Giga Litre
kl	Kilolitre
LDP	Licensed Discharge Point
LGA	Local Government Area
LW	Longwall
ML	Mega Litre
MOP	Mining Operations Plan
MP	Major Project
MSB	Mine Subsidence Board
Mtpa	Million Tonnes Per Annum
NOW	NSW Office of Water
NPWS	National Parks and Wildlife Services
NSW	New South Wales
WCL	Wollongong Coal Limited
OEH	Office Environment Heritage
O&G	Oil and Grease
PAC	Planning Assessment Commission
PKCT	Port Kembla Coal Terminal
PRP	Pollution Reduction Program
SMP	Subsidence Management Plan
SSD	State Significant Development
TARP	Trigger Action Response Plan
TSS	Total Suspended Solids
WCC	Wollongong City Council
WCL	Wollongong Coal Limited
WNSW	Water NSW

SURFACE WATER MANAGEMENT PLAN

1 INTRODUCTION

This Surface Water Management Plan has been prepared in accordance with the principles and guidelines contained within:

- Managing Urban Stormwater – Soils and Construction, Volume 1 (the Blue Book) (Landcom, 2004); and
- Managing Urban Stormwater – Soils and Construction, Volume 2E Mines and Quarries (DECC, 2008).

1.1 Project Background

Wongawilli Coal Pty Ltd owns Wongawilli Colliery in the Southern Coalfield of New South Wales. Wongawilli Coal Pty Ltd is a wholly owned subsidiary of Wollongong Coal Limited (WCL). Wongawilli Colliery is located approximately 14 km south-west of Wollongong, within the Wollongong and Wingecarribee Local Government Areas (LGAs). DeltaSBD Ltd became the Mine Operator in the July 2016.

In June 2017 the contract miner (Delta) went into receivership and mining at Wongawilli ceased. WCL then became owner/operator of the Wongawilli Colliery, and maintained the mine in preparation for recommencement of mining. Approval for a variation to mining methods was received from the Department on the 5th September 2017. Mining operations recommenced in a reduced capacity in October 2017.

Wongawilli Colliery currently operates under a major project approval granted by the Planning Assessment Commission (PAC) under delegation on 02 November 2011 (MP 09_0161). The project approval allows:

- Continued use of the surface infrastructure at the Wongawilli pit top as currently operated;
- Coal production at the historic level of up to 2 million tonnes per annum (mtpa);
- Mining in the Nebo area in the north east corner of the lease area;
- Continued development and construction of the Western Drive;
- Continued transportation of run of mine coal from the Colliery to Port Kembla Coal Terminal (PKCT) by rail; and
- Rehabilitation of the site.

A modification (MOD1) to MP 09_0161 was approved on 27 November 2015. MOD1 authorised the continuation of mining operations until 31 December 2020.

1.2 Purpose and Scope

Schedule 4, Condition 20 of the project approval requires the preparation of a Surface Water Management plan (herein referred to as the 'Plan').

The purpose of this plan is to:

- Clearly identify the sources, flow paths and discharge points for all site surface water;
- Develop a comprehensive water balance for the Colliery;
- Develop management plans to describe water management systems, minimise potable water use, comply with surface water discharge limits, and manage sewage wastewater;
- Develop plans to guide future development, water management and operational use of the site; and
- Ensure compliance with all relevant approvals and legislation.

1.3 Consultation and Distribution

The plan has been prepared in consultation with the Environment Protection Authority (EPA), NSW Office of Water (NOW) and Wollongong City Council (WCC). A log of consultation with agencies was presented in the development of the original SWMP. An update of this Plan will be completed at any time feedback is received as per Section 8.6 of this Plan.

This Plan will be distributed to Department of Planning and Environment (DP&E) for comment prior to update and distribution to:

- EPA;
- Division of Resources & Energy (DRE);
- NOW; and
- WCC.

In accordance with Schedule 6, Condition 10 of the Project Approval, WCL will make this Plan publicly available on the WCL website and will be responsible for its maintenance. A hard copy will also be kept at the Wongawilli Colliery, Jersey Farm Road, West Dapto, NSW 2530.

Any revisions undertaken will be the responsibility of WCL and any notifications will be sent accordingly. WCL will not be responsible for maintaining uncontrolled copies beyond ensuring the most recent version is maintained on WCL's computer system, website, and hard copy at the Wongawilli Colliery, Jersey Farm Road, West Dapto, NSW 2530.

This Surface Water Management Plan has been developed by WCL based on the *Wongawilli Colliery Surface Water Management* report produced by WRM in 2010. The assessment was undertaken as part of the application for MP 09_0161.

1.4 Report Structure

This Surface Water Management Plan has been prepared in WCL standard management plan format and in accordance with the requirements of Schedule 4, Condition 8 and Schedule 6, Condition 2 of the project approval. It also addresses Schedule 4, Conditions 16 to 19 and elements of Schedule 3, Condition 7(i) of the project approval, as well as the Statement of Commitments section on Surface Water. It also incorporates erosion and sedimentation, surface water management systems and activities as outlined in the Mining Operation Plan (MOP).

2 CONSENTS, LEASES & LICENCES

During the reporting period, Wongawilli Colliery held approvals for a variety of activities. These approvals included mining leases and lease related approvals (MOP and SMP), complying development certificates, development consents, major project approvals, environmental protection licences and a variety of other approvals. These are outlined in Table 2.1.

Table 2.1: Consents, Leases & Licences relevant to mining activities at Wongawilli Colliery

Licence and/or Approval	Document Number	Issue Date	Expiry Date
Mining Lease (DRE)	ML 1596	03/02/2012	07/10/2029
Mining Lease (DRE)	ML 1565	02/08/2006	Renewal Application in Progress
Consolidated Coal Lease (DRE)	CCL 766	27/06/2005	Renewal Application in Progress
Mine Operations Plan - Interim (DRE)	MOP	23/05/2016	31/12/2016
Subsidence Management Plan (DRE)	SMP LW11,12,15,16,19 & 20 (Mod)	01/06/2010	31/12/2017
Subsidence Management Plan (DRE)	Nebo Longwalls N1-N6	17/12/2015	31/01/2020
Project Approval – Nebo Area Project	MP 09_0161	02/11/2011	31/12/2020
Complying Development Certificate for 33kV power supply	CDC721/10	15/06/2010	15/06/2016
Complying Development Certificate for Temporary Stacker Conveyor (PCA)	CDC392/10	26/02/2010	NA

Licence and/or Approval	Document Number	Issue Date	Expiry Date
Complying Development Certificate for a ROM Coal Screening and Sizing Plant (PCA)	CDC272/09	24/02/2010	NA
Project Approval for the Construction of a New Bath House and Office Extensions (DP&E)	MP 09_0030	03/02/2012	07/10/2029
Environmental Protection Licence - WCL Wongawilli Colliery (EPA)	EPL 1087	1 st October (Anniversary Date)	NA
Environment Protection Licence WCL -Avondale Colliery (EPA)	EPL 12442	31 March (Anniversary Date)	NA
Radiation Control Licence/Registration (EPA)	5061480	-	13/08/2018
Apparatus Licence (ACMA)	1939618	02/06/2016	02/05/2017
WaterNSW Special Areas Access Mining Consent	D2015/036046	04/03/2016	04/03/2021
Surface Disturbance Notice (DRE)	06/3092	24/02/2010	NA
Surface Disturbance Notice (DRE)	11/19 & 06/3052	05/01/2011	NA
Part 5 Approval (WaterNSW) – Avon Water Quality monitoring	D2011/1059	09/05/2011	At Completion of Monitoring
Part 5 Approval (WaterNSW) – LW19 Subsidence Survey Line	D2011/13055	10/05/2011	At Completion of LW19
Part 5 Approval (WaterNSW) – Nebo Longwalls N1 to N6 Monitoring	D2013/18268	25/03/2013	31/03/2018
Water Licence	10BL602990	16/01/2013	16/01/2018
License to Store (Class 1.1B & 1.1D Explosives)	XSTR200001	09/01/2017	13/12/2021

2.1 Relevant Legislation and Guidelines

WCL will conduct approved mining operations consistent with the Project Approval conditions and any other legislation that is applicable. The following Acts may be applicable:

- Wollongong Local Environment Plan 2009;
- Wollongong Local Environment Plan (West Dapto) 2010;
- Environmental Planning and Assessment Act 1979 (NSW);
- Local Government Act 1993 (NSW);
- Protection of the Environment Operations Act 1997 (NSW); and
- Water Management Act 2000 (NSW).

Relevant licences or approvals required under these Acts will be obtained as required.

3 IMPACT ASSESSMENT

3.1 Baseline Data

3.1.1 Pit Top and Stockpile Areas

3.1.1.1 System Configuration and Capacity

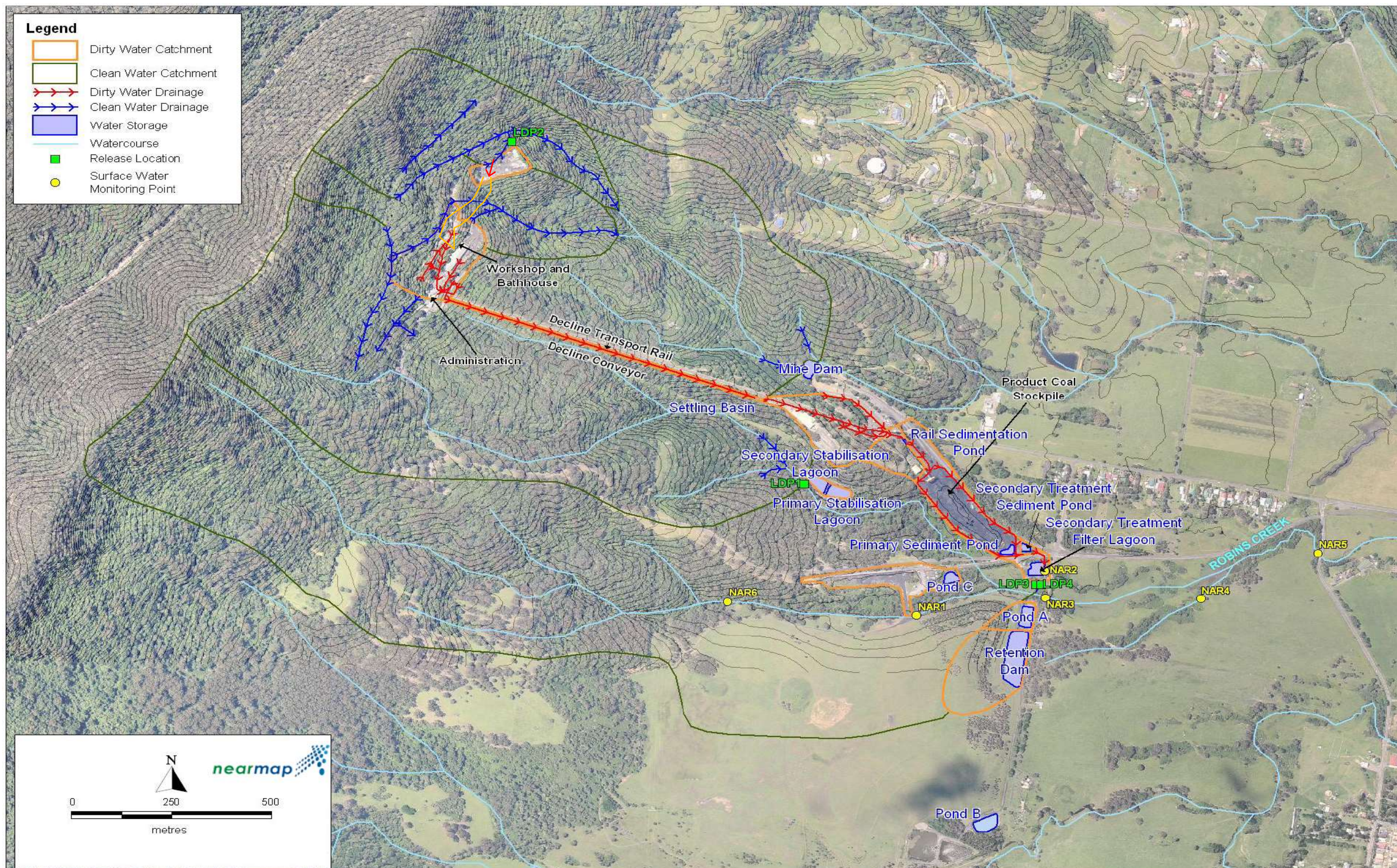
The Colliery is located on the escarpment at the western edge of the Lake Illawarra catchment. Monthly rainfall is highest in February and March and lowest between July and September. The average annual rainfall and pan evaporation rates are shown in Table 3.1.

Table 3.1: Background Climate Characteristics (adapted from WRM 2010)

Ave. Annual Rainfall (mm) (Upper Avon Rain Gauge)	Mean Annual Pan Evaporation (mm) (Calculated by BOM Data Drill)
1,396	1,354

A detailed description of the surface water on the Wongawilli Colliery Pit Top has been undertaken in the Wongawilli Colliery Surface Water Management Plan produced by WRM 2010. An overview of the baseline assessment from that report follows and more detailed information is available in the WRM 2010 document. The surface water management system around the Pit Top area, Stockpile area and EPL monitoring and water management system sites for the Pit Top area are shown in Figure 3.1.

Figure 3.1: Surface Water Management System at Wongawilli Colliery (modified from WRM 2010)



The surface drainage system is designed to separate clean and dirty water runoff. Runoff from the escarpment upslope of the mine site facilities is diverted both north and south around the workings by a system of grass and concrete-lined clean water drains. Northern diversions enter an unnamed tributary of Robins Creek and flow to the Mine Dam. Southern diversions enter unnamed tributaries of Robins Creek slightly to the north and south of the southern Pit Top carparks.

Runoff that potentially contains coal fines and sediment (from the Pit-Top Area, Decline Conveyor, and Coal Storage/Loading Bins) passes through a series of sedimentation ponds for coarse particles to settle out (Settling Basin, Surcharge Dam, Elevator Sump, Stackout Sump, Rail Sedimentation Pond).

Runoff from the Coal Stockpiles (along with overflows from the above sedimentation ponds) passes through two sediment ponds (Primary Treatment Sediment Pond and Secondary Treatment Sediment Pond), before discharging to the Filter Lagoon. The Filter Lagoon discharges to Robins Creek. During high flows the Retention Pond flows to Pond A which flows over a weir and into a tributary of Robins Creek. A flow diagram of the water management system is shown in Figure 3.2.

The risk of non-compliant off-site discharge from Pond C and the Filter Lagoon (via Licensed Discharge Point LDP4) is managed by pumping excess water to the Retention Dam on the southern side of Robins Creek when required. Water from the Retention Dam is used for the irrigation of pasture on the adjoining property. This arrangement reduces the risk of unplanned off-site discharge to a minimum.

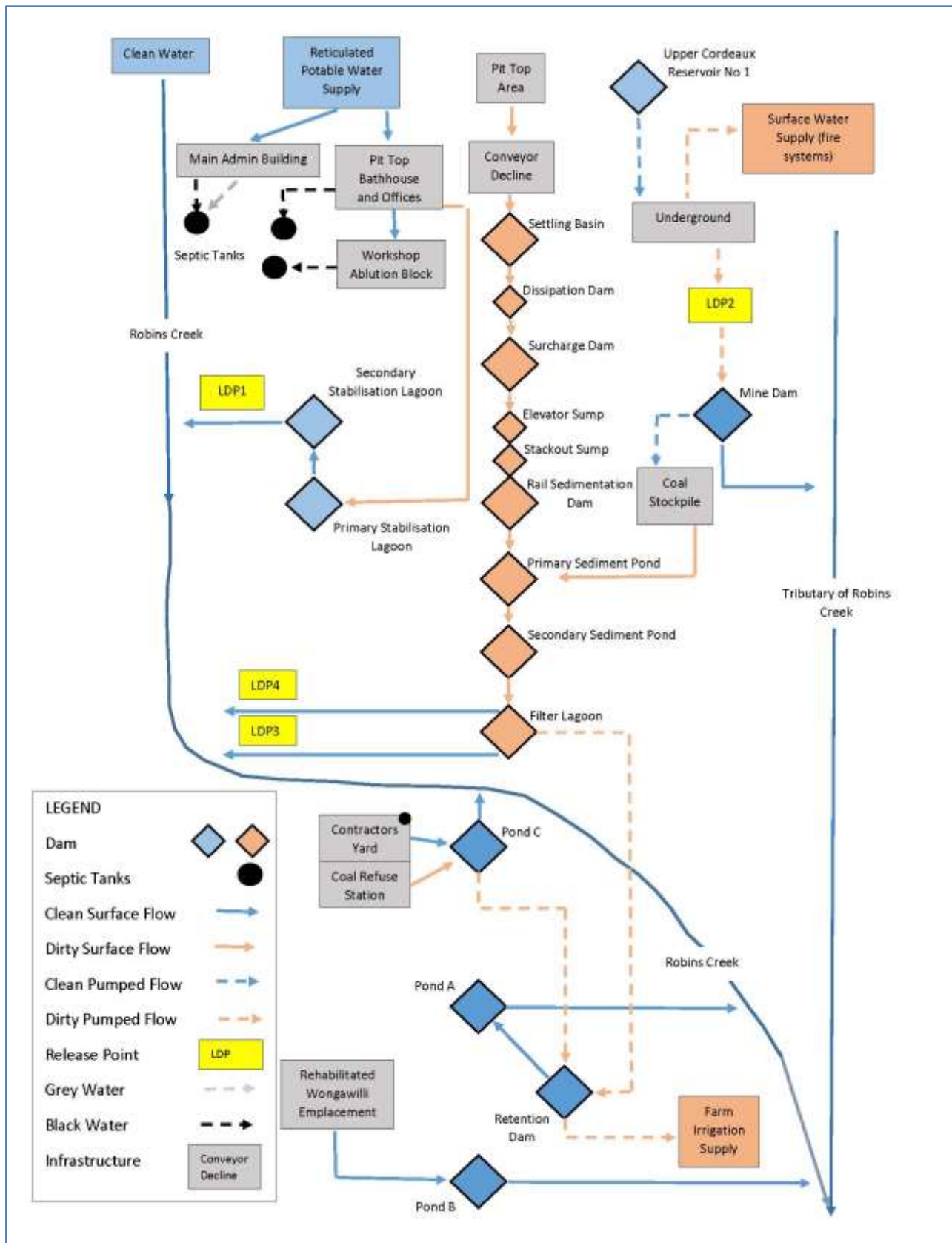
The catchment basin (Pond B) that was associated with the emplacement area is no longer included in the sites water management system. It has been discussed with the adjoining property owner about looking at options of reinstating some infrastructure so the property can utilise that stored water.

During 2017 the Colliery has dewatered the mine at a rate of a little over 3ML/day or around 1.1GL per annum via the LDP2 discharge point. The drive of the North West Mains that commenced in 2010 has started to produce small quantities of groundwater. This is currently directed through the site's dirty water system to the Filter Lagoon.

Raw water from Upper Cordeaux Reservoir No. 1 is occasionally supplied to the underground workings via Shaft No. 3 (located 5km north-northeast of the Wongawilli Pit Top Area, approximately 400m from Upper Cordeaux Reservoir No. 1). Water from this source is used to recharge fire-fighting storage and when Mine Water cannot be sufficiently recycled to meet underground water demands (e.g. due to pump failure).

The annual water demand from this source is approximately 20ML. This requirement is unlikely to change as a result of the proposed changes to the operation. There are unlikely to be opportunities to significantly reduce raw water use via additional water recycling. A flow meter is installed on this water supply and a record of meter readings is maintained at the Colliery.

Figure 3.2: Flow Diagram of Wongawilli Colliery



Potable water demands for the administration area and bathhouse are drawn from the Wollongong potable water supply reticulation system. Average annual potable water demand is estimated to be approximately 10ML. Potable water demands are not expected to change significantly as a result of the proposed consolidation and continuation.

Wastewater is managed in the following systems:

- Admin building - blackwater from toilets and urinals is collected in a 8,000L poly tank which is located on the mine access road and pumped out fortnightly by a licensed waste contractor;
- Blackwater from the new bath house is captured in a 5,000L poly tank which is located below the new bath house building and is pumped out fortnightly by a licensed waste contractor;
- Greywater from the new bath house is piped down the decline into the dirty water settlement basins below.
- Workshop area – blackwater from toilets and urinals are captured in a septic tank which is located behind the training room and pumped out fortnightly by a licensed waste contractor; and
- The lower bathhouse is no longer used so there is no greywater being sent to the Primary and Secondary Stabilisation Lagoons.

Details of the catchment and capacity of the system can be found in Table 3.2 & Table 3.3.

Table 3.2: Catchment Areas to Storm Water Management Dams (adapted & modified from WRM 2010)

Water Management Structure	Sub Catchment Description	Sub Catchment Area ¹ (ha)	Cumulative Catchment ¹ (ha)
Mine Dam	Clean Catchment (and Underground Mine Water)	64.6	64.6
Rail Sedimentation Pond	Decline Conveyor	4.2	4.2
	Disused Bathhouse Area	4.45	8.6
	Surcharge Dam	0.03	8.7
Primary Sedimentation Pond	Coal Stockpile	3.44	12.1
Secondary Treatment Sedimentation Pond	Pond Area & Rail	0.13	12.2
Filter Lagoon	Lagoon Area	0.45	12.7
Pond C	Coal Refuse Station	1.64	1.6
Pond A	Wongawilli Emplacement	0.7	0.7
Retention Dam	Wongawilli Emplacement	3.8	4.5

¹ All areas include the dam surface.

Structures which make a relatively small contribution to on-site volume and yield have not been shown and include Settling Basin (Decline Dam), Elevator Pit, Stackout Pit, Pond B and Stabilisation Lagoons).

Table 3.3: Water Management Dam Details (adapted & modified from WRM 2010)

Water Management Structure	Estimated Volume ML	Top Surface Area
Decline Dam	0.4	0.01
Surcharge Dam	0.6	0.03
Rail Sedimentation Pond	0.3	0.01
Primary Sediment Pond	0.6	0.03
Secondary Treatment Pond	1.2	0.06
Filter Lagoon	5.8	0.13
Pond C	2.2	0.09
Retention Dam	29.2	0.65
Pond A	3.2	0.16
Mine Dam	3.1	0.16
Primary Stabilisation Lagoon	3.2	0.16
Secondary Stabilisation Lagoon	3.4	0.17

Structures which make a relatively small contribution to on-site volume and yield have not been shown and include Settling Basin (Decline Dam), Elevator Pit, Stackout Pit, Pond B and Stabilisation Lagoons).

A calculated water balance shown in Table 3. indicates that discharges from Pond C and the Retention Dam via Pond A are very low and would only occur under very wet conditions. The filter lagoon will discharge more often. Since the water balance was undertaken a further potential 0.6ML on-site storage capacity has been added by the creation of the Surcharge Dam as required by PRP10. Decline Conveyor Storm Water Management in EPL 1087.

Table 3.4: Mean Annual Inflows and Outflows (ML) for Storm Water Management System (WRM 2010)

	Rail Sediment	Primary Sediment Pond	Secondary Treatment Sediment Pond	Filter Lagoon	Pond C	Pond A	Retention Dam
Rainfall/Runoff	48.9	26.9	1.3	4.2	11.2	4.6	23.2
Inflow from U/S discharge	0	48.8	75.4	76	0	0	2.8
Pump In	0	0	0	0	0	0	61.3
Evaporation	0.1	0.3	0.7	1	0.5	1.8	4.3
Discharges	48.8	75.4	76	27.4	1.3	2.8	0.7
Pump Out	0	0	0	51.8	9.5	0	82.5

3.1.1.2 Water Quality

The mine water is moderately alkaline and the dissolved solids content is predominantly in the form of sodium bicarbonate. This is characteristic of the groundwater quality seeping into the underground mines in the Illawarra.

Wongawilli Colliery mine water quality is not expected to vary significantly because the water quality is primarily determined by the hydrogeology of the region rather than the activities of the mine. Monitoring results undertaken as part of the old emplacement monitoring program indicate that the majority of measured parameters within receiving waters around the site are within an acceptable range. The levels haven't exceeded the ANZECC guidelines for Marine and Freshwater 2000 – Irrigation and Agriculture. The detailed data is available in Appendix A of WRM 2010.

3.1.2 Mine Subsidence Areas

The Colliery will extract from remanent coal reserves in both the Elouera and Nebo Domains of the mine, in accordance with the Subsidence Management Plan (SMP) and Project Approval. The surface water quality of the extraction areas has been assessed and is being managed as a part of the modified Environment, Subsidence and Safety Management Plan (LW11-20 SMP) and the Nebo N1-N6 Extraction Plan.

The areas of surface water potentially affected by subsidence in the Nebo extraction area are shown in Figure 3.3 and greater detail is available in WRM 2010. The LW11-20 extraction area is shown in Figure 3.4. The Nebo area surface water is shown in Figure 3.5 and Elouera surface water is shown in Figure 3.6. More information on the Elouera area is available in *Skora 2009*.

Figure 3.3: Surface Water in the Nebo Extraction Area (from MSEC 2010)

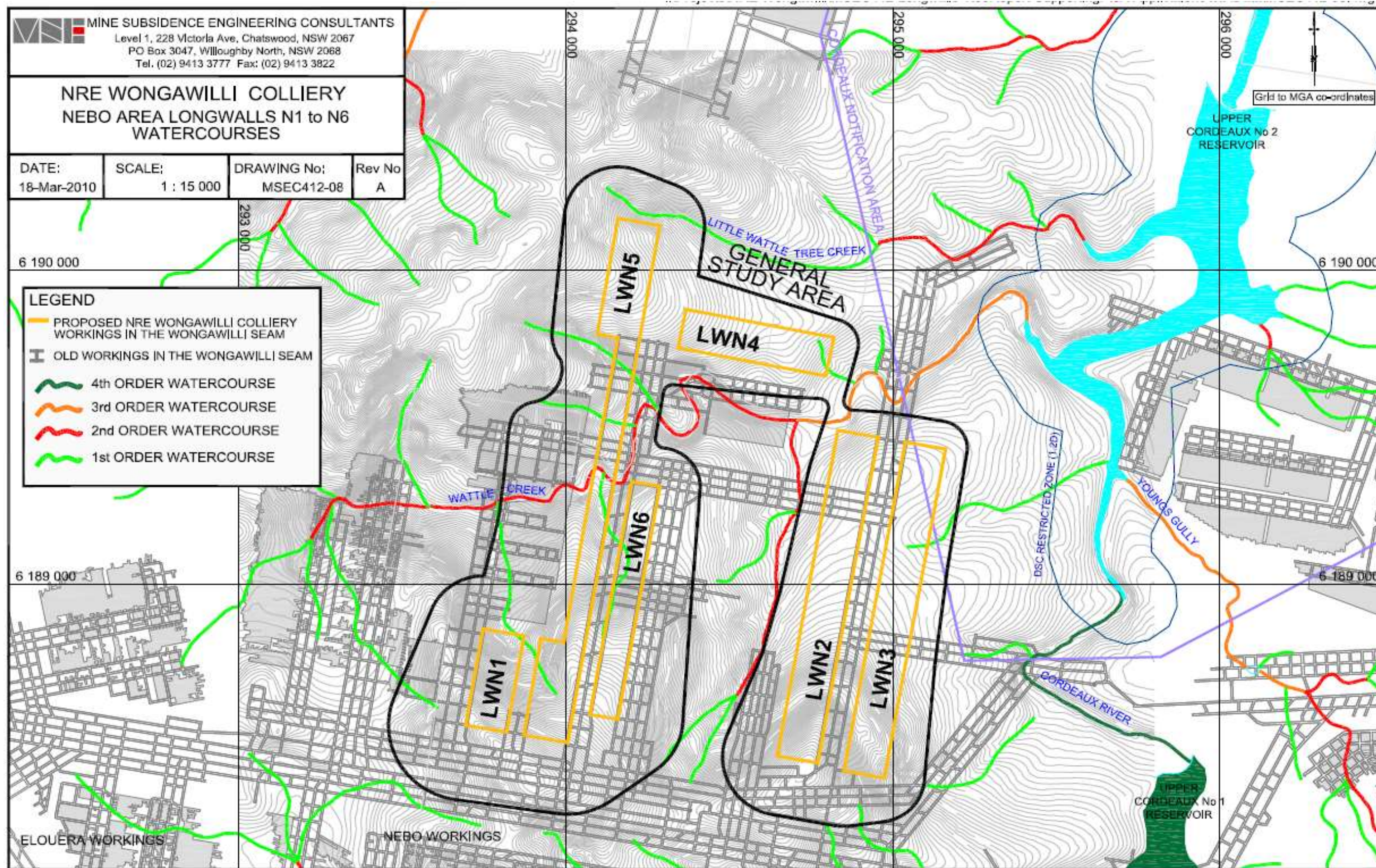


Figure 3.4: Surface Water in the Elouera Extraction Area (from Biosis 2009)

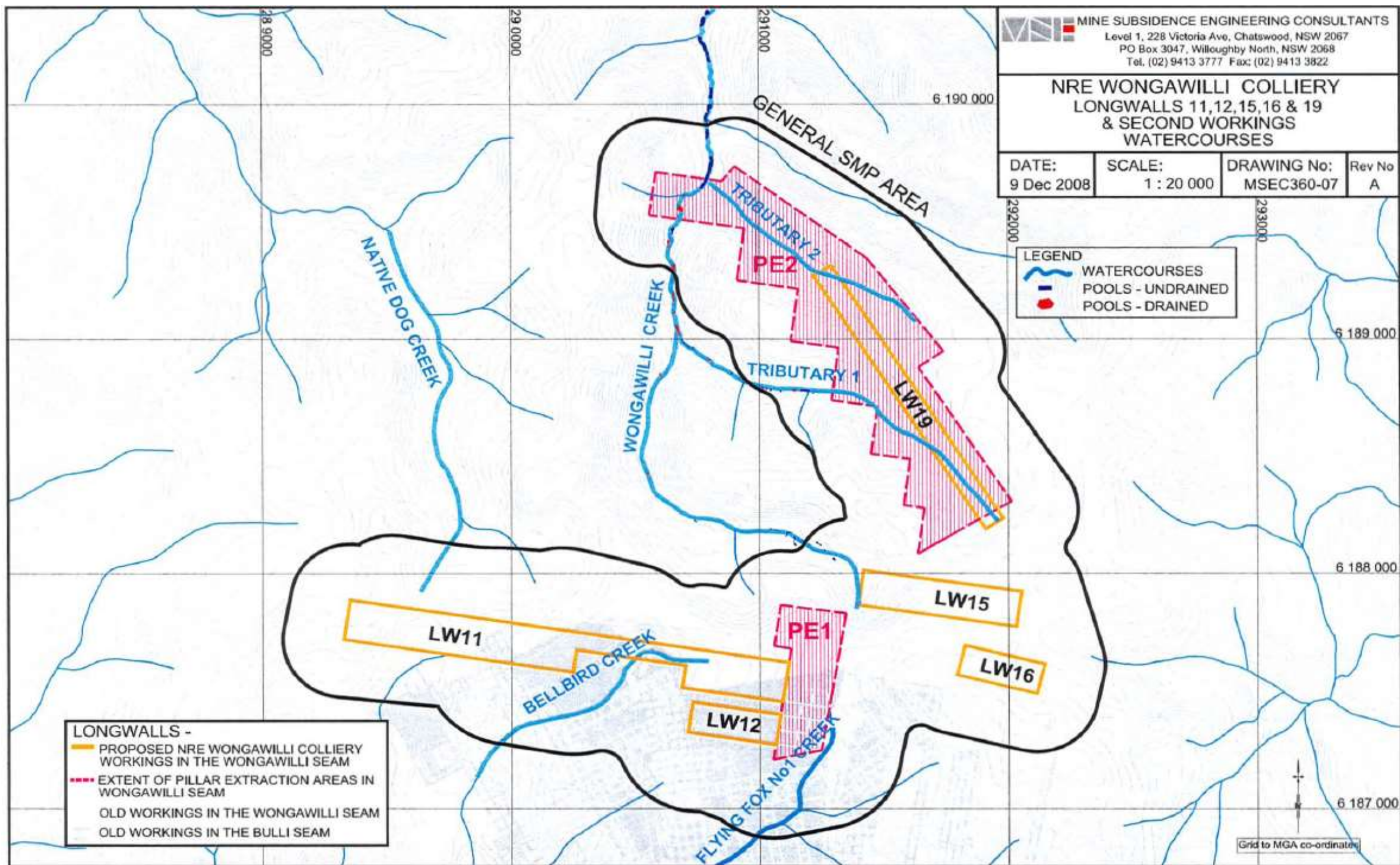
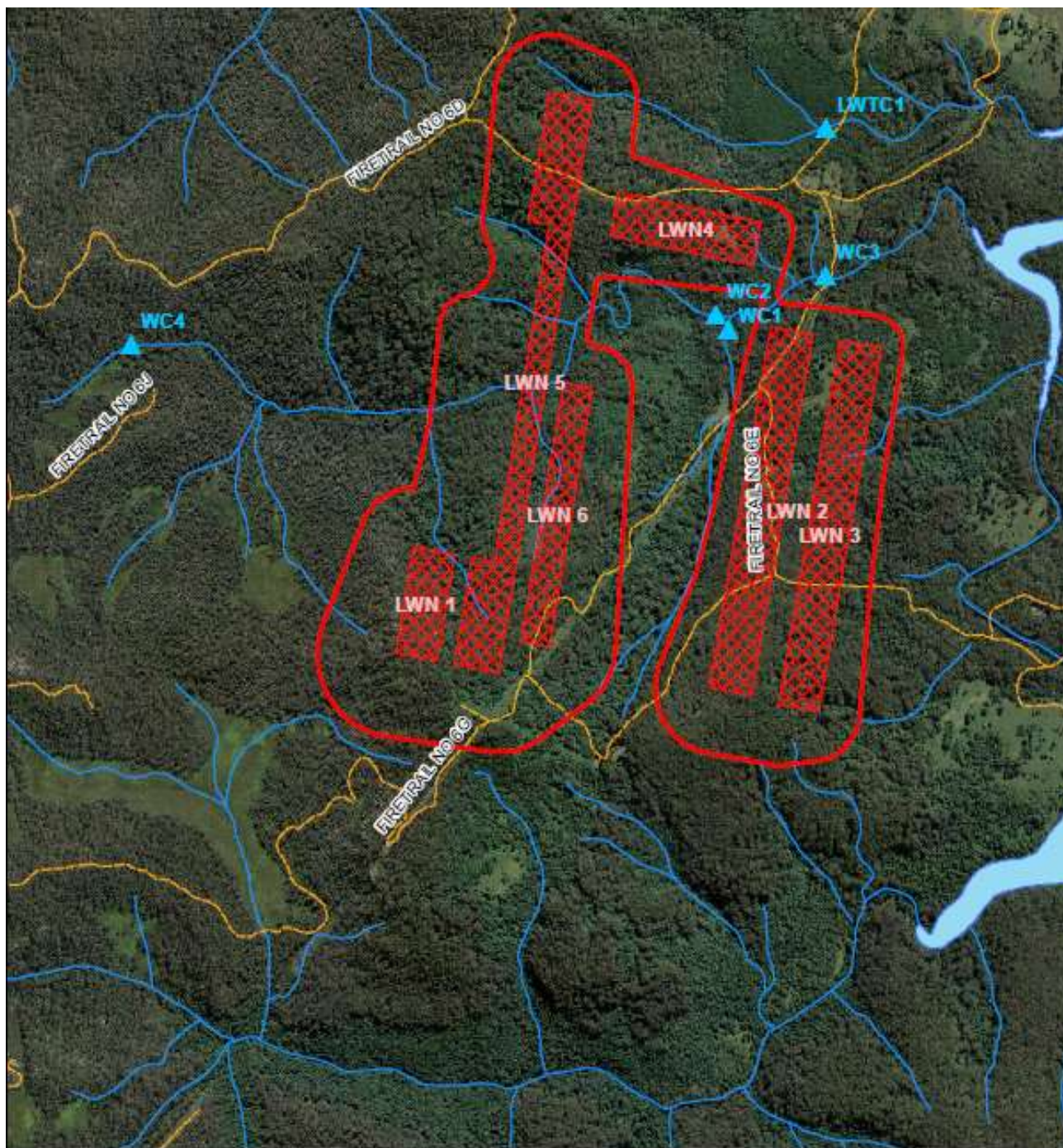


Figure 3.5: Nebo LW1 – 6 Surface Water Monitoring Sites



Surface Water Monitoring Plan

1098 Nebo Extraction Plan

Drawn by: RJ

Project Mgr: CM

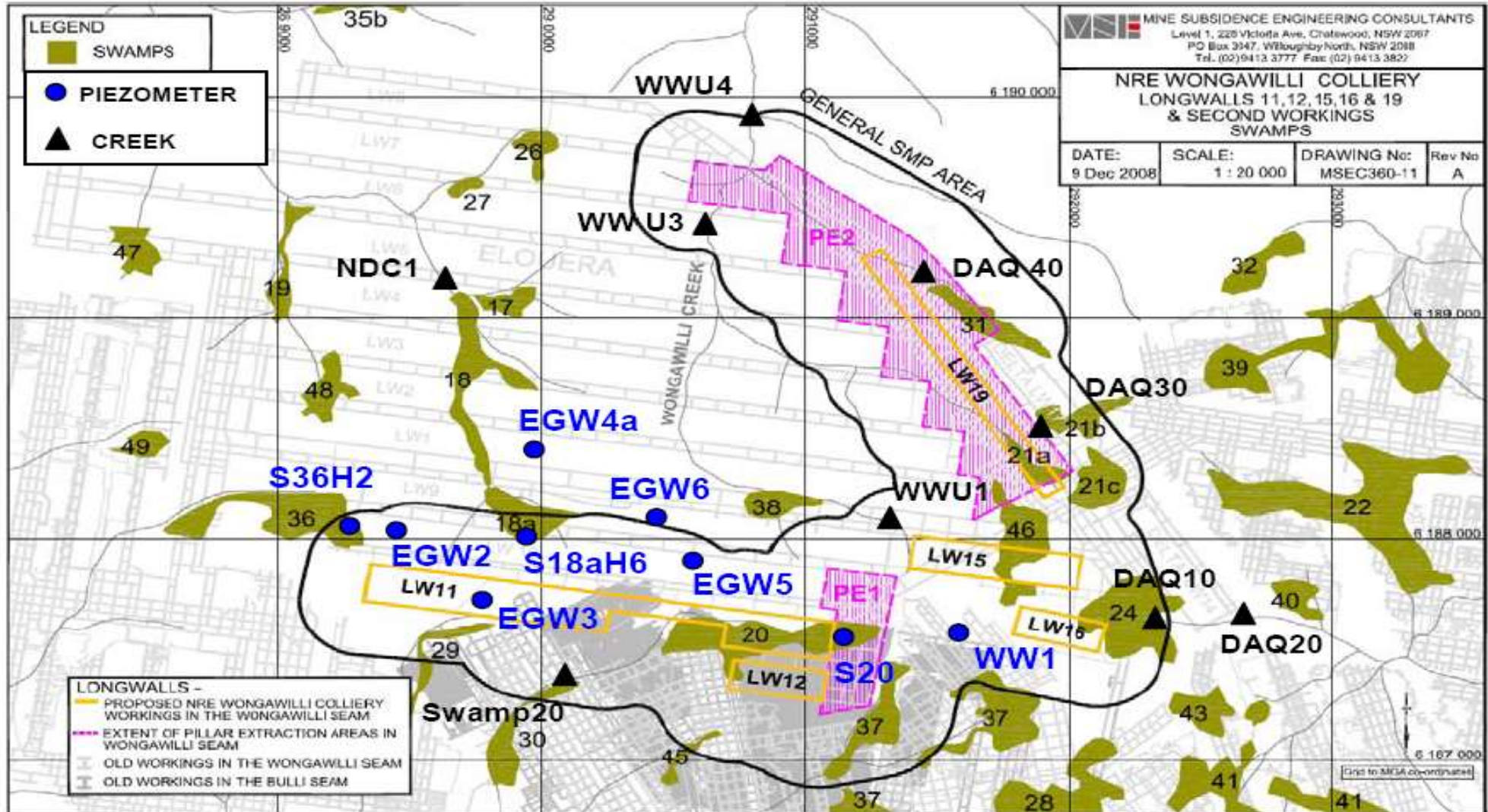
Date: 3/01/2012

-  Surface Water Monitoring Locations
-  Application Area
-  Longwalls



Site	Wongawilli Colliery	DOC ID	WWC EC PLN 003
Type	Plan	Date Published	27/03/2019
Doc Title	SURFACE WATER MANAGEMENT PLAN		

Figure 3.6: Elouera LW11-20 Water Monitoring Sites



3.2 Potential Impacts

3.2.1 Pit Top and Stockpile Operations

General operations at the Colliery Pit Top will have little impact on the surface water quality of the site because the work is carried out in areas that pass through the existing water management system.

Colliery Pit Top areas will be managed as follows:

1. Disturbed areas of the Colliery Pit Top which include the existing mine benches, works areas and access tracks will have surface drainage directed to the dirty water catchment of the Colliery's surface water management system. Where possible, an effort will be made to remove sediment from surface water through the use of filters or sumps. The Colliery's work order system will be used to schedule regular maintenance on the surface water management system to ensure that the build-up of sediment does not occur and all components operate in an efficient manner.
2. Undisturbed areas of the Pit Top outside of the existing cleared mine benches, works areas and access tracks will have surface water drainage directed to the clean water catchment of the Colliery's surface water management system. This will allow clean surface water to drain to the local creek and drainage lines of the Lake Illawarra catchment area.

All future major development on the site and in the Metropolitan Special Area(not including exploration activities), focused on increasing the production capacity of the Colliery, will be subject to full assessment as part of State Significant Development (SSD) processes in compliance with the requirements of DP&E as outlined in the EP&A Act.

3.2.2 Mine Subsidence Impacts

Surface water located above mining areas will potentially be subject to mine subsidence effects. Current management plans for surface water have been developed separately to this Surface Water Management Plan as a part of the modified Environment, Subsidence and Safety Management Plan LW's 11, 12, 15, 16, 19 & PE1 (LW11-20 SMP) and the Nebo N1-N6 Extraction Plan.

3.2.3 Exploration Impacts

The Colliery has an extensively planned exploration program as required by the conditions of its various leases. The activities all occur in the Metropolitan Special Area managed by Water NSW (WNSW). No exploration is undertaken without a Part 5 EP&A Act approval issued by the WNSW. This process involves detailed assessment of the potential impacts of the proposal on surface water in the affected areas and production of agreed management plans for disturbed areas.

4 PERFORMANCE MEASURES AND CRITERIA

4.1 Pit Top and Stockpile Areas

The following performance measures and criteria have been developed for the Colliery Pit Top and Stockpile areas.

1. Minimise the use of potable water through the increased usage of recycled and on-site water. This will be determined by:
 - a) No reduction of potable water use efficiency (litres used per tonne of coal produced) over time, under normal operating conditions; and
 - b) The use of Mine Dam water as the primary supply for dust suppression water in the stockpile area.
2. Prevention of water contamination through the effective implementation and maintenance of containment systems. This will be determined by:
 - a) The regular inspection and maintenance of containment systems for all sources of contaminants.
3. Prevention of surface water discharges above discharge limits. This will be determined by:
 - a) Compliance with Colliery's EPL requirements.
4. Effective erosion control for all activities. This will be determined by:
 - a) The implementation, regular inspection and maintenance of erosion control for activities where required.
5. Effective operation of the site water management system. This will be determined by:
 - a) The regular completion of inspections and maintenance of the water management system.

4.2 Mine Subsidence Areas

Table 4.1 outlines the performance measures and criteria that applies to surface water management from Table 1 in Schedule 3, Condition 1 of the project approval.

Table 4.1: Performance Measures and Criteria

Water Resources	
Catchment yield to the Upper Cordeaux Reservoirs (No.1 & No.2) and Avon Reservoir	- Negligible reduction to the quality or quantity of water resources reaching the reservoirs; and - No connective cracking between the surface and the mine.

Upper Cordeaux Reservoirs (No.1 & No.2) and Avon Reservoir	- Negligible leakage from the reservoirs, and - Negligible reduction in the water quality of reservoirs
Watercourses	
Wattle Creek, Little Wattle Tree Creek, Cordeaux River, Gallaghers Creek	Negligible environmental consequences, including: - Negligible diversion of flows or changes in the natural drainage behaviour of pools; - Negligible gas releases and iron staining; and - Negligible increase in water cloudiness.
Other watercourses	No greater subsidence impact or environmental consequences than predicted in the EA
Upland Swamps (No 22 and No 39)	Negligible environmental consequences including: - Negligible change in the size of swamps; - Negligible change in the functioning of swamps; - Negligible change to the composition of or distribution of species within swamps; and - Negligible drainage of water from swamps, or redistribution of water within swamps.

Additional information on the performance criteria are presented in the LW11-20 SMP and both the Nebo N1-N6 Extraction Plan.

4.3 Exploration Areas

Performance measures and criteria for surface water management are contained in the separate Exploration Program Reviews of Environmental Factors and Approvals.

5 MONITORING AND REPORTING

5.1 Monitoring

Monitoring will be undertaken as outlined in the TARP in Appendix A. A general summary of proposed monitoring is included in Table 5.1.

Table 5.1 : Summary of Surface Water Monitoring

Location	Aspect	Monitoring	Frequency	By Whom
Pit Top	Water Use	Potable Water Meter Reads	During Environmental Inspection Report	WCL
	Water Contamination	Environmental Inspection Report	Weekly	WCL
	Water Discharge	As per EPL	As per conditions	WCL
	Water Management	Environmental	Weekly	WCL

	System	Inspection Report		
	Erosion	Visual inspection of operational areas Review of sediment levels in dams	Ongoing	WCL
Mine Subsidence Areas	Surface & Ground Water	As outlined in LW11-20 SMP & Nebo N1-N6 Extraction Plan	As per conditions	Contractors, WCL
Exploration Areas	Surface & Ground Water	As outlined in the various REF's and accompanying approvals	As per REF and approvals	Contractors, WCL

5.2 Reporting

Reporting against the performance criteria will be undertaken in accordance with WCL Wongawilli Colliery EMS Strategic Framework reporting requirements. Reporting on this plan will be undertaken annually. Other reporting, including reporting under the Contingency Plan in Section 6.3, will be undertaken as shown in Table 5.2.

Table 5.2 : Reporting Requirements

Report	Regulator	Reporting Period	Frequency	Comments	Distribution
Annual Environmental Management Report	DRE	1 July to 30 June	Annually	Condition of coal leases. Must be prepared in accordance with DRE's "Guidelines to the Mining, Rehabilitation, and Environmental Management Process"	DRE EPA OEH NPWS WNSW WCC
Environment Protection License 1087	EPA	1 October to 31 September	Annually	Annual Return required as part under the 'Protection of the Environment Operations Act 1997'	EPA
			As required	Trigger or Incident Reporting	EPA
Environment Protection License 12442	EPA	1 April to 31 March	Annually	Annual Return required as part under the 'Protection of the Environment Operations Act 1997'	EPA
			As required	Trigger or Incident Reporting	EPA
Subsidence Management	DRE DP&E	2011-2020 (approx. period of extraction)	As required	Trigger or Incident Reporting	DRE MSB NOW WNSW

		of LW11-20 and Nebo longwalls)	4 monthly	Subsidence Management Status Report (SMP LW11-20)	DRE NOW WNSW
			Within 4 months of the end of each longwall in the LW11-20 area extraction	Summary End of Panel Report	DRE
			Within 4 months of the end of Nebo N1-N6 area extraction	End of Extraction Report	DRE
Major Project Approval (MP09_0161)	DP&E	1 July to 30 June	As required	Incident Reporting	DP&E EPA WCC DRE
			Annual	Annual Review	DP&E WCL Website
WWC EC PLN 003 Surface Water Management Plan (This plan)	WCL	Ongoing	Annual	Report in MP09_0161 Annual Review Report and AEMR report	DP&E DRE WCL Website

6 MITIGATION AND MANAGEMENT STRATEGIES

6.1 General

The Surface Water Management Plan mitigation and management strategies can be found in Appendix B. In summary the surface water management actions involve:

- Ensuring all work and projects on site pass through the correct approval process and/or consider impacts on surface water;
- Compliance with EPL conditions;
- Ensuring adequate containment measures at sources of potential contaminants;
- Ensuring the effective operation of the site water management system; and
- Effective management of erosion. Through the use of sediment control structures for all disturbed areas onsite where sediment can be mobilised.

Surface water in exploration and subsidence affected areas are managed in accordance with the plans in the separate relevant approved exploration REF's and the LW11-20 SMP and Nebo N1-N6 Extraction Plan.

6.2 TARP

A TARP has been developed for the management of surface water on the project. The primary goal of this TARP is to monitor risks and then control or eliminate the risk using the appropriate management action. The TARP's is shown in Appendix A.

TARPs for surface water in exploration and subsidence affected areas are contained in the relevant exploration REF's, Section 1.1 of the LW11-20 SMP and Section 12 of the Nebo N1-N6 Extraction Plan. The SMP TARP's have been included in Appendix A

6.3 Contingency Plan

Natural or potential impacts will be managed as outlined in the management plan and TARP's in this Surface Water Management Plan. Contingency and emergency response options are available and will be implemented if environmental or public safety impacts are demonstrated to be greater than expected. The following steps will be followed after a non-conformance has been identified:

1. WCL will report the reasons the management objective has not been met to DP&E, NPWS, EPA, DRE, WCC and other relevant stakeholders as per Table 5.2;
2. Impacts and corresponding contingency measures will be assessed and considered based on the significance, extent, scale or longevity of impact and practical aspects of mitigation or rehabilitation;
3. WCL will identify an appropriate course of action with respect to the management objectives, in consultation with specialists and relevant agencies, as necessary;
4. After stakeholder consultation, WCL will implement the agreed contingency measures;
5. WCL is committed to implementing such agreed contingency measures within the shortest practical timeframe;
6. WCL will review the effectiveness of the contingency measures within the shortest practical timeframe and report back to all stakeholders and;
7. The Contingency Plan provides for an adaptive approach with consultation and input from relevant Agencies and stakeholders.

Contingency plans for surface water in exploration and subsidence affected areas are contained in relevant exploration REF's, Section 1.1 of the LW11-20 SMP and Section 12 of the Nebo N1-N6 Extraction Plan.

If either, it is not reasonable or feasible to remediate the impact or remediation measures implemented by WCL have failed to satisfactorily remediate the impact, WCL will provide a suitable offset to compensate for the impact, to the satisfaction of the Secretary of DP&E in accordance with Condition 3 / Schedule 3 of the Project Approval.

7 INCIDENTS, COMPLAINTS AND NON-CONFORMANCES

7.1 Incidents

The definition of incident in the Plan is same as that used in the project approval:

"A set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in this approval."

Incidents will be handled in accordance with the WCL Wongawilli Colliery EMS Framework incident management processes and reported in accordance with Table 5.2.

The incident will be reported to DP&E and, if triggers, performance criteria or measures are exceeded the Contingency Plan will be activated. Reporting and liaison with DRE, EPA and WCC will commence in accordance with the requirements of Schedule 6, Condition 6 of the project approval.

7.2 Complaints Handling

Complaints will be handled in accordance with the WCL Wongawilli Colliery EMS Framework community complaints and enquiries management processes.

As required by Schedule 6, Condition 10 of the project approval, a copy of a complaints register (updated on a Monthly basis) will be kept on the WCL website. A summary of complaints will be available to regulatory authorities on request and provided in the Annual Environmental Management Reports (AEMRs).

7.3 Non-Conformance Protocol

Non-conformances with performance measures and criteria in this Plan or project approval will be classified as an incident and will be investigated and documented using WCL's incident management processes.

The incident will be reported to DP&E and, if triggers, performance criteria or measures are exceeded, the Contingency Plan in Section 6.3 will be activated. Reporting and liaison with DRE, EPA and WCC will commence in accordance with the requirements of Schedule 6, Condition 6 of the project approval.

8 PLAN ADMINISTRATION

8.1 Roles and Responsibilities

Environment and community management is regarded as part of the responsibilities of all Colliery personnel.

The roles and function of the main personnel responsible for the implementation of environmental and community management including the plans, procedures and action plans contained in this plan are outlined in WCL's Management Operating System.

8.2 Resources Required

In accordance with the WCL SYS POL 003 Environmental Policy, Management shall ensure that the appropriate resources are made available to achieve the implementation of this Plan.

It is the role of the Group Environment Manager to ensure that these requirements are communicated to WCL Management.

8.3 Training

Training will be undertaken in accordance with Section 5.4 of EMS STD 001 Environmental Management System Strategic Framework.

8.3.1 Staff Training

As a part of employment on site, all staff will be required to sit through a site induction which includes an environmental component. The induction covers things such as; Waste management, water management, hydrocarbon management, erosion and sediment control, weed management, and legislation etc. Other environmental training will be identified and assessed as required.

Staff that are required to work in the WNSW Catchment Area will also be required to complete an online WNSW Induction before undertaking task in the catchment.

8.3.2 Inductions

All contractors and associated subcontractors will be required to participate in site induction prior to the commencement of work. As a minimum, the induction is to include:

- An overview of the Cardinal Rules, Environment Policy and EMS requirements;
- Environmental incident and community compliant reporting requirements;
- Environmental emergency contact details;
- In the event that there are specific environmental management requirements relating to a contractor's work activities, details of these requirements are to be issued to the contractor in writing as a part of the induction; and
- Records, which detail the attendees, content of the induction/training as well as any additional information provided, will be maintained.

In addition to the induction program, training will be provided as deemed necessary to contractors to provide them with the knowledge, skills and awareness to minimise environmental impact. At a minimum this should include:

- Contractors whose activities are not directly supervised by Colliery personnel; and
- Contractors whose activities are ongoing and have the potential to result in an environmental incident (e.g. stockpile contractors).

8.4 Record Keeping and Control

Environmental records are to be managed in accordance with the WCL SYS PRO 001 Document and Data Control procedure.

All records of the EMS will be stored so that they are readily retrievable and suitably protected from deterioration or loss. Archiving will be managed in accordance with the WCL SYS PRO 001 Document and Data Control procedure.

A master copy of each EMS document including all appendices and supporting information is to be held in the office of the Environment Department.

8.5 Plan Revision

8.5.1 Annual Review

In accordance with Schedule 6, Condition 3 of the project approval, an Annual Review of the environmental performance of the Project is prepared.

The Annual Review will:

- Describe the works carried out in the past year, and the works proposed to be carried out over the next year;
- Include a comprehensive review of the monitoring results and complaints records of the Project over the past year, including a comparison of these results against the:
 - Relevant statutory requirements, limits or performance measures/criteria;
 - Monitoring results of previous year/s; and
 - Relevant predictions in the EA(s).
- Identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- Identify any trends in the monitoring data over the life of the Project;
- Identify any discrepancies between the predicted and actual impacts of the Project, and analyse the potential cause of any significant discrepancies; and
- Describe what measures will be implemented over the next year to improve the environmental performance of the Project.

8.5.2 Auditing

In accordance with Schedule 6, Condition 8 of the project approval an Independent Environmental Audit will be undertaken by a suitably qualified auditor and include experts in any field specified by the Secretary within 12 months of the approval and every three years after that.

This audit must:

- Be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
- Include consultation with the relevant agencies;
- Assess the environmental performance of the project and assess whether it is complying with the requirements in this approval and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals);
- Review the adequacy of strategies, plans or programs required under the abovementioned approvals; and
- Recommend measures or actions to improve the environmental performance of the project, and/or any strategy, plan or program required under these approvals.

8.5.3 Plan Revision

In accordance with Schedule 6, Condition 4 of the project approval, this Plan will be reviewed within three months of:

- The submission of an annual review;
- The submission of an incident report;
- The submission of an audit; and
- Any modification to the conditions of approval (unless the conditions require otherwise or as otherwise agreed with DP&E).

The revision status of this plan is indicated in the Section 10 of each copy. Revisions to any documents listed within this Plan will not necessarily constitute a revision of this document. The distribution of controlled copies is described in Section 1.4.

9 REFERENCES

Department of Planning and Environment 2011. Project Approval MP09_0161.
 Niche2012. Wongawilli Colliery Nebo Longwalls N1-N6 Extraction Plan. Revision D3. Niche Environment and Heritage.
 WRM 2010. Wongawilli Colliery Surface Water Management. WRM Water and Environment Pty Ltd.
 Skora, D. 2009. *Environment, Subsidence and Safety Management Plan (ESSMP) LW's 11, 12, 15, 16, 19, & PE1*. Wongawilli Colliery.

10 CONTROL AND REVISION HISTORY

PROPERTY	VALUE
Approved by	Group Environment Manager
Document Owner	WCL Environmental Department
Effective Date	27/03/2019

REVISIONS

VERSION	DATE REVIEWED	REVIEW TEAM (CONSULTATION)	NATURE OF THE AMENDMENT
1	26/03/13	S. Cugalj	Minor formatting
2	20/05/13	C. Irving	Incorporating DP&E Feedback
3	29/05/13	C. Irving	Updating consultation record
4	24/03/16	K. Prajapati, D. Clarkson, K. Lee, B. Mecozzi	Review after MOD1 approval
4.1	07/08/16	K. Prajapati	Incorporating DP&E Feedback
5	27/03/2019	John Ross, Eladio Perez, Robert Faddy-Vrouwe	AEMR Yearly review and minor updates

APPENDICES

Appendix A: WCL Wongawilli Colliery Surface Water TARPS

Appendix A1: WCL Wongawilli Colliery Pit Top TARP

Aspect	Feature	Monitoring		TARPS	
		Type	Whom	Trigger	Response
Water Use	☐ Pit Top Potable Water Use	☐ Meter Reads during Environmental Inspection Reports	☐ WCL	☐ >20% increase in water usage sustained over a 1 month period, as compared to historic cumulative average for supply point	☐ Undertake visual inspection of potable water infrastructure to supply point for leaks. Repair as necessary. ☐ Identify any changes of activity at supply point. Cease as required. ☐ If new activity is not avoidable. Identify methods to provide alternate supply. ☐ If alternate supply is not possible, ensure water used by activity is minimized where possible.
	☐ No.3 Shaft Water Use	☐ As billed by WNSW	☐ WCL	☐ >20% increase in water usage over 2 month period, as compared to historic cumulative average.	☐ Review production tonnage for increase. ☐ Undertake visual inspection of potable water infrastructure to supply point for leaks. Repair as necessary. ☐ Identify any changes of

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Type	Plan	Date Published	27/03/2019
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Aspect	Feature	Monitoring		TARPS	
		Type	Whom	Trigger	Response
					activity at supply point. Cease as required. ☐ If new activity is not avoidable. Identify methods to provide alternate supply. ☐ If alternate supply is not possible, ensure water used by activity is minimised where possible.
Water Contamination	☐ Containment Measures	☐ Weekly Environmental Inspection Reports	☐ WCL	☐ Liquid in containment areas	☐ Visually identify liquid (hydrocarbon, water etc) and identify source of liquid. ☐ Organise for liquid to be removed and disposed of by a licensed contractor. ☐ If equipment failure, organise to have component repaired. ☐ If usage failure, organise refresher training.
				☐ Damage to containment areas and infrastructure	☐ Assess effectiveness of containment due to damage. ☐ Organise additional temporary containment as required. ☐ Organise for damage to be repaired as soon as

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Aspect	Feature	Monitoring		TARPS	
		Type	Whom	Trigger	Response
					practical. ☐ Investigate cause of damage. ☐ Develop and implement controls to prevent recurrence as required.
				☐ Inappropriate use of containment measures	☐ Investigate and raise as an incident as required. ☐ Develop and implement controls to prevent recurrence as required.
				☐ Sewage tank levels above 75%	☐ Arrange for tanks to be pumped out and disposed offsite. ☐ Review and adjust pump out schedule if inadequate.
		☐ Annual AS1940 Audit	☐ WCL ☐ Contractor	☐ Non-compliance against AS1940 requirements	☐ Develop and implement action plan to achieve compliance with AS1940.

Site	Wongawilli Colliery	DOC ID	WWC EC PLN 003
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Aspect	Feature	Monitoring		TARPS	
		Type	Whom	Trigger	Response
Water Discharge	☐ Licensed Water Discharge	☐ LDP 1,2,3 & 8 monitored as per EPL 1087 Conditions	☐ WCL ☐ Contractors	☐ LDP 1: - o BOD>50mg/L - o O&G>10mg/L - o pH 6.5-8.5 - o TSS>30mg/L - o Discharge>30KL/Day ☐ LDP 2: - o O&G>10mg/L - o pH 6.5-8.5 - o TSS>50mg/L - o Discharge>10000KL/Day ☐ LDP3: - o O&G>10mg/L - o pH 6.5-8.5 - o TSS>50mg/L ☐ LDP8: - o O&G>10mg/L - o pH 6.5-8.5 - o TSS>50mg/L - o Discharge>2500KL/Day	☐ On receiving results immediately notify EPA of exceedance. ☐ Investigate incident and commence remedial actions to achieve compliance. ☐ Provide written details of the notification to the EPA within 7 days of incident date. ☐ Provide a written report to EPA as per EPL 1087 conditions. ☐ Develop and implement controls to prevent recurrence as required.

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Aspect	Feature	Monitoring		TARPS	
		Type	Whom	Trigger	Response
		☐ Daily visual assessment of Stockpile Filter Lagoon capacity	☐ WCL	☐ Stockpile Filter Lagoon ○ >33% capacity	☐ Transfer water from dam to achieve storage level below 33%.
Water Management System	☐ System Integrity	☐ Weekly Environmental Inspection Reports	☐ WCL ☐ Contractors	☐ Damage/Failure to system components	☐ Investigate cause of damage/failure and rectify.
				☐ Siltation of sumps and water storages	☐ Excavate sediment from sumps and storages as required.
Erosion	☐ Erosion Control – sediment fences and sediment sumps/dams	☐ Weekly Environmental Inspection Reports	☐ WCL ☐ Contractors	☐ Activity commenced without erosion control measures	☐ Cease activity until adequate erosion control measures are in place. ☐ Develop and implement controls to prevent recurrence as required.
				☐ Erosion control measure full of sediment	☐ Excavate sediment from sumps and storages as required. ☐ Develop and implement controls to prevent recurrence as required.

Appendix A2: Nebo N1-6 Extraction Plan TARP

Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
Rainfall	☐ Daily rainfall monitoring at WCL Wongawilli Colliery and WNSW Cordeaux No. 2 Dam weather station	☐ Continuous	☐ Continuous	☐ Significant departure from standard rainfall – runoff relationship in extraction area creeks.	☐ Visual inspection of creek lines for cracking or water loss. ☐ Contract hydrologist investigate and report on changes identified. ☐ Inform WNSW, DP&E, OEH and DRE of results of investigation. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required.
Stream Water Quality Sites WC1, WC2, WC3, WC4 and LWTC1	☐ Field Analysis (EC, pH, DO, ORP, temp) ☐ Laboratory Analysis TDS, Na, K, Ca, Mg, F, Cl, SO ₄ , HCO ₃ , NO ₃ , Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Li, Ba, (filtered) DOC,tot.	☐ Weekly Field Analysis during active undermining of the main channel of Wattle Creek over LWN5 ☐ Monthly Lab analysis during active mining ☐ Weekly observations during active	☐ Field Analysis every 2 months for one year after Nebo mining is completed ☐ Lab analysis every four months for one year after Nebo mining is completed ☐ Observations every 2 months	NORMAL No change in water quality variability compared to baseline period WITHIN PREDICTIONS Temporary reduction in water quality over less than 2 months at any site compared to baseline period, i.e. ☐ Observable increase	☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report. ☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report.

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Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
	Alkalinity. ☐ Observable iron hydroxide staining using photo points ☐ Monthly for at least two months prior to mining (for all parameters) ☐ Baseline monitoring commenced 2009.	undermining of stream using photo points	for one year after Nebo mining is completed using photo points	in iron hydroxide precipitation in creek, banks, or bed) ☐ EC < 250uS/cm ☐ pH < 1.5 drop from minimum baseline value ☐ Fe (Tot) < 10mg/L ☐ Mn (tot) < 0.2mg/L ☐ Al (tot) < 0.2mg/L ☐ Zn (filt) < 0.2mg/L ☐ SO4 (filt) < 15mg/L EXCEEDS PREDICTIONS Temporary reduction in water quality over more than 2 months at any site compared to baseline period, i.e. ☐ Long term increase in iron hydroxide precipitation in creek, banks, or bed) ☐ EC > 300uS/cm ☐ pH > 1.5 drop from minimum baseline value	☐ Inform WNSW, OEH & DRE immediately. ☐ Repeat water quality sampling and initiate laboratory water quality sampling on a monthly basis. ☐ Contract specialist to investigate and report on changes identified. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management

Site	Wongawilli Colliery	DOC ID	WWC EC PLN 003
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Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
				☐ Fe (Tot) > 10mg/L ☐ Mn (tot) > 0.2mg/L ☐ Al (tot) > 0.2mg/L ☐ Zn (filt) > 0.2mg/L ☐ SO4 (filt) >15mg/L	Act if required. ☐ Report on mitigation as soon as practicable. ☐ Report in AEMR/Annual Review.
Stream Flow Automated monitoring of Water Depth / Flow monitoring at WC3 and WC1 (upstream) which will be compared to local rainfall Automated monitoring of water depth at WC2 and WC4.	☐ Minimum 6 hourly prior to mining, with 2 monthly downloads ☐ Minimum hourly for 1 month before LWN5 undermines Wattle Creek ☐ Baseline data from Nov 2009	☐ Minimum hourly with weekly downloads for 1 month before / after LWN5 undermines Wattle Creek	☐ Minimum 2 hourly with downloads every two months for one year after Nebo mining ceases	NORMAL No change in stream flow or pool level variability compared to baseline period WITHIN PREDICTIONS Temporary reduction in stream flow of >20% over less than 2 months compared to the baseline variability at any site, i.e. ☐ Small cracks developed ☐ No observable loss of stream flow, pool height or stream connectivity, compared to baseline regime	☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report. ☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report.

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Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
				EXCEEDS PREDICTIONS Long term reduction in stream flow of >20% compared to the baseline variability at any site, i.e. ☐ Observable loss of stream flow, pool height or stream connectivity, compared to baseline regime	☐ Inform WNSW, OEH & DRE immediately. ☐ Notify hydrology and ecology specialists immediately. ☐ Site visit with stakeholders. ☐ Take photographic record immediately. ☐ Contract specialist to investigate and report on changes identified. ☐ Review monitoring program within 2 weeks and implement additional monitoring if required. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required. ☐ Report on mitigation as soon as practicable. ☐ Report in AEMR/Annual Review Report.
Flooding	☐ Observations every month for at least two months prior to	☐ Observations every week during active undermining of	☐ Observations every 2 months for one year after Nebo	NORMAL No change in flood extent variability compared to baseline	☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and

Site	Wongawilli Colliery	DOC ID	WWC EC PLN 003
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Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
	mining using photo points	Wattle Creek by LWN5 using photo points	mining is completed using photo points	period WITHIN PREDICTIONS Temporary increase in flood extent over less than 2 months compared to the baseline variability at any site EXCEEDS PREDICTIONS Long term reduction in flood extent over more than 2 months compared to the baseline variability at any site, i.e. ☐ Increased extent of flooded stream reach in excess of baseline conditions – identified by increased flooding within the terrestrial habitat compared to baseline variability	monitoring in AEMR/Annual Review Report. ☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report. ☐ Inform WNSW, OEH & DRE immediately. ☐ Notify hydrology and ecology specialists immediately. ☐ Site visit with stakeholders. ☐ Take photographic record immediately. ☐ Contract specialist to investigate and report on changes identified. ☐ Review monitoring program within 2 weeks and implement additional monitoring if required. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies

Site	Wongawilli Colliery	DOC ID	WWC EC PLN 003
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Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
					and in accordance with Section 54 of the Water Management Act if required. ☐ Report on mitigation as soon as practicable. ☐ Report in AEMR/Annual Review Report.
Erosion of stream bed and banks	☐ Observations every month for at least two months prior to mining using photo points	☐ Observations every month during active undermining of 1st and 2nd order streams using photo points	☐ Observations every 2 months for one year after Nebo mining is completed using photo points	NORMAL No change in stream, bed or bank erosion compared to baseline period WITHIN PREDICTIONS Minor decrease in stream, bed or bank stability compared to baseline period i.e., small cracks with no observable change in stream stability EXCEEDS PREDICTIONS Major decrease in stream, bed or bank stability compared to baseline period	☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report. ☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report. ☐ Inform WNSW, OEH & DRE immediately. ☐ Notify hydrology and ecology specialists immediately.

Site	Wongawilli Colliery	DOC ID	WWC EC PLN 003
Type	Plan	Date Published	27/03/2019
Doc Title	SURFACE WATER MANAGEMENT PLAN		

Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
				i.e. Cracks or other physical damage with permanent change in stream stability	☐ Site visit with stakeholders. ☐ Take photographic record immediately. ☐ Contract specialist to investigate and report on changes identified. ☐ Review monitoring program within 2 weeks and implement additional monitoring if required. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required. ☐ Report on mitigation as soon as practicable. ☐ Report in Annual Report/Annual Review Report.
Groundwater quality Using piezometers Nebo1S, 1D, 2S, 2D, 3, 4	☐ Field water quality (EC, pH) every 2 months ☐ Laboratory analysis – every four months ☐ Lab	☐ Field water quality – monthly during extraction ☐ Laboratory analysis – every two months	☐ Field water quality – every two months ☐ Laboratory analysis – every four months until Nebo mining is	NORMAL No change in groundwater quality variability compared to baseline period	☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report.

Site	Wongawilli Colliery	DOC ID	WWC EC PLN 003
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Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
	Parameters-- TDS, Na, K, Ca, Mg, F, Cl, SO ₄ , HCO ₃ , NO ₃ , Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd, (filtered)		completed	WITHIN PREDICTIONS Reduction in groundwater quality which extends for less than 2 months and does not persist after significant recharge (or lack of) events with the water having the following change above baseline variability; ☐ EC <20% increase above baseline maximum ☐ pH < 1.5 drop below minimum baseline value ☐ Fe (Tot), Mn (tot), Al (filt), Zn (filt), SO ₄ (filt) < 20% increase above baseline maximum ☐ Total N, Total P < 20% increase above baseline maximum	☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report.

Site	Wongawilli Colliery	DOC ID	WWC EC PLN 003
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Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
				EXCEEDS PREDICTIONS Reduction in groundwater quality which extends for more than 2 months and persists after significant recharge (or lack of) events with the water having the following change above baseline variability; ☐ EC >20% increase above baseline maximum ☐ pH < 2.0 drop below minimum baseline value ☐ Fe (Tot), Mn (tot), Al (filt), Zn (filt), SO ₄ (filt) > 20% increase above baseline maximum ☐ Total N, Total P > 20% increase above baseline maximum	☐ Inform WNSW, OEH & DRE immediately. ☐ Notify hydrogeology specialist immediately. ☐ Contract specialist to investigate and report on changes identified. ☐ Review monitoring program within 2 weeks and implement additional monitoring if required. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required. ☐ Report on mitigation as soon as practicable. ☐ Report in AEMR/Annual Review Report.
Ground Water Levels Using vibrating wire	☐ Minimum 12 hourly in VWP and open standpipe	☐ Minimum 12 hourly in VWP and open standpipe	☐ Minimum 12 hourly in VWP and open standpipe	NORMAL No change in groundwater level variability compared to	☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and

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Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
piezometers Nebo 6, 7, 8, 8A, WW11, WW20B and dip meters/ transducers in open standpipe piezometers Nebo1S, 1D, 2S, 2D, 3, 4	piezometers ☐ Bi-monthly downloads and dip meter	piezometers ☐ Monthly downloads and dip meter	piezometers ☐ Bi-monthly downloads and dip meter	baseline period WITHIN PREDICTIONS Reduction in groundwater level which extends for less than 2 months, or does not persist after significant recharge (or lack of) events and is within baseline variability; EXCEEDS PREDICTIONS Reduction in groundwater level which extends for more than 2 months, or persists after significant recharge (or lack of) events and is outside baseline variability;	monitoring in AEMR/Annual Review Report. ☐ Continue monitoring program. ☐ Report in end of panel report. ☐ Summarise all actions and monitoring in AEMR/Annual Review Report. ☐ Inform WNSW, OEH & DRE immediately. ☐ Notify hydrogeology specialist immediately. ☐ Contract specialist to investigate and report on changes identified. ☐ Review monitoring program within 2 weeks and implement additional monitoring if required. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section

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Feature	Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
					54 of the Water Management Act if required. ☐ Report on mitigation as soon as practicable. ☐ Report in AEMR/Annual Review Report.
Inflow into mine workings or hydraulic connectivity between stream/s and the workings during active mining	☐ Daily volumetric flow monitoring of mine inflow and discharge ☐ Water quality analysis of any anomalous inflow event	☐ Daily monitoring of mine inflow and discharge ☐ Water quality analysis of any anomalous inflow event, with the sampling method and assessment parameters to be defined depending on what is being investigated, (i.e. major / minor elements, isotopes, algae etc.)	☐ Daily monitoring of mine inflow and discharge ☐ Water quality analysis of any anomalous inflow event (as required) with the sampling method and assessment parameters to be defined depending on what is being investigated, (i.e. major / minor elements, isotopes, algae etc.)	☐ Increase in water discharge of > 1ML/day for 7 successive days from active longwall or pillar extraction areas, which are suspected to be as a result of mine subsidence and excluding elevated inflows due to high rain events over the entire Wongawilli workings ☐ Note: the typical discharge from the overall Wongawilli underground is 6ML/day	☐ Engage hydrogeologist to investigate and report on changes identified. ☐ Inform relevant agencies of investigation. ☐ Investigation initiated within one week of trigger exceedance being observed. ☐ Monthly updates of investigation process to WNSW&NOW. ☐ Report on mitigation as soon as practicable to WNSW&NOW. ☐ Report in AEMR/Annual Review Report.

Appendix A3: LW11-20 SMP TARP

Feature	ESSMP Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
Stream Water Quality and Flow	☐ Field Analysis (EC, pH, temp) ☐ <u>Laboratory Analysis</u> TDS, Na, K, Ca, Mg, F, Cl, SO ₄ , HCO ₃ , NO ₃ , Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd, Cr, Li, Ba, Cs, Rb, Sr (filtered) ☐ Observable iron or salinity staining using Photo Points ☐ Monthly for at least two months prior to mining (for all	☐ Weekly Field Analysis during active undermining of stream ☐ Bi-monthly Lab analysis during active undermining of stream ☐ Weekly observations during active undermining of stream using Photo points	☐ Bi-monthly Field Analysis for one year after subsidence ceases ☐ Lab analysis Every four months for one year until subsidence ceases ☐ Bi-monthly observations for one year after subsidence ceases using Photo points	☐ Observable increase from baseline in iron hydroxide precipitation (e.g. orange staining in water or on banks/bed) from comparison with pre-mining monitoring and photographs ☐ Based on the baseline monitoring conducted since July 2005 the following triggers will be used: ☐ EC > 200uS/cm ☐ 4.2 > pH > 6.77 ☐ Fe (Tot) > 6mg/L ☐ Mn (tot) > 0.1mg/L ☐ Al (tot) > 0.7mg/L ☐ Zn (filt) > 0.04mg/L ☐ SO ₄ (filt) > 8mg/L ☐ Dissolved oxygen /	☐ Repeat water quality sampling and initiate laboratory water quality sampling on a monthly basis. ☐ Contract hydrologist investigate and report on changes identified. ☐ Inform WNSW, OEH & DRE of results of investigation. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act. ☐ Report in the End of Panel Report.

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Feature	ESSMP Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
	parameters above)			ORP / temperature	
Loss of Flow	☐ Monthly for at least two months prior to mining	☐ Weekly during active undermining of stream	☐ Bi-monthly for one year after subsidence ceases	☐ Observation of loss of flow connectivity within a flowing ephemeral stream (related to rainfall), compared to the flow regimes evident prior to the extraction of LW's 11-20	☐ Repeat water quality sampling and initiate laboratory water quality sampling on a monthly basis. ☐ Contract hydrologist investigate and report on changes identified. ☐ Inform WNSW, OEH& DRE of results of investigation. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act. ☐ Report in the End of Panel Report.
Areas of increased flooding	☐ Monthly for at least two months prior to mining	☐ Weekly during active undermining of stream	☐ Bi-monthly for one year after subsidence ceases	☐ Observation of areas of flooded stream in excess of baseline conditions – identified by extended flooding within a terrestrial habitat and from comparison of pre-mining and post-mining photographs	☐ Survey area to identify whether earthworks are required. ☐ Contract hydrologist investigate and report on changes identified. ☐ Inform WNSW/OEH of results of investigation. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required. ☐ Report in the End of Panel Report.

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Feature	ESSMP Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
Erosion of stream bed and banks	☐ Monthly for at least two months prior to mining	☐ Weekly during active undermining of stream	☐ Bi-monthly for one year after subsidence ceases	☐ Observation of erosion of stream bed and banks in excess of baseline conditions identified from comparison of pre-mining and post-mining photographs	☐ Contract hydrologist investigate and report on changes identified. ☐ Inform WNSW, OEH& DRE of results of investigation. ☐ Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act. ☐ Report in the End of Panel Report.
Groundwater – Hawkesbury Sandstone (water quality and water levels) in four bores EGW2, EGW3,EGW5 ,WW1	☐ Field water quality (EC, pH, temp)– bi monthly ☐ Laboratory analysis – every four months Lab Parameters–TDS, Na, K, Ca, Mg, F, Cl, SO4, HCO3, NO3, Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd, Cr, Li, Ba, Cs, Rb, Sr (filtered)	☐ Field water quality – monthly during extraction ☐ Laboratory analysis – every two months	☐ Field water quality – bi monthly ☐ Laboratory analysis – every four months	Ground Water Quality ☐ 2 std deviation change, or distinctive diversion over at least 4 months from baseline levels for pH, EC, Fe, Mn, Al, Zn and SO4	☐ Investigation initiated within one week of trigger. ☐ Repeat water quality sampling of impacted and adjacent bores if triggers exceeded, as required. ☐ If trigger is exceeded for at least 4 months, engage hydrogeologist to investigate and report on any identified adverse changes to water level / water quality. ☐ Inform WNSW, OEH& DRE of investigation outcomes. ☐ Investigation of possible mitigation measures in consultation with WNSW/OEH. ☐ Prepare and implement a site mitigation/action plan in consultation

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Feature	ESSMP Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
					with WNSW /OEH if appropriate. ☐ Report in End of Panel report to inform relevant agencies of results of monitoring.
Ground Water Levels (using pressure transducer and bores)	☐ Bi- monthly	☐ Monthly	☐ Bi -monthly	☐ Continuous >5m ground water level reduction over a minimum 2 month period	☐ Instigate investigation within 1 week of trigger. ☐ Engage hydrogeologist to investigate and report on the cause of trigger exceedances where the cause may not be directly related to lack of rainfall recharge. ☐ Inform WNSW, OEH & DRE of investigation outcomes. ☐ Investigation of possible mitigation measures in consultation with WNSW/OEH. ☐ Prepare and implement a site mitigation/action plan in consultation with WNSW / OEH if necessary. ☐ Report in End of Panel report to inform relevant agencies of ongoing results of monitoring.
Inflow into mine workings (during all active mining)	☐ Daily monitoring of mine discharge (completed)	☐ Daily monitoring of mine discharge (completed)	☐ Daily monitoring of mine discharge (ongoing)	☐ Increase in water discharge of > 1ML/day for 7 successive days from active longwall or pillar extraction areas,	☐ Engage contract hydrogeologist to investigate and report on changes identified. ☐ Inform relevant agencies of results of investigation.

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Feature	ESSMP Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
(daily monitoring)	☐ Water quality sample of any measured inflow event (not required)	☐ Water quality sample of any measured inflow event (not required)	☐ Water quality sample of any measured inflow event (as required)	which are suspected to be as a result of mine subsidence ☐ Note: the typical discharge from U/G is 6ML/day	☐ Report in Subsidence Management Status Report. ☐ Report in End of Panel Report. ☐ Investigation initiated within one week of trigger. Monthly updates of investigation process.
Potential Mine inflow events	☐ Daily monitoring of mine discharge (completed) ☐ Water quality sample of any measured inflow event (not required)	☐ Daily monitoring of mine discharge (completed) ☐ Water quality sample of any measured inflow event (not required)	☐ Daily monitoring of mine discharge (ongoing) ☐ Water quality sample of any measured inflow event (as required)	☐ Inflow event from mining area requiring notification to the mining inspectorate	☐ Engage contract hydrogeologist to investigate and report on changes identified. ☐ Inform WNSW, OEH & DRE of investigation outcomes. ☐ Report in Subsidence Management Status Report. ☐ Report in End of Panel Report. ☐ Investigation initiated within one week of trigger. Monthly updates of investigation process.
Mine water connectivity to the surface	☐ Daily monitoring of mine discharge (completed) ☐ Water quality sample of	☐ Daily monitoring of mine discharge (completed) ☐ Water quality sample of any	☐ Daily monitoring of mine discharge (ongoing) ☐ Water quality sample of any	☐ Water Chemistry or age indicates connectivity to the surface ☐ NB: this trigger must be derived from a hydrogeologist's	☐ Inform WNSW, OEH & DRE of this change. ☐ Commence preparation of mitigation/action plan within the timeframe agreed with relevant government agencies. ☐ Inform WNSW, OEH & DRE within 24hrs. ☐ Commence preparation of

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Feature	ESSMP Monitoring Commitments			TARPS	
	Prior to Mining	During Mining	Post Mining and Future Monitoring	Trigger	Response
	any measured inflow event (not required)	measured inflow event (not required)	measured inflow event (as required)	investigation report	mitigation/action plan within timeframe agreed with relevant agencies. ☐ Monthly updates of investigation progress. ☐ Report in Subsidence Management Status Report. ☐ Report in the End of Panel Report.

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Appendix B: Wongawilli Colliery Surface Water Management and Mitigation

Surface Water Management and Mitigation

Aspect	Feature	Management and Mitigation
Water Use	Potable Water	- Site audit of potable water usage and infrastructure to identify water saving opportunities. - Repair all water leaks on site.
Water Contamination	Hydrocarbon & Chemical Containment	Hydrocarbon and chemical storage to comply with AS1940.
	Sewage Treatment	Black Water to be stored in onsite tanks for regular disposal offsite
Water Discharge	Licensed Water Discharge	Maintain compliance with EPL No.1087.
	Receiving Water Quality	Water quality monitoring as per Surface Water Management Plan and TARP.
Water Management System	System Integrity	Maintenance of existing water management system.
Erosion	Erosion Control	Implementation of erosion control for Colliery activities as required.
Mine Subsidence Areas	Surface Water Quality	Continue to implement approved monitoring and management plan and TARP for both Elouera LW11-20 and Nebo N1-N6.
Exploration Areas	Surface and Groundwater Quality Erosion Control	Continue to implement approved monitoring and management plans as per WNSW approvals.