SOUTH32 Illawarra Metallurgical Coal




APPIN MINE
WATER MANAGEMENT PLAN

Table of Contents

DOCUMENT REVISION LOG

Persons authorising this Plan

NAME	TITLE	DATE
Chris Schultz	Lead Environment	July 2020

Document Revisions

REVISION	DESCRIPTION OF CHANGES	DATE
1.0	Original Document	September 2012
2.0	Addressed comments from government agencies	December 2012
3.0	Update following Triennial Independent Audit	October 2014
4.0	Change to South32 and Review of Inventory Tables	December 2016
5.0	Update following BSO consent amendment	January 2017
5.1	Minor changes following feedback from the Department of Planning and Environment	June 2018
6.0	Review of content/format, inclusion of comments from consultation and inclusion of Appin North Water Treatment Plant	July 2020

Persons involved in the review of this Plan

NAME	TITLE	COMPANY	EXP (YRS)	DATE
Chris Schultz	Lead Environment	South32 IMC	24	July 2020
David Gregory	Specialist Environment	South32 IMC	12	July 2020
Simon Pigozzo	Specialist Environment	South32 IMC	9	July 2020
Nicola Curtis	Principal Approvals	South32 IMC	5	July 2020
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1. INTRODUCTION

Appin Mine incorporates the underground mining operations, which extract coal from the Bulli Seam, and associated surface activities, including the West Cliff Coal Preparation Plant (WCCPP) and Coal Wash Emplacement Area (CWEA). Appin Mine is located approximately 25 kilometres (km) north-west of Wollongong in New South Wales (See Plan 1). Appin Mine is owned and operated by Endeavour Coal Pty Ltd, a subsidiary of Illawarra Coal Holdings Pty Ltd (ICHPL), which is a wholly owned subsidiary of South32 Limited. Appin Mine, Cordeaux Colliery and Dendrobium Mine (and associated facilities) collectively operate as South32 Illawarra Metallurgical Coal (IMC).

ICHPL received Project Approval 08_0150 (the Appin Mine approval) from the NSW Department of Planning and Infrastructure (DoPI) on 22 December 2011 for current and proposed mining of the Bulli Seam Operations (BSO) for the next 30 years, and production of up to 10.5 million tonnes per annum of run of mine (ROM) coal. This approval incorporates underground mining, transport and coal wash emplacement activities undertaken 24 hours a day, seven days per week.

This Water Management Plan (WMP) has been prepared to detail the control measures, compliance procedures, monitoring programs, evaluation protocols, notification and communication processes for water management for Appin Mine. This plan has been prepared to satisfy Condition 16 of Schedule 4 of the Appin Mine approval for the Surface Water Management Plan.

1.1 Plan Objectives

This WMP has been prepared to comply with the intent and requirements of Condition 16 of Schedule 4 of the Appin Mine approval. The objectives of this WMP are to:

- establish responsibilities for water management across Appin Mine;
- comply with all relevant regulatory requirements, Environment Protection Licence (EPL) 2504 and South32 policies and standards for water management;
- describe the water management systems including measures to comply with discharge limits and minimise potable water usage;
- outline the framework for water monitoring, auditing and reporting;
- provide a water balance for the project including sources, usage and discharge quality;
- outline the process to reduce the impacts on biota from the Brennans Creek Dam discharge; and
- specify investigation and communication processes in response to water related issues and complaints.

1.2 Scope

The WMP applies to all existing and future activities related to Appin Mine including water management for operational and construction needs at:

- Appin East, Appin West and Appin North Pit Top areas;
- Appin No. 1, No. 2, No. 3 and No. 6 Ventilation Shaft sites;
- Douglas North Substation;
- WCCPP;
- CWEA; and
- North Cliff Mine site.[1]

Refer to Plan 1 for locations of these sites.

1.3 Environmental Management System

IMC has a comprehensive Environmental Management System (EMS) in place to minimise the impact of its operations on the local environment and community. The WMP is a component of the EMS which is certified to ISO 14001.

1.4 Consultation

Consultation has been undertaken as part of this review of the WMP with the Department of Planning, Industry and Environment – Water (DPIE – Water)/Natural Resource Access Regulator and the Environment Protection Authority (EPA). The comments from the consultation process have been incorporated into the current version of the WMP. A summary of consultation has been provided in Appendix 3.

Consultation with agencies as stated in Condition 16 of Schedule 4 will only be undertaken where there is a material change to the WMP or if specifically requested by Department of Planning Industry and Environment (DPIE). Administrative or descriptive changes do not constitute a material change.

Endorsement by the Secretary of suitably qualified and experienced persons to prepare the WMP will only be sought where there is a material change to the water management system or if specifically requested by DPIE. Endorsement of personnel for Revision 6.0 is provided in Appendix 5.

2. ROLES AND RESPONSIBILITIES

Roles and responsibilities associated with environmental management at Appin Mine are defined in the Environmental Management Strategy. Table 1 outlines the roles and responsibilities associated with the implementation and periodic review of the WMP.

[1] North Cliff Mine site is no longer an operational site. Rehabilitation/closure of the site is planned.

Table 1: Roles and Responsibilities

Role	Responsibilities
Site Specialist Environment	Advise, coach and mentor IMC operations with respect to meeting the standards and requirements of the WMP. Monitor and review compliance against these requirements. Undertake monitoring as required.
Lead Environment	Implementation and periodic review of the WMP. Liaise with government regulators and IMC senior leadership team in relation to arising water issues.
Maintenance and Operations Supervisors Site Maintenance Managers	Operation and maintenance of surface infrastructure in accordance with the requirements of the WMP.
Corporate Affairs/Community Relations	Meeting the commitments contained within the WMP in relation to stakeholder engagement.
Manager Health, Safety and Environment Lead Environment General Manager Appin Mine	Provide the necessary resources and systems to meet the requirements of the WMP.

3. LEGISLATION AND PLANNING

3.1 Project Approval Conditions and Statement of Commitments

Potential surface water usage and impacts associated with Appin Mine were addressed in the BSO Project Environmental Assessment (EA) 2009. The EA was assessed and approved under the Environmental Planning and Assessment Act 1979 (EP&A Act) and associated Regulations.

Appendix 1 outlines the water management requirements of the Appin Mine approval and cross references where the requirements have been addressed within the WMP.

Appendix 2 summarises the requirements of the commitments included within the EA and cross references where the requirements have been addressed within the WMP.

3.2 Environment Protection Licence Requirements

Environment Protection Licence No. 2504 (EPL 2504) applies to Appin Mine and associated activities. A copy of the licence can be accessed at the EPA website:

http://www.epa.nsw.gov.au/prpoeoapp/.

3.3 Relevant Legislation and Licences

Key regulatory and WMP obligations applicable to Appin Mine are managed via an online obligations management database. The obligations are allocated to responsible personnel. This process is detailed in the Environmental Compliance/Conformance Assessment and Reporting Procedure.

Legislation applicable to water, erosion and sediment control management includes but is not limited to:

- Protection of the Environment Operations Act 1997 (POEO Act);
- Protection and the Environment Operations (Underground Petroleum Storage Systems) Regulation 2014;
- Environmental Planning and Assessment Act 1979 (EP&A Act);
- Water Act 1912;
- Water Management Act 2000;
- Water Management (General) Regulation 2018;
- Mining Act 1992;
- Water NSW Act 2014;
- Sydney Water Regulation 2017;
- Soil Conservation Act 1938; and
- National Environment Protection (National Pollutant Inventory) Measure 1998.

A list of water licences issued by WaterNSW is provided in Appendix 4.

3.4 Guidelines and Standards

This WMP has been developed to be consistent with the principles of the following:

- ISO14001:2015 Environmental Management Systems;
- South32 Sustainability Policy; and
- South32 Environment Standard.

Other relevant guidelines for water management include:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000);
- Bunding and Spill Management Guidelines (EPA);
- National Water Quality Management Strategy: Guidelines for Sewerage Systems – Effluent Management (ANZECC/ARMCANZ, 1997);
- National Water Quality Management Strategy: Guidelines for Sewerage Systems – Use of Reclaimed Water (ANZECC/ARMCANZ, 2000c);
- Environmental Guidelines: Use of Effluent by Irrigation (DEC, 2004);

- Managing Urban Stormwater – Soils and Construction, Volume 1 (Blue Book) (Landcom, 2004);
- Managing Urban Stormwater – Soils and Construction, Volume 2A Installation of services (DECC, 2008);
- Managing Urban Stormwater – Soils and Construction, Volume 2C Unsealed Roads (DECC, 2008);
- Managing Urban Stormwater – Soils and Construction, Volume 2D Main Road Construction (DECC, 2008); and
- Managing Urban Stormwater – Soils and Construction, Volume 2E Mines and Quarries (Landcom, DECC).

4. BASELINE AND WATER BALANCE

4.1 Baseline (EA)

A comprehensive EA was completed in 2009 (BSO Project Environmental Assessment: Resource Strategies 2009) as part of the Part 3A application. The assessment included comprehensive baseline datasets for rainfall and evaporation, and water flow and quality data for the Nepean River, Georges River, Cataract River, O'Hares Creek, Woronora River and Punchbowl Creek catchments and surface water resources. This baseline data can be viewed in the EA (Bulli Seam Operations Project Environmental Assessment / Volume 2 – Appendices / Appendix C – Surface Water Assessment Baseline Hydrology on pp. 24-120) at the following link:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

Recommendations from the baseline water assessment included in the EA have been considered in the development of this WMP.

4.2 Water Balance

A Water Balance model has been developed for Appin Mine in line with the Minerals Council of Australia Water Accounting Framework. The Water Balance model for Appin Mine is shown in Figure 1. [2]

[2] Figures shown are total volume used or discharged in megalitres for FY17. Figure 1 does not reflect the cessation of groundwater discharges to BCD since February 2019 or the changes associated with the installation of the proposed Appin North Water Treatment Plant. These changes will be reflected in the next update of the WMP.

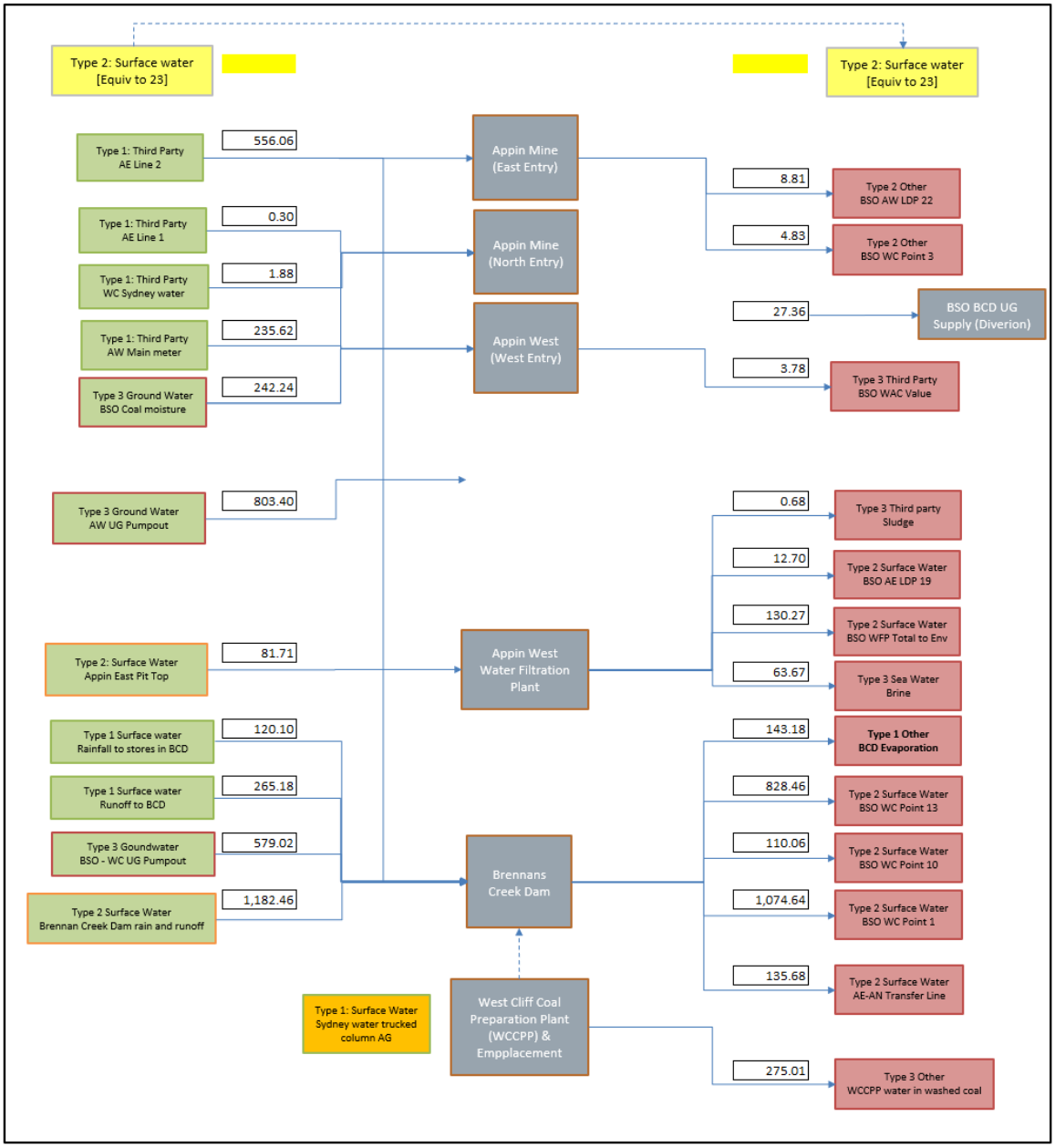


Figure 1: Appin Mine Water Accounting Framework (Water Balance)

Internal and external measuring points have been installed to monitor the inputs, outputs and recycling to inform the water balance.

A water model simulation was conducted as part of the EA and can be accessed (Appendix C – Surface Water Assessment Baseline Hydrology on pp. 24-120) via the following link:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

5. OPERATIONAL WATER MANAGEMENT

This section of the WMP provides a detailed summary of the operational water management processes that are utilised across Appin Mine to manage water resources.

5.1 Water Management - Summary

Table 2 provides a summary of the water management processes and activities that are implemented to comply with surface water discharge/EPL limits.

Table 2: Water Management Processes and Activities

Type	Description	Storage and Treatment
Mine water	Blend of process water from underground operations and groundwater inflows that is initially stored in old underground workings (goaf areas).	**Appin Mine**: Underground storage - Areas 1, 4 and 5. Treatment via the Water Treatment Plants (WTP) located at the Appin West and Appin North Pit Tops. Dosing at Appin East in the Green Tank.
		WCCPP: Underground storage (sumps) and pump out to the Concrete Settling Tanks located adjacent to the WCCPP. This is no longer a general practice onsite and authorised only under exceptional circumstances (for example drought), providing the Concrete Settling Tanks have enough storage capacity to prevent overflows into the downstream site water management system.
Treated mine water	Mine water that has been treated to a suitable quality for reuse (surface and underground operations) and / or discharge via Licence Discharge Points (LDPs).	**Appin West**: Water from the WTP is stored in the product water tanks prior to delivery underground or discharged to Allens Creek via LDP 24.
		Appin East: Mine water is pumped to the surface at Appin East into Green Tank, where it is dosed with sodium hypochlorite and pumped back underground for operational use.
		Appin North/WCCPP: Mine water pumped from Area 5 is treated at the Appin North WTP (to be constructed FY21) and discharged to Brennans Creek Dam (BCD) or to Brennans Creek via LDP 10.

Type	Description	Storage and Treatment
		Mine water can also be treated at the Concrete Settling Tanks prior to being supplied to the WCCPP[3].
Surface and stormwater management	Clean and potentially contaminated stormwater is separated at each of the sites. Potentially contaminated stormwater is treated, reused and/or discharged via a LDP.	**Appin East**: Stormwater is chemically treated, settled in the Main Dam and filtered via a Dynasand filter prior to discharge via LDP 19.
		Appin West: Stormwater is settled in the surface water basins and filtered via a Stormfilter® prior to discharge via LDP 23.
		Vent Shaft 1/2: Clean water is diverted around the site. The site is sealed.
		Vent Shaft 3: Surface water drains to the onsite sediment basin. The basin overflows when full and water gradually evaporates. There is no active management.
		Vent Shaft 6: Stormwater is settled in the surface water basins and discharged to Harris Creek via LDP 36. This water can be dosed if required.
		Appin North: Stormwater is chemically treated (where required), settled in settling dams and stored in BCD for use or discharge via LDP 10 (if water quality criteria are met).
		North Cliff: Surface water drains to the onsite sediment basin. The basin overflows when full and water gradually evaporates. There is no active management.
Effluent	Effluent is a waste product from site toilets, bathhouse and kitchen facilities.	**Appin East**: Effluent from the toilets, kitchen and bathhouse is connected into the Sydney Water sewerage system.
		Appin West:

[3] This is planned to be disconnected following commissioning of the Appin North WTP.

Type	Description	Storage and Treatment
		Effluent from the toilets, kitchen and bathhouse is treated via a sewage treatment package plant and treated effluent is irrigated on site via LDP 22.
		Appin North: Effluent from the toilets, kitchen and bathhouse is treated via a sewage treatment package plant and treated effluent is irrigated on site via LDP 3/4.
Potable water	Potable water supplied by Sydney Water is used for drinking, bathhouse facilities, surface cooling systems and longwall support hydraulics (when Sydney Water not available). A Sydney Water supply is available to dilute discharge from BCD to reduce salinity levels in-line with the EPL.	**Appin West/East:** Potable water is either stored in tanks or transferred from the main line to the fresh water supply lines underground.
		Appin North/WCCPP: Potable water to trucked to Appin North/WCCPP and stored in tanks.
Oils and oily water	Waste oil and oily waters and stored in waste tanks for off-site treatment.	**Appin Mine and WCCPP:** Oil is removed from oily waters via mechanical and chemical separators. Waste oil and oily waters are treated off-site at a licenced waste facility.

5.2 Mine Water Management

5.2.1 Appin West

5.2.1.1 Mine Water Make

The mining process results in the liberation of groundwater from the coal seam and strata immediately overlying and underlying the working areas of the mine. Groundwater from the Bulli Seam is unsuitable for direct re-use in the mining operations and is transferred into old mine workings in Area 1 (White Panel), Area 4 and Area 5[4] for solids settling and storage. The storage capacity of each underground storage area is as follows:

- Area 1 – 1000 ML;
- Area 4 – 600 ML; and
- Area 5 – 110 ML.

[4] Water from Appin Area 5 can be transferred to the Appin West WTP via the Area 1 and Area 4 water storages if required.

5.2.1.2 *Underground Supply*

Process water is used underground for machine cooling, controlling dust emissions in active underground mining areas, hydraulic oil emulsions, conveyors and fire-fighting purposes. Water supplied to underground operations needs to meet specific minimum water quality requirements for human health and operational needs. The water is sourced from treated mine water (primary supply) or Sydney Water (backup supply).

5.2.1.3 *Treatment System*

Mine water is pumped from Areas 1 and 4 to the two WTPs at Appin West Pit Top – Integrated Membrane System (IMS) 1 and IMS2. These plants provide treated mine water (permeate) for the underground operations at Appin Mine. The WTP includes mine dams for solids settlement and nutrient removal, filter units (multimedia, granular activated carbon, and microfiltration units), water softeners and a reverse osmosis unit.

The WTP reduces the concentration of suspended solids, metals and salinity to acceptable levels for recycling back underground as process water for operational activities, and to meet water quality concentration limits at LDP 24 for water discharged to the environment that is surplus to operational requirements.

Back wash and cleaning waste water from the WTP is returned to Mine Dam 2 where it undergoes treatment through the Backwash Treatment Plant (mine dam aerators, Dynasand filter and sludge separator). This water is blended with the permeate that is pumped underground.

Brine from the WTP is transported off site to LDP 5 (under EPL 3241 for Dendrobium Mine), located at Marley Place, Unanderra. At LDP 5 the brine mixes with mine water that is pumped out of Dendrobium Mine, into Allans Creek, which flows into Port Kembla Harbour. Alternative licenced locations for brine disposal may be utilised as required.

Weak acid cation exchange solution is transported to an appropriate licenced waste facility for reuse. Biosolids are transported to the CWEA for disposal.

5.2.2 *Appin North*

5.2.2.1 *Mine Water Make*

As noted in 5.2.1.1, groundwater from the Bulli Coal Seam is transferred into old mine workings in Area 1 (White Panel), Area 4 and Area 5 for solids settling and storage. The WTP being constructed at Appin North (in FY21) will utilise mine water from Area 5.

5.2.2.2 *Underground Supply*

Treated water from the Appin North WTP will not be directly returned to the underground workings for use. Some water from the WTP will be transferred to BCD, which is pumped underground for operational purposes.

5.2.2.3 *Treatment System*

The Appin North WTP will receive water from the Area 5 underground water storage, which will be mixed with a portion of the underdrainage from the CWEA prior to treatment. The treated water either be discharged to Brennans Creek for environmental flows or BCD.

The WTP will reduce the concentration of suspended solids, metals and salinity to acceptable levels to meet water quality concentration limits at LDP 10 for water discharged to the environment.

Back wash and cleaning waste water from the WTP will be transferred to BCD.

Brine from the WTP will be transported off site to LDP 5 (under EPL 3241 for Dendrobium Mine), located at Marley Place, Unanderra. At LDP 5 the brine mixes with mine water that is pumped out of Dendrobium Mine, into Allans Creek, which flows into Port Kembla Harbour. Alternative licenced locations for brine disposal may be utilised as required.

Weak acid cation exchange solution will be transported to an appropriate licenced waste facility for reuse. Biosolids will be transported to the CWEA for disposal.

5.2.3 WCCPP

5.2.3.1 *Mine Water*

Water for the WCCPP is preferentially sourced from BCD, that is either pumped directly into the WCCPP or to the Concrete Settling Tanks, which is then pumped into the WCCPP for use in the coal washing process. Mine water can be used as a top-up supply, providing the Concrete Settling Tanks have enough storage capacity to prevent overflows into P3 (this would only be used under exceptional circumstances e.g. drought conditions).

5.2.3.2 *Process Water*

WCCPP process water no longer required by the plant, is directed to P3 for initial settlement. This water is pumped back into the Concrete Settling Tanks and recirculated through the WCCPP.

Overflow from P3 flows into Pond 4A (P4A) or is spray irrigated onto the emplacement. The pipeline from P4A to the Eastern clean water diversion drain (that flows into BCD) can be opened if required to transfer water. Overflow from P4A also filters through the CWEA and into the underdrainage system. Water from P4A can also be spray irrigated on the active emplacement area which also drains through the CWEA to the underdrainage.

5.2.3.3 *Treatment System*

The Concrete Settling Tank treatment system is used to chemically assist coagulation, flocculation and settling of water used in the WCCPP. The treatment system is located adjacent to the WCCPP.

The Concrete Settling Tanks are operated separately and independently of the Pond P1/P2 /P4A surface runoff system, as that system has been designed to treat surface stormwater runoff.

The tanks are cleaned out (i.e. sediment removed) periodically to ensure the treatment system operates efficiently. The clean out of this system is coordinated by the WCCPP Supervisor. Periodic inspections are completed by the site Specialist Environment to ensure the system is operating effectively and associated chemical storage is adequately bunded.

5.3 Surface and Stormwater Runoff Management

5.3.1 Appin East

The surface water drainage and LDPs at Appin East are shown in Plan 2.

5.3.1.1 Clean Stormwater Catchment

Clean stormwater from undisturbed areas around the site is diverted around the Appin East Pit Top to avoid potential contamination.

5.3.1.2 Mine Entrance and Sherriff Road Catchment

Stormwater runoff from the mine entrance and Sheriff Road is diverted into a retention system that is designed to capture the 'first flush' after rain events. The stormwater is then pumped into the Main Dam for use in the stockpile suppression system. During heavy rainfall events (above the capacity of the first flush system), clean stormwater overflows into the Georges River.

5.3.1.3 Disturbed and Potentially Contaminated Surface and Stormwater Catchment

Surface and stormwater from the internal roads, workshop, stockpile and other disturbed areas is directed to the silt trap (for settlement of coal fines and other particulates) via the chemical treatment system, which overflows into the Main Dam.

A slurry pit is in place at the base of the surface elevator belt to capture coal fines.

Coal fines are removed from the slurry pit, Main Dam silt trap, Main Dam and settling pond on an as required basis and placed onto the drying areas (adjacent to the Main Dam, coal bins or on the coal stockpile).

Water from the Main Dam is used as the primary water supply for dust suppression sprays on the stockpiles.

Water from the Main Dam is pumped into the Sediment Dam, from which it is pumped through the Dynasands filter into the Georges River via LDP 19.

Overflow from the Main Dam is via LDP 21.

5.3.2 Appin West

The surface water drainage and LDPs at Appin West are shown in Plan 3.

5.3.2.1 Clean Stormwater Catchment

Clean stormwater from undisturbed areas around the site is diverted around the Appin West Pit Top to avoid potential contamination.

5.3.2.2 *Disturbed and Potentially Contaminated Surface and Stormwater Catchment*

Storm and surface water from disturbed and potentially contaminated areas is diverted to the Surface Water Dams. The catchment includes the pit top, stormwater drainage system, internal roads, hardstand areas, car park and the workshop. Surface water from the sealed areas around the workshop and store which has the potential to be contaminated with oily water is sent to Dam 1. All other surface water can be transferred to either Dam 1 or Dam 2.

The surface water management system (Surface Water Dams and Storm Filter System) is designed to capture and treat a 1 in 10-year, 72-hour duration rainfall event. Surface water is treated to reduce suspended solids and oil and grease prior to discharge into Sandy Gully (Clements Creek) via LDP 23.

Overflow from Dam 1 is via LDP 25.

5.3.3 *Appin North/WCCPP*

The Appin North/WCCPP water management system has been designed to:

- collect all groundwater inflows in underground workings and pump them to the surface for treatment with the Appin North Water Treatment Plant;
- discharge treated water (permeate) from the Water Treatment Plant to BCD and Brennans Creek to improve water quality and aquatic macroinvertebrate health in Brennans Creek/Georges River;
- collect, store, and treat all dirty water surface runoff from rainfall events up to a 1 in 10-year ARI 3-day duration storm; and
- convey all treated water to Brennans Creek Dam (BCD) for storage and reuse onsite/underground, or discharge to Brennans Creek/Georges River (pending ability to meet water quality concentration limits).

The water management system includes several onsite drains, treatment systems, and surface water storage/treatment ponds, including Ponds 1 to 7 and emplacement ponds (EPs) 2 and 3, with a combined storage capacity of over 200 ML. This infrastructure is used to store and treat all site dirty surface runoff from coal stockpile areas, haul roads, active coal wash emplacement areas, and process flows from the WCCPP and underground mine water[5].

The reclaim pond at the base of BCD collects seepage from the dam. This water is either discharged to Brennans Creek (if water quality concentration limits are achieved) or pumped back into BCD.

The surface water drainage and EPL 2504 LDPs at Appin North, WCEA and WCCPP are shown in Plan 4.

[5] Discharges of underground mine water to Brennans Creek Dam via P3 and P4A ceased in February 2019.

5.3.3.1 *Clean Stormwater Catchment*

The segregation of clean and dirty water is an important feature of the site water management system as it minimises the clean catchment area draining to the active emplacement catchment and ensures that the emplacement water management system is not overloaded. The Brennans Creek clean water diversion channels are located to the:

- south-west of the emplacement area; and
- adjacent to Brennans Creek on both sides of the valley.

These clean water diversion channels have been established to divert clean water runoff around the active emplacement area and dirty water ponds EP2 and EP3. The clean water diversion system must be maintained throughout the operational lifetime of the emplacement area to ensure that the amount of clean water catchment draining to the emplacement water treatment system is minimised.

Stormwater runoff from the Appin North Pit Top office/administration area is considered 'clean' and directed to Brennans Creek via the Brennans Creek diversion channel around the emplacement.

Stormwater runoff from emplacement areas with established landform (with vegetation spread) is considered to be clean runoff and is directed to the clean water diversion system to minimise the load entering the emplacement water management system.

5.3.3.2 *Disturbed and Potentially Contaminated Catchment*

Storage ponds located within the Appin North/WCCPP site also form part of the site water management system. Their function is summarised as follows:

- P1 (23 ML) captures runoff from coal stockpile areas, with controlled release and spill to P2.
- P2 (24 ML) captures runoff from adjacent coal stockpile areas. Water from P2 is gravity fed to either P3 or P4A.
- P3 (23 ML) is located adjacent to the Concrete Settling Tanks at the WCCPP. Water from P3 is pumped back to the settling tanks (if required)or spray irrigated on to the CWEA. Overflow from P3 reports to P4A.
- P4A (45 ML) captures overflow from P3 and the active emplacement area. Inflow water is able to be dosed with flocculant to facilitate solids removal. The pipeline from P4A to BCD can be opened if required to transfer water. Overflow from P4A also filters through the CWEA and into the underdrainage system. Water from P4A can also be irrigated on the active emplacement area.
- P5 (maximum capacity 40 ML, minimum capacity with stockpile at capacity 8 ML) is located in the Stockpile 4 area north of the WCCPP. Water is released from P5 to P6 and P7. Clean water is diverted around the pond system.
- P6/P7 (21 ML) are located immediately downslope of P5. Inflow water is dosed with flocculant to facilitate solids removal. Water from the ponds is discharged to BCD.

- EP2/EP3 (68ML) are located downstream of the active emplacement area. EP2 is used for primary settlement prior to the water being dosed with flocculant and released into EP3 for settlement prior to discharge to BCD.

The management of water levels in each of the ponds is reliant on manual processes such as visual observations of pond volumes, and cumulative pumping rates. The levels are heavily influenced by rainfall events and therefore the ponds are generally kept empty during dry periods as this allows for sufficient storage capacity to capture and treat rainfall events as per their design specifications.

In summary, the majority of water used at the WCCPP is recycled from stormwater or treated underground minewater (if required). Prior to storage in BCD, the water passes through water treatment systems which use chemically-assisted coagulation, flocculation and settling.

Prior to reuse or storage in tanks, BCD water is pumped from the dam through a chlorine dioxide plant to reduce microbiological growth, into the:

- North Tank;
- South Tank; or
- underground workings water system via the water supply borehole.

Water from the North Tank is used for the truck wash, firefighting tanks and make-up requirements for the WCCPP, and to supply the South Tank, located at the Appin North Pit Top. The South Tank is used to provide water for fire-fighting capacity and for vehicle wash down requirements.

5.3.4 CWEA

5.3.4.1 Active Emplacement Area Runoff

Runoff from the active emplacement areas (or areas where the vegetation has not yet been spread) is directed to the emplacement water management system (i.e. P4A, EP2, and EP3) for treatment prior to being gravity fed to BCD.

The emplacement water treatment system is designed for a:

- 1 in 10-year 72-hour duration storm event; and
- maximum active emplacement area of 21 hectares.

The active emplacement area draining to P4A, EP2 and EP3 is maintained at or below 18 ha.

If additional treatment is required prior to delivery into BCD (i.e. during/following a rainfall event), the water can be re-circulated through the EP2/EP3 dosing flume to improve the water quality.

Clean catchment areas (including rehabilitated emplacement areas) are diverted around the emplacement water treatment system, either via the Brennans Creek diversion channel or the clean water cutoff drains.

5.3.4.2 Emplacement Under Drainage

Emplacement under-drainage flows are generally clean. The emplacement under-drainage is pumped to the clean water diversion channel for release into BCD. If required (i.e. if the water is turbid), the underdrainage can be directed into the emplacement dirty water system.

Overflow from the emplacement under-drainage system feeds directly to the emplacement water treatment system.

Water from the emplacement underdrainage will also be pumped to the Appin North WTP for blending with mine water prior to treatment.

5.3.5 Ventilation Shaft 1/2

Clean water is diverted around the site. The site is sealed and there is very limited hydrocarbon storage at the site. Surface water drainage at this site is shown on Plan 5.

5.3.6 Ventilation Shaft 3

Surface water from rainfall drains to the onsite sediment basin. The majority of the site is sealed. The basin overflows when full and water gradually evaporates. There is no active management of the sediment basin. Surface water drainage at this site is shown on Plan 5.

5.3.7 Ventilation Shaft 6

Surface runoff that was captured on site during the construction phase was treated with flocculant in surface dams prior to discharge into Harris Creek via LDP 36. Ventilation Shaft 6 site is now in the operational phase and the majority of the site is either vegetated or sealed. Surface runoff no longer requires treatment under normal operating conditions, however discharge is still carried out as required.

Overflow from the storage dam is via LDP 37. Surface water drainage at this site is shown on Plan 6.

5.3.8 North Cliff

Surface rainfall run off is directed to the on-site sediment basin. The basin overflows when full to natural bushland and water gradually evaporates. There is no active management of this sediment basin. The sediment basin has an approximate capacity of 6.5 ML.

5.4 Surface Water Discharges

Water releases from Appin Mine are undertaken in accordance with the requirements of EPL 2504. Additional monitoring points are also sampled. A summary of monitoring and discharge points is shown in Table 3.

Table 3: Licence Monitoring and Discharge Points – Surface Waters

Point	Description	Receiving Environment	Monitoring Frequency	Sample Method
Appin North/WCCPP				
Point 1 (LDP 1)	Overflow (spillway) from BCD	Brennans Creek / Georges River	N/A	N/A
Point 10 (LDP 10)	Discharge from BCD/Appin North WTP	Brennans Creek / Georges River	Monthly during discharge Continuous during discharge	Grab sample In line Instrumentation
Point 11	Ambient Water Quality (located in the Georges River upstream of Brennans Creek confluence)	N/A	Monthly during discharge	Grab sample
Point 12	Ambient Water Quality (located in the Georges River downstream of Brennans Creek confluence)	N/A	Monthly during discharge	Grab sample
Point 13 (LDP 13)	Volume monitoring for Point 10 discharge.	Brennans Creek / Georges River	Continuous during discharge	In line Instrumentation
Point 16	CWEA underdrainage	BCD	Monthly	Grab sample
Appin East				
Point 18 (LDP 18)	Underflow from the filter lagoon	Georges River	Monthly during discharge	Grab sample
Point 19 (LDP 19)	Dynasand Filter outlet	Georges River	Monthly during discharge	Grab sample
Point 21 (LDP 21)	Overflow (spillway) from the site Main Dam	Georges River	N/A	N/A
Appin West				
Point 23 (LDP 23)	Stormwater discharge	Sandy Gully/Nepean River	Monthly during discharge	Grab sample
Point 24 (LDP 24)	Treated mine water discharge	Sandy Gully/Nepean River	Monthly during Discharge Continuous during discharge	Grab sample In-line instrumentation
Point 25 (LDP 25)	Overflow (spillway) from the sand filtration dam	Sandy Gully/Nepean River	N/A	N/A

Point	Description	Receiving Environment	Monitoring Frequency	Sample Method
Ventilation Shaft No. 6				
Point 36 (LDP 36)	Discharge from the primary sediment pond	Harris Creek / Nepean River	Monthly during discharge	Grab sample
Point 37 (LDP 37)	Overflow spillway on stormwater dam	Harris Creek / Nepean River	N/A	N/A

The monitoring requirements and licence limits for Appin Mine can be accessed via this link:

http://www.epa.nsw.gov.au/prpoeoapp/.

Environmental monitoring (sampling) is undertaken by the site Specialist Environment with the lab analysis performed at a NATA accredited laboratory.

5.4.1 Appin East

Stormwater runoff from the mine entrance and Sheriff Road is diverted into a treatment system that is designed to capture the 'first flush' after rain events. The stormwater is then pumped into the Main Dam for use in the stockpile dust suppression system. During heavy rainfall events (above the capacity of the first flush system), clean stormwater overflows from the first flush system into the Georges River via LDP 18.

Pit top surface and stormwater is directed to the Main Dam where it is treated and allowed to settle. After settling occurs, treated surface and stormwater is filtered via a Dynasand filter and discharged into the Georges River via LDP 19. During high rainfall events, the Main Dam may spill to the Georges River via LDP 21.

5.4.2 Appin West

Surface water settles in the surface water dams and is then filtered via the Stormfilter® which reduces suspended solids, oil and grease, odour and nutrient load prior to release via LDP 23. During high rainfall events, the surface water dams may spill to Sandy Gully via the main spillway at LDP 25 to protect the integrity of the dam walls.

Mine water is treated at the WTP, resulting in a reduction in suspended solids, electrical conductivity, nutrient load and metals. Treated mine water is discharged into Sandy Gully via LDP 24.

5.4.3 Appin North/WCCPP

Releases from BCD are authorised via LDP 1 (spillway) and LDP 10. Pollution Reduction Programs and an Environment Improvement Program (EIP) have been implemented to progressively improve water quality and aquatic macroinvertebrate health in the Georges River.

Water is discharged from BCD under controlled conditions to minimise uncontrolled releases over the BCD spillway to Georges River past LDP 1 to:

- minimise the impact to the aquatic environment in Georges River;
- control discharges to Georges River to manage water quality;
- provide dry weather environmental flow (where required); and
- provide sufficient capacity and settlement time for treatment after rainfall events.

The volume of BCD to its spillway is 320 ML, with a maximum depth behind the dam wall of 12.5 m. A Trigger Action Response Plan (TARP) is in place for the operation of discharges from BCD. A target depth in the dam is maintained to provide security of supply and to accommodate rainfall events. The discharge of water from BCD may cease when the water level falls below nine metres.

A pipeline has been installed that transports Sydney Water from Appin East to BCD. This water is able to be used for dilution of discharge from BCD to meet electrical conductivity water quality limits. In accordance with Condition L 2.6 of EPL 2504, dilution is not required when drinking water restrictions are in place as gazetted under the Sydney Water Regulation 2017.

A WTP is being constructed at Appin North (to be completed in FY21) that will reduce/eliminate discharge directly from BCD. Overflow from BCD may still occur during rainfall events.

The WTP will treat a mix of water from Area 5 (underground) and water from the CWEA underdrainage system. The treated water (permeate) will be preferentially discharged to Brennans Creek to meet the 1.5 ML/day minimum discharge requirement (averaged over one month) in Condition E1.1 Table 3 in EPL 2504. Any surplus water, or water that does not meet the water quality concentration limits, will be discharged to BCD.

5.4.4 Ventilation Shaft 6

Surface runoff that was captured on site during the construction phase was treated with flocculant in surface dams prior to discharge into Harris Creek via LDP 36. Ventilation Shaft 6 is now in the operational phase and the majority of the site is either vegetated or sealed. Surface runoff no longer requires treatment under normal operating conditions, however discharge is still carried out as required.

Overflow from the storage dam is via LDP 37.

5.5 Sewage Effluent Treatment and Management

Sewage effluent irrigation at Appin West and Appin North is undertaken in accordance with the requirements of EPL 2504. A summary of EPL 2504 monitoring points relevant to effluent irrigation is shown in Table 4.

Table 4: Licence Discharge Points – Effluent Irrigation

LDP	Description	Receiving Environment
Appin North		
Point 3/4	Spray Irrigation onto grassed utilisation area	On-site
Appin West		
Point 22	Spray irrigation onto grassed utilisation area	On-site

5.5.1 Appin East

The primary method for disposal of bathhouse waters (grey waters) and sewage effluent (black waters) is through the Sydney Water wastewater system (low pressure sewer connection).

5.5.2 Appin West

Bathhouse water and sewage is treated at the Appin West site through a primary aeration pond and a Smith and Lovelace STP that discharges into a holding pond. The treated effluent is spray irrigated via LDP 22 onto the utilisation area.

5.5.3 Appin North/WCCPP

Sewage from bathhouse and toilet facilities is treated on site using a Smith and Lovelace STP that discharges into a holding pond. Treated effluent is spray irrigated via LDP 4 to a dedicated utilisation area (located on-site).

5.5.4 Ventilation Shafts 1, 2, 3 and 6

Sewage generated at the ventilation shaft sites is collected in septic tanks and pumped out and disposed of offsite by a licenced contactor.

5.6 Water Supply

Potable water (including Sydney Water and treated water) storage capacities are provided in Table 5, Table 6 and Table 7.

5.6.1 Appin East

Potable water is supplied to Appin East by mains connections to the Sydney Water network. Sydney Water is used in the administration buildings, workshops and bathhouse. It is also supplied to the underground workings when required, and for dilution at BCD (if required).

The Sydney Water supply provides water to properties owned by IMC adjacent to the Pit Top, Ventilation Shafts 1/2 and 3 and the EDL Power Plant (at Ventilation Shaft 1/2).

5.6.2 Appin West

Potable water is supplied to Appin West by mains connections to the Sydney Water network. Sydney Water is used in the administration buildings, workshops and bathhouse. It also supplies the EDL Power Plant.

The majority of water used at Appin West (and in the Appin Mine underground workings) is supplied by the WTP located at Appin West. Treated water is used in areas that require high quality water, including:

- the longwall roof support hydraulics emulsion; and
- underground supply at Appin Mine.

Sydney Water is used to replace water from the WTP when required.

5.6.3 Appin North/WCCPP

Potable water is supplied to Appin North/WCCPP via:

- a pipeline used to dilute discharge from BCD (where required) to reduce salinity levels in-line with EPL 2504. This pipeline may be used as a water supply to the WCCPP during drought conditions or be diverted to Appin North in the future; and
- water tanker to the remainder of the site.

Potable water is used in the administration buildings, workshops and the bathhouse.

5.6.4 Ventilation Shaft 6

Water is extracted from the Nepean River and used on site for operational purposes. The water is extracted under the Surface Water Licence No. 10WA117285, issued by NSW Office of Water (NOW) on the 15 November 2011. The licence allows up to 53 ML to be diverted, comprising 40 ML for mining use and 13 ML for industrial use in any one year commencing 1 July.

5.7 Water Storage Facilities (Surface)

Appin Mine stores and treats water for operational needs via a number of storage bodies as listed in Table 5, Table 6 and Table 7.

Table 5: Key Water Storages at Appin East

Facility	Capacity (kL)	Comments
Bathhouse water and effluent		
Bathhouse wastewater tank	24	Concrete tanks which collect the bathhouse/sewage water prior to discharge into the municipal sewerage system.
Sewage treatment tanks	34	
Mine Water		
Green Tank	1,400	Provides water for underground mining operations. Water is supplied to the tank from the underground storages and dosed prior to being pumped back underground for general use. It can be topped up with Sydney Water.
Fresh Water		
White Tank	600	Provides potable water supplied by Sydney Water: • onsite for offices, bathhouse, toilets and workshop; and • off site for the EDL Power Plant, mine cottages, BCD and Ventilation Shafts 1, 2 and 3. The tank is set up with an emergency valve to ensure 200 kL of fire water is always available.
Potentially contaminated storm and surface waters		
Main Dam	20,000	This earthen dam is used to capture, treat and recycle surface and stormwater from the Pit Top. Water is used from the Main Dam for dust suppression.
Sediment Dam	2,000	This dam is used as a settling dam after surface and stormwater from the Main Dam has been treated. The treated water can be drawn from the dam to the Dynasand filter for discharge to the Georges River.
Sand filter lagoon	500	Sand filter for the filtration of clean storm water prior to discharge via LDP 18 (no longer utilised).
First flush system	136	Collects and treats potentially contaminated storm water from the mine entrance and Sheriff Road.
Surface elevator sump	10	Collects coal fines washed from elevator belt structure.
Workshop sump and oil / water separator	9	Collects, stores and treats wastewater from the wash down facility in the workshop.

Table 6: Key Water Storages at Appin West

Facility	Capacity (kL)	Comments
Potentially contaminated storm and surface waters		
Surface Water Dam 1	4,000	The surface water dams are kept low to capture and treat storm event. The volume stored is dependent upon rainfall and volume diverted prior to dams for reuse
Surface Water Dam 2	3,500	
Storage Tank under Coal Bins	1,000	Not currently in use. Available for additional surface water storage.
Drying Dam	1,700	Dam is used for the drying of solids as required.
Workshop Sump	40	Contains wastewater from the workshop. Wastewater is pumped into an oily water separator. Waste oil is transferred to the waste oil tank and clean water is transferred into Surface Water Dam 1.
Water Treatment Plant		
Mine Dam 1	1,900	Approximately 2500 kL/day is pumped from the underground workings into Mine Dam 1.
Mine Dam 2	3,400	Mine Dam 2 is set up as a biological lagoon to treat the backwash and cleaning wastes from several of the stages of the WTP.
Raw Water Buffer Tank	250	Pre-treated mine water storage tank. Acts as an operational buffer to keep WTP operational when underground pumps are being maintained.
Product Water Tank	500	Tank stores treated mine water from the WTP for use in underground operations.
Bulk storage tanks	2 x 1800	Tank stores a blend of treated water from WTP and Sydney Water for underground use.
Brine Tank	300	Tank stores waste brine from the WTP. Brine is transported from site and discharged via LDP 5 (under EPL 2341).
Biosolids Tank	15	Biosolids from the backwash treatment plant is stored ready for transportation off site.
MF filtrate tank	2000	Filtered mine water storage for sustaining of production of the reverse osmosis system and source of supply for blending waters.
Potable water		
Sydney Water Tank	300	Tank stores potable water supplied by Sydney Water to provide backup supply for underground operations. The tank is set up to maintain 200 kL of fire water for firefighting.

Facility	Capacity (kL)	Comments
		Potable water for offices, bathhouse, cooling towers, toilets, workshop is supplied direct from the Sydney Water mains line.
Treated sewage effluent		
Effluent Pond 1	1,200	Raw effluent is fed from the mutrator into Pond 1 where it undergoes aeration. The effluent is then fed into the STP for further polishing. Pond 2 receives treated effluent from the STP. Treated effluent is transferred from Pond 2 to the Irrigation Tank.
Effluent Pond 2	1,200	
Irrigation Tank	3	Treated effluent is irrigated onto the licenced utilisation area from the Irrigation Tank.
Underground storage		
Areas 1 and 4	1,600,000	Area 1 and Area 4 have a storage capacity of 1600 ML (combined)

Table 7: Key Water Storages at Appin North/WCCPP/CWEA

Facility	Capacity (kL)	Comments
Appin North/WCCPP/CWEA		
BCD	320,000	BCD is the key water body at Appin North. It is located in the lower reaches of Brennans Creek, downstream of pit top disturbance and the CWEA.
Reclaim Pond	750	Collects seepage from BCD.
P1	23,000	Captures runoff from coal stockpile areas, with controlled release and spill to P2.
P2	24,000	Captures runoff from adjacent coal stockpile areas. Water from P2 is gravity fed to either P3 or P4A.
P3	23,000	Located adjacent to the Concrete Settling Tanks at the WCCPP. Water from P3 is pumped back to the settling tanks (if required) or spray irrigated on to the CWEA. Overflow from P3 reports to P4A.
P4A	45,000	Pond P4A captures overflow from P3 and the active emplacement area. Inflow water is able to be dosed with flocculant to facilitate solids removal. The pipeline from P4A to BCD can be opened if required to transfer water. Overflow from P4A also filters through the CWEA and into the underdrainage system. Water from P4A can also be irrigated on the active emplacement area.
P5	40,000	P5 is located in the Stockpile 4 area north of the WCCPP. Water is released from P5 to P6 and P7. Clean water is diverted around the pond system.

Facility	Capacity (kL)	Comments
P6/P7	21,000	Downslope of P5. Inflow water is dosed with flocculant to facilitate solids removal. Water from the ponds is discharged to BCD.
EP 2/3	68,000	Combined capacity of the emplacement pond system. Collects dirty water runoff from the active emplacement area.
Underdrainage Pond	2,000	Collects water from emplacement underdrainage and supplies water to Appin North WTP.
North Tank	400	Supplies the WCCPP with BCD water.
Firefighting supply tanks	1,200	Two tanks which store 660 kL each. The tanks store recycled water for firefighting.
Drill mud and water ponds	10,000	Ponds used for the disposal of drill muds and water from exploration and other drilling operations.
Water Treatment Plant		
Blended water storage tank	1800	Stores a blend of water from the Underdrainage Pond and Area 5 prior to treatment.
Permeate storage tank	1800	Stores permeate prior to discharge to Brennans Creek or BCD.
Appin North Pit Top		
Bathhouse water tank	60	Supplies potable water for bathhouse and amenities.
South Tank	22	Supplies recycled water from BCD for surface hose down and fire water.
Underground storage		
Areas 5	110,000	Area 5 has a storage capacity of approximately 110 ML.

5.8 Other Operational Areas/Activities

5.8.1 Surface Cooling Towers

All operational cooling towers are required to have certified microbial treatment. The treatment systems for the Gas Extraction Plant cooling towers have been certified by a chemical treatment company. The maintenance and microbiological management of cooling and seal water systems is in accordance with the relevant Australian Standards.

5.8.2 Chemicals and Hydrocarbon Management

5.8.2.1 Storage and Handling

The chemical and hydrocarbon products in use at Appin Mine are stored in appropriately designed and maintained facilities. SDSs are required for all substances brought onto site

by IMC employees and contractors. The site SDSs are stored in the ChemAlert System and available through iPICK to all personnel.

Diesel fuel is brought to Appin East, Appin West and Appin North/WCCPP sites by road tanker and stored in above ground bunded tanks from where it is transferred to diesel pods for underground use or direct to machinery. Spills and leakages are directed to oily water separators to remove the mineral-based hydrocarbons from the surface water streams. Oily water separators are used to reduce the potential of hydrocarbon contamination of the surface water management systems.

These facilities are managed as detailed in the Bund, Sump and Oily Water Separator Management Procedure.

5.8.2.2 Pollution Incident Response Management Plan

A Pollution Incident Response Management Plan (PIRMP) has been developed for EPL 2504 in accordance with Part 5.7A Section 153A of the Protection of the Environment Operations Act 1999 (POEO Act) and Part 3A Section 98C of the Protection of the Environment Operations (General) Regulation 2009 (POEO Regulation).

The objectives of the PIRMP (as per the EPA's Guideline: Pollution Incident Response Management Plans, dated March 2020) are to:

- minimise the risk of a pollution incident occurring as a result of licenced activities, by identifying risks and the actions proposed to be taken to minimise and manage those risks;
- have established clear and effective notification, action and communication procedures to ensure the right people are notified, warned and quickly provided with updates and information they may need to act appropriately; including
    - people who may need to be involved in incident responses, including staff at the premises, the EPA and other relevant authorities (such as Fire and Rescue NSW, NSW Health and local councils); and
    - industrial, commercial and residential neighbours and other members of the community; and
- have properly trained staff and up-to-date incident management information available to ensure the potential impact of a pollution incident is minimised.

The PIRMP is available in iPick and on the South32 website at the following link:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

5.8.3 Waste Management

Waste management (including liquid waste) is conducted in accordance with the Appin Mine Waste Management Plan which is available in iPick or on the South32 website at the following link:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

5.8.4 *Construction Activities*

Construction activities will be undertaken periodically and as required at Appin Mine. When site specific disturbance occurs due to construction activities or remediation works, temporary sediment controls (e.g. sand bags, filter fabric) will be installed where appropriate to intercept sediment movement that may occur during the works and for a period after completion.

Erosion and sediment control works will be designed and installed generally in accordance with applicable erosion and sediment control principles and guidelines (e.g. the requirements of the NSW Blue Book "Managing Urban Stormwater – Soil and Construction 2004"). Sediment fencing and/or sandbags and coir logs would generally be used for sediment control. At the pit tops, runoff water will be directed to site dirty water management system for treatment and discharge.

These controls would be maintained as required by removing any excessive build-up of sediment and repairing any failure of the structures e.g. due to storm activity.

5.8.5 *Mining Induced Subsidence*

Subsidence Management Plans (SMPs) and Extraction Plans (EPs) address the management of potential impacts and/or environmental consequences of underground mining on water courses and aquifers, including the collection of baseline data where required.

WMPs for each of the mining areas are detailed in the approved SMP or EP and can be accessed on the South32 website at the following link:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

5.9 Risk Identification and Control Summary

A summary of the identified risk and associated controls with respect to water management and minimisation is provided in Table 8, Table 9 and Table 10.

Table 8: Appin East Water Management and Usage Minimisation Measures

Area	Potential Water Management Issue	Operational Controls
Surface and stormwater management	Contaminated water may exit the site if not contained and treated prior to discharge, resulting in pollution of water and land.	• Clean stormwater (from undisturbed areas) is diverted around the site. In extreme rain events some is discharged via LDP 18. • All pit top surface and stormwater is directed to the Main Dam, where it is chemically treated and allowed to separate via gravity. The water quality in the Main Dam is assessed regularly, and when within acceptable limits, is transferred to the Sediment Dam, before being filtered through the Dynasands unit, prior to discharge via LDP 19. • Water pumped from the Main Dam into the Sediment Dam will overflow back into the Main Dam if discharge is not occurring.

Area	Potential Water Management Issue	Operational Controls
		• Continuous monitoring of waters discharged to the Georges River via LDP 19 occurs. Exceedance of pH criteria results in the Dynasands pump being turned off and discharge ceasing. • During high rainfall events, the dams may spill to the Georges River via the main spillway (LDP 21) to protect the integrity of the dam walls. • Inspection of the surface water drainage system is conducted by the Specialist Environment as part of the routine inspection program to ensure drains and silt traps on site are maintained. • Detailed surface water management measures are outlined throughout the WMP.
Storage and handling of chemicals, oils and fuels	Inadequate handling and storage of chemicals, oils and fuels could result in water contamination	• Chemicals, oils and fuels are segregated and stored within bunded areas to reduce the risk of spills entering the stormwater system. • Inspections of storages are undertaken by site personnel. • Oily water separators are installed to treat collected spills and leakages and prevent oil entering the stormwater system.
Oily water separator	Failure of the oily water separator(s) could result in oil entering the stormwater system and potentially contaminating the water discharged into waterways	• Systems are regularly maintained using the maintenance system. • Removal of waste oil from the separator is undertaken by a licenced contractor. • Personnel conduct inspections which include the condition and levels within the oily water separator. • Contaminated water/oily water can be isolated in the Main Dam.
Waste management	Poor waste management and housekeeping could result in water contamination	• Waste is stored, transported and disposed of in accordance with regulatory requirements and the Waste Management Plan.
Potable water usage	Excessive usage of Sydney Water	• Use of Sydney Water for BCD discharge dilution will be minimised as per Condition L2.6 in EPL 2504. • Water usage is monitored.

Table 9: Appin West Water Management and Usage Minimisation Measures

Area	Potential Water Management Issue	Operational Controls
Surface and stormwater management	Contaminated water may exit the site if not contained and treated prior to discharge, resulting in pollution of water and land.	• Clean stormwater is diverted around the site and into Sandy Gully via natural drainage lines. • Surface water (from disturbed and sealed areas) is diverted to surface water dams and filtered through a stormwater filter system before being

Area	Potential Water Management Issue	Operational Controls
	Build-up around drains and blockage caused by debris and waste.	discharged into Sandy Gully via LDP 23. During high rainfall events, the dams may spill to Sandy Gully via the main spillway (LDP 25) to protect the integrity of the dam walls. • Water is managed by transfers between Dams 1 and 2 as required. • Inspection of the surface water drainage system is conducted by the Specialist Environment as part of the routine inspection program to ensure drains and silt traps on site are maintained. • Detailed surface water management measures are outlined throughout the WMP.
Management of mine water (from underground)	Mine water quality may result in exceedances of EPL limits if not treated prior to discharge.	• Mine water from underground is stored in dams prior to treatment at the WTP prior to reuse or discharge via LDP 24.
Storage and handling of chemicals, oils and fuels	Inadequate handling and storage of chemicals, oils and fuels could result in water contamination	• Chemicals, oils and fuels are segregated and stored within bunded areas to reduce the risk of spills entering the stormwater system. • Inspections of storages are undertaken by site personnel. • Oily water separators are installed to treat collected spills and leakages and prevent oil entering the stormwater system.
Oily water separator	Failure of the oily water separator(s) could result in oil entering the stormwater system and potentially contaminating the water discharged into waterways	• Systems are regularly maintained using the maintenance system. • Removal of waste oil from the separator is undertaken by a licenced contractor. • Personnel conduct inspections which include the condition and levels within the oily water separator. • Contaminated water/oily water can be isolated in the Surface Water Dams.
Waste management	Poor waste management and housekeeping could result in water contamination	• Waste is stored, transported and disposed of in accordance with regulatory requirements and the Waste Management Plan.
Sewage and bathhouse waste water management	Inadequate treatment or overloading of the STP could result in EPL non-compliance and pollution of land and water.	• Site personnel conduct regular inspections. • Sewage and bathhouse wastes are treated on site, with the treated effluent spray irrigated via LDP 22.
Potable water usage	Excessive usage of Sydney Water	• Sydney Water usage is largely limited to office and amenity usage. • The WTP produces water for use underground, and Sydney Water only supplements supply when WTP water is not sufficient/available.

Table 10: Appin North/WCCPP Water Management and Usage Minimisation Measures

Area	Potential Water Management Issue	Operational Controls
Surface and stormwater management	Contaminated water may exit the site if not contained and treated prior to discharge, resulting in pollution of water and land.	• Clean stormwater (from undisturbed areas) is diverted around the site. • Surface water (from disturbed and sealed areas) is diverted to the site dirty water management system for treatment and directed into BCD. • BCD TARP and automated response system can detect water quality issues and react accordingly (i.e. raising alarms). The system controls discharge flows based on water storage levels to maintain freeboard for heavy rainfall events. • The surface water drain system is inspected by site personnel.
Storage and handling of chemicals, oils and fuels	Inadequate handling and storage of chemicals, oils and fuels could result in water contamination	• Chemicals, oils and fuels are segregated and stored within bunded areas to reduce the risk of spills entering the stormwater system. • Inspections of storages are undertaken by site personnel. • Oily water separators are installed to treat collected spills and leakages and prevent oil entering the stormwater system.
Sewage and bathhouse waste water management	Inadequate treatment or overloading of the STP could result in EPL non-compliance and pollution of land and water.	• Site personnel conduct regular inspections. • Sewage and bathhouse wastes are treated on site, with the treated effluent spray irrigated via LDP 3/4.
Waste management	Poor waste management and housekeeping could result in water contamination	• Waste is stored, transported and disposed of in accordance with regulatory requirements and the Waste Management Plan. • Coal wash is managed in accordance with the CWEA Management Plan.
Management of mine water (from underground)	Mine waters are saline and have potential to impact surface water environments if discharged untreated.	• Mine water from Area 5 will be treated in the Appin North WTP. Treated water will be discharged to the environment. • Mine water may be used in the WCCPP to supplement BCD supply.
Oily water separator	Failure of the oily water separator(s) could result in oil entering the stormwater system and potentially contaminating the water discharged into waterways	• Systems are regularly maintained using the maintenance system. • Removal of waste oil from the separator is undertaken by a licenced contractor. • Personnel conduct inspections which include the condition and levels within the oily water separator. • Contaminated water/oily water can be isolated in the dirty water system.

Area	Potential Water Management Issue	Operational Controls
Potable water usage	Excessive usage of Sydney Water	• Potable water is not utilised in the WCCPP. • Use of Sydney Water for BCD discharge dilution will be minimised as per Condition L2.6 in EPL 2504. • Potable water usage is monitored.

6. IMPROVEMENT ACTIVITIES (5, 7 AND 10 YEARS)

As part of the Appin Mine approval, IMC is required to identify and deliver improvement projects that will reduce the impacts on biota in the Georges River as a result of the discharge from Appin North, and Allens Creek (and subsequent flows into the Nepean River) as a result of discharge from Appin West. Table 11 provides a summary of the planned identified projects over the period 2020 to 2025, which are aligned with the requirements in Condition E1 of EPL 2504, and Table 12 provides a summary of planned identified projects for the seven and 10 year periods.

Progress against the listed projects will be provided via the Annual Review. It is noted that operational changes, external influences or community expectations may influence the proposed timeframes.

6.1 Five Year Horizon

Table 11: Improvement Activities Proposed for 2020 to 2025

Activity/Project	Assumptions	Expected benefits
Complete Aquatic Health Monitoring Program (AHMP).	Planned to be undertaken for an additional four-year period.	Continue the AHMP to identify long term trends in river health and assess changes post implementation of the Appin North WTP.
Undertake quarterly ecotoxicity monitoring at LDP 10 and LDP 24.	Required for a period of two years post implementation of new/upgraded WTPs.	Increase understanding of potential ecotoxicity of discharge waters from WTPs on aquatic health.
Implement improvements to Appin West WTP to meet revised EPL water quality concentration limits.	Feasibility studies and execution completed by 31 July 2021.	Improved quality of discharge water to Sandy Gully and Nepean River.

Activity/Project	Assumptions	Expected benefits
Construct Appin North WTP.	Feasibility studies and execution completed by 31 March 2021.[6]	Improved quality of discharge water to Brennans Creek and Georges River.
Continue meetings with Georges River Stakeholder Group.	Meetings will continue until at least the end of 2021.	Continue to keep the community and other stakeholders advised of progress of Appin Water projects.
Implementation of Georges River Rehabilitation Plan.	Approvals received from relevant regulatory agencies and access agreements established with landholders.	Repair of subsidence impacts from underground longwall extraction in Area 5.
Cease groundwater hydrocarbon monitoring at Appin East and Appin North.	Review of groundwater monitoring results indicates a trend of no hydrocarbon contamination.	No remediation of groundwater required.

6.2 Seven to 10 Year Horizon

Table 12: Improvement Activities Proposed for 2027 to 2030

Activity/Project	Assumptions	Expected benefits
Investigate options for desilting BCD.	Disposal location for sediment able to be sourced.	Continue long term improvement of water quality in BCD.

7. MONITORING PROGRAM

7.1 EPL 2504 Monitoring and Discharge Points

Sampling of licence monitoring and discharge points is undertaken in accordance with the requirements of EPL 2504. A summary of the monitoring and discharge points is provided in Table 3.

The monitoring program is designed to:

- inform management decisions relevant to operations;
- ensure compliance with all regulatory requirements set out in EPL 2504 and the Appin Mine approval with regards to water management; and

[6] At the time of development of the WMP (July 2020), discussions have been held with the EPA regarding potential delays due to COVID-19 in achieving this date.

- measure the influence of discharges from Appin Mine on Brennans Creek/Georges River and Sandy Gully/Allens Creek/Nepean River.

Note that the monitoring sites and frequencies are subject to change through consultation with the relevant agencies and approving authorities. EPL 2504 provides the most up to date monitoring regime relevant to the monitoring and discharge points and should be used as the main reference point. A copy of the licence is available online via this link:

http://www.epa.nsw.gov.au/prpoeoapp/.

A summary of the results from the monitoring program is made available to the public (via the South32 website) in accordance with the requirements of the POEO Act. A more detailed summary of the monitoring results is provided in the Annual Review.

The summary and Annual Review can be accessed via this link:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

7.2 Georges River Aquatic Health Monitoring Program

The Georges River EIP has been in place since 2016, which was a monitoring and improvement program for the Upper Georges River. The program included:

- quantitative sampling of macroinvertebrates conducted in line with previous studies;
- ecological assessment of the sediments using a DNA-based approach, referred to as metabarcoding;
- in-stream water quality testing; and
- laboratory ecotoxicological testing of the discharge water from BCD.

A variation to EPL 2504 issued in March 2020 revoked the EIP and included Special Condition E3, that requires the development and implementation of the Georges River Aquatic Health Monitoring Program (AHMP) that meets the same objectives as the Georges River EIP.

Special Condition E3 states:

The licensee must prepare an aquatic health monitoring program to verify improvements to the aquatic health of the Georges River following commissioning of the reverse osmosis water treatment plant required by condition E1.1. The monitoring must include:

- *quantitative sampling of macroinvertebrates;*
- *ecological assessment processed using DNA extracted from sediment (as appropriate);*
- *in-stream water quality; and*
- *laboratory water testing.*

A copy of the monitoring program was submitted to the EPA by 30 June 2020.

Special Condition E2 requires quarterly ecotoxicity monitoring of discharge at LDP 10 and LDP24.

7.3 Groundwater (Contamination) Monitoring

Groundwater monitoring bores are located at Appin East and Appin North which have been strategically positioned to monitor the level and extent of potential groundwater hydrocarbon contamination. The bores are generally located at sites where there is potential for contamination to have occurred in the past (i.e. old underground storage tanks). The location of the monitoring bores and the frequency at which monitoring occurs was developed through discussions with a specialist consultant in 2010/11. The monitoring program was subsequently endorsed by the EPA.

Table 13 provides a summary of the groundwater (contamination) monitoring bores located at Appin East and Appin North.

Table 13: Groundwater (Contamination) Monitoring Bores

Surface Facility	Reason	Monitoring Site	Monitoring Frequency
Appin East	Bores are located upstream and downstream of decommissioned USTs. The USTs were removed from site in 2010.	P1	Six-monthly
		P2	Six-monthly
		P3	Six-monthly
		T1 (reference site)	Six-monthly
Appin North	Bore is located downstream of a decommissioned UST. The UST was removed from site in 2010/11	BH8	Six-monthly

A summary of the monitoring results is provided in the Annual Review.

7.4 Surface Water Monitoring – Subsidence Zones

Water monitoring programs for each of the active mining areas are detailed in the approved SMP or EP which can be accessed using this link:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

SMPs or EPs describe the measures and procedures:

- to investigate, notify and mitigate any ground or surface water exceedances;
- to minimise, prevent or offset any adverse impacts to ground or surface water resources;
- for collection of baseline data on surface water quality in creeks and other waterbodies that could potentially be affected by the project; and
- for review against surface water and stream health impact assessment criteria.

A summary of the results from the surface water monitoring associated with active mining zones is provided in the End of Panel reports which are available using this link:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

7.5 Surface Water and Stream Impact Assessment Criteria

Surface and stream water quality for operational sites is assessed against the limits in EPL 2504. For mining areas, stream impact assessment criteria are included in the relevant SMP/EP.

8. COMPLAINTS AND NON-COMPLIANCE MANAGEMENT

8.1 Complaints and Dispute Resolution

All water related complaints received in relation to Appin Mine are managed in accordance with the Handling Community Complaints, Enquiries and Disputes Procedure.

Upon receipt of a community complaint, preliminary investigations will commence as soon as practicable to determine the likely cause of the complaint using information such as environmental conditions, activities being undertaken on site at the time of the complaint and available monitoring data.

Additional monitoring may be required to be undertaken to verify and validate community concerns. An initial response will be provided to the complainant within 24 hours of the complaint being made, with a follow up response being provided as soon as practicable once a more detailed investigation is complete. This may include the provision of relevant monitoring data if requested.

A summary of all complaints received during the reporting year will be provided as part of the Annual Review. A log of complaints is also maintained on the South32 website at:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

8.2 Compensatory Water Supply

A compensatory water supply will be provided to a land owner in accordance with Condition 14 of Schedule 4 of the Appin Mine approval if a privately-owned water supply is adversely affected by mining activities (other than an impact that is negligible). A supply equivalent to the loss attributed to the project will be provided (at least on an interim basis) within 24 hours of the loss being identified. Long term supply will be provided following identification of the most feasible alternative.

If an agreement cannot be reached with the landowner, or there is a dispute regarding the implementation of the measures, the matter will be referred to the Secretary of DPIE for resolution. Alternative compensation may be offered if an alternative long-term supply is unable to be provided.

The Landholder Compensation and Land Access Agreements Guideline defines the process for offering compensation.

8.3 Non-Compliance, Corrective Action and Preventative Action

Events, non-compliances, corrective actions and preventative actions are managed in accordance with the Reporting and Investigation Standard and Environmental Compliance/Conformance Assessment and Reporting Procedure. These procedures,

which relate to all IMC operations, detail the processes to be utilised with respect to event and hazard reporting, investigation and corrective action identification. The key elements of the process include:

- identification of events, non-conformances and/or non-compliances:
- recording of the event, non-conformance and/or non-compliance in the event management system G360;
- investigation/evaluation of the event, non-conformance and/or non-compliance to determine specific corrective and preventative actions;
- assigning corrective and preventative actions to responsible persons in G360; and
- review of corrective actions to ensure the status and effectiveness of the actions.

Exceedances of or non-compliances with water related criteria will be reported to all relevant agencies via the Annual Review and EPL Annual Return or notified in accordance with Section 9.2.

Specifically, in the event that there is a ground or surface water exceedance of criteria or water pollution has occurred, the following process would be followed:

- responsible personnel would be notified of the exceedance/event;
- measures would be taken as soon as possible to control (e.g. turning off valves, blocking off drains) the source of the exceedance/contamination (if applicable) or contain any contamination (potentially with the use of booms, dosing or earthworks) to minimise the extent of impact;
- if the event is deemed to be material, the notification process as outlined in Section 8.4 would be implemented;
- if required, any contamination would be cleaned up (including removal of contaminated soil, pumping of contaminated water);
- additional monitoring may be undertaken (to determine water quality or verify laboratory results);
- an investigation would be undertaken to identify the cause of the event/exceedance;
- corrective actions would be identified, preferably including engineering controls to reduce or eliminate the risk of the exceedance or event occurring again; and
- reporting to regulatory agencies would be undertaken as outlined in Section 8.4.

8.4 Notification of Pollution Incidents to Government Authorities and the Public

In accordance with Condition 7 of Schedule 6 of the Appin Mine approval and Condition R2 of EPL 2504, IMC is to notify DPIE, EPA and other relevant agencies of any incident that has caused (or threatens to cause) material harm to the environment. The process and contact numbers for these notifications is outlined in the PIRMP. For any other incidents associated with the project, the proponent shall notify the Secretary and any other relevant agencies as soon as practicable after the proponent becomes aware of the incident (refer to Section 9.2).

The EPA is to be notified immediately following detection by telephoning 131 555 and DPIE by emailing compliance@planning.nsw.gov.au at the earliest opportunity.

Within 7 days of these notifications, a written report is to be provided to DPIE and other relevant agencies (in accordance with Condition 4 of Schedule 8 of the Appin Mine approval) and the EPA (in accordance with Condition R2.2 of the EPL).

9. REPORTING AND REVIEW

9.1 Reporting

The results of water monitoring are compiled and reported to internal and external stakeholders (as required). The reports include:

- 14-day report (compliance with EPL water quality and volume monitoring conditions which is updated on the South32 website);
- Annual Review (for mining leases and Appin Mine approval);
- Annual Return (for EPL);
- National Pollutant Inventory;
- internal sustainability report;
- End of Panel reporting for mining areas; and
- periodic environmental and operational updates to the Community Consultative Committee.

9.1.1 Annual Review

IMC will report on the performance of the WMP in the Annual Review.

The Annual Review will include:

- water monitoring results and comparison to water quality and volume criteria;
- management/mitigation measures undertaken in the event of any confirmed exceedance of water quality and volume criteria; and
- review of the performance of management/mitigation measures and the monitoring program.

The Annual Review is prepared in accordance with the requirement of Condition 4 of Schedule 6 of the Appin Mine approval and is submitted to relevant agencies in September each year. Annual Reviews are made available to the general public via the South32 website.

9.1.2 Public Reporting of Results (via website)

A summary of the water monitoring results, including details of exceedances and non-compliances (as determined in accordance with Section 8.3 of the WMP), will be provided on the IMC website in the 14-day report at:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

9.2 Exceedance/Non-compliance Notifications

In the event that an exceedance or non-compliance of the relevant water quality or volume criteria is confirmed, a notification is to be made in accordance with Condition 7 of Schedule 6 via the DPIE Major Projects Planning Portal:

https://www.planningportal.nsw.gov.au/major-projects.

This notification is to be made as soon as practicable after becoming aware of the exceedance[7]. The EPA must also be notified of the exceedance/non-compliance (via email).

9.3 Review of WMP

In accordance with Condition 5 of Schedule 6 of the Appin Mine approval, the WMP will be reviewed, and if necessary revised, within three months, of:

- the submission of an Annual Review;
- the submission of an incident report;
- the submission of an Independent Environmental Audit report; or
- any modification to the conditions of the Appin Mine approval (unless the conditions require otherwise).

9.4 Audits

9.4.1 Independent Environmental Audit

In accordance with Condition 9 of Schedule 6 of the Appin Mine approval, an IEA shall be commissioned every three years, that will include a review of the WMP. The report is required to be submitted to the Secretary within six weeks of completion of the IEA, in accordance with Condition 10 of Schedule 6.

The IEA is also undertaken to comply with Condition 18 of EPBC Approval 2010/5350. A copy of the report is also submitted to the Department of the Environment and Energy to satisfy Condition 18 (g).

IEAs have been conducted in 2013, 2016/17 and 2019, with the next IEA scheduled to be conducted in 2022. Recommendations from the IEA will be incorporated into the WMP where appropriate.

9.4.2 Governance Reviews

Internal Governance Reviews of the WMP are nominally undertaken on an annual basis.

[7] The definition of an incident in the Appin Mine approval is "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".

10. SUMMARY OF COMMITMENTS

Commitment	Section in WMP
IMC will provide personnel and resources to implement the WMP.	Section 2
IMC will comply with the conditions of the approvals and relevant legislation.	Section 3
IMC will maintain a water balance.	Section 4.2
IMC will maintain infrastructure for water diversion, storage, pumping, treatment, discharge and monitoring.	Section 2
IMC will conduct regular inspections of the site and water infrastructure to ensure the water management system is functioning effectively.	Section 5.9
IMC will implement and maintain erosion and sediment controls to reduce the risk of water contamination.	Section 5.8.4 Section 5.9
IMC will construct a new WTP at Appin North and modify the existing WTP at Appin West to achieve water quality concentration limits.	Section 5.4.3 Section 6.1
IMC will implement the Georges River Rehabilitation Plan.	Section 6.1
IMC will continue to implement an Aquatic Health Monitoring Program in the Georges River, and undertake quarterly ecotoxicity monitoring for discharge from LDP 10 and LDP 24.	Section 6.1 Section 7.2
IMC will maintain the active emplacement area at 18 hectares.	Section 5.3.4.1
IMC will comply with water quality concentration and discharge volume limits and monitoring requirements, including the collection of baseline data where required.	Section 5.4, 5.5, 5.8.5 and 4.1
IMC will reduce reliance on Sydney Water by substituting treated or recycled water where possible.	Section 5.6 Section 5.9
IMC will store chemical and hydrocarbon products in appropriately designed and maintained facilities.	Section 5.8.2
IMC will report and investigate complaints, incidents, exceedances of limits and non-compliances as required, and identify and implement corrective actions.	Section 5.8.2.2 Section 8 Section 9
IMC will manage wastes to minimise the risk of water contamination.	Section 5.8.3 Section 5.9
Compensatory water supply will be provided if a privately-owned water supply is adversely affected by mining activities.	Section 8.2
IMC will undertake reporting as required.	Section 9
IMC will review the WMP and undertake consultation with relevant stakeholders as required.	Section 9.3 Section 1.4
IMC will ensure the WMP is suitably integrated with the Water Management Plans that form part of extraction plans.	Section 5.8.5
IMC will undertake audits as required.	Section 9.4

11. ACRONYMS

Term	Definition
AHMP	Aquatic Health Monitoring Program
BCD	Brennans Creek Dam
BSO	Bulli Seam Operations
CWEA	Coal Wash Emplacement Area
DoPI	Department of Planning and Infrastructure (now DPIE)
DPIE	Department of Planning, Industry and Environment
EDL	Energy Developments Limited
EIP	Environment Improvement Program
EMS	Environmental Management System
EPA	Environment Protection Authority
EPL	Environment Protection Licence
EP	Extraction Plan
EP&A Act	Environmental Planning and Assessment Act
FY	Financial Year
G360	IMC event reporting system
ICHPL	Illawarra Coal Holdings Pty Ltd
IEA	Independent Environmental Audit
IMC	Illawarra Metallurgical Coal
LDP	Licence Discharge Point
NPI	National Pollutant Inventory
NOW	NSW Office of Water
NSW	New South Wales
PIRMP	Pollution Incident Response Management Plan

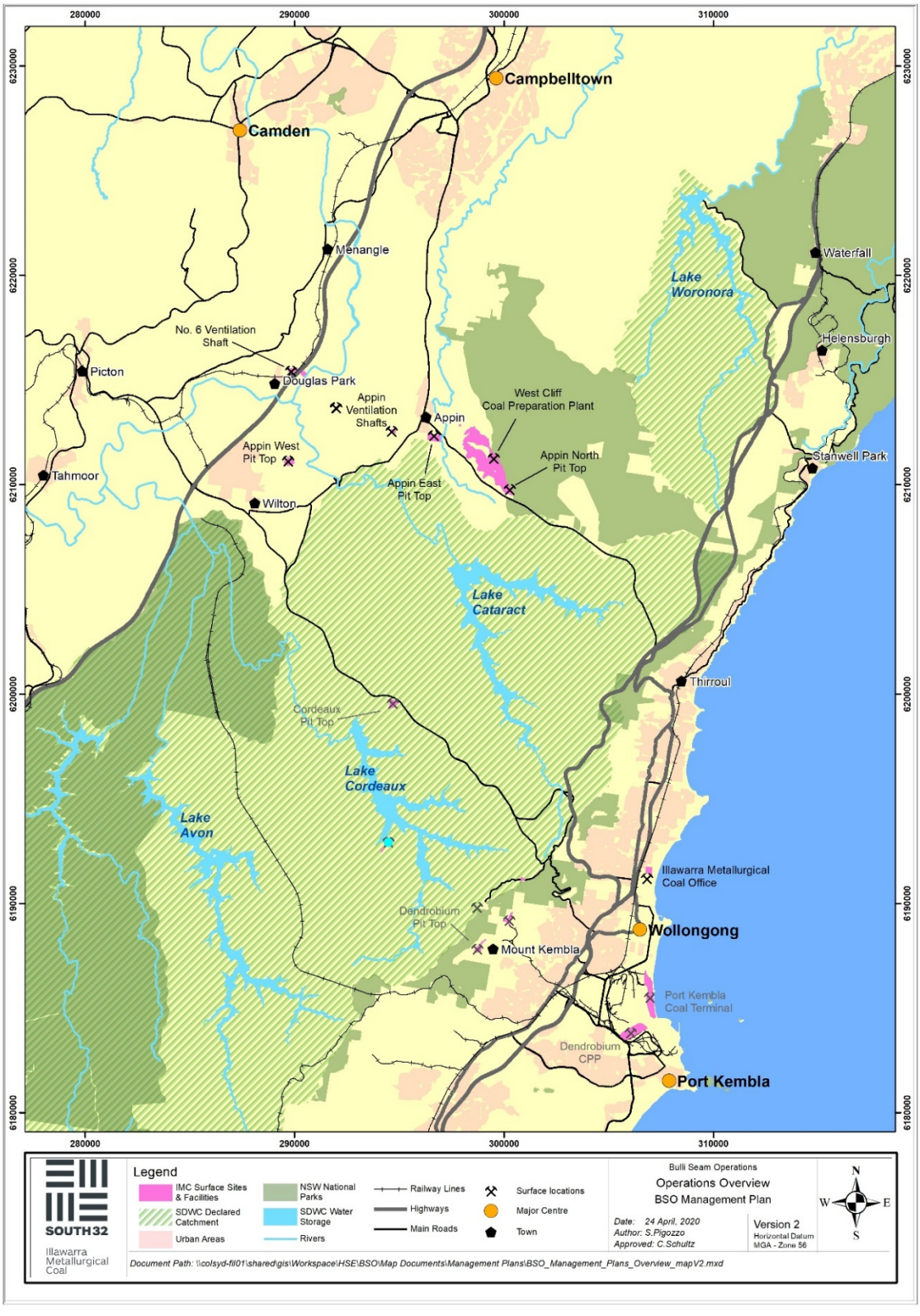
POEO	Protection of the Environment Operations
ROM	Run of mine
SMP	Subsidence Management Plan
STP	Sewage Treatment Plant
TARP	Trigger Action Response Plan
WCCPP	West Cliff Coal Preparation Plant
WMP	Water Management Plan
WTP	Water Treatment Plant

12. REFERENCES

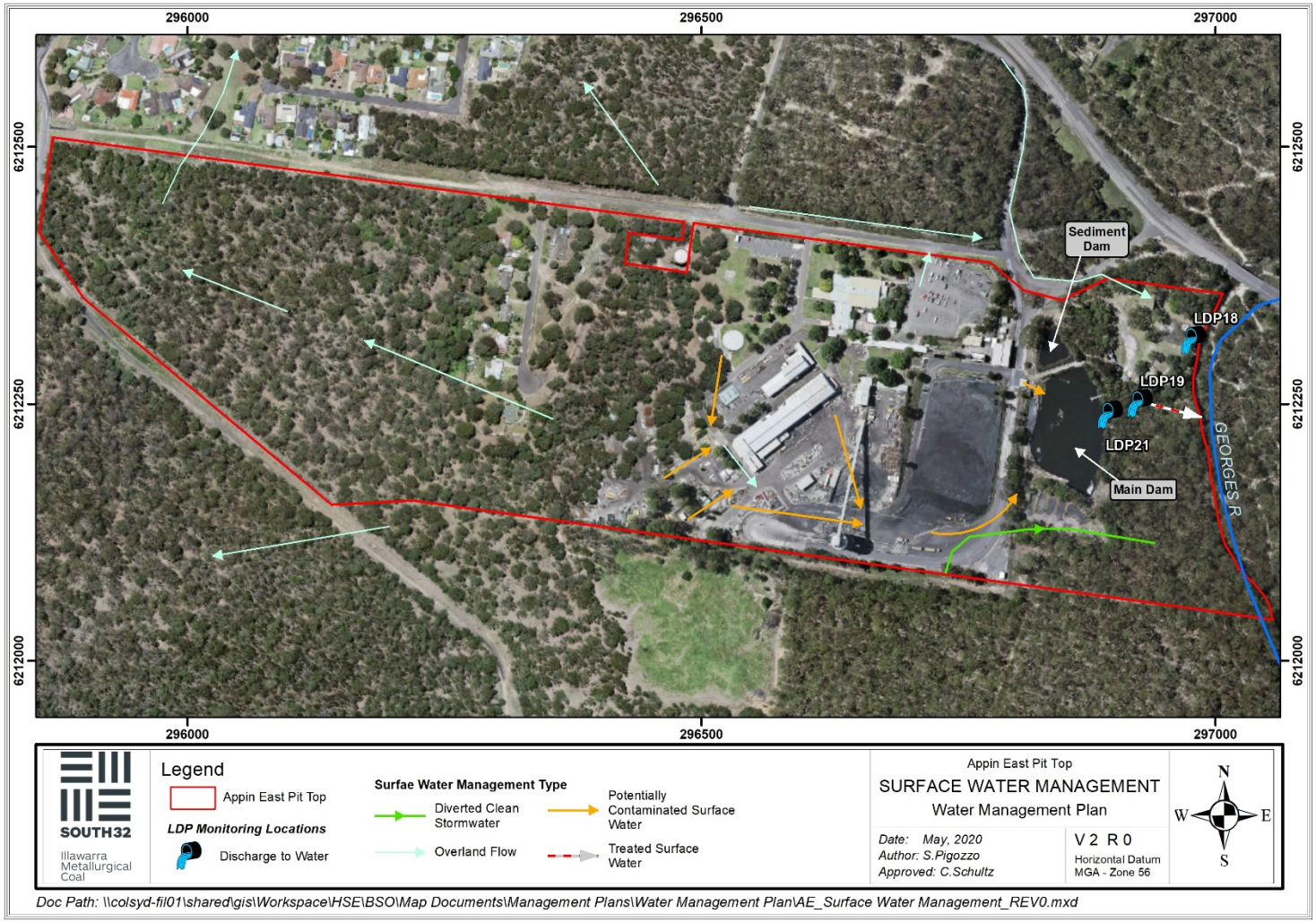
- IMC Environmental Aspects and Impacts Register
- Resource Strategies, 2009, Bulli Seam Environmental Assessment
- ISO 14001:2015 Environmental Management Systems Standard
- Appin Mine Mining Operations Plan (MOP) / Rehabilitation Management Plan
- Appin West Surface Stormwater Dam Operations (APNP0015)
- Water Monitoring Procedure (IMCP0335)
- Coal Wash Emplacement Area Management Plan (WCPMP0019)
- Waste Management Plan (IMCP0234)
- Bund, Sump and Oily Water Separator Management Procedure (IMCP0184)
- Environment Data Internal Reporting (IMCP0201)
- Spill Management Procedure (IMCP0183)
- Spill TARP (IMCTARP0006)
- Brennans Creek Dam TARP (WCPTARP0007)
- Environmental Compliance/Conformance Assessment and Reporting Procedure (IMCP0186)
- Handling Community Complaints, Enquiries and Disputes Procedure (ICHP0112)
- Event Investigation Procedure (IMCP0098)
- Landholder Compensation and Land Access Agreements Guideline (ICHGD0097)
- Pollution Incident Response Management Plan (IMCMP0229)
- Guideline: Pollution Incident Response Management Plans (EPA) dated March 2020
- Reporting and Investigation Standard (IMCSTD0069)

13. PLANS

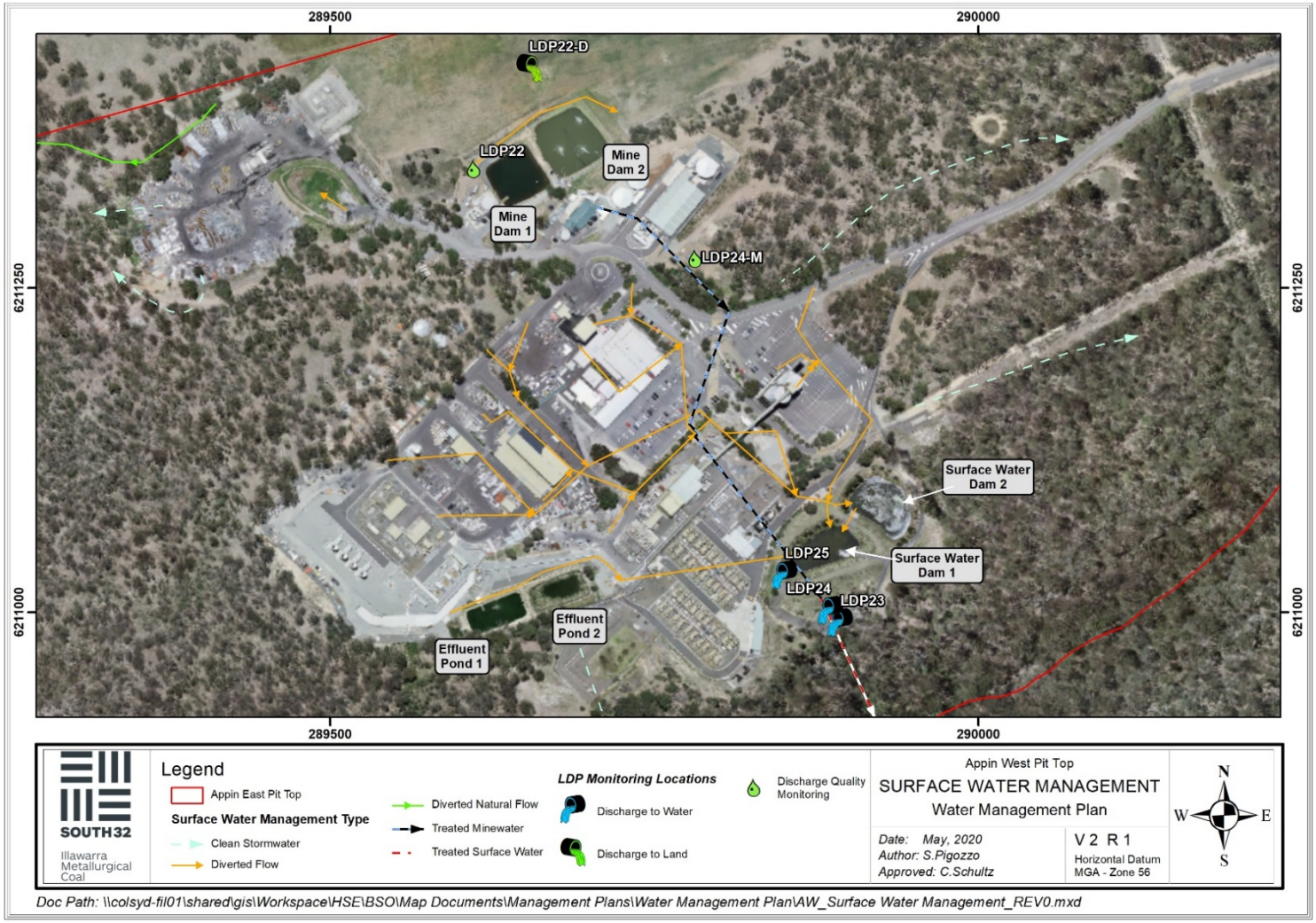
Plan 1: Appin Mine Locality Plan



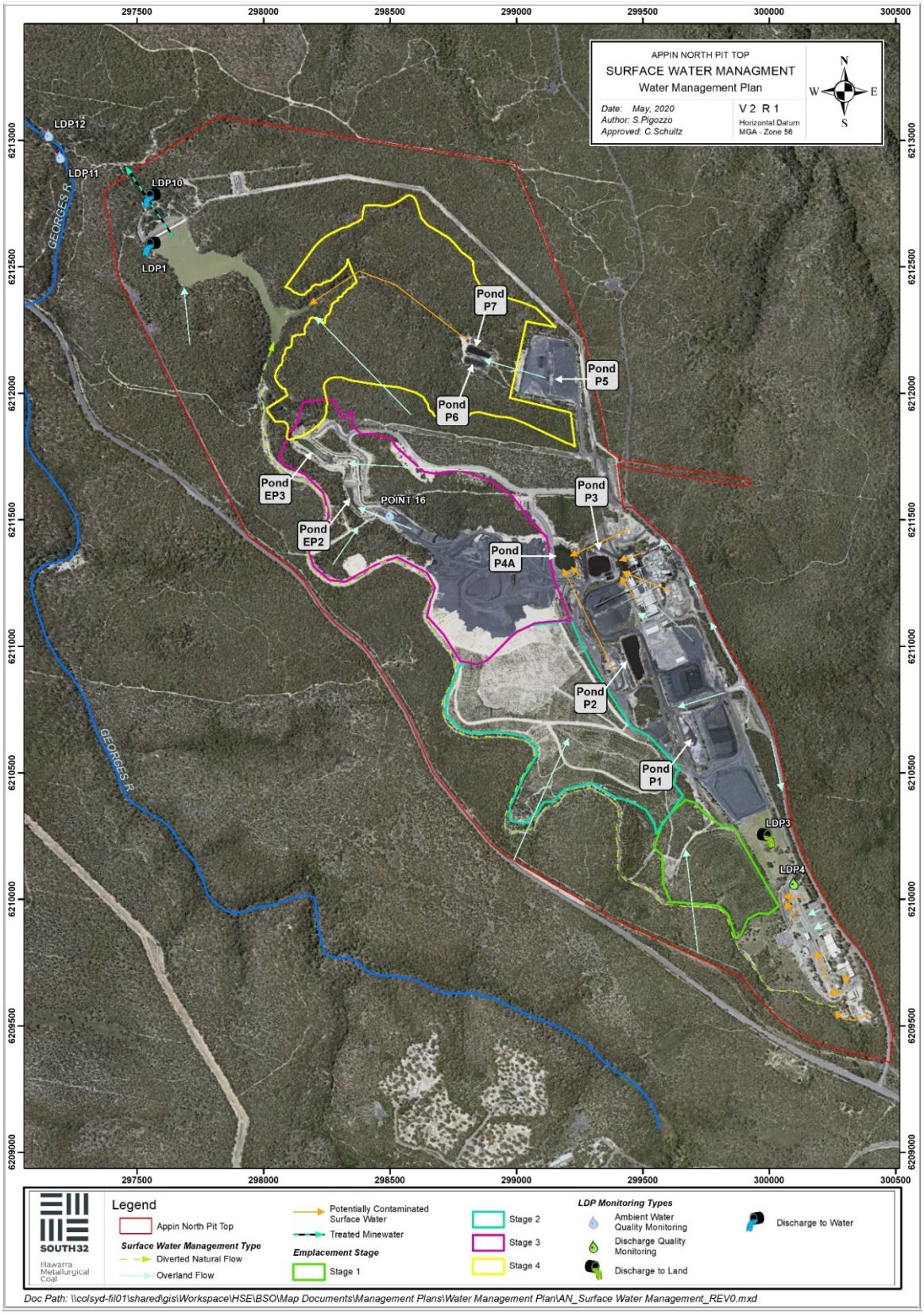
Plan 2: Surface Water Drainage and EPL 2504 Points – Appin East



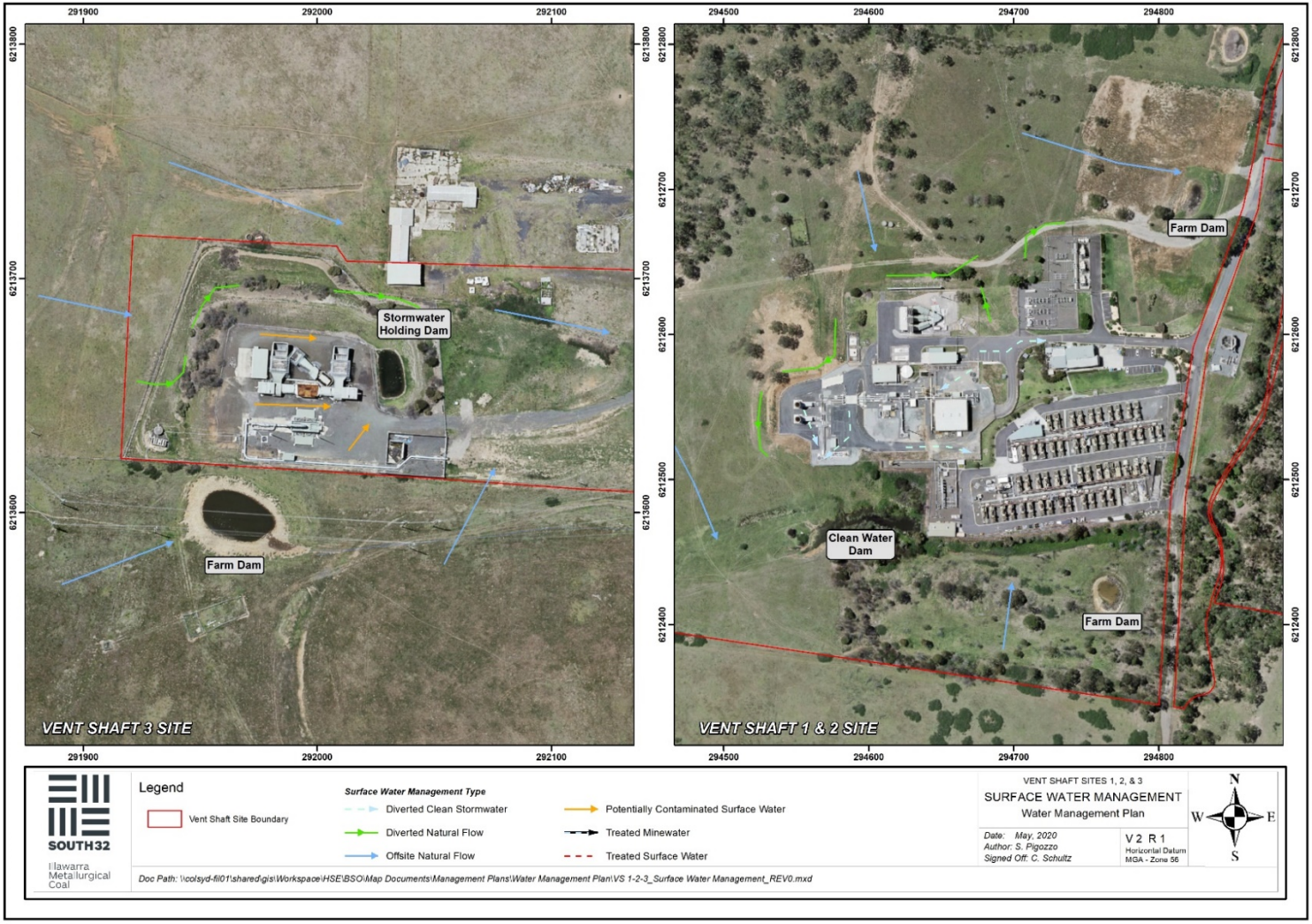
Plan 3: Surface Water Drainage and EPL 2504 Points – Appin West



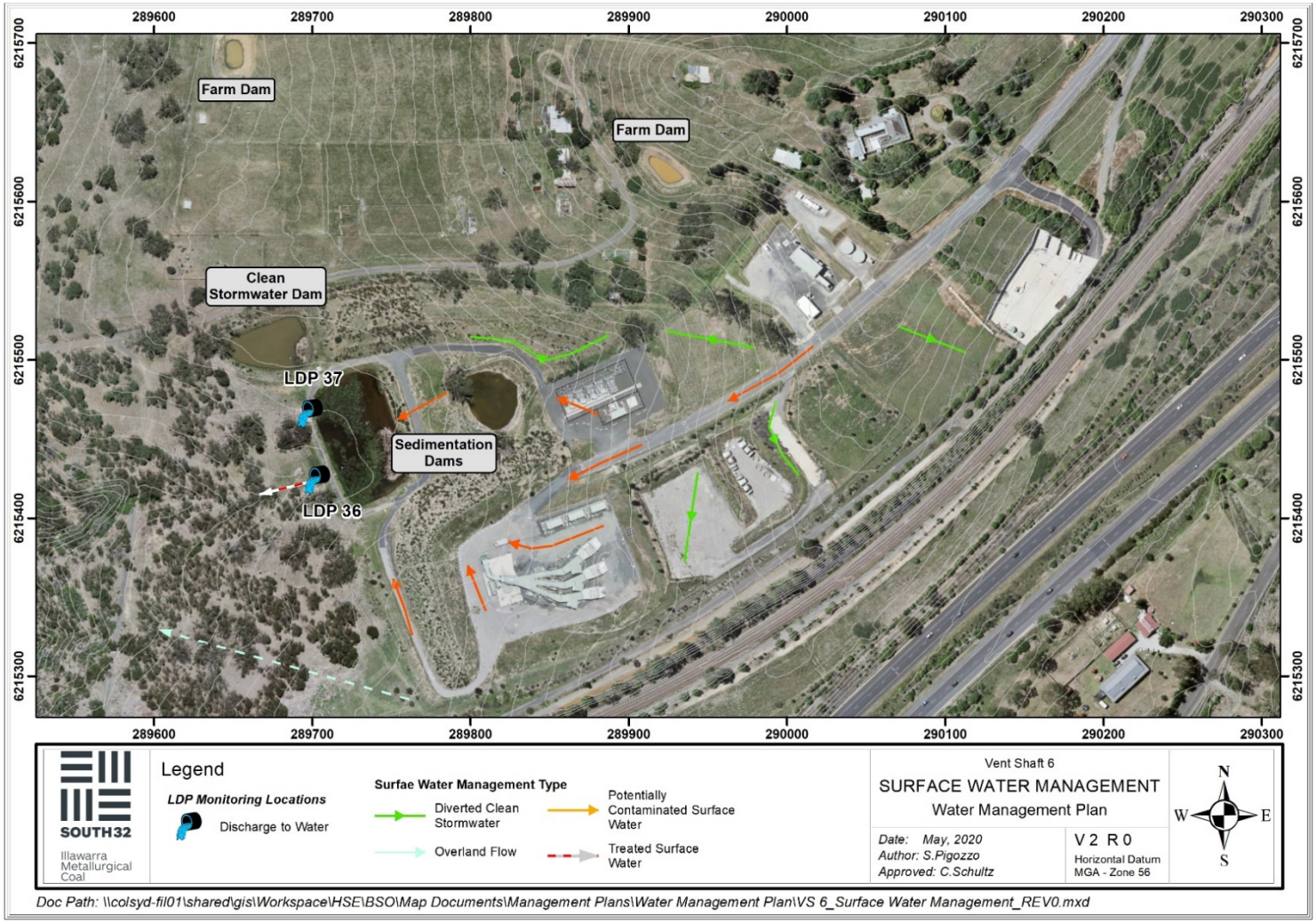
Plan 4: Surface Water Drainage and EPL 2504 Points – Appin North, WCCPP and CWEA



Plan 5: Surface Water Drainage – Ventilation Shafts 1, 2 and 3



Plan 6: Surface Water Drainage and EPL 2504 Points – Ventilation Shaft 6



14. APPENDICES

Appendix 1: Appin Mine Approval Conditions: Water Management

Clause	Requirement	Document / Section
Condition 12 of Schedule 2	**Operation of Plant and Equipment** The Proponent shall ensure that all plant and equipment used at the site is: (a) maintained in a proper and efficient condition; and (b) operated in a proper and efficient manner.	Section 2
	SOIL and WATER 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.	Appendix 4
Condition 14 of Schedule 4	**Compensatory Water Supply** The Proponent shall provide a compensatory water supply to any owner of privately-owned land whose water supply is adversely impacted (other than an impact that is negligible) as a result of the project, in accordance with the approved Surface Water Management Plan. The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributed to the project. Equivalent water supply must be provided (at least on an interim basis) within 24 hours of the loss being identified. If the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer to the Secretary for resolution. If the Proponent if unable to provide an alternative long-term supply of water, then the Proponent shall provide alternative compensation to the satisfaction of the Secretary.	Section 8.2
Condition 15 of Schedule 4	The Proponent shall ensure that all surface water discharges from the site (including from Brennans Creek Dam) comply with the discharge limits (both volume and quality) set for the project in any EPL.	Section 5.4 Section 7 Table 3, Table 8, Table 9, Table 10
Condition 16 of Schedule 4	**Surface Water Management Plan** The Proponent shall update and implement a Surface Water Management Plan for the project to the satisfaction of the Secretary.	This Plan
	This plan must be prepared in consultation with DPI Water and EPA by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary, and submitted to the Secretary for approval by 31 January 2017.	Section 1.4 Appendix 3 Appendix 5 Note: These actions were completed by 31 January 2017. This date is not relevant for the 2020 review.
	This plan must include: a) a comprehensive water balance for the project, that includes details of: • sources and security of water supply and water make; • water use; and • water discharges; and	Section 4.2

Clause	Requirement	Document / Section
	b) management plans for the surface facilities sites, that include: • a detailed description of water management systems for each site, including:	Section 5 Table 8, Table 9 and Table 10
	- clean water diversion systems;	Section 5
	- erosion and sediment controls; and	Section 5
	- any water storages	Table 5, Table 6 and Table 7
	• measures to minimise potable water use and to reuse and recycle water;	Section 5 Table 8, Table 9 and Table 10
	• a Water Response Plan, which describes the measures and/or procedures that would be implemented to: - investigate, notify and mitigate any ground or surface water exceedances; - minimise, prevent or offset any adverse impacts to ground or surface water resources; - provide compensatory water supply to any owner of privately-owned land whose water supply is adversely impacted (other than an impact that is negligible) as a result of the project; and	Section 7 Section 5 Section 8.2
	• measures to comply with surface water discharge limits;	Section 5.4 Table 8, Table 9 and Table 10
	• implementation of any pollution reduction program relating to mine water discharges from Brennans Creek Dam and identification of 5,7 and 10-year commitments to substantially reduce the impacts on biota of salinity and other pollutants in such discharges; and	Section 6 Section 7.2
	• monitoring and reporting procedures including:	Section 7
	- collection of baseline data on surface water quality in creeks and other waterbodies that could potentially be affected by the project; and - surface water and stream health impact assessment criteria.	Section 4 and Section 7
	Note: This plan must be suitably integrated with the Water Management Plans that form part of Extraction Plans.	Section 5.8.5
Condition 17 of Schedule 4	e) a comprehensive water monitoring program for the emplacement;	Section 5.3.4
Condition 2 of Schedule 6	**Management Plan Requirements** The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
	a) detailed baseline data;	Section 4.1
	b) a description of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions; • any relevant limits or performance measures/criteria; • the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any measurements measures;	Section 3 Section 5 Section 7

Clause	Requirement	Document / Section
	c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits of performances measures / criteria;	Section 5 Table 8, Table 9 and Table 10
	d) a program to monitor and report on the: • impacts and environmental performance of the project; • effectiveness of any management measures (see c above)	Section 7
	e) a contingency plan to manage unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Section 5
	f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Section 6
	g) a protocol for managing and reporting any: • incidents; • complaints; • non-compliances with statutory requirements; and • exceedances of the impact assessment criteria and / or performance criteria; and	Section 8 Section 9
	h) a protocol for periodic review of the plan.	Section 9.3

Appendix 2: Appin Mine EA Commitments: Water Management

EA Section	EA Commitment	Document / Section
5.6.2	ICHPL is currently conducting assessments and trials in accordance with an existing PRP under EPL 2504, in relation to the continued licensed release of water from Brennans Creek Dam to the Georges River. *PRP11 completed and submitted.*	Section 7.2
5.6.2	The current PRPs at Appin West and Appin East pit tops would continue to be addressed and relevant improvements implemented to enable future pit top water management to be conducted in compliance with EPL conditions.	Section 5 Section 6
5.6.3	*Surface Disturbance* Where surface disturbance activities are undertaken outside of existing contained catchments with erosion and sediment controls in place (e.g. pit tops, shaft sites), temporary erosion and sediment controls (e.g. silt fences and sediment control structures) would be installed prior to the commencement of construction activities. Erosion and sediment control measures would be designed in accordance with applicable water management principles and guidelines (e.g. *Managing Urban Stormwater: Soils and Construction* [Landcom, 2004]).	Section 5.8.4
5.6.3	*Site Water Balance* The existing monitoring regime for tracking the water balance of each pit top together with water supply and use in the underground operations and at the surface facilities would be continued for the life of the Project. The performance of the water management system would be reviewed regularly using the monitored data, in combination with the site water balance model, to identify changes in water management performance against targets. These reviews would be used to implement corrective actions and improvements in line with EPL PRP targets.	Section 4.2
5.6.3	*Licenced Water Releases to Georges River* ICHPL is conducting ecologically based studies and trials to determine an appropriate water quality release limit for salinity from Brennans Creek Dam under dry weather flow conditions, with the intention to include this limit in EPL 2504 for the West Cliff pit top. ICHPL is scheduled to complete these assessments and trials by the end of 2009 in accordance with the current PRP under EPL 2504. *PRP11 completed*	Section 6 Section 7.2

Appendix 3: Consultation with Agencies

Agency Comments	IMC Response/Where addressed in WMP
Environment Protection Authority (EPA)	
Response received 11 June 2020 The EPA has reviewed the plan and provided minor comments for consideration at relevant locations in the attached document. Overall the EPA notes that the plan contains the elements required by the Project Approval including a description of: the water balance, stormwater management, water storage & re-use, monitoring & reporting, and proposed programs to "substantially reduce the impacts on biota of salinity and other pollutants in such discharges". The latter point incudes the new requirements for toxicity and aquatic health monitoring in the licence (conditions E2 & E3). The EPA recommends that the plan be updated following completion of work on the water treatment plants required under the licence in 2021. This could include review of the TARP for management of Brennans Creek Dam further clarifying its joint roles for water storage and environment protection.	WMP to be updated and resubmitted following the implementation of works required EPL 2504 at Appin North and Appin West.
Section 4.2 - Suggest that a note be added to the effect that Figure 1 doesn't reflect cessation of groundwater discharges to BCD since February 2019.	Note has been added. It is noted that the Water Accounting Framework is currently under review and an updated Figure will be inserted in the next revision of the WMP.
Section 5.2.2.3 - Could clarify that the underdrainage will also be treated in the WTP.	Clarification has been provided in the WMP.
Section 5.3.3.2 - Is chlorine dioxide still used or was it replaced with sodium hypochlorite?	Yes. The chemicals that are mixed to treat water pumped from BCD are sodium chlorite and hydrochloric acid. These chemicals form chlorine dioxide.
Section 5.4.2 – Are the surface water dams and spillway designed for a 1:1000 or 1:100-year rainfall event.	The 1:1000-year statement incorrectly referred to rainfall events. It related to a 1:1000-year flood level and the relationship with the spillway. This statement has been removed from the WMP.

Department of Planning, Industry and Environment - Water	
Response provided 27 May 2020 We do not review post approval requests. Please submit to nrar.servicedesk@industry.nsw.gov.au.	Noted. Request for comment sent to NRAR
Natural Resources Access Regulator	
Response received 21 July 2020 1. The project is to identify if the Water Management Plan (WMP) submitted is intended to address both Schedule 4, Clause 16 and Schedule 3, Clause 5 of the Conditions of Approval (08_0150), or if a separate WMP has been prepared for the purpose of Schedule 3, Clause 5. The current draft WMP does not address the requirements for a WMP as specified in Schedule 3, Clause 5.	The WMP has been prepared to meet the requirements of Condition 16 of Schedule 4. This is clearly stated in Section 1.1. The WMP required under Condition 5 h) of Schedule 2 has been included in the Extraction Plan for Longwalls 901 – 904 and will be included in further Extraction Plans as developed.
2. Provide a clear, tabulated form of the water balance detailing water input to Appin Mine versus water output from the mine for easier comprehension of the water balances.	As noted in Section 4.2, the footnote states: *Figures shown are total volume used or discharged in megalitres for FY17. Figure 1 does not reflect the cessation of groundwater discharges to BCD since February 2019 or the changes associated with the installation of the proposed Appin North Water Treatment Plant. These changes will be reflected in the next update of the WMP.*
The Water Management Plan (WMP) does not comply with Conditions of Approval 08_0150. Whilst impacts relating to groundwater under Conditions of Approval 08_0150 Schedule 4, Clause 16 Surface Water Management Plan are required in: (b) management plans for the surface facilities sites, that include: • a Water Response Plan, which describes the measures and/or procedures that would be implemented to: ○ investigate, notify and mitigate any ground or surface water exceedances; ○ minimise, prevent or offset any adverse impacts to ground or surface water resources;	The assessment by NRAR is noted. The determination of whether the WMP complies with Condition 16 of Schedule 4 is the remit of the Department. IMC considers that the requirements of the Water Response Plan has been addressed in Section 5 and Section 7.

The document has been presented as a Water Management Plan, not a Water Response Plan as a component of a Surface Water Plan, and therefore must also satisfy Schedule 3, Clause 5 Extraction Plan: (h) include a Water Management Plan, which has been prepared in consultation with OEH, WaterNSW and DPI Water, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on watercourses and aquifers, including: • surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality; • a program to monitor and report stream flows and assess any changes resulting from subsidence impacts; • a program to monitor and report groundwater inflows to underground workings; and • a program to predict, manage and monitor impacts on groundwater bores on privately-owned land; Although the current document has not been presented in connection with an Extraction Plan, it is clear the WMP as presented does not contain any references to groundwater impact monitoring other than that for hydrocarbon contamination. Contamination matters are administered by the EPA. As the WMP could potentially be referenced by any pending or existing extraction plan, DPIE-Water cannot endorse the WMP.	A WMP was included in the Longwall 901 – 904 Extraction Plan, submitted for approval in 2014. The WMP submitted in the Extraction Plan meets the requirements of Condition 5 of Schedule 3, and the content has not been replicated in the WMP being submitted under Condition 16 of Schedule 4. This is correct, as groundwater monitoring associated with longwall mining operations has been included in the Extraction Plan. Groundwater monitoring included in the WMP in Section 7.3 relates to hydrocarbon contamination monitoring. This has been clarified in the document. Noted. Noted. Endorsement of the WMP by NRAR is not required under Condition 16 of Schedule 4, rather that the WMP to prepared in consultation with NRAR.
In review of the presented document, DPIE-Water makes the following comments in relation to groundwater: **Water Balance**	

The water balance is hard to decipher, a clear tabulated water in, water used and water out with balances would greatly improve understanding. In terms of groundwater it is interpreted from the flowchart documented that 242 ML/year is contained in product moisture; 803 ML/year is extracted from Appin West underground workings; and 579 ML/year is extracted from West Cliff underground workings. A total of 1624 ML per year of groundwater take. DPIE-Water interpret that a water volume of 2148 ML/year is discharged from varies approved discharge points. Whilst 27 ML/year is diverted to underground storage. How much of this discharged water is groundwater or whether all the groundwater is held in the adequate underground storage is not clear.	As noted in Section 4.2, the footnote states: *Figures shown are total volume used or discharged in megalitres for FY17. Figure 1 does not reflect the cessation of groundwater discharges to BCD since February 2019 or the changes associated with the installation of the proposed Appin North Water Treatment Plant. These changes will be reflected in the next update of the WMP.* The comments from NRAR will be considered in the revised water balance. This will be updated following the implementation of the Appin North Water Treatment Plant.
Groundwater Take The incidental groundwater ingress to each coal mine is not outlined. However, the overall volume is assumed to be as outlined in the water balance, a total of 1382 ML/year of pumped groundwater; this excludes 242 ML/year of groundwater as contained product moisture. This volume is stated to be directed to underground storage. The mine complex has underground storage capacity of 1710 ML/year in three storage Areas, 1, 4 and 5. Further, and notably, there is no outline of groundwater take versus groundwater licence volume on an annual basis in regard to trigger level or Trigger Action Response Plan (TARP). Unless these are in a specific groundwater management plan, as yet to be supplied and reviewed.	As noted in Section 4.2, the footnote states: *Figures shown are total volume used or discharged in megalitres for FY17. Figure 1 does not reflect the cessation of groundwater discharges to BCD since February 2019 or the changes associated with the installation of the proposed Appin North Water Treatment Plant. These changes will be reflected in the next update of the WMP.* The comments from NRAR will be addressed in the revised water balance. This will be updated following the implementation of the Appin North Water Treatment Plant.
Proposed Changes to Monitoring Programme Improvement activities proposed for 2020 to 2025 period include to “Cease groundwater monitoring at Appin East and Appin North”. Justification for this is	This has been clarified to state this relates to monitoring for hydrocarbons.

given that "Review of groundwater monitoring results indicates a trend of no hydrocarbon contamination" and that "No remediation of groundwater [is] required." DPIE-Water fail to see how discontinuing groundwater monitoring for contamination fits with the principal of "identify and deliver improvement projects that will reduce the impacts on biota in the Georges River as a result of the discharge from Appin North, and Allens Creek (and subsequent flows into the Nepean River) as a result of discharge from Appin West." It would be in the interest of all concerned parties that six-monthly monitoring be continued for a minimum of 10 years beyond closure of mines to assess continued compliance, unless this closure time frame is already met.	NRAR is correct. There is no linkage between the cessation of the hydrocarbon contamination monitoring and the water treatment plant projects at Appin North and Appin West. The monitoring was implemented for decommissioned underground fuel storage tanks, and there is no further source of contamination at those sites.
Groundwater (Contamination) Monitoring Contamination monitoring in groundwater is monitored at two locations only, Appin East (three bores) and Appin North (one bore), under an EPA endorsed monitoring programme. DPIE-Water notes that this appears minimal in comparison to other mines operating in the state. The type of contamination is not directly clear in the text of this section in the WMP. In addition, it is not clear, as it is not outlined, what elements and chemical compounds are being analysed for, nor what groundwater quality trigger level criteria are used to compare the analyses against.	There is no other identified source of contamination at the Appin Mine surface facilities that has the potential to impact groundwater. The groundwater monitoring that has been implemented is in response to identified past sources of contamination.
General Overall the WMP, as presented, is not a stand-alone document. There are numerous references to external located documents which the reader must source to understand this water management document.	Noted.
Department of Planning, Industry and Environment – Planning Services	
TBC	

Appendix 4: Water Licences

Licence	Number	Issue Date	Expiry Date
Licence to divert Brennans Creek around Stage 3 of refuse area	10WA103794	01/07/2011	30/06/2024
Nepean River Extraction Across from VS 6. Douglas North pump (Nepean River).	10WA117285	15/11/2011	14/11/2026
WCCPP Water Usage BCD. BCD UG Supply and BCD Recycled.	10WA117999	15/11/2012	14/11/2028
Appin Mine Underground Groundwater Extraction	10WA118778	01/07/2013	18/02/2028
West Cliff Mine Groundwater Extraction	10WA118766	01/07/2013	26/03/2028
Groundwater Access Licence – West Cliff	36481	NA	NA
Groundwater Access Licence – Appin	36477	NA	NA
Groundwater Access Licence – Appin	37464	NA	NA
Surface Water Access Licence – Brennans Creek Dam	35519	NA	NA
Surface Water Access Licence – Mountbatten	30145	NA	NA

Appendix 5: Secretary Endorsement of Personnel

Planning, Industry & Environment

Mr Chris Schultz
Lead Environment
Illawarra Metallurgical Coal

By Email: chris.schultz1@south32.net

23/04/2020

Dear Mr Schultz

Bulli Seam Operations (MP08_0150)
Appointment of Persons to Review Surface Water Management Plan

I refer to your request for the Planning Secretary's approval of suitably qualified persons employed by South32 to review and update the Water Management Plan for the Bulli Seam Operations Project.

The Department has reviewed the nominations and information you have provided and is satisfied that Christopher Schultz, David Gregory, Simon Pigozzo and Nicola Curtis are suitably qualified and experienced.

Consequently, I can advise that the Planning Secretary approves the appointment of these persons to review the plan.

If you wish to discuss the matter further, please contact Rose-Anne Hawkeswood on 927 6324.

Yours sincerely

Stephen O'Donoghue
Director
Resource Assessments

As nominee of the Planning Secretary

4 Parramatta Square, 12 Darcy Street, Parramatta 2150 | dpie.nsw.gov.au | 1

Appendix 6: Management Plan Approval

To be included when received