



ILLAWARRA COAL  
BULLI SEAM OPERATIONS



# ANNUAL REVIEW FY2018

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Name of operation	Bulli Seam Operations
Name of operator	South32 – Illawarra Coal – Bulli Seam Operations
Development consent / project approval #	08_0150
Name of holder of development consent / project approval	Illawarra Coal Holdings Pty Ltd
Mining lease #	CCL 767, CCL 724, CL 388, CL 381, ML 1382, ML 1433, ML 1574, ML 1678, ML 1698, ML 1473, MPL 200, MPL 201
Name of holder of mining lease	Illawarra Coal Holdings Pty Ltd, Endeavour Coal Pty Ltd
Water licence #	10WA103794; 10WA118766; 10WA118778
Name of holder of water licence	Endeavour Coal Pty Ltd
MOP/RMP start date	1 Oct 2012
MOP/RMP end date	30 Sept 2019
Annual Review start date	01 July 2017
Annual Review end date	30 June 2018

I, Alex Parro, certify that this audit report is a true and accurate record of the compliance status of South32 – Illawarra Coal – Bulli Seam Operations for the period 01 July 2017 – 30 June 2018 and that I am authorised to make this statement on behalf of Illawarra Coal – Bulli Seam Operations.

Note.

- a) The Annual Review is an 'environmental audit' for the purposes of section 122B (2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.
- b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).

Name of authorised reporting officer	Alex Parro
Title of authorised reporting officer	Specialist Environment
Signature of authorised reporting officer	
Date	25/9/2018

# 1. STATEMENT OF COMPLIANCE

Table 1: Statement of Compliance

Development Approval	Purpose	Issue Date	Expiry date	Compliant?
08_0150	Bulli Seam Operations Project Approval under Section 75J of the EP&A Act 1979.	22/12/2011	31/12/2041	No
EPBC 2010/5350	Federal Government approval of the Bulli Seam Operations Project under Sections 130(1) and 133 of the EPBC Act 1999.	15/05/2012	15/05/2042	Yes
10_0079	Appin Ventilation Shaft No.6 Approval under Section 75J of the EP&A Act 1979.	04/05/2011	04/05/2041	Yes <sup>1</sup>
EPBC 2010/5722	Federal Government approval of the Appin Mine Ventilation Shaft No.6 under Sections 130(1) and 133 of the EPBC Act 1999.	01/04/2011	01/04/2041	Yes
<b>Mining Lease / Sub-Number</b>				
<b>Lease</b>				
Coal Lease	388	22 Jan 1992	22 Jan 2034	Yes
Mining Lease	1382	20 Dec 1995	20.12.2037	Yes
Mining Lease	1433	24 Jul 1998	23 Jul 2019	Yes
Mining Lease	1574	09 Jul 2008	30 Dec 2023	Yes
Mining Lease	1678	27 Sep 2012	26 Sep 2033	Yes
Mining Lease	1698	26 Jun 2014	26 Jun 2035	Yes
Consolidated Lease	Coal 724	4 Jul 1991	18 Dec 2031	Yes
Consolidated Lease	Coal 767	29 Oct 1991	08 Jul 2021	Yes
Coal Lease	381	24 Oct 1991	24 Oct 2033	Yes
Mining Purposes Lease	200	13 Jan 1982	13 Jan 2024	Yes
Mining Purposes Lease	201	1 Jan 1982	13 Jan 2024	Yes
Mining Lease	1473	20 Nov 2000	29 Nov 2021	Yes

<sup>1</sup> A notice of Modification under Section 75W of the Environmental Planning and Assessment Act 1979 28 October 2016 incorporated the VS#6 Approval requirements into the BSO Approval.

**Table 2: Non-compliances**

<b>Relevant approval</b>	<b>Condition #</b>	<b>Condition description (summary)</b>	<b>Compliance status</b>	<b>Comment</b>	<b>Where addressed in Annual Review</b>
08_0150	Sch4.15	Surface water discharges exceeding EPL 2504 concentrations limits	Non Compliant	Concentration limits were exceeded at 2 sites during the reporting period	For a summary refer to Section 6.3, Table 11 of this report

Refer to Appendix E: BSO EPBC Approval 2010/5350 Compliance Report & Appendix F: BSO Consent Compliance Report and Summary of Non-compliances for more detail. The predictions and Statement of Commitments from the BSO Environmental Assessment (EA) are incorporated into the BSO federal EPBC and state EP&A Approval conditions. Compliance with the state and federal conditions is assessed in the following documents:

- Appendix E: BSO EPBC Approval 2010/5350 Compliance Report; and
- Appendix F: BSO Consent Compliance Report and Summary of Non-compliances.

## 2. INTRODUCTION

### 2.1. BACKGROUND

This Annual Review for the Bulli Seam Operations (BSO) details the environment and community performance for the 12-month period ending 30<sup>th</sup> of June 2018 and meets the requirements set out in the *Annual Review Guidelines* (NSW DPE, 2015).

The Review has been prepared to meet the requirements of Schedule 6 Condition 4 of the BSO Development Consent and the NSW Division of Resources and Geoscience (formerly Division of Resources and Environment), requirement to submit an Annual Environmental Management Report (AEMR) under the Mining Lease for the BSO.

A copy of the report is publicly available via the South32 website under Bulli Seam Operations: <http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>.

### 2.2. OVERVIEW OF OPERATIONS

The NSW Government granted approval for the Bulli Seam Operations Project (BSOP) in December 2011. The BSOP combines future mining operations and provides for the continuation of coal mining operations at the Appin Mine and West Cliff Colliery. The Bulli Seam underground longwall mining operations have transitioned wholly to the Appin areas (Area 9 and Area 7) following completion of longwall mining activities at West Cliff in early 2016. The locations of all sites associated with the BSOP are illustrated in Plan 1 - Regional Location Plan.

#### **Appin**

Appin Mine consists of the merged Appin and Tower collieries. Appin Mine is owned and operated by Endeavour Coal P/L, a subsidiary company of Illawarra Coal Pty Ltd (ICHPL) which is 100% owned by South32. Appin Colliery (located at Appin) commenced operations in 1962 and Tower Colliery (located at Douglas Park) commenced operation in 1978. The underground infrastructure, roadways, conveyor and ventilation systems were joined in 2003 to become the Appin Mine. The original Appin Colliery is located adjacent to Appin Village, approximately 37 kilometres Northwest of Wollongong.

Tower Colliery (Now Appin West) was officially opened in November 1978. Following the sinking of the access and ventilation shafts, underground development of the mine was undertaken from 1978 through to 1988 when longwall operations were introduced. Tower Colliery completed extraction of 20 longwall blocks between 1988 and September 2002. The mine was redeveloped underground to establish mining operations in the current longwall Area 7 mining domain.

Key areas associated with the current Appin operations include the Appin East (Central) pit top site (Plan 2 - Appin East (Central) Mine Site), the Appin West pit top site (Plan 3 – Appin West Mine Site), the Appin East (Central) No.1 and No.2 fan site (Plan 4 – No.1 & No.2 Shaft Site), the Appin West No.3 fan site (Plan 5 – No.3 Shaft Site), No.6 fan site (Plan 6 – No.6 Shaft Site) and the Douglas Park substation site (Plan 7 – Douglas North Substation).

#### **West Cliff/Appin North**

West Cliff/Appin North Colliery is located 26km northwest of Wollongong, NSW. West Cliff Colliery is operated by Endeavour Coal Pty Ltd, a subsidiary company of ICHPL with South32 as the parent company. South32 owns 100% of the West Cliff assets.

Illawarra Coal has conducted underground coal mining operations at West Cliff since 1997. Prior to this, West Cliff was operated by Kembla Coal and Coke Pty Limited (KCC). Longwall mining at West Cliff concluded in early 2016. The latest mining area, Area 5, was completed in February 2016 and consists of part of Consolidated Coal Lease 767 and Coal Lease 381 which were both transferred from Appin Colliery to West Cliff Colliery in 1997. West Cliff merged with Appin Mine in February 2016.



Key areas of the West Cliff Colliery Site include the pit top (Plan 8 – West Cliff South Site), the West Cliff Emplacement Area and Coal Preparation Plant (CPP) at the North Site (Plan 9 – West Cliff North Side) and the redundant North Cliff Mine site within the Dharawal National Park Area (Plan 10 – North Cliff ).

### 2.3. MINE CONTACTS

**Table 3: Contacts.**

<b>Position</b>	<b>Name</b>	<b>Number</b>
General Manager Appin Mine	Craig Manz	(02) 4629 2305
Specialist Environment	Alex Parro	(02) 4224 6215
Environmental Supervisor	Peter McMillan	(02) 4286 3415

### 3. APPROVALS

Tables below describe the Development Approvals, Mining Leases, Licences and Exploration Leases associated with the BSO.

**Table 4: Development Approvals associated with the BSO**

Document	Issue Date	Expiry date
Appin Gas Drainage Project – Initial	Oct 2009	
Appin Gas Drainage Project – 2010	Dec 2010	
Appin Gas Drainage Project – 2012	Feb 2012	
Bulli Seam Operations Project Approval (NSW Government)	22 Dec 2011	31 Dec 2041
Bulli Seam Operations Project Approval (EPBC Act)	15 May 2012	15 May 2042
No. 6 Ventilation Shaft (NSW Government)	4 May 2011	4 May 2041 <sup>2</sup>
No. 6 Ventilation Shaft (EPBC Act)	1 Apr 2011	1 Apr 2041

**Table 5: Mining Leases and Licences associated with the BSO.**

Mining Lease / Sub-Lease	Number	Issue Date	Expiry Date
Coal Lease	388	22 Jan 1992	22 Jan 2034
Mining Lease	1382	20 Dec 1995	20 Dec 2037
Mining Lease	1433	24 Jul 1998	23 Jul 2019
Mining Lease	1574	09 Jul 2008	30 Dec 2023
Mining Lease	1678	27 Sep 2012	26 Sep 2033
Mining Lease	1698	26 Jun 2014	26 Jun 2035
Consolidated Coal Lease	724	4 Jul 1991	18 Dec 2031
Consolidated Coal Lease	767	29 Oct 1991	08 Jul 2029
Coal Lease	381	24 Oct 1991	24 Oct 2033
Mining Purposes Lease	200	13 Jan 1982	13 Jan 2024
Mining Purposes Lease	201	13 Jan 1982	13 Jan 2024
Mining Lease	1473	20 Nov 2000	19 Nov 2021
Environment Protection Licence	2504	---	---
NSW Office of Water Licences	10WA117999;	15 Nov 2011	14 Nov 2027
	10WA103794;	1 July 2011	30 June 2024
	10WA118778;	1 July 2013	18th Feb 2028
	10BL156587;	NA	NA
	10WA117285;	15 Nov 2011	14 Nov 2026

<sup>2</sup> A notice of Modification under Section 75W of the Environmental Planning and Assessment Act 1979 28 October 2016 incorporated the VS#6 Approval requirements into the BSO Approval.

**Table 6: Exploration Leases associated with the BSO.**

<b>Mining Lease / Sub-Lease</b>	<b>Site</b>	<b>Issue Date</b>	<b>Expiry Date</b>
A199	West Cliff	27 Jun 1980	27 Jun 2019
A201	Appin	27 Jun 1980	27 Jun 2019
A248	Appin	13 May 1981	13 May 2021
A306	West Cliff	19 Jul 1983	27 Jun 2019
A312	Appin	10 Aug 1983	10 Aug 2018 <sup>3</sup>
A370	Appin	8 May 1986	27 Jun 2019
A395	Appin	23 Nov 1987	10 Aug 2018 <sup>3</sup>
A396	Appin/West Cliff	28 Jun 1988	27 Jun 2019
A397	West Cliff	4 Aug 1987	27 Jun 2019
A432	West Cliff	12 Feb 1991	31 Aug 2018 <sup>3</sup>
EL 4470	Appin	5 Jan 1993	5 Jan, 2021

<sup>3</sup> For the three titles that expire in 2018 renewal applications have been submitted or are in the process of being submitted.

## 4. OPERATIONS SUMMARY

### 4.1. EXPLORATION

During the reporting period, no exploration was conducted for the BSO. No exploration activities were conducted in mining leases CCL767 and CCL724.

### 4.2. LAND PREPARATION

#### Mine Safety Gas Drainage

There were no land preparation works relating to Mine Safety Gas Drainage during the 2017/2018 reporting period. Refer to section 8.1- Rehabilitation for the reporting period for more information.

#### Emplacement Operations

The following works were undertaken during the reporting period:

- Seeding of approximately 1.3Ha t in Stage 3;
- Establishing the growth medium for ~0.3Ha in stage 3;
- Continued deposition of Coal wash.

Plan 11 – Land Preparation Plan, illustrates the works completed.

The rehabilitated emplacement areas were inspected regularly to determine the progress and effectiveness of the rehabilitation. The monitoring program consists of quarterly inspections undertaken by an Illawarra Coal Environmental representative which are supplemented by a more extensive annual monitoring program. The Annual monitoring program was undertaken in spring FY17. The report is provided in Appendix A: Annual Rehabilitation Report.

### 4.3. CONSTRUCTION

The following construction activities were undertaken during the 2017/2018 reporting period:

#### Vent Shaft 6 Concrete Ballast Borehole

Surface construction work was undertaken at the Vent Shaft 6 shaft site (Plan 6) to set up infrastructure to enable concrete and ballast to be delivered directly to Appin Area 7 and 9 underground operations via an existing borehole (Figure 1). Works completed in the reporting period were:

- Construction of a 3,500m<sup>2</sup> concrete pad with associated bunding and retaining walls
- Installation of surface water tanks, pumps, and associated pipework.
- Installation of surface air compressors and associated pipework.
- Downcast yard lighting installed (without power).
- All service conduits and cabling (without power).

All works were undertaken with the necessary environmental permits. The following works are expected to be completed in FY19:

- Service pipe design and installation.
- Installation of concrete/ballast surface hoppers.

- Site office and storage shed installation.
- Completion of electrical installation and power up.
- Commissioning.

All underground works have been scoped but construction has not been initiated.

### Water Filtration Plant Expansion

Works to expand the Appin West Water Filtration Plant continued during the reporting period (Figure 2). The project completion date reported as August 2018 in the FY17 AEMR has been postponed to fix the following defects/issues that emerged during the dry/initial wet commissioning:

- Degasser vessel wall damage following an unplanned vacuum in the vessel when filling/inadequate overflow capacity.
- RO module feed pumps power supply rectification via installation of sine wave filters.
- Permeate tank discharge pump upgrade.

The projected final operational date for the Water Filtration Plant upgrade is November 2018. Other activities that must be completed prior to final operation are:

- Wet commissioning, including balance of process sequence testing.
- Process commissioning, including trialing at different flow conditions and verifying output quality.
- Production ramp-up, final integration with existing Plant, and handover of plant from contractor to Illawarra Coal operators.



Figure 1: Concrete pad construction at the Vent Shaft 6 site concrete/ballast borehole.



Figure 2: Water Filtration Plant Expansion - Main processing facility.

## Appin East (Central) Gas Drainage Plant Flaring Units and Overland Gas Extraction Pipe

The Appin East Gas Drainage Plant (GDP) upgrade to increase gas extraction capacity and to provide some gas flaring capability was completed in the reporting period (Figure 3). GDP flares abate methane content of the extracted gas and are used when more gas is available from the mine than can be consumed by EDL, and can potentially generate Australian Carbon Credit Units (ACCU's). The project scope included the upgrade of:

- Vent Shaft #3, consisting of:
  - 900mm pipe extension to underground gas range to bottom of Vent Shaft #3;
  - 900mm pipe Gas Riser within Vent shaft #3 (downcast) to surface; and
  - Water separator/valve train top of Vent Shaft #3.
- Appin Central GDP- consisting of:
  - 1x Vacuum Skid;
  - 1x Water Skid;
  - 2x Flare Skids;
  - Mechanical and electrical interconnection to existing GDP; and
  - Design has included for future Vacuum and water skid connections.
- An Interconnection Suction Pipeline – approx. 4km in length along Brooks Point Road (Figure 4), consisting of:
  - A buried 1000mm high density poly-ethylene pipeline; and
  - A 1000mm galvanised steel pipe crossing the Water NSW channel and adjacent creek.

A modification to the Surface Gas Management Plant for Appin East GDP Stage 3 works was approved in February 2017. Prior to submission of the application for the pipeline along Brooks Point Road, access agreements were sought with landholders for the location of the pipe line. These included Wollondilly Shire Council, Walker Corp and WaterNSW. The Brooks Point Road gas extraction pipeline was approved by the Department of Planning on October 2016 as part of the BSO Project Modification (08\_0150 MOD 2).

The South32 project start date was 15 April 2016 and final commissioning of the plant was completed in April 2018. The plant is currently operational.

An overview of the project area can be found in Plan 12 – Appin East Gas Drainage Plant and Pipeline Upgrade.



Figure 3: Gas flaring units constructed at the Appin East GDP.



Figure 4: Buried gas pipeline along Brooks Point Road during the construction phase of the project.

## 4.4. MINING

### Longwall Status

The Bulli Seam underground longwall mining operations have transitioned wholly to the Appin areas following completion of longwall mining activities at West Cliff in early 2016. Appin and West Cliff (Appin North) mines extract coal from the Bulli Seam within the Southern Coalfield.

Underground operations at Appin Colliery were suspended following a measured withdrawal of people on 28 June (following disruption to the gas extraction plant) and the subsequent issue of a Section 195 Prohibition Notice by the Regulator. An action plan to address the concerns of the Regulator was approved mid-September 2017 and safe operations resumed in October 2017. Following the prohibition notice Appin has predominantly been operating a single longwall.

Appin Area 7 Longwall 707B extraction commenced on the 26<sup>th</sup> of September 2016 and completed on the 19<sup>th</sup> of June 2018 at 2055m. Appin Area 9 Longwall 901 extraction commenced on the 19<sup>th</sup> of January 2016 and completed on 8<sup>th</sup> September 2017 at 2029m. Longwall 902 commenced extraction on the 12<sup>th</sup> of May 2018 and as of the 30<sup>th</sup> of June 2018 had extracted 375m, with 1778m remaining.

### Longwall Production

Appin extracted 1.77 million tonnes of 'Run of Mine' (ROM) coal via roadway development and longwall extraction methods for the reporting period, a 56% decrease from the 2016/17 reporting period. The ROM production levels from FY09 through to the current reporting period are provided in Figure 5. Note that forecast figures for FY19 are not yet available.

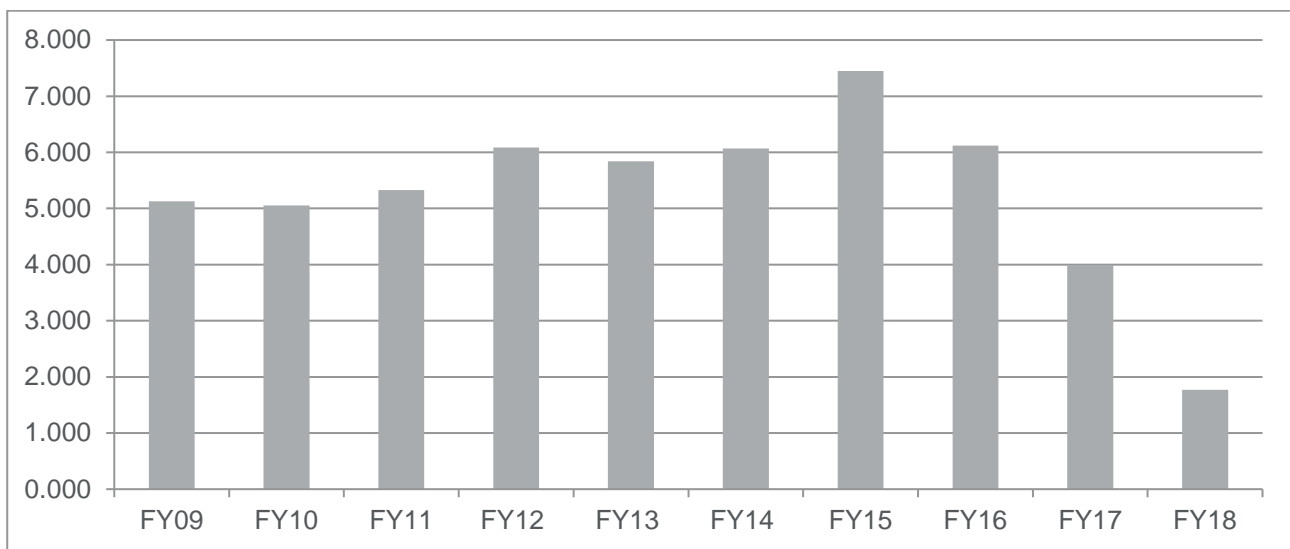


Figure 5: ROM production – BSO

The average yield for the Bulli Seam operations for the reporting period was 78%. The production and waste summary for the reporting period is provided in Table 7.

**Table 7: Production Summary**

	<b>Approval Limit</b>	<b>Previous Reporting Period</b>	<b>This Reporting Period</b>
Waste rock/Overburden	N/A	N/A	N/A
ROM Coal/Ore	10.5MT	3.995MT	1.771MT
Coarse Reject (Coal Wash Tonnes) <sup>4</sup>	N/A	.595MT	.356MT
Saleable Product	9.3MT <sup>5</sup>	3.436MT	1.381MT

#### 4.5. MINERAL PROCESSING

Mineral processing facilities include the West Cliff Coal Preparation Plant (CPP), the West Cliff Emplacement Area and the Dendrobium CPP (located at the Port Kembla Steelworks). The majority of ROM coal from Appin Mine is directed to the West Cliff CPP for processing. The Emplacement Area is used to emplace coal wash from the West Cliff CPP and Dendrobium CPP.

ROM Coal is transported to West Cliff CPP by:

- Coal trucks from the Appin East (Central) site, along Appin and Wedderburn Roads; and
- Bulk coal winder at Westcliff (Appin North) transported underground from Appin Area 7 and 9.

ROM Coal from Appin Mine is also directed to the Dendrobium CPP on an 'as required' basis to maintain work continuity and maintain reduced stockpile sizes at the Appin Site. ROM coal is transported via Mt Ousley to the Dendrobium CPP (located within the BlueScope Steel complex). Clean coal from the West Cliff CPP is trucked to BlueScope Steel (Port Kembla Steel Works) coal handling facilities or to the Port Kembla Coal Terminal for distribution.

Daily road haulage volumes associated with both the Appin and West Cliff sites is available on the South32 website: <http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>

#### 4.6. ORE AND PRODUCT STOCKPILES

No coal is stockpiled at the Appin West Site as ROM coal is transported underground to the Appin East (Central) Site. The Appin West coal storage bins are currently under care and maintenance.

The Appin East (Central) mine site has a total raw coal stockpiling capacity of up to 50,000 tonnes. The stockpile is recovered with front-end loaders directly into the coal haulage trucks for transport by road to either the West Cliff (Appin North) or Dendrobium CPP's.

West Cliff (Appin North) operates six primary coal stockpiles for both clean coal and raw coal. The stockpile capacities at West Cliff (Appin North) are outlined in Table 8.

<sup>4</sup> Total processing waste produced at West Cliff CPP (includes Appin Coal Wash) for Annual Review period only – does not include coal wash produced at Dendrobium CPP

<sup>5</sup> Transport Limit



**Table 8: West Cliff (Appin North) Stockpiles Capacities**

<b>Area</b>	<b>Capacities</b>
No.1 Stockpile	650,000t nominal capacity - 600,000t coking coal, 20,000t jig coal, 30,000t Middlings coal (Note: The capacity of this stockpile has been temporarily reduced to allow space for a temporary lay down area as part of the RCRIP)
No.2 Stockpile	150,000t nominal capacity – generally coking coal
No.3 Stockpile	600,000t nominal capacity – generally coking coal
No.4 Stockpile	800,000t nominal capacity – generally Appin ROM coal
No.5 Stockpile	90,000t nominal capacity – generally Appin ROM coal
No.6 Stockpile	90,000t nominal capacity – generally West Cliff (Appin North) ROM

A Stockpile and Slope Stability Management Plan is in place to manage the stockpile operations. This plan is a framework document where the operational risks and controls are documented. Risks associated with the stockpile operations are also detailed in the West Cliff (Appin North) CPP Risk Register, which is reviewed regularly by the site management team to test the effectiveness of controls.

Monitoring and management review indicates that the current plan effectively controls all potential stockpile management issues effectively.

## 5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

**Table 9: Actions from Previous Annual Review**

Action Required	Where covered in this Annual Review
1. Ensure that the Title Block of future AEMRs refers to all applicable mining leases; only two titles are referenced in this section of the 2016/17 AEMR.	CL 388, CL 381, ML 1382, ML 1433, ML 1574, ML 1678, ML 1698, ML 1473, MPL 200, MPL 201.- Have been added to the title block.
2. Include status update on any outstanding action proposed to address any outstanding recommendations made in the 2017 Independent Environmental Audit Report, as required under the Department's guideline for the <i>Post-approval requirements for State significant mining developments – Annual Review Guideline</i> (2015).	The Independent Environmental Audit is addressed in Section 10 of this Annual Review. There are no outstanding actions to address outstanding recommendations made in the 2017 Independent Report.

## 6. ENVIRONMENTAL PERFORMANCE

### 6.1. AIR POLLUTION

#### Environmental Management

Air quality is managed in accordance with the BSO Air Quality and Greenhouse Gas Management Plan (AQMP) which details the air quality and emissions control measures for the project, compliance procedures, monitoring programs, evaluation protocols, notification and communication processes.

The AQMP was prepared to comply with the intent and requirements of Condition 12, Schedule 4 of the BSO approval.

The objectives of the AQMP are to:

- Provide the framework for the responsible management of air quality and emissions associated with the project;
- Describe the control measures for management of dust, odour, greenhouse gas (GHG) and other emissions to atmosphere;
- Prevent adverse air quality impacts on the local communities and environment;
- Describe the compliance criteria for air quality for the project;
- Describe the air quality monitoring program;
- Comply with the relevant requirements of Environment Protection Licence (EPL) No. 2504 and the Bulli Seam Operations (BSO) Project approval;
- Describe measures for the reduction of project GHG emissions; and
- Comply with South32 and other relevant standards and requirements.

The air quality monitoring program incorporates:

- Collection and measurement of dust samples from strategically placed dust deposition gauges at representative sites;
- Use of real-time air quality monitors: fixed Optical Photometers, portable Optical Photometers;
- Use of a High Volume Air Sampler (HVAS) to determine the land acquisition values; and
- Dust emission surveys and spot checks using hand held photometers; and
- Visual inspections and audits.

**Table 10: BSO Air Quality Monitoring Sites and their Function**

Location	Equipment and Monitoring Point ID	Function
Appin East (Central)	Dust Deposition Gauge 14	Particulate dust deposition rate at SE corner of Stockpile at property boundary Operational Control - Stockpile and internal roadway dust control measures performance reference
	Dust Deposition Gauge 15	Particulate dust deposition rate at NE corner of Stockpile Operational Control - Stockpile and internal roadway dust control measures performance reference
	Dust Deposition Gauge 16	Particulate dust deposition rate at NW corner of Appin East (Central) pit top property boundary Amenity goal reference Operational Control - Site dust control performance reference
	Dust Deposition Gauge 17	Particulate dust deposition rate at NE corner of Appin East (Central) pit top property boundary Amenity goal reference Operational Control - Stockpile and public road dust control measures performance reference
	Dust Deposition Gauge 18	Particulate dust deposition rate at SE corner of Stockpile Operational Control - Stockpile and internal roadway dust control measures performance reference
	Real-time Photometer (fixed) Photometer ID: (AE-PF3) (NW corner of Appin East (Central) pit top boundary between nearest residential receivers)	Amenity goal reference Real Time Operational Control Site dust control performance reference
	High Volume Air Sampler High Volume Air Sampler ID:(AE-HV1)	Amenity goal reference Review against land acquisition levels Real Time Operational Control
	Real-time Photometer (fixed) Photometer ID: (AE-PF1) (NE corner of pit top property boundary – coal stockpile vehicle entry/exit point)	Real-time monitoring of dust emissions at the coal stockpile area truck entry/exit point onto public roads Real-time Operational Control – Stockpile, internal roads and public road dust control measures performance reference monitor
	Real-time Photometer (portable) Photometer ID: (AE-PS1) Coal truck exit point onto Appin Road	Monitor dust emissions at the coal truck exit point onto Appin Road Quarterly survey dust monitoring point Real-time Operational Control
	Real-time Photometer (portable) Photometer ID: (AE-PS3) Residential Area to the NW of Appin East (Central) Pit Top	Monitor dust emissions at the Appin residential area immediately NW of Appin Pit Top Quarterly survey dust monitoring point Real-time Operational Control
Appin West	Dust Deposition Gauge No.1 Gauge ID: (AW-DD1)	Particulate dust deposition rate at Appin West pit top

**Table 10: BSO Air Quality Monitoring Sites and their Function**

Location	Equipment and Monitoring Point ID	Function
	(Appin West pit top – adjacent mine access road, employee car park and EDL power plant)	Operational Control – Site and road dust control measures performance reference
	Dust Deposition Gauge No.2 Gauge ID: (AW-DD2) (Appin West property boundary at Mine Entrance Point off Douglas Park Drive	Particulate dust deposition rate at the Appin West Mine Gate Entrance Point and the public road Amenity goal reference Operational Control – Site and mine access road dust control measures performance reference
	Real-time Photometer (portable) Photometer ID: (AW-PS1) Northern property boundary between Appin West Pit Top and St. Mary's Towers property	Monitor dust emissions at the Northern pit top property boundary Quarterly survey dust monitoring point Real-time Operational Control
Appin West	Real-time Photometer (portable) Photometer ID: (AE-PS2) Main mine road intersection with Douglas Park Drive	Monitor dust emissions at the mine road intersection with Douglas Park Drive Quarterly survey dust monitoring point Real-time Operational Control
	Dust Deposition Gauge No.1 Gauge ID: (W-DD1) (West Cliff (Appin North) southern property boundary at the Wedderburn Rd and-Appin Rd junction)	Particulate dust deposition rate at the Wedderburn Rd and-Appin Rd junction Operational Control – Mine entrance road and coal truck dust control measures performance reference
	Dust Deposition Gauge No.3 Gauge ID: (W-DD3) (West Cliff (Appin North) pit-top south site)	Operational Control – Site dust control performance reference for the West Cliff (Appin North) pit-top south site
West Cliff (Appin North)	Dust Deposition Gauge No.8 Gauge ID: (W-DD8) (Brennans Creek Dam)	Amenity goal reference Operational Control – Site dust control performance reference Indicator for dust deposition rates between the emplacement area activities and the nearest Appin township residential area Baseline and historical dust deposition trends related to the expansion of the emplacement area north towards the nearest residential receivers
	Dust Deposition Gauge No.10 Gauge ID: (W-DD10) (West Cliff (Appin North) property boundary between the product stockpiles adjacent to Wedderburn Road and the Dharawal State Conservation Area boundary)	Site dust control performance reference for product stockpiles and Wedderburn Road coal truck transport corridor
	Real-time Photometer (fixed) Photometer ID: (W-PF1)	Fixed monitor for real-time monitoring of dust emissions at the Wedderburn Road and Appin Road intersection Real-time Operational Control – Roadway dust emissions

**Table 10: BSO Air Quality Monitoring Sites and their Function**

Location	Equipment and Monitoring Point ID	Function
(West Cliff (Appin North) southern property boundary at the Wedderburn and Appin Road intersection)		
Real-time Photometer (portable)	Photometer ID: (W-PS1)	Monitor real-time dust emissions at the Brennans Creek Dam locality.
(Brennans Creek Dam locality to the north of the West Cliff (Appin North) Emplacement Area)		Quarterly survey dust monitoring point Operational Control and baseline reference point
Real-time Photometer (portable)	Photometer ID: (W-PS2)	Monitor real-time dust emissions at the zone between the active emplacement area and Appin Road
(Dust emissions survey locality at the western boundary between the emplacement operations and Appin Road)		Quarterly survey dust monitoring point Operational Control
Real-time Photometer (portable)	Photometer ID: (W-PS3)	Monitor real-time dust emissions along Wedderburn Road
(Dust emissions survey locality along Wedderburn Road between the coal stockpiles and the Dharawal National Park)		
Real-time Photometer (portable)	Photometer ID: (W-PS4)	Quarterly survey dust monitoring point
(Cataract Scout Camp Reserve to the South West of the West Cliff (Appin North) Site)		Operational Control

Five weather stations are located at Appin East/Central (Solar and Mains Power), Appin West (Solar), Vent Shaft 6 (Solar), with additional temperature inversion monitoring equipment at Appin North/Westcliff solar).

### Environmental Performance

Results of the air quality monitoring are reported online every 14 days in accordance with Section 66 (6) of the POEO Act and Schedule 6, Condition 11 of the BSO Project Approval; and on an annual basis to the OEH via the EPA Annual Return (Appendix C: 2017/18 EPA Annual Return). The online report is available via the following link:

<http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>

A comprehensive summary of all air monitoring results for the BSO is provided below:

### ***BSO Dust Deposition Gauge Monitoring***

The Appin East (Central) and West Cliff (Appin North) sites non-operational gauges were below the long-term criteria/amenity goal of 4 g/m<sup>2</sup>/month for deposited dust during the reporting period (Figure 6). This is evident at all sites located near the perimeter of the Appin and West Cliff (Appin North) sites (i.e. AE-DDG14, 15, 16 and 17; and AW-DD1 and 2; and WC-DD1, 3 and 8).

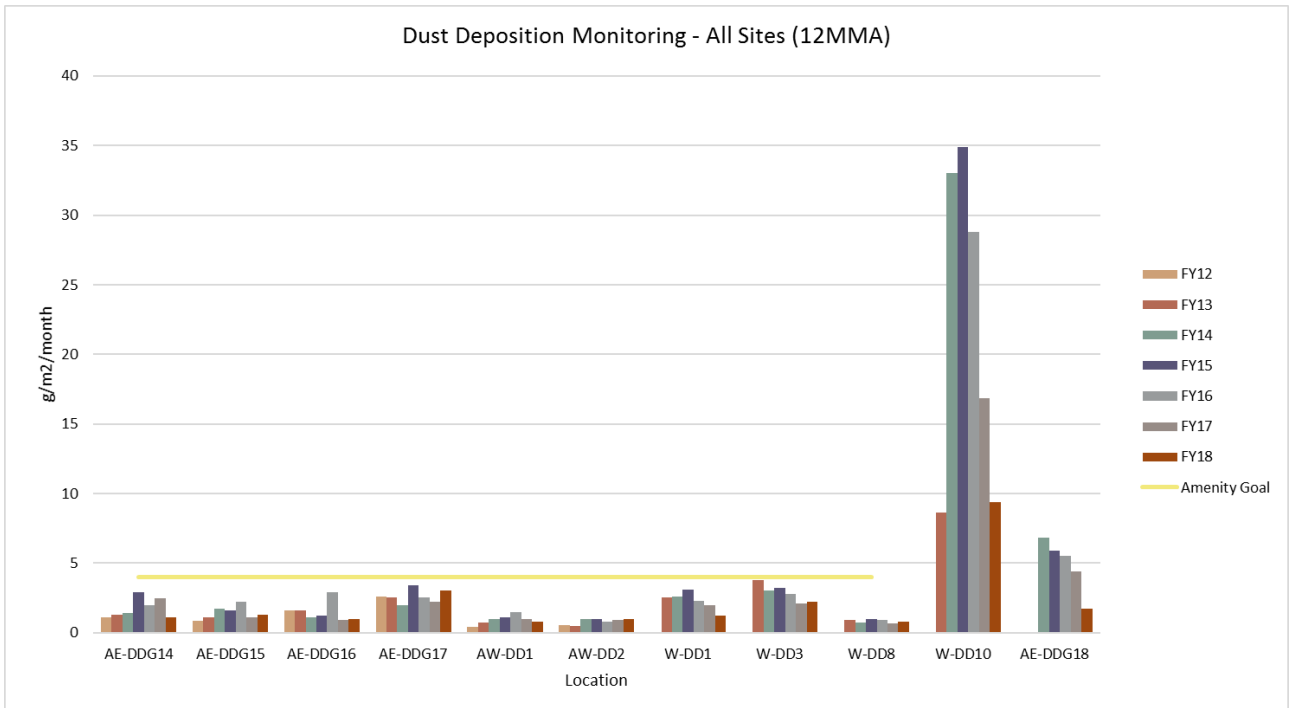


Figure 6: Comparison annual averages from FY12 to FY18 for insoluble solids across the BSO.

The long-term criteria (amenity goal) applies to particulate emissions on any residence on privately owned land – W-DD10 and AE-DDG18 are operational gauges located within the mine site (i.e. operational land), they provide an indication of effectiveness of the sites immediate dust control measures.

**Real-time Monitoring**

As described in the BSO AQMP, if the optical photometer at Appin East (Central) (AE-PF3) indicates average dust levels greater than 80% of the Air Quality Criteria (refer to Schedule 4, condition 9 of the BSO project approval) additional monitoring will be undertaken using the HVAS (AE-HV1) to assess compliance. The apparent maximum average PM10 dust levels were measured above the 80% criteria three times during the reporting period. These exceedances were attributed to regional bush fires and hazard reduction burning rather than dust emissions generated by BSO activities.

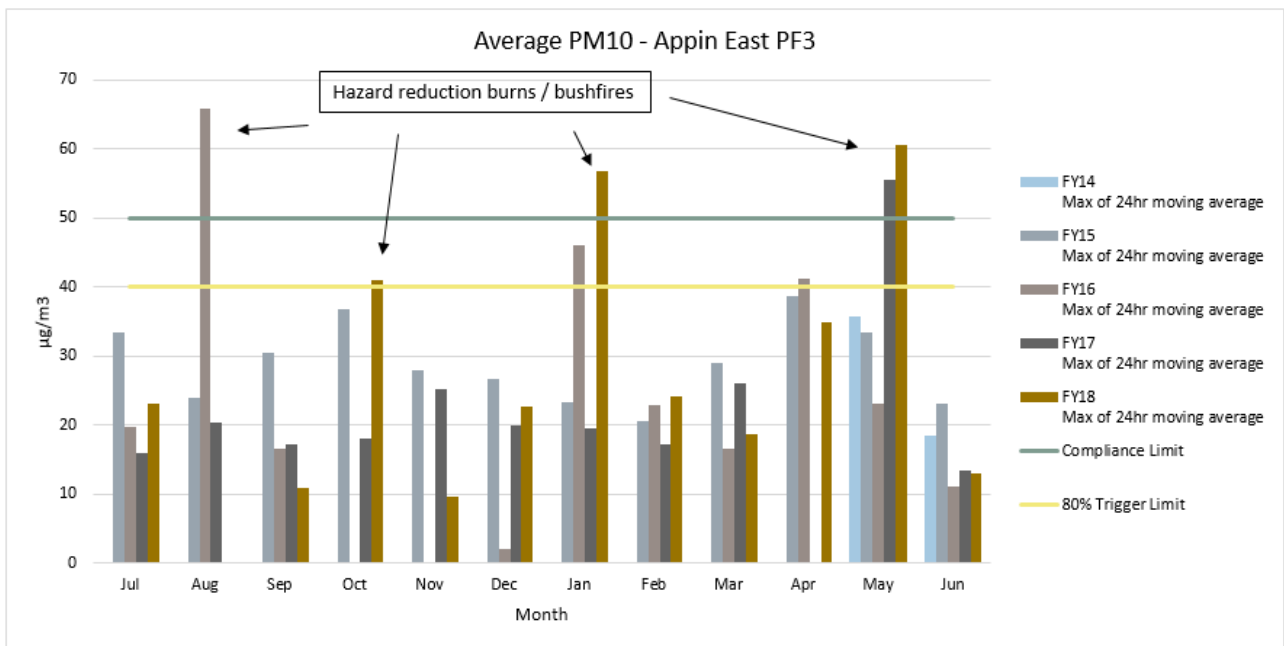


Figure 7: PM10 average 24 hour levels and maximum 24 hour levels at Appin East (Central).

## **6.2. EROSION AND SEDIMENT**

### **Environmental Management**

Most activities at the Appin East (Central), West and North pit top sites are undertaken on relatively flat areas. In addition, high activity areas are sealed. There are minimal exposed earthen areas at all sites. Internal unsealed roads are maintained to prevent dust, primarily through dust suppression sprays and water carts. Sediment fences are installed where required to filter sediment from drainage / seepage. Sediment is controlled by a series of dams and water treatment facilities at both sites. Discharged water is monitored for suspended solids.

Areas that have the potential to be contaminated by surface operations at the Appin West Pit Top are contained within the catchment of the surface water dams which are designed to capture and treat a 1:10 year, 72-hour rainfall event. The surface water dam contains a spillway designed for a 1:1000 year rainfall event to maintain the engineering integrity of the structure and reduce the risk of erosion and sediment release. Prior to the release of surface water from the surface water dam (via Licenced Discharge Point 23), water passes through a filter unit which is designed to remove suspended solids, oil and grease.

The potential for erosion at the emplacement area is managed in accordance with the West Cliff (Appin North) Coal Wash Emplacement Area Management Plan. The following activities are undertaken to minimise the likelihood of erosion within the emplacement area:

- Compaction of emplaced material;
- Profiling of finished areas to designed gradients; and
- Revegetation of emplaced area.

Sediment is controlled by a series of sedimentation ponds, which have a combined capacity of ~200 ML. Water is treated at several locations across the site prior to transfer into Brennans Creek Dam (BCD) to comply with EPL limits.

The water management system is regularly inspected by the site environmental representative to ensure the system is operating as efficiently as possible.

### **Environmental Performance**

Routine water quality monitoring of Total Suspended Solids (TSS) across the BSOP has not identified any issues associated with erosion and sedimentation. The Appin East (Central), and Appin North sites are operating within the licence limits for TSS. Appin West had a non-compliant sample at Licensed Discharge Point 23 for exceeding the TSS limit during the reporting period. The exceedance was contributed to a faulty sediment filter after a routine service. Following the exceedance, the filter cartridges were serviced, the filter medium replaced, and all following samples have been within compliance limits.

## **6.3. SURFACE WATER**

### **Environmental Management**

Surface water management across the BSOP is completed in accordance with EPL 2504 and the approved BSO Surface Water Management Plan. The Surface Water Management Plan (SWMP) details the control measures, compliance procedures, monitoring programs, evaluation protocols, notification and communication processes for surface water management for the BSO. This plan has been prepared to satisfy Schedule 4, Condition 16 of the BSO approval.

The objectives of the SWMP are to:

- 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;



- Establish responsibilities for the surface water management at the BSOP;
- Comply with all relevant regulatory requirements, Environmental Protection Licence 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; and
- Specify investigation and communication processes in response to water related issues and complaints.

For specific surface water management strategies and controls, please refer to the SWMP found at:

<http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>

### **Environmental Performance**

Results of the surface water monitoring are reported online every 14 days as per the requirements of Section 66 (6) of the POEO Act and Schedule 6, Condition 11 of the BSO Project Approval; and on an annual basis to the OEHL via the EPA Annual Return (Appendix C: 2017/18 EPA Annual Return). The online report is accessible via the following link:

<http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>

A summary of results from the BSO monitoring program is included in the following sections.

### ***Water Quality***

All but two of the eleven monitoring sites across the BSO achieved compliance with the EPL2504 limits during the reporting period (refer to Table 11). Non-compliances at each of the sites are discussed below.

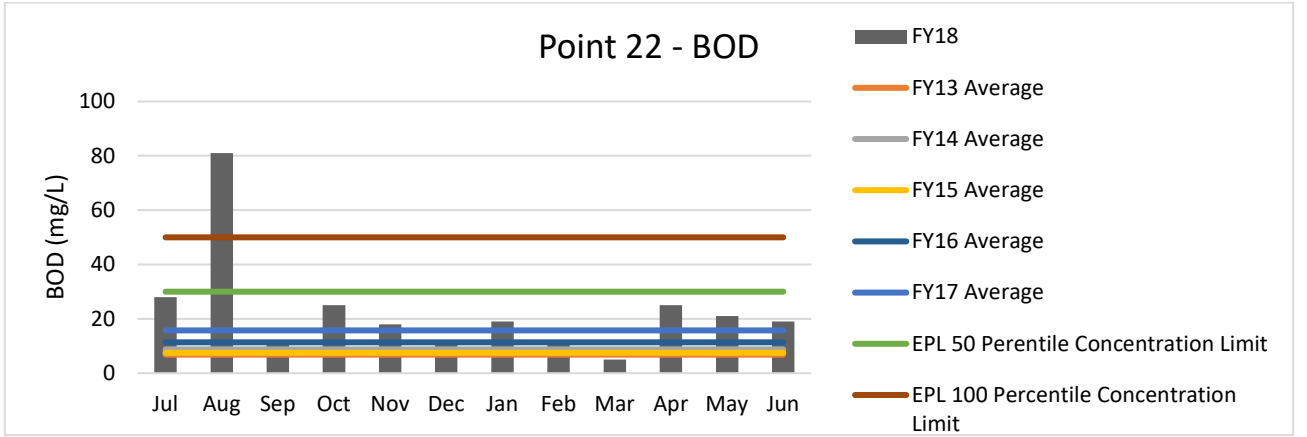
**Table 11: Summary of Compliance with EPL  
Water Quality Limits Across BSO**

Monitoring Site	EPL Compliant (Y/N)	Comments	Data
Point 4	Yes		<a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a>
Point 11	Yes	---	<a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a>
Point 12	Yes	---	As above
Point 18	Yes	---	As above
Point 19	Yes	---	As above
Point 20	Yes	---	As above

Point 22

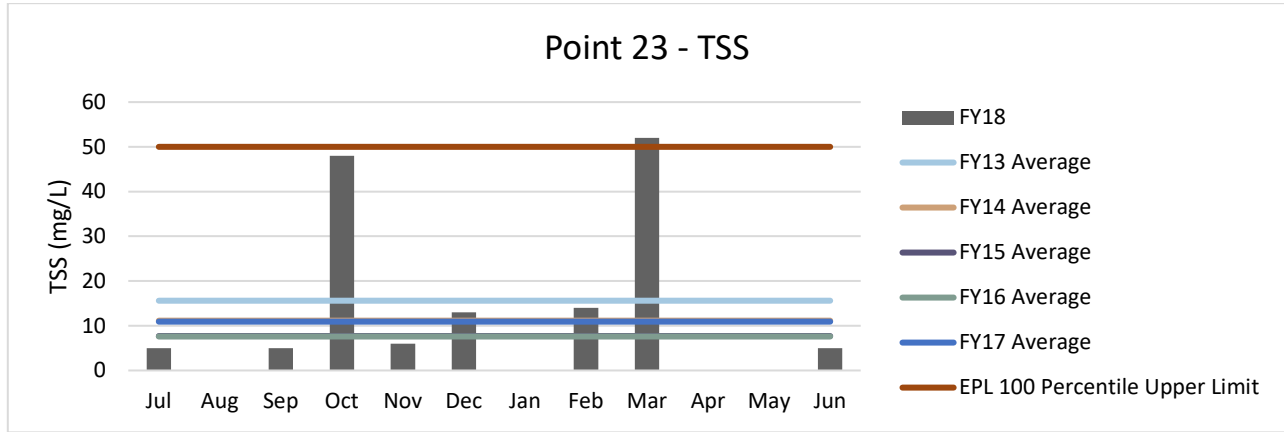
No

BOD sample result over the EPL 100 percentile limit in August. The exact cause of the exceedance is unknown. A likely contributing factor could be lack of material moving through the system as a result of reduced mining due to the prohibition notice. The average BOD for FY18 is below the 50 percentile concentration limit.



Point 23 No

TSS sample result over the EPL 100 percentile concentration limit on March. Cause attributed to incorrect replacement of filter medium in filter cartridges prior to discharge. Results for next sample and all others for FY18 below limit.



Point 24 Yes -

<http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>

Point 36 Yes -

<http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>

## Water Discharge

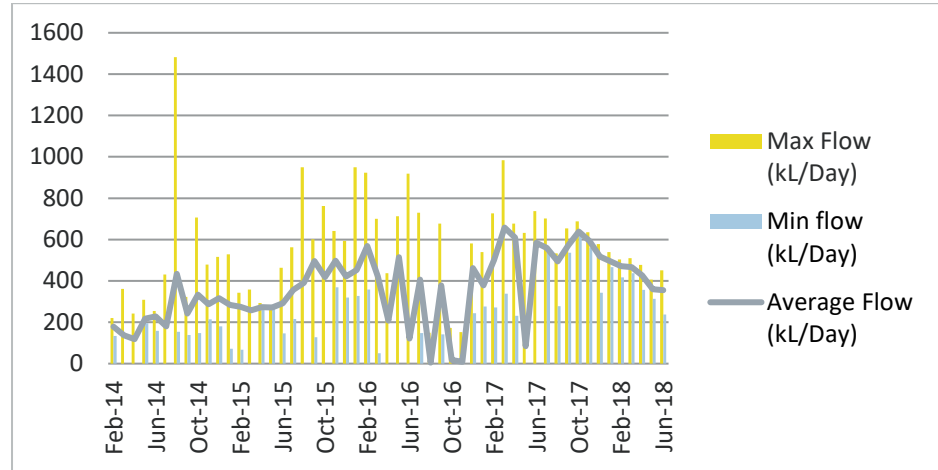
There have been no instances where discharge volume exceeded the EPL limits for discharge (see Table 12). Note: Manual readings taken from December 2016 to approximately October 2017 due to closure of the 2G automated logger network. Installation of 3G capable water meter loggers for EPL2504 related water discharge loggers is complete.

**Table 12: Summary of Compliance with EPL Discharge Volume Limits Across BSO**

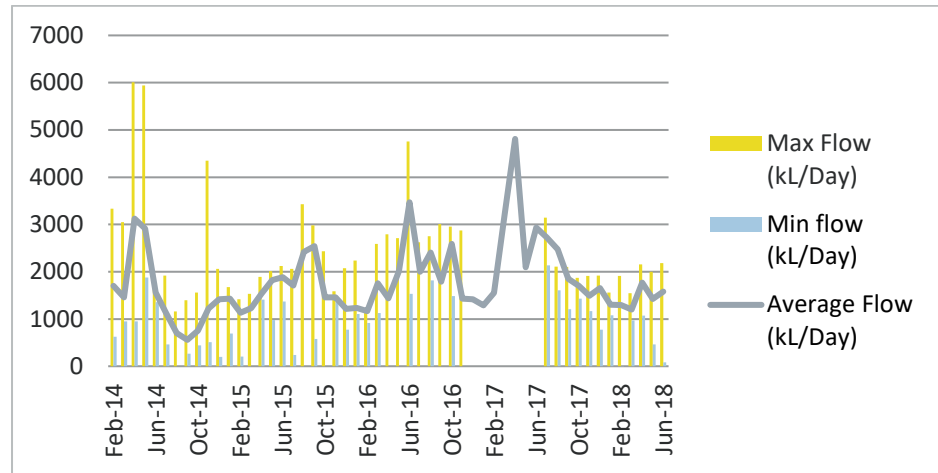
Monitoring Site	EPL Compliant (Y/N)	Comments	Data
Point 4	Yes	High discharge in Feb 2018 attributed to equipment malfunction. No licence discharge conditions were exceeded and inspection of irrigation area revealed no pooling of treated effluent.	<p>The chart displays three data series over time from February 2014 to June 2018. The Y-axis represents flow in kiloliters per day (kL/Day), ranging from 0 to 7000. The X-axis shows time intervals: Feb-14, Jun-14, Oct-14, Feb-15, Jun-15, Oct-15, Feb-16, Jun-16, Oct-16, Feb-17, Jun-17, Oct-17, Feb-18, and Jun-18. The 'Max Flow (kL/Day)' series is represented by yellow bars, showing a major spike in February 2018 reaching approximately 6500 kL/Day. The 'Min flow (kL/Day)' series is a purple line that remains consistently near zero. The 'Average Flow (kL/Day)' series is a blue line that also remains very low throughout the period.</p>

**Table 12: Summary of Compliance with EPL Discharge Volume Limits Across BSO**

Point 10                      Yes                      --



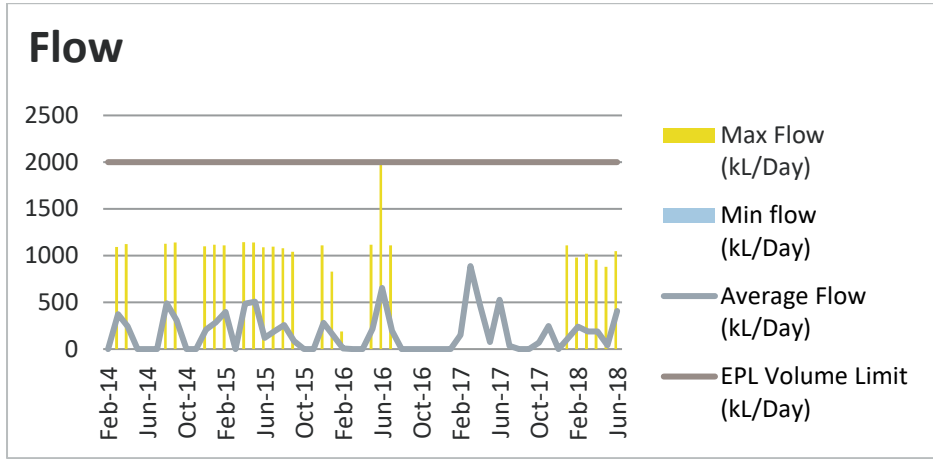
Point 13                      Yes                      --



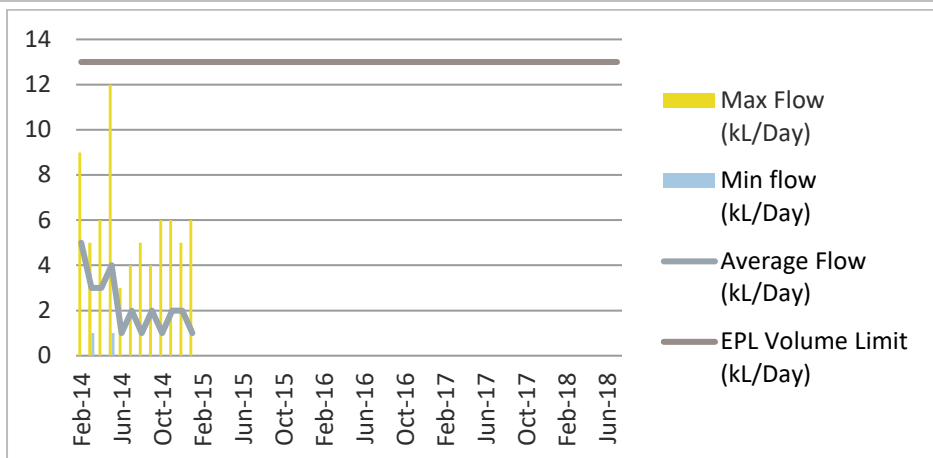
Point 18                      Yes                      --                      No flow during the period

**Table 12: Summary of Compliance with EPL Discharge Volume Limits Across BSO**

Point 19                      Yes                      --

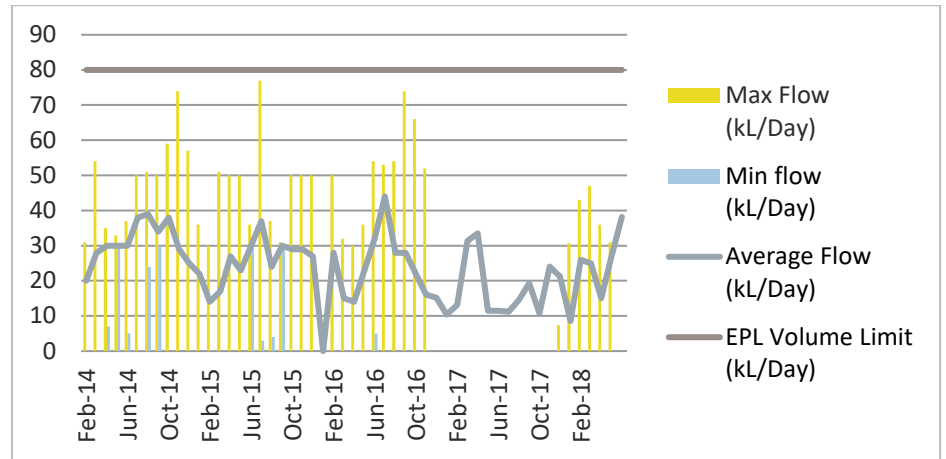


Point 20                      Yes                      --

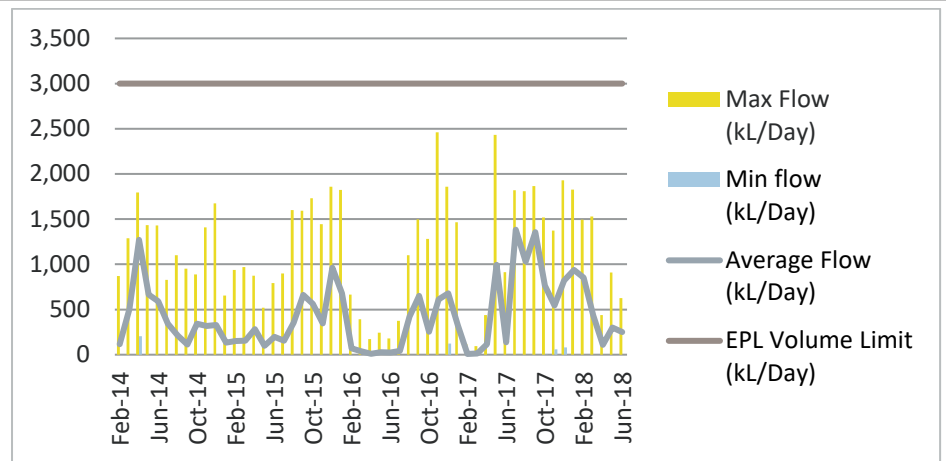


**Table 12: Summary of Compliance with EPL Discharge Volume Limits Across BSO**

Point 22                      Yes                      --



Point 24                      Yes                      --



## ***Pollution Reduction Programs***

There are currently no PRP's underway at the BSO. PRP19 and PRP20 have been incorporated into the Georges River Environmental Improvement Program (EIP2).

### ***EIP2 – Georges River Environmental Improvement Program***

The EIP for the Georges River incorporates:

- Improvement projects as per the previous PRP19 requirements; and
- Monitoring to verify improvements to aquatic health as the above projects are commissioned. Monitoring includes (based on previous PRP20 requirements):
  - Quantitative sampling of macroinvertebrates;
  - Ecological assessment processes using DNA extracted from sediment;
  - Ecotoxicity testing;
  - In-stream water quality; and
  - Laboratory water testing.

The EIP aims to improve the aquatic health of the Upper Georges River by reducing the concentration of pollutants discharging from Point 10; and monitor the changes to biota in-stream and within the sediment of the Upper Georges River as water quality improvement projects are commissioned.

The aims will be verified by:

- Comparing the Brennans Ck/Georges River sites with reference sites (upstream of the Brennans Creek Confluence);
- Estimating changes over time in the composition and abundance of in-stream and sediment biota; and
- Assessing the downstream gradient changes in composition and abundance of in-stream and sediment biota.

The program will eventually be used to define water quality limits for Point 10 as well as flow requirements.

South32 IC holds regular meetings with community stakeholders to review progress of PRP19 projects and monitoring results from PRP20 (Table 13).

The Progress Meetings include representatives from the EPA; Georges River Combined Councils Committee (GRCCC); Wollondilly and Campbelltown local councils; The Georges River Environmental Alliance (GREA); National Parks Association of NSW (NPA NSW); Bulli Seam Operations Community Consultative Committee (BSO CCC) and Western Sydney University (WSU).

In 2015, a Technical Working Group (TWG) was established (as a subset to the above) to develop water quality and river health objectives for the Upper Georges River. The TWG includes nominated (by the community stakeholders) representatives from the above stakeholders including the GRCCC, WSU, South32 IC and the EPA.

The following community stakeholder meetings have been held since 2014:



**Table 13: Summary of the Georges River Community Stakeholder Meetings held since 2014.**

<b>Date</b>	<b>Type</b>	<b>Purpose of Meeting</b>	<b>Outcome</b>
Spring 2014	Progress Meeting	Review of PRP20 results (Yr1) and discuss water strategy for PRP19.	Water strategy for PRP19 endorsed by the attendees.
Spring 2015	Progress Meeting	Review of PRP20 results (Yr2) and PRP19 update.	Consensus to establish a Technical Working Group to improve monitoring program under PRP20, develop water quality limits and flow requirements for Point 10.  Representatives from GRCCC and Western Sydney University nominated to attend.
Autumn 2016	Technical Working Group	1 <sup>st</sup> Technical Working Group meeting to share monitoring results and establish water quality limits and flow principals for Point 10.	Monitoring results consistent between all parties.  Agreed on river health objectives.
Winter 2016	Progress Meeting followed by 2 <sup>nd</sup> Technical Working Group meeting	Site visit to Appin West Water Filtration Plant and discuss water quality and flow principals for Point 10.	In principal support for flow and water quality and endorsed changes to PRP20 monitoring program (increased monitoring frequency etc.).
Winter 2016	Technical Working Group	Further development of flow and water quality principals.	Consensus to replace PRP19/20 with Environmental Improvement Program (this document). South32 IC to submit licence amendment application to include EIP, extend deadline for water quality limits under PRP19 and extend interim limits for Point 10 (with some concentration reductions). The stakeholders will be consulted on the proposed changes.
Spring 2016	Progress Meeting	Seek endorsement for submission of the EIP.	Endorsement from attendees to submit EIP. The attendees requested that the following be noted:  They recognised the value of the in-depth consultative process and the goodwill it generates;  The group appreciated the effort made by South32 to improve the water quality of the Georges River;

**Table 13: Summary of the Georges River Community Stakeholder Meetings held since 2014.**

<b>Date</b>	<b>Type</b>	<b>Purpose of Meeting</b>	<b>Outcome</b>
			The group understood that the current targets need to be realistic and look forward to further planned improvements to pH and salinity.
Spring 2017	Progress Meeting	Tour of the Water Filtration Plant  Presentation on the EIP: <ul style="list-style-type: none"> <li>• Progress on Improvement projects;</li> <li>• Recap on previous data; and Latest results.</li> </ul>	S32IC may submit license variation to extend dates for water projects and interim limits due to WFP commissioning date being delayed.
Autumn 2018	Progress Meeting	Presentation on the EIP: <ul style="list-style-type: none"> <li>• Progress on Improvement Projects;</li> <li>• Recap on previous data; Latest results</li> </ul>	Additional license variation required to extend the deadline for water improvement projects and Increase the flow from LDP24. 2017 monitoring report available on the S32IC website.

The major water quality improvement projects under EIP2 are summarised below:

**Table 14: Summary of the EIP2 water improvement works**

<b>Works</b>	<b>Purpose</b>	<b>Status June 2018</b>
Coagulant / flocculant review.	Reduction of aluminium concentration within treatment ponds,	Review completed. Several new products were tested, however none satisfied operational and water quality requirements for the site.
Trial of flocculants at West Cliff Coal Preparation Plant.	Brennans Creek dam (BCD) and discharge into the Georges River.	Currently implementing an automated dosing system to achieve dosing rate efficiencies.
Water Filtration Plant Upgrade – Appin West	Increase capacity to pre-treat underground pump out. Increase processing capacity of mine water (4.7 ML/Day).  Maximise re-use of treated water for underground operations and reduce potable water usage.	Final commissioning delayed to fix defects/issues that emerged during dry/initial wet commissioning.
Modification to the Washery water management system to create a 'semi-closed loop'. Includes installation of a slurry pipeline.	Reduce BCD water taken for process water in the Washery.  Reduce diversion of Washery waters into BCD.	'Semi' closed system is complete. Some minor pipework connections required to bypass Pond 3 (which is the Pond used in the closed loop supply to the Washery).  Slurry pipeline is complete.

Illawarra Coal will discuss results with the stakeholder groups on a regular basis and formally present progress reports in accordance with the following table:

**Table 15: Summary of reporting and consultation commitments for the Georges River EIP**

Report Type or Consultation	Frequency	Report Due
Progress report to EPA on implementation of water improvement projects	6 monthly	31 Dec 2016; 30 June 2017; 31 Dec 2017,  31 July 2018.
Stakeholder progress meeting with EPA, GRCCC, CCC, Wollondilly and Campbelltown Councils, WSU, Other interest groups	6 monthly	Oct 2016, Winter and Summer 2017, Winter and Summer 2018; Winter and Summer 2019, Winter 2020 (final meeting).
Detailed scientific report on macroinvertebrate and CSIRO monitoring to EPA and loaded onto South32IC Website.	Biennial	26 April 2018; 31 March 2020, 31 March 2022.
Illawarra Coal Community Consultative Committee	Regular updates at meetings which are held every two months	N/A
Technical Working Group – Nominated representatives from Stakeholders	If monitoring TARP (Table 5) is triggered or to address issues from the Stakeholder	As required.

A summary of the results from the 2017 CSIRO report is provided below. For more detail refer to the report on the S32IC website:

[https://www.south32.net/docs/default-source/illawarra-coal-bulli-seam-operations/licenses/epl2504-georges-river-environmental-improvement-program-\(eip2\)-report\\_year-3-\(2017\).pdf?sfvrsn=b2579f7d\\_4](https://www.south32.net/docs/default-source/illawarra-coal-bulli-seam-operations/licenses/epl2504-georges-river-environmental-improvement-program-(eip2)-report_year-3-(2017).pdf?sfvrsn=b2579f7d_4)

Collectively, the long-term data indicates that the discharge waters are impairing macrobenthic communities, with the effect being more pronounced in the upstream sites Point 10 and Point 12.

The two indices, EPT % and SIGNAL, indicated a lower level of ecological integrity in the Discharge Monitoring sites. The SIGNAL scores suggested that the ecological integrity of the system improved with downstream distance (most notable in site GRQ18). However, due to high variability no clear temporal trend were evident.

The long-term trends in water chemistry showed that conductivity and the concentrations of aluminium, nickel, zinc and ammonia generally declined over time. However, in most discharge monitoring sites, metal concentration still remained high, although appreciably lower in the downstream site GRQ18. In contrast, pH appears to have remained unchanged. While highly variable, ammonia concentrations also declined over time, although occasional spikes were observed.

The macrobenthic and metabarcoding surveys for 2017 support the findings of previous surveys, providing strong correlative evidence that the discharge was altering the composition of macrobenthic biota within the discharge monitoring treatment. This is supported by multiple lines of ecological evidence, including EPT%, SIGNAL scores, macrobenthic community structure, metabarcoding community structure, and correlative patterns between the communities and water quality measurements.

## 6.4. GROUNDWATER

No groundwater pollution issues were associated with the BSOP during this reporting period.

At West Cliff (Appin North), water make resulting from strata water inflow is collected in pits and low points in the underground workings where it is mixed with water delivered underground from surface storage. This strata water is brought to the surface either as moisture contained within the coal or as surplus underground water which is pumped to the surface. Once on the surface, the water is piped to the concrete settling tanks where it is used as the main supply for the WCCPP. There were no incidents of ground water pollution within the report period.

At Appin, mine water is pumped from the underground working to the surface for treatment in the Appin West Water Treatment Plant (WTP) from where it is either fed back underground for use or blended with mine water and discharged via LDP24.

## 6.5. CONTAMINATED POLLUTED LAND

### Environmental Management

#### *Appin*

During the 2010/11 reporting period, Illawarra Coal investigated a small area of the Appin East (Central) site that had formerly been used as a fuel dispensing station which comprised two bowsers, a bunded above-ground diesel tank, and a bunded refuelling pad. The decommissioned fuelling area was being excavated for road construction to upgrade coal loading facilities at the site.

Preliminary investigations found the decommissioned fuelling area contained elevated concentrations of Total Petroleum Hydrocarbons (TPH) C10-C36. In response to this finding, Illawarra Coal endeavoured to remove the majority of contaminated material from the decommissioned fuelling area to reduce environmental and health risks and ensure the site is suitable for continued industrial land use.

During the excavation and grading works, three previously unknown underground diesel storage tank pits (including a total of four underground storage tanks- USTs) were discovered. Leakage of diesel was evident in all three UST pits, so after the tanks were removed from site, 0.5-1.0m of soil was excavated from the walls and floor of each tank pit excavation.

Validation sampling of the floor of the excavated area continued to show elevated concentrations of TPH but concentrations of aliphatic and aromatic hydrocarbon compounds were below the NEPC (1999) guidelines for human health. The consultant's validation report indicated that the land remaining in the investigation area and around the UST excavations is suitable for continued industrial land use based on application of the NEPC (1999) guidelines and that the remaining in-situ contamination is not perceived to compromise the ongoing use of the site for industrial purposes. A monitoring program was established in 2011, with sampling conducted at four locations – T1, P1, P2 and P3. As per the BSO Project Surface Water Management Plan boreholes are samples six-monthly. T1 is used to monitor for potential contamination from the old Appin Tip which is located upstream of the site (Figure 8).

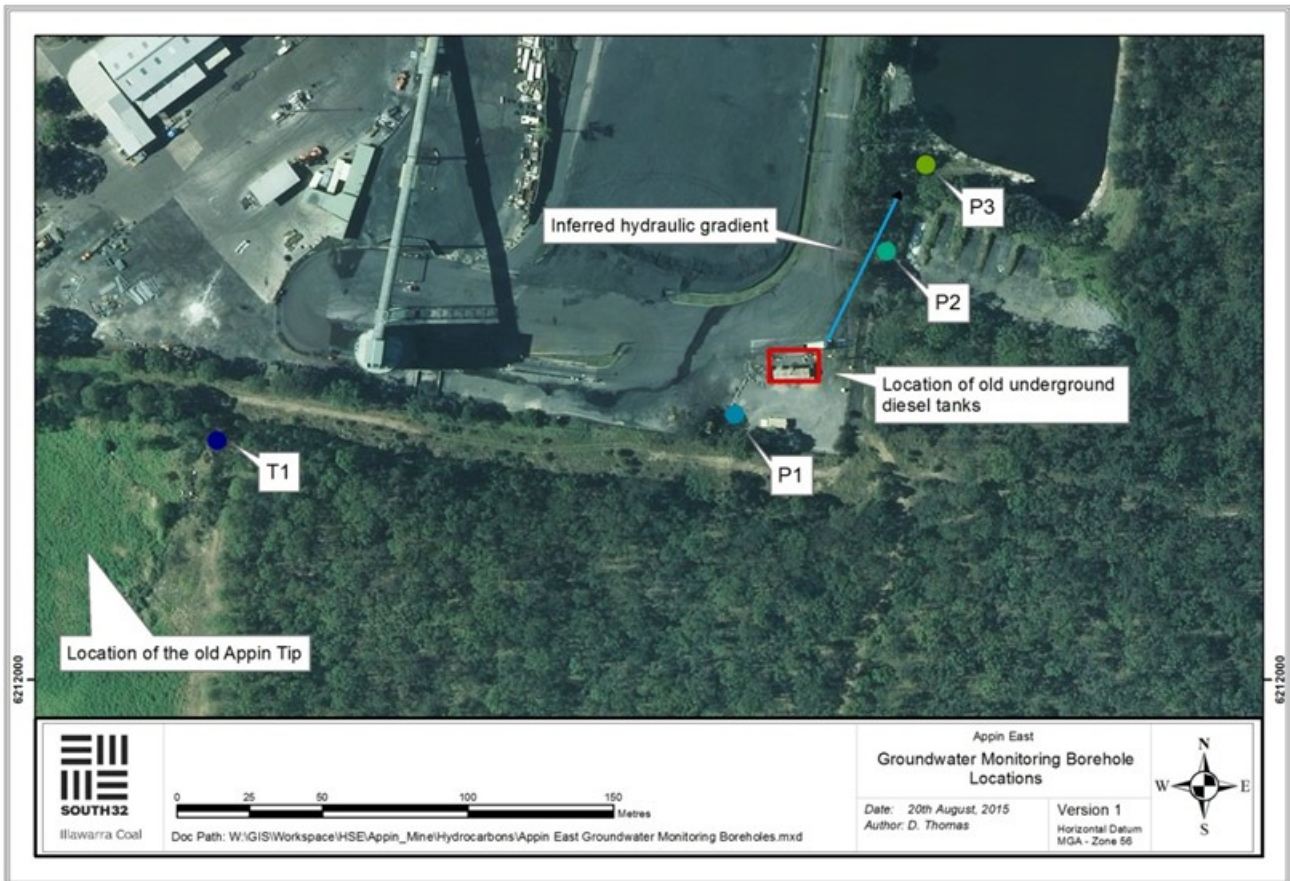


Figure 8: Groundwater Monitoring Bores locations at Appin East (Central).

**West Cliff (Appin North)**

During the 2009/10 reporting period Westcliff (Appin North) and the Westcliff CPP completed ‘Preliminary Contamination Assessments’ to review site activities. A site inspection to identify indicators of contamination took place and a Risk Assessment was conducted with relevant staff.

The site inspection identified a small groundwater seep which was discharging into one of the site dirty water catchment ponds (i.e. Pond P3). The lab analysis of the seep confirmed that the seep contained traces of hydrocarbons and therefore triggered the reporting requirements under Section 60 of the Contaminated Land Management Act 1997 (CLM Act).

As part of the notification, Illawarra Coal proposed to undertake a comprehensive contamination assessment to determine the level and extent of contamination (both groundwater and soil) prior to determining an appropriate management strategy. This approach was endorsed by DECCW (now EPA) on the 11<sup>th</sup> of May 2010.

The comprehensive contamination site assessment was completed by an environmental consultant during the 2010/11 reporting period. The assessment involved drilling of nine boreholes (BH1 to BH9), screening of 39 soil samples and laboratory analysis of 15 soil samples. Two groundwater bores (BH8 and BH9) were also installed as part of the investigation.

Analysis of the results suggested that the majority of the investigation area appeared to be free of contamination with only four of the samples indicating relatively low levels of contamination, three of which were located within 2.5 metres of a recently decommissioned and removed Underground Petroleum Storage System (UPSS). The concentrations were relatively low in the context of an industrial site and analysis indicates the concentrations were likely to be well below NEPM health investigation guidelines for the industrial

land use. In addition, a preliminary assessment of the soils waste classification suggested that the soil is likely to be classified as general solid waste.

## Environmental Performance

### Appin

Since the first round of monitoring, all samples across all sites have been uncontaminated with respect to BTEX (Benzene, Toluene, Ethylbenzene and Xylene) and TPH.

During the reporting period all boreholes showed below the observable limit for TPH (50 µg/L). Samples taken at three of the boreholes in the previous reporting period show elevated levels of TPH, however this is attributed to potential contamination during the sampling process as samples taken since show TPH below the observable limit. The most recent samples taken at T1 showed TPH levels below the Limit Of Reporting (LOR), indicating that there was no potential contamination from the old Appin Tip.

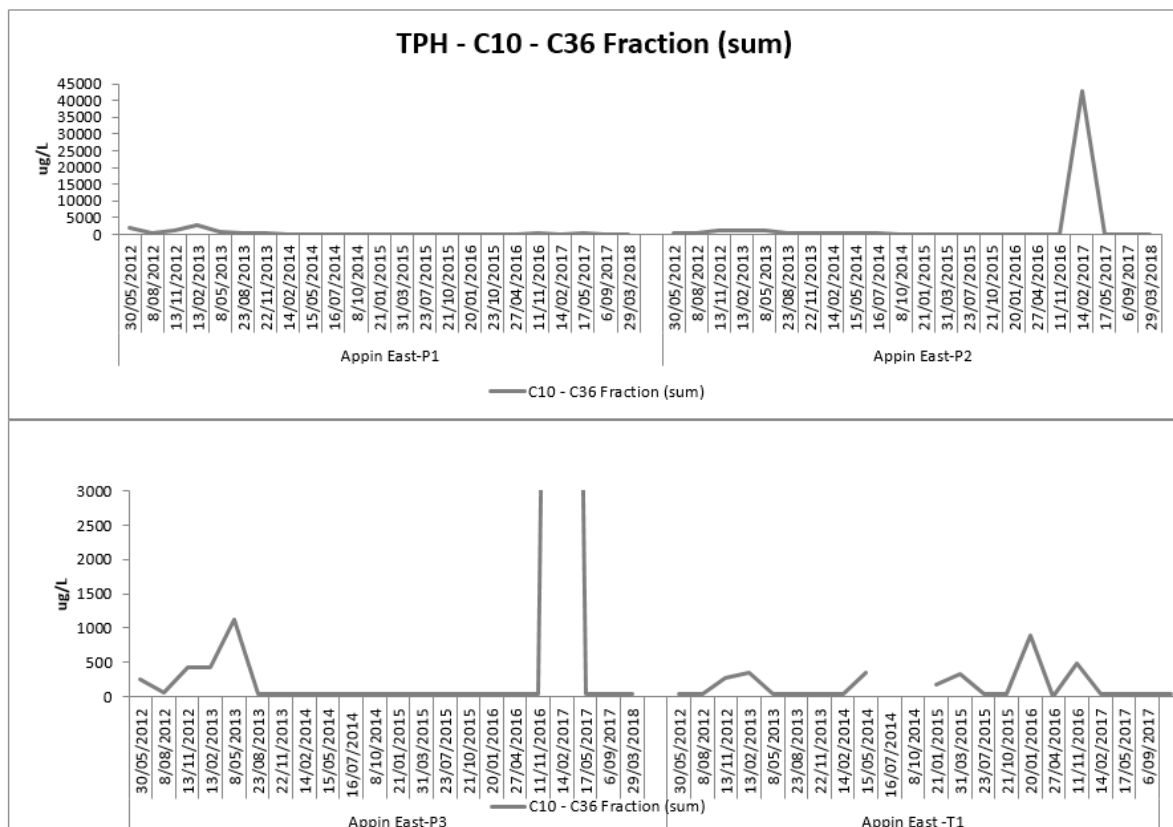


Figure 9: Total Petroleum Hydrocarbons (C10 – C36 Fraction (Sum)) since monitoring began in 2012 at Appin East (Central).

### West Cliff (Appin North)

Since the first sampling campaign, TPH concentrations had generally trended downwards in BH8. TPH concentrations had ranged between 2050 µg/L in Feb 2012 down to 260 µg/L in August 2012 (Figure 10). The carbon chain range for BH8 are between C10 – C28 indicating that diesel is a potential source of contamination at this location. This is consistent with data reported in the validation report which was submitted to the EPA in August 2010 which indicated there was a small hot spot of contamination remaining.

During the reporting period the borehole was found to be dry due to sustained periods of low rainfall on two occasions. In March 2018 the borehole was found to be buried by adjacent roadworks. Actions to uncover the borehole have been initiated but not completed by the close of FY18.

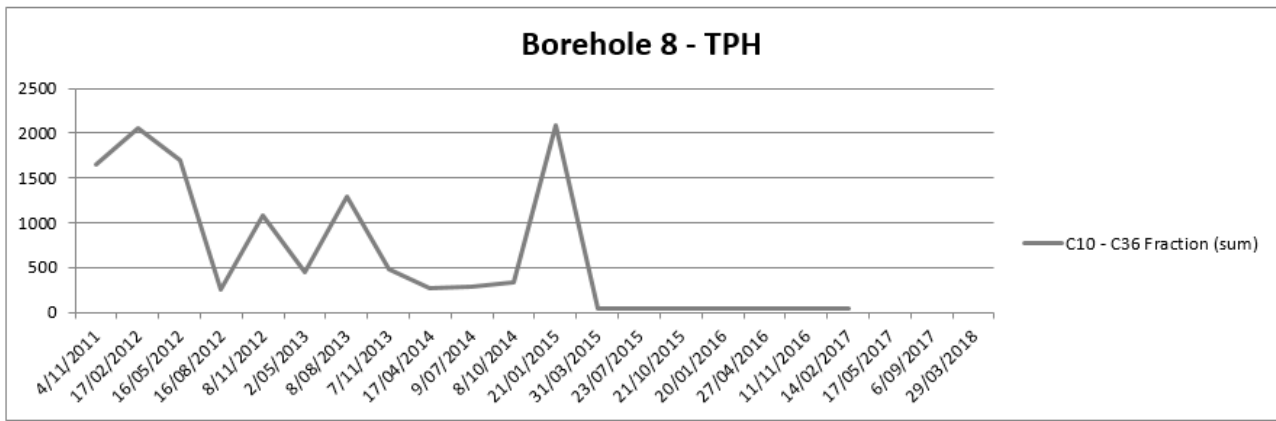


Figure 10: Total Petroleum Hydrocarbons (C10 – C36 Fraction (Sum) µg/L) since monitoring began in 2012 in BH8 at West Cliff (Appin North).

## 6.6. WASTE

### General Waste

General waste is segregated on all sites to maximise reuse and recycling opportunities in accordance with the BSO Waste Management Plan. The waste streams applicable to the BSO are specified in Table 16 below.

Table 16: The main waste streams for the BSO.

Waste Stream	Treatment
Timber	Recycled off site
Cardboard and paper	Recycled off site
Printer Cartridges	Recycled off site
Oil	Recycled off site
Oily waters	Recycled or disposed off-site
Steel and Scrap Metal	Recycled off site
Sewage effluent (treated)	West Cliff (Appin North) – Treatment and irrigation on site. Appin West – Treatment and irrigation onsite Appin East (Central) – Disposed via town sewerage system
Industrial filters	Off-site treatment and disposal
Bathroom water	West Cliff (Appin North) - Spray irrigated to land on site Appin West - Spray irrigated to land on site Appin East (Central) – Transported to licensed sewage treatment facility for first part of reporting period. Connected to town sewerage system for later part of reporting period.
Particulate filter	Off-site treatment and disposal
Hazardous waste	Off-site treatment and disposal
General Waste	Landfill

Solid waste volumes generated at the BSO (including the Appin West, Appin East (Central) and West Cliff (Appin North) sites) for the reporting period are provided in Table 17.

**Table 17: Waste Volumes – BSO**

	General Waste	Industrial Waste (Filters)	Timber	Metal	Cardboard	Commingle
Quantity (Tonnes) FY15	1146	381	234	1349	30	17
Quantity (Tonnes) FY16	1323	380	225	1344	20	17
Quantity (Tonnes) FY17	1080	268	147	935	21	14
Quantity (Tonnes) FY18	782	243	62	936	15	7

Approximately 24% less waste was disposed as landfill for the reporting period when compared to the previous financial year. This is attributed to lower production levels due to the prohibition notice in 2017.

## Coal Wash

Coal wash is a by-product of processing ROM coal. During the FY18, a total of 1.2Mt of coal wash (includes Dendrobium, Appin and West Cliff (Appin North)) was emplaced at the West Cliff (Appin North) Emplacement Area. Illawarra Coal received approval to expand the West Cliff (Appin North) Emplacement Area (i.e. Stage 3) from the DoP on the 20<sup>th</sup> of December 2007. The Stage 3 Emplacement Area provides an additional 33.5Mt of coal wash emplacement (refer to table below) with an expected emplacement life of 10 to 15 years (based on projected coal wash volumes).

Illawarra Coal received approval for Stage 4 of the West Cliff (Appin North) Emplacement Area on the 22<sup>nd</sup> of December 2011. The Stage 4 Emplacement Area will provide an additional 59.4 million tonnes of coal wash emplacement (refer to table below) with an expected life to 2041.

Table 18 outlines the capacity and status of each of the West Cliff (Appin North) coal wash emplacement areas.

**Table 18: West Cliff (Appin North) Emplacement Area – Capacity and Status.**

Emplacement Stage	Estimated Capacity	Emplacement Status
1	4.6	Complete
2	20.8	Complete
3	33.5	Current
4	59.4	Not Yet Commenced

## Coal Wash Research

During FY18, Illawarra Coal diverted approx. 83,000t of coal wash for beneficial uses in the local region (i.e. as an engineered fill, and for the development of arterial and agricultural roads), with over 3Mt diverted since 2009. Illawarra Coal was unable to provide coal wash for its long-term contract with Lend Lease in FY18 due to council approvals holding up the development, however it is envisaged that deliveries will resume in late 2018. Illawarra Coal is also looking to provide Coal Wash as an engineered fill for two major local RMS road infrastructure projects, starting in 2018/2019.

Illawarra Coal is continuing with its Coal Wash Road Base project, which utilises coal wash with other recycled materials such as fly ash to produce a material suitable for a variety of applications. In late 2014, the RMS published a specification of this material based on the success in trials of this product, and local councils have undertaken trials of this product in their respective areas. Following on from the success of these trials, Illawarra Coal has aligned itself with three universities (University of Wollongong, University of Sydney and University of Newcastle) and 4 other industry partners (RMS, Douglas Partners, Infratech and Stabilco) and has been successful in securing an ARC-Linkage Project grant of \$590k to conduct research into the long-



term performance of this material in roads and railways. The project kicked off in 2017, and will take 3 years to complete.

Illawarra Coal will continue to research, develop and implement alternative uses for coal wash in order to minimise the volume emplaced at the West Cliff (Appin North) site in future.

### ***Underground Coal Wash Emplacement***

Illawarra Coal submitted a revised Underground Coal Wash Emplacement Trial to the Department in 2013. The revised Plan proposed to defer the trial for 5 years for the following reasons:

- Illawarra Coal's focus on diverting material from surface emplacement via alternative beneficial uses continues to provide good outcomes;
- The declaration of Dharawal National Park has eliminated a significant area of potentially suitable roadways for underground coalwash emplacement; and
- The trial replicates what has been demonstrated by another Southern District Colliery.

There has been no update to the Coal Wash Emplacement Trial during the reporting period. There are currently no available suitable underground storage areas for coalwash. The key aspects of the Plan remained valid during the reporting period and detailed reports and presentations will be made available at the completion of major research milestones.

### **Sewage**

During the reporting period, ongoing monitoring and inspections were conducted on the two BSO sewage treatment plants (Appin West and Appin North). Appin East (Central) is connected to town sewage.

There is a Smith and Loveless Sewage Treatment Plant (STP) on the Appin West and West Cliff (Appin North) sites that discharge into maturation ponds. The treated effluent is irrigated on site via LDP22 (Appin West) and LDP4 (West Cliff (Appin North)). A waste water maintenance contractor is periodically used to assist with the operational aspects of the Appin and West Cliff (Appin North) Sewerage treatment systems to minimise the likelihood of any issues occurring.

Monitoring of the STP effluent at both sites is completed monthly in accordance with conditions specified in EPL 2504. Monitoring results are reported annually via the EPA Annual Return and are made available to the public via the web based environmental monitoring report which is issued every 14 days.

### **Appin WAC Disposal**

Weak Acid Cation Regenerate (WAC), a waste stream from the Appin WTP, is transported offsite to a licensed waste management facility. The total volume of WAC transported off-site during the reporting period was 3.83ML, an increase of 0.05ML compared to the previous reporting period.

### **Appin Water Treatment Plant Biological Sludge**

The Appin backwash treatment plant was commissioned in April 2009. One of the by-products of the Backwash Treatment process is an organic sludge. The total volume of sludge reused as a soil conditioner offsite at the Emplacement Operations during the reporting period was approximately 390kL.

## **6.7. THREATENED FLORA AND FAUNA**

### **Environmental Management**

Threatened flora and fauna communities at the BSO are managed in accordance with the following approved plans:

- West Cliff (Appin North) Coal Wash Emplacement Area Management Plan;
- Broad-headed Snake Management Plan;

- Southern Brown Bandicoot Management Plan;
- *Persoonia hirsuta* Offset Management Plan;
- Strategic Biodiversity Offset Plan;
- Ventilation Shaft No.6 Biodiversity Management Plan;
- Sandstone Shale Transition Forest Offset Management Plan; and
- Surface and Groundwater Quality Monitoring and Adaptive Management Plan for Water Sensitive EPBC Listed Species.

These plans include the management and mitigation measures for threatened species or habitats that occur on BSO sites and are available on the South32 website:

<http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>

The *Persoonia hirsuta* is listed as “Endangered” under both the NSW Threatened Species Conservation Act and Commonwealth Environmental Protection and Biodiversity Conservation (EPBC) Act. A substantial population of the *Persoonia hirsuta* is known to exist on the Appin North Colliery Lease. Several of the *Persoonia hirsuta* are located within operational areas such as high voltage transmission lines on site.

*Acacia bynoeana* is listed as “Threatened” under the NSW Threatened Species Conservation Act and “Vulnerable” under the Commonwealth EPBC Act. The species has previously been recorded along existing roads, tracks and disturbed areas at West Cliff (Appin North).

*Pultenaea aristata* is listed as “Vulnerable” under the NSW Threatened Species Conservation Act and the Commonwealth EPBC Act. The species has been recorded in areas of impeded drainage in woodland adjoining the main access road and in the vicinity of the southern extent of Stage 3 Emplacement Area. 41 *P. aristata* have been identified within the rehabilitating emplacement area (See Appendix A: Annual Rehabilitation Report).

Flora and Fauna aspects associated with mine subsidence are detailed in section 6.15.

## **Environmental Performance**

### ***Broad-headed Snake and Southern Brown Bandicoot***

There have been no instances that required the implementation of mitigation measures for Broad-headed Snakes (as outlined in the approved management plan).

There were no instances that required implementation of mitigation measures for the Southern Brown Bandicoot.

### ***Persoonia hirsuta***

In Summer 2017, Illawarra Coal conducted its fifth round of annual condition monitoring of the *Persoonia hirsuta* population at West Cliff (Appin North). The monitoring was completed in accordance with the approved *P. hirsuta* Offset Management Plan, which complies with EPBC Approval Condition 2. The monitoring was completed over 3 days in December 2017 during the peak flowering period for the species. The report is included as Appendix B: Annual *Persoonia Hirsuta* Condition Monitoring Report.

## **Ongoing Research and Conservation Management**

In accordance with EPBC 2010/5350 Condition 3, Illawarra Coal is undertaking targeted research on *Persoonia hirsuta* including:

- Habitat and demography;

- Population genetics;
- Seed biology, germination and recruitment and propagation, and
- Pollination.

Refer to Appendix– *Persoonia Research Status and Strategy* for more detail.

### **Shale Sandstone Transition Forest Offset**

The EPBC approval conditions for the Bulli Seam Operations (BSO) require a biodiversity offset of at least 44.9 ha of Shale Sandstone Transition Forest (SSTF) as well as an Offset Management Plan. In 2012, IC identified a suitable site in Douglas Park NSW, within the Wollondilly Local Government Area (LGA). The land is approximately 86 ha in size which includes bushland, a transmission line easement, a small paddock, and several access tracks. The Offset area is comprised of two parcels of land, separated from each other by Douglas Park Drive.

In-line with the EPBC conditions at the time (2012), IC provided an Offset Management Plan as well as ecological survey information. The original SSTF Offset Plan was approved by the Department of the Environment (DOTE) in June 2013. In 2014, IC was granted an additional 18 months to secure the Offset for long term conservation purposes.

The northern area is located within Lot 1 DP 1101129. It is bordered to the north by private property, the Cataract River to the east and south, and Douglas Park Drive to the west. The southern area is located within Lot 1 DP216237 and Lot 7 DP1082237. It is bordered by Douglas Park Drive to the east, Clements Creek to the north and west, and private property to the south. The Appin West Colliery Pit-top is located approximately 200 metres to the north on the opposite side of Clements Creek. The land is currently owned by Illawarra Coal (Refer to Plan 3 – Appin West Mine Site and Plan 18 – Biodiversity Offset Locations).

Past land use of the study area involved agricultural practices and probably timber cutting.

The study area is connected to other vegetated areas along the Cataract River to the north and Clements Creek to the south.

In October 2015, IC made an application to NSW Office of Environment & Heritage (OEH) to have the SSTF offset secured via a BioBanking Agreement under Part 7A Division 2 of the *Threatened Species Conservation Act 1995*. The BioBanking Agreement was finalised and executed on 1st February 2017. The Offset is now managed in accordance with the BioBanking Agreement, ID Number 215.

### **Ventilation Shaft No.6 Offset**

The Appin No. 6 Ventilation Shaft Site project approval requires Illawarra Coal Illawarra Coal to secure, manage and monitor an 8.7 hectare offset of Cumberland Plain Woodland (CPW) such that an improve or maintain outcome would be achieved for threatened biodiversity.

The offset area is known as MZ5 and is located to the north of the Appin No. 6 Ventilation Shaft site on the property known as Mountbatten Stud at Douglas Park NSW (Figure 1). An initial assessment of the proposed offset area was conducted by Niche in December 2010 to assess the suitability of the site to be used as an offset for the unavoidable impacts associated with the development site. Niche determined that the site was CPW and, under management, would improve to benchmark condition over time. The initial inspection of MZ5 also resulted in the discovery of a population of the threatened plant, *Pimelea spicata*, adding significant conservation value to the offset area.

In accepting the offset proposal, the DOPE and DOTE provided a number of approval conditions relating to the reservation, management and monitoring of management actions within MZ5. One of the conditions required Illawarra Coal to implement a formal monitoring program for both the management of the native vegetation on the site and the extent and health of the *Pimelea spicata* population.

The results of the 2017 monitoring survey indicate that, on average, the bushland on the site is outside of benchmark attribute values for the Cumberland Plain Woodland but is showing trends towards benchmark values. An assessment of the change in size and distribution of the threatened plant population of *Pimelea spicata* (spiked rice-flower) was undertaken as part of the 2016/17 monitoring program and was not repeated this year. The next scheduled census of the *Pimelea spicata* population is in 2021/22.

Recommendations in relation to the ongoing management of the site include continued treatment of African Olive and African Boxthorn, seasonal spraying of Blackberry, continued treatment of exotic vines and exotic perennial grasses and consider management actions that may relieve environmental stress on the overstorey associated with potential Bell Miner-related dieback.

### ***Dendrobium and BSO Project Strategic Biodiversity Offset***

In 2016, the DOPE approved Illawarra Coals proposal to provide an offset for mining impacts from the Dendrobium Coal Mine and Bulli Seam Operations Project through the conservation of a 598ha site at Maddens Plains near Helensburgh. DOPE and the Office of Environment and Heritage (OEH) supported South32's intention to secure the Maddens Plains site in perpetuity by transferring this land to the National Park estate. The transfer was completed in April 2018.

The offset land at Maddens Plains met the offset requirements for any impacts on:

- Upland swamps at the Dendrobium Coal Mine; and
- Vegetation communities at the BSO.

Refer to Plan 18 for the locations of all biodiversity offsets across the BSO.

## **6.8. WEEDS**

### **Environmental Management and Performance**

#### ***Appin East (Central) and Appin West***

Environmental inspections (which include weed identification) are undertaken at the Appin East (Central) and Appin West sites. When noxious weeds are identified they are removed and treated as per the approved Waste Management Plan. Maps outlining the weed growth areas are provided to the grounds maintenance personnel to assist with identifying the target locations. During the reporting period active weed management included:

- Regular spaying of weed zones by licensed contractors;
- Regular audits of the effectiveness of weed management activities.

#### ***Appin North***

Ongoing grounds maintenance is undertaken by a contractor who has a regular schedule of work. The annual emplacement rehabilitation monitoring program includes the identification and proposed management strategies to control weed growth within the emplacement areas. Focus areas for weed control are determined through this program. Records of areas targeted are maintained for future reference. Targeted weed control within the emplacement area was undertaken by a licenced contractor during the year which included weed spraying and slashing of perennial grasses.

## **6.9. BLASTING**

No surface blasting activities are undertaken on site. Minor blasting activities underground are undertaken using approved management plans.

## 6.10. OPERATIONAL NOISE

### Environmental Management

Noise across the BSOP is managed in accordance with the approved BSO Noise Management Plan. The Plan was prepared to satisfy Schedule 4, Condition 5 of the BSO approval and details the relevant noise criteria, compliance procedures and controls relating to the mining operations.

The objectives of this plan are to:

- Provide the framework for the responsible management of noise emissions associated with the project;
- Describe the control measures for management of noise emissions;
- Prevent adverse noise impacts on the amenity of local communities and environment;
- Describe compliance criteria for noise for the project;
- Describe compliance criteria exceedance assessment protocols;
- Describe the noise monitoring program;
- Comply with the relevant requirements of Environment Protection Licence (EPL) No. 2504 and the BSO Project approval;
- Describe measures for the reduction of noise emissions; and
- Comply with South32 and other relevant standards and requirements.

A copy of the Plan is available on the South32 website:

<http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>

### **Monitoring Program**

A noise monitoring program has been developed to comply with Condition 5(f) of Schedule 4 of the Project Approval.

The objectives of the noise monitoring program are to:

- Measure noise levels experienced by nearby residential receivers;
- Assess the effectiveness of the existing noise controls;
- Measure project related noise levels;
- Detect any adverse developments in Project noise;
- Measure Residential Background Level (RBL) noise; and
- Acquire sufficient and reliable data to inform the assessment of compliance with noise criteria.

Assessment criteria have been established for each monitoring location, as outlined in Table 19. The criteria enables an assessment of compliance to be made against the noise levels outlined in the Project Approval. The site-specific assessment criteria were developed using the following methodology:

- Adoption of the most stringent noise levels as outlined in the Development Consent noise criteria; and
- Where relevant, the noise levels were adjusted (to take into account monitoring location verse receivers) using the noise contours from the BSO Noise Impact Assessment.

The program consists of continuous, real-time noise monitoring and attended monitoring using handheld portable monitors. The attended monitoring is undertaken at the nominated monitoring locations to confirm compliance.

Table 19: Noise Survey Points and Results.

Survey Point ID	Type	Receivers	Assessment Criteria		Locality	Function	Data Summary	Comments																				
			LA <sub>eq</sub> (15 min)	LA <sub>1</sub> (1 min)																								
AE-NS4	Real-time and attended	Appin township	43 (day, evening and night)	52 (night)	Located in paddock between Illawarra and Toggara St North of Pit Top behind receiver 137	Noise from AE	<table border="1"> <caption>Noise - AE-NS4 Data</caption> <thead> <tr> <th>Period</th> <th>FY15</th> <th>FY16</th> <th>FY17</th> <th>FY18</th> </tr> </thead> <tbody> <tr> <td>Day</td> <td>36</td> <td>34</td> <td>34</td> <td>39</td> </tr> <tr> <td>Evening</td> <td>39</td> <td>35</td> <td>37</td> <td>41</td> </tr> <tr> <td>Night</td> <td>35</td> <td>37</td> <td>37</td> <td>39</td> </tr> </tbody> </table>	Period	FY15	FY16	FY17	FY18	Day	36	34	34	39	Evening	39	35	37	41	Night	35	37	37	39	Compliant
Period	FY15	FY16	FY17	FY18																								
Day	36	34	34	39																								
Evening	39	35	37	41																								
Night	35	37	37	39																								
AE-NS5	Attended	Appin No.1 and No.2 receivers	40 (day, evening and night)	50 (night)	Northampton Dale Road between the No.2 Shaft Site and power plant project and the nearest residential receivers in the South to East quadrant from site.	Noise levels between Shaft Site and the nearest residential receivers to the SE	<table border="1"> <caption>Noise - AE-NS5 Data</caption> <thead> <tr> <th>Period</th> <th>FY15</th> <th>FY16</th> <th>FY17</th> <th>FY18</th> </tr> </thead> <tbody> <tr> <td>Day</td> <td>37</td> <td>36</td> <td>36</td> <td>39</td> </tr> <tr> <td>Evening</td> <td>37</td> <td>36</td> <td>35</td> <td>37</td> </tr> <tr> <td>Night</td> <td>36</td> <td>34</td> <td>34</td> <td>37</td> </tr> </tbody> </table>	Period	FY15	FY16	FY17	FY18	Day	37	36	36	39	Evening	37	36	35	37	Night	36	34	34	37	Compliant
Period	FY15	FY16	FY17	FY18																								
Day	37	36	36	39																								
Evening	37	36	35	37																								
Night	36	34	34	37																								
AW-NS5	Real-time and attended	All other Appin West receivers	39 (day and evening)	53 (night)	Between nearest residential receivers on Douglas Park Drive and the Appin West Pit Top	Noise level at AW property boundary; Noise levels between AW and nearest residential receivers on Douglas Park Drive	<table border="1"> <caption>Noise - AW-NS5 Data</caption> <thead> <tr> <th>Period</th> <th>FY15</th> <th>FY16</th> <th>FY17</th> <th>FY18</th> </tr> </thead> <tbody> <tr> <td>Day</td> <td>35</td> <td>35</td> <td>32</td> <td>35</td> </tr> <tr> <td>Evening</td> <td>33</td> <td>33</td> <td>34</td> <td>36</td> </tr> <tr> <td>Night</td> <td>35</td> <td>30</td> <td>33</td> <td>35</td> </tr> </tbody> </table>	Period	FY15	FY16	FY17	FY18	Day	35	35	32	35	Evening	33	33	34	36	Night	35	30	33	35	Compliant
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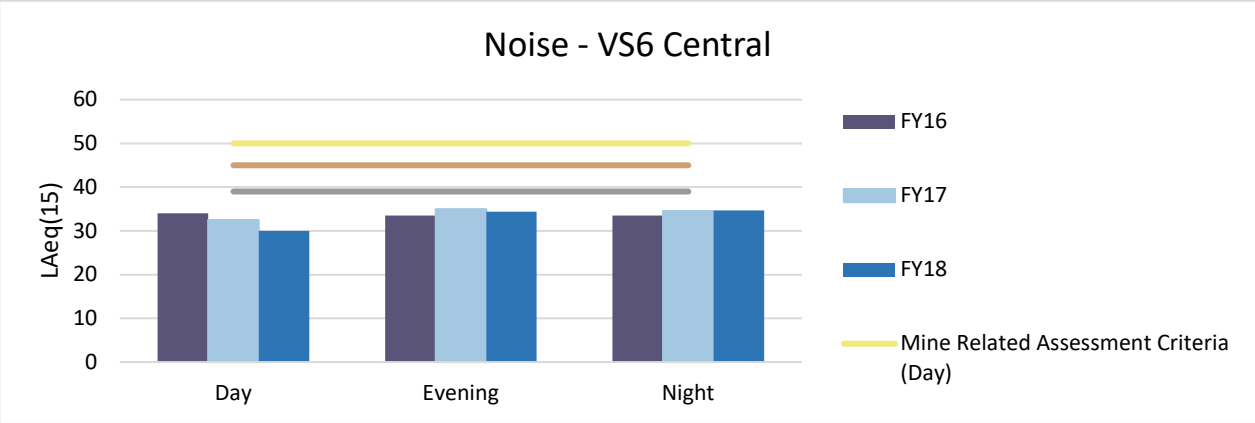
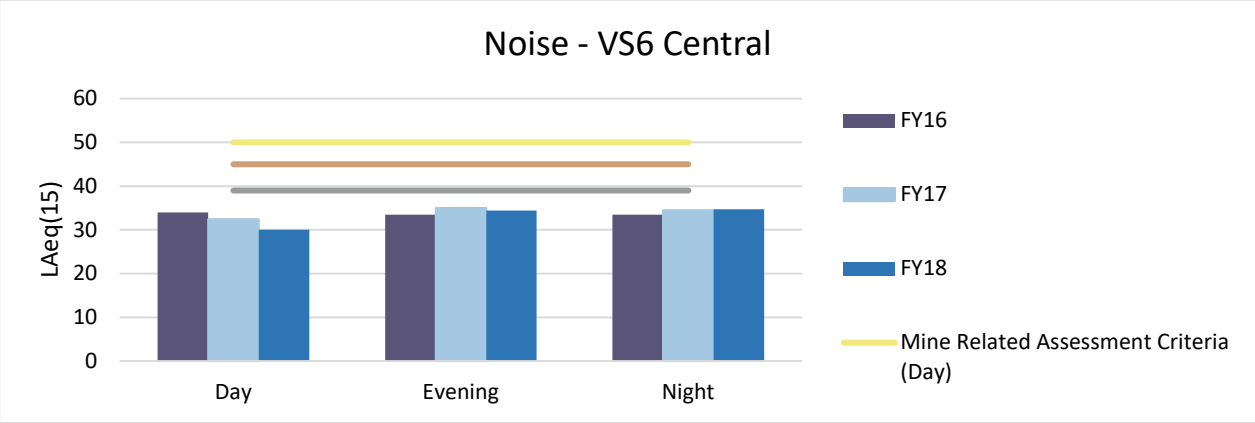
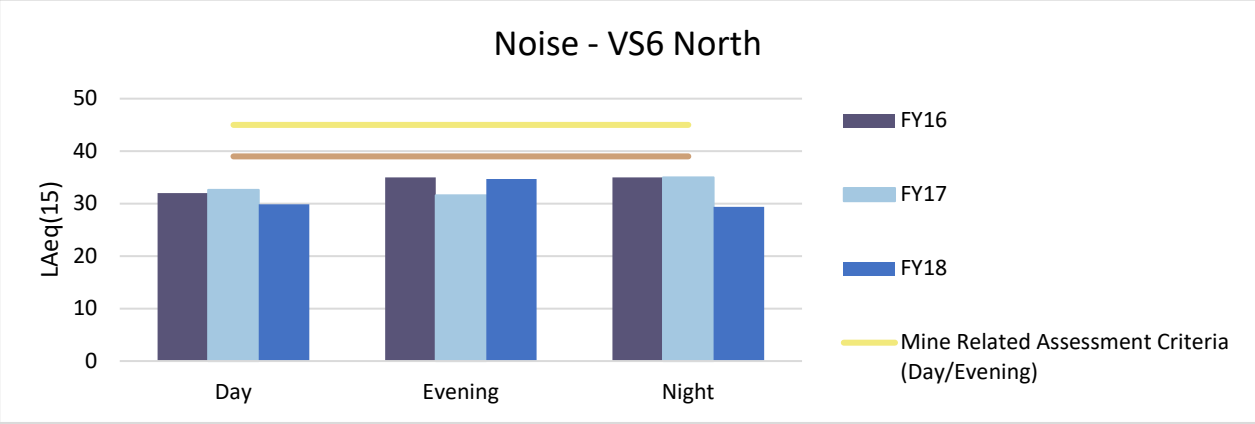
Table 19: Noise Survey Points and Results.

AW-NS4	Attended	Appin West receivers South-west of Appin West; and Appin West receivers near Hume Highway	39 (day and evening) 49 (night) 35 (night)	Ashwood Road, South-west of Appin West Pit Top		Noise level for Appin West Receivers South-west of Appin West; and Appin West Receivers near Hume Highway	<p>Noise - AW-NS4</p> <table border="1"> <thead> <tr> <th>Period</th> <th>FY15</th> <th>FY16</th> <th>FY17</th> <th>FY18</th> <th>Criteria (Day/Evening)</th> <th>Criteria (Night)</th> </tr> </thead> <tbody> <tr> <td>Day</td> <td>35</td> <td>38</td> <td>35</td> <td>38</td> <td>40</td> <td>35</td> </tr> <tr> <td>Evening</td> <td>33</td> <td>33</td> <td>35</td> <td>36</td> <td>40</td> <td>35</td> </tr> <tr> <td>Night</td> <td>33</td> <td>34</td> <td>31</td> <td>34</td> <td>40</td> <td>35</td> </tr> </tbody> </table>	Period	FY15	FY16	FY17	FY18	Criteria (Day/Evening)	Criteria (Night)	Day	35	38	35	38	40	35	Evening	33	33	35	36	40	35	Night	33	34	31	34	40	35	Compliant
Period	FY15	FY16	FY17	FY18	Criteria (Day/Evening)	Criteria (Night)																														
Day	35	38	35	38	40	35																														
Evening	33	33	35	36	40	35																														
Night	33	34	31	34	40	35																														
AW-NS3	Attended	Appin No.3 receivers	41 (day, evening and night) 49 (night)	Appin No.3 Shaft site at end of Brookes Pt Road		Noise level at Brookes Pt Road and nearest residential receivers to the East of the shaft site	<p>Noise - AW-NS3</p> <table border="1"> <thead> <tr> <th>Period</th> <th>FY15</th> <th>FY16</th> <th>FY17</th> <th>FY18</th> <th>Criteria</th> </tr> </thead> <tbody> <tr> <td>Day</td> <td>33</td> <td>31</td> <td>31</td> <td>30</td> <td>42</td> </tr> <tr> <td>Evening</td> <td>33</td> <td>34</td> <td>33</td> <td>30</td> <td>42</td> </tr> <tr> <td>Night</td> <td>33</td> <td>33</td> <td>33</td> <td>30</td> <td>42</td> </tr> </tbody> </table>	Period	FY15	FY16	FY17	FY18	Criteria	Day	33	31	31	30	42	Evening	33	34	33	30	42	Night	33	33	33	30	42	Compliant				
Period	FY15	FY16	FY17	FY18	Criteria																															
Day	33	31	31	30	42																															
Evening	33	34	33	30	42																															
Night	33	33	33	30	42																															
W-NS1	Attended	N/A – Baseline data for West Cliff (Appin North) only	N/A N/A	West Cliff (Appin North) Brennans Creek Dam		Noise level between the West Cliff (Appin North) emplacement area and the nearest residential receivers to the North of site	<p>Noise - WC-NS1</p> <table border="1"> <thead> <tr> <th>Period</th> <th>FY15</th> <th>FY16</th> <th>FY17</th> <th>FY18</th> </tr> </thead> <tbody> <tr> <td>Day</td> <td>38</td> <td>32</td> <td>40</td> <td>32</td> </tr> <tr> <td>Evening</td> <td>36</td> <td>35</td> <td>37</td> <td>30</td> </tr> <tr> <td>Night</td> <td>37</td> <td>32</td> <td>30</td> <td>31</td> </tr> </tbody> </table>	Period	FY15	FY16	FY17	FY18	Day	38	32	40	32	Evening	36	35	37	30	Night	37	32	30	31	Compliant								
Period	FY15	FY16	FY17	FY18																																
Day	38	32	40	32																																
Evening	36	35	37	30																																
Night	37	32	30	31																																



Table 19: Noise Survey Points and Results.

Survey Point	Attended	Receivers	Day/Evening	Night	Location	Notes	Chart Title	Compliance	
VS6 North	Attended	Douglas Park Township and Receivers	45 (day and evening)	49 (night)	Residential area between Camden Rd and Harris Ck North West of VS6	Noise level between VS6 area and the nearest residential receivers to the North West of site	Noise - VS6 North	Compliant	
VS6 Central	Attended	Douglas Park Township and Receivers	50 (day)	45 (evening)	49 (night)	Duggan street behind Douglas Park Public School	Noise level between VS6 area and the nearest residential receivers to the West of site	Noise - VS6 Central	Compliant
VS6 South	Attended	Douglas Park Township and Receivers	50 (day)	45 (evening)	49 (night)	Adjacent to rail corridor on Station Street, Douglas Park	Noise level between VS6 area and the nearest residential receivers to the South West of site	Noise - VS6 Central	Compliant



## **Environmental Performance**

Quarterly attended and real-time monitoring was conducted in accordance with the approved management plan for the reporting period. Results of the monitoring are reported online and summarised in Table 19.

The assessed noise levels generated from the Bulli Seam Operations were below the Day, Evening and Night assessment criteria in Table 19.

### **6.11. VISUAL, STRAY LIGHT**

The Appin West Mine Site is not directly visible by residential receivers. Lighting located on the Man and Materials Winder is partially visible by some residences at Wilton, but has not been raised by the community as an issue.

At Appin East (Central), operations are not directly visible by residential receivers. Lighting located at the top of the coal storage bins is partially visible by some residences but has not been raised by the community as an issue.

Due to the relatively remote locality of Appin North Colliery there are no significant issues in regard to lighting pollution.

There were no lighting impacts from the construction activities undertaken during the reporting period. Emissions of stray light continued to be assessed quarterly in conjunction with other monitoring outside of daylight hours.

Aesthetics of Mine Safety Gas Drainage activities are addressed by:

- Shielding wells from residences as practicable. This included utilising natural topography and vegetation to screen operations and optimising the position of pad infrastructure;
- Where possible infrastructure is green coloured, or housed in a green coloured compound;
- Green coloured noise barriers are installed at the perimeter of sites within sight of residences; and
- Revegetation of exposed areas as soon as practicable.

To minimise the visual disturbance from the Vent Shaft No.6 site, exposed areas have been revegetated progressively as final landform is achieved. The most significant feature is the earthen noise barrier that is was constructed using coal wash. This site has been revegetated.

### **6.12. ABORIGINAL HERITAGE AND NATURAL HERITAGE**

Aboriginal and natural heritage at West Cliff (Appin North) is managed in accordance with the approved West Cliff (Appin North) Coal Wash Emplacement Area Management Plan. This Plan outlines the management/mitigation measures relating specifically to each heritage site located within or in close proximity to the West Cliff (Appin North) Coal Wash Emplacement. A copy of the Plan is available at

<http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document>

The location of all heritage sites at West Cliff (Appin North) is outlined in Plan 13.

Aboriginal and natural heritage aspects associated with subsidence from the underground mining activities are detailed in section 6.15 of this report.

### **6.13. SPONTANEOUS COMBUSTION**

No incidence of spontaneous combustion occurred within this reporting period.

Bulli seam coal has a very low propensity to spontaneous combustion. Sampling programs (at Appin and West Cliff (Appin North)) are in place to detect any changes in coal quality that could potentially lead to spontaneous combustion occurring in coal stockpiles or refuse emplacements.

Routine and Statutory Inspections are used to identify any heating or spontaneous combustion events. In addition, a real-time CO monitoring system exists, and all mine officials carry CO handheld monitors.

#### **6.14. BUSHFIRE**

The risk of bushfire at Appin West, Appin East (Central) and West Cliff (Appin North) is managed by a combination of preventative and ready response activities. Bushfire management on both sites is achieved through the formation of a “fire break” around the site perimeters fence-line and the establishment of an extensive firefighting water pipeline around the sites (with booster pump facilities).

Appropriate site personnel are trained in emergency response and firefighting and have a large supply of readily available firefighting equipment on the sites.

#### **6.15. MINE SUBSIDENCE**

##### **Approvals**

##### ***Appin Area 7 Longwalls 705 – 710***

The Subsidence Management Plan (SMP) for Appin Area 7 Longwalls 705 to 710 was approved by the Department of Trade, Investment, Regional Infrastructure and Services (DTIRIS), now the Department of Industry: Resources and Energy (DRE) on the 28<sup>th</sup> of February 2012 (for Longwalls 705 and 706) and 28<sup>th</sup> of September 2012 (for Longwalls 707 to 710). Longwalls 705 to 710 SMP are supported by a number of management plans addressing social, cultural, environmental and infrastructure aspects of the mining area.

Approval was granted by the DRE on the 9<sup>th</sup> of July 2016 to vary the SMP Approval for Longwalls 707 to 710 in order to split Longwalls 707 and 708 into Longwall 707 A&B and Longwall 708 A&B. The change was made in order to avoid an intrusive dyke in the Bulli Coal Seam during the longwall mining process.

During the reporting period Appin Mine continued extracting coal from Longwall 707B. Extraction started on the 26<sup>th</sup> of September 2016 and was complete on the 19<sup>th</sup> of June 2018 at 2055m. During the reporting period approximately 995m of coal was extracted.

##### ***Appin Area 9 Longwalls 901 - 904***

The Extraction Plan (EP) for Appin Area 9 Longwalls 901 - 904 was approved by the DPE on the 10<sup>th</sup> of September 2014. The Longwalls 901 – 904 EP is supported by a number of management plans addressing social, cultural, environmental and infrastructure aspects of the mining area.

Illawarra Coal applied to the DPE to vary the EP Approval for Longwalls 901 - 904 on the 24<sup>th</sup> of March 2015 to shorten the commencing end of Longwall 901 by 418m. DRE approved the variation on the 29<sup>th</sup> of April 2015.

Longwall 901 commenced extraction on the 19<sup>th</sup> of January 2016 and was complete on the 8<sup>th</sup> of September 2017 at 2029m. Extraction of Longwall 902 commenced on the 12<sup>th</sup> of May 2018 and as of the 30<sup>th</sup> of June 2018 had progressed 375m, with 1780m remaining.

##### ***West Cliff (Appin North) Area 5 Longwalls 37 – 38***

The West Cliff (Appin North) Area 5 Extraction Plan (EP) for Longwalls 37 and 38 was approved by the Department of Planning and Infrastructure - DoPI (now the Department of Planning and Environment – DPE) on the 24<sup>th</sup> of March 2014. SMP approval was granted by the Department of Trade and Investment (T&I) on the 28<sup>th</sup> of March 2014. The EP is supported by a number of management plans addressing cultural, environmental and infrastructure aspects of the mining area.

Longwall 38 commenced extraction on the 3<sup>rd</sup> of February 2015 and was completed on the 1<sup>st</sup> of February 2016. The area has undergone post-mining monitoring in the reporting period as part of the approved monitoring program.

### **Appin Area 7 and 9 Monitoring and Management Programs**

Surface features in the vicinity of mining during the reporting period include:

- The Nepean River and associated tributaries;
- Harris Creek and associated tributaries;
- Cliffs, rocky outcrops and steep slopes;
- Aboriginal and European heritage; and
- Buildings and infrastructure.

Monitoring activities within the SMP area includes:

- Water flow, pool water levels and water quality monitoring;
- Photographic and observational monitoring to identify mining-induced fractures, strata gas releases, iron staining and rock falls;
- Aquatic ecology monitoring;
- Aboriginal and European heritage items; and
- Built features.

The results of these monitoring programs are provided below.

#### ***Landscape Features***

During the reporting period monitoring of environmental features was carried out in accordance with the Appin Longwall 705 to 710 SMP and Longwall 901 to 904 EP. Monitoring was conducted within the zone of influence during baseline, mining and post-mining periods (where applicable).

Two previously reported gas zones on the Nepean River and its tributary adjacent to the Appin Area 7 mining area were active at some point during the reporting period (Gas Zone 18 and AA7\_LW706\_001) (Plan 14 – Appin Area 7 FY18 Subsidence Impacts).

Two previously unidentified gas zones in the Nepean River adjacent to LW901 were discovered during the reporting period by the Illawarra Coal Environmental Field Crew (ICEFT) (AA9\_LW901\_023 and AA9\_LW901\_026). At the end of the reporting period active gas releases were identified at seven of the 26 gas release zones attributed to Longwall 901 (Plan 15 – Appin Area 9 FY18 Subsidence Impacts). As the distance from the river and active area of Longwall extraction increased with the end of Longwall 901 and start of Longwall 902 the number and intensity of active gas zones has decreased. No new gas releases were attributed to extraction of Longwall 902 during the reporting period.

For all observed impacts, the appropriate TARP's were applied, actions implemented and key stakeholders notified as required by the approved SMP and EP. Landscape Impacts associated with Longwalls 707A, 707B and 901 are summarised in Table 20. Refer to relevant End of Panel reports for greater analysis of impacts to landscape features as a result of Longwall extraction.

**Table 20: Predicted vs Observed Impacts for Landscape Features for Appin Area 7 and Appin Area 9.**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Nepean River water levels	Unlikely for any significant change in water level along the Nepean River	Decline in water level identified at site 'NR0' was also identified at reference site 'NR110'. The cause to the observed reduction in water level is uncertain due to dislocated reference datum at 'NR110'	• Reference datum at 'NR110' has been reinstalled, as per recommendation from the Surface Water Assessment
Surface waters in the mining areas	Potential for surface water diversion directly above or adjacent the mining area	No impacts observed	n/a
Gas releases	Likely that gas emissions could occur in the Nepean River	Gas releases identified	<ul style="list-style-type: none"> <li>• Continued monitoring program</li> <li>• Reported impacts to key stakeholders</li> <li>• Summarised impacts and recorded in End of Panel Report and AEMR</li> </ul>
Iron staining	Minor iron flocs are expected to occur in the Nepean River. No change in water quality is predicted	No impacts observed	n/a
Fracturing	Minor fracturing may occur in the bed of the Nepean River	No impacts observed	n/a
Creeks	Possible for localised increase in ponding, flooding or scouring	No impacts observed	n/a
Cliffs	Possible minor isolated rock falls. Unlikely that any large cliff instabilities would occur	No impacts observed	n/a
Steep Slopes	Unlikely that there would be any significant impacts to steep slopes	No impacts observed	n/a

### **Surface Water**

Inspections carried out by the IC Environmental Field Team include monitoring for iron staining and gas releases in the river and tributaries. No areas of iron staining were identified during the reporting period.

Data for pH, Electrical Conductivity, Dissolved Oxygen, Total Iron and Total Manganese are compared at sites upriver and downriver of mining in order to identify any significant water quality change. TARP limits have been established for water quality adjacent to the mining and downriver at monitoring sites.

Level 2 TARP trigger levels for water quality in Area 9 were recorded at 'NR0', 'SW3/NR1' and 'NR2' for EC (salinity) during July 2017. However, these levels were also reflected at the upstream reference site 'NR110' during the same period, and are considered to be associated with periods of low rainfall, not attributed to the extraction of Longwall 901. No TARP trigger levels were identified to date for Longwall 707. Table 21 provides a summary of the predicted and observed impacts for surface waters during the reporting period.

**Table 21: Predicted vs Observed Impacts for Surface Water for Appin Area 7 and Appin Area 9.**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Nepean River	Unlikely for any significant change in water level along the Nepean River	No mining-induced water level change has been observed Flow monitoring has been discontinued by WaterNSW Decline in water level identified at site 'NR0' was also identified at reference site 'NR110' The cause to the observed reduction in water level is uncertain due to dislocated reference datum at 'NR110'	Reference datum at 'NR110' has been reinstalled, as per recommendation from the Surface Water Assessment
	Potential for surface water flow diversion is very low	No surface water flow diversion has been observed	n/a
	Strata gas emissions into the river likely, with some associated reduction in dissolved oxygen possible	Gas zones observed in the Nepean River. No associated reduction in dissolved oxygen has been observed	<ul style="list-style-type: none"> <li>Continued monitoring program</li> <li>Reported impacts to key stakeholders</li> <li>Reported in End of Panel Report and AEMR</li> </ul>
Harris River	Low likelihood of ferruginous springs. Significant impacts on Nepean River pH, iron and dissolved oxygen not predicted	No new iron staining or seeps identified	n/a
	Mine subsidence induced ferruginous springs possible, with potential impacts on water quality	No subsidence induced fracturing or iron staining observed in Harris Creek	n/a

### **Groundwater**

Piezometer and bore monitoring data has been used to determine pre-mining groundwater levels and quality. Monitoring undertaken includes deep groundwater (e.g. Bulgo Sandstone and coal seams) and the Hawkesbury Sandstone (shallow groundwater). Targeted monitoring to a depth of approximately 10 m below the level of the Nepean River has been established to determine if there are any changes to groundwater contributions to base flow of the river resulting from mining.

Groundwater data is collected during the mining period, then analysed and interpreted for reporting in the End of Panel Report as outlined in the relevant Subsidence Management and Extraction Plans.

Extraction of Longwall 707 was complete on the 19<sup>th</sup> of June 2018. A comprehensive groundwater assessment will be a part of the LW707 End of Panel report which is currently being prepared as defined in the Appin Area 7 Water Management Plan. Extraction of Longwall 901 was complete on the 8<sup>th</sup> of September 2017. A comprehensive groundwater assessment was included as part of the LW901 End of Panel report. A summary of the groundwater observations in the Area 7 and 9 is below. The location of groundwater monitoring bores can be found in Plan 16 – Groundwater Monitoring Sites in Area 9.

Consultant reports on past groundwater observations in Appin Area 7 show a clear difference in the behaviour of groundwater pressures above and below the Bald Hill Claystone, evidence of the contiguous nature of the claystone across the general Appin mining area and indication of the pre-mining separation between shallow and deep aquifer heads.

Borehole EAW5 [S1913] is located approximately 1580 m from the longwall and has a string of ten piezometers installed at depths from 65 m (Hawkesbury Sandstone) to 559.5 m (Bulli Coal Seam) below ground level. During extraction of Longwall 707 water head continued to gradually decline in Bulli Seam and Bulgo Sandstone. The decline was also observed in three piezometers installed in the Hawkesbury Sandstone, however only the dropdown of 12 m in piezometer located at a depth of 194 m exceeded the predictions. The

latest observed water head in the piezometer located at 65 m below ground level has been higher than the baseline levels recorded in 2010.

Borehole EAW7 (S1936) is located over Longwall 706. Only one piezometer, installed 65 m below ground level, was operational during extraction of LW707. No water head changes associated with Longwall 707 extraction were observed. Remaining piezometers were disconnected prior to LW 706 extraction for safety reasons.

Borehole Appin West S2308 with eight piezometers installed is located approximately 940 m from LW707. No water head changes that could be associated with longwall extraction were recorded. The top Hawkesbury sandstone piezometer installed 70 m below ground level has recorded some 20 m water head increase during longwall extraction.

Borehole Appin West S2315 is located 990 m from the longwall, it has nine piezometers installed. During Longwall 707 extraction, three piezometers recorded water head recession. These were Hawkesbury Sandstone piezometers installed at depths of 144 m and 224.5 m and Bulli Coal seam instrument installed at 576.4 m. Water head decline in the Bulli Seam can be attributed to the longwall extraction, however drops recorded in Hawkesbury are unlikely a result of mining, as the Bulgo Sandstone piezometers did not record any notable change and the top Hawkesbury piezometer located 65 m below ground level recorded water head increase of some 15 m.

Bores S2281 and S1941 are located 190 m and 980 m from Longwall 901, respectively. A moderate decline in groundwater level was identified in the Hawkesbury Sandstone at both boreholes. The reduction in groundwater level, at both S2281 and S1941, was less than the predicted maximum reduction of 10 m outlined in the WMP; thus, no TARP levels were reached. No significant changes in groundwater chemistry were observed during the monitoring period.

A daily water balance is maintained by South32. The balance tracks daily volumes of water pumped into the mine (supply), within the mine, and from the mine into storage and/or discharge. The rate of groundwater inflow to the Appin Mine workings is determined by subtracting the water supply volume (to Area 9) from the total volume of water pumped to storage. The TARP level for mine inflow is based on the 20-day moving average of inflow to Area 9. The calculated 20-day moving average groundwater inflow into the Appin Mine workings fluctuated between 0.2 and 1 ML/day, less than the level 1 TARP trigger of 2.7 ML/day.

### ***Aquatic Ecology***

Within the Appin Areas 7 and 9 mining domain, significant aquatic habitat is limited to the Nepean River and its tributaries. Four species of aquatic macrophytes and five species of native fish were identified in the EIS and SMP studies. No threatened fish or invertebrate species were identified during field surveys. The area is potentially within the range of two threatened species (Macquarie Perch and Sydney Hawk Dragonfly) listed under the Threatened Species Conservation Act.

Mine subsidence can result in fracturing and a net vertical uplift of the river bed, resulting in reductions in water depth. It was predicted that these effects could impact flow, connectivity and water quality and could also reduce availability of aquatic habitat. The Nepean River within the mining areas is generally a deep, continuous slow-flowing pool created by the damming effect of Douglas Park and Menangle Weirs. This would minimise the risk the potential impacts on aquatic ecology resulting from reduced water flow and / or depth caused by any fracturing or net uplift of the river bed. Any impacts on water flow would be expected to be minimal due to the flooded nature of the river system.

The latest round of aquatic ecology monitoring was completed in November 2017, as part of the ongoing aquatic ecology monitoring program. At this time extraction of Longwall 707B had been completed. Extraction of Longwall 901 was completed on the 8<sup>th</sup> of September 2017. The assessment focused on the effects of extraction on aquatic habitats and biota in relevant sections of the Nepean River, comparing results from surveys undertaken since 2002). Monitoring undertaken by South32 and other specialist consultants during extraction of Longwalls 705, 706, 707A, 707B and 901 identified gas releases in the Nepean River. No fracturing, changes in water levels and flow or changes in water quality have been attributed to mining.

There were no observed impacts to indicators of aquatic ecology (number of taxa and biotic indices derived from macroinvertebrate sampling) that could be attributed to extraction of these longwalls. This was not surprising given no more than minor gas releases have been observed in the Nepean River associated with mining. No changes in water quality were observed due to these releases neither were any changes in water levels or diversions of flow. Statistically significant differences in these indicators among Surveys and Reaches on the Nepean River, where present, were attributed to natural spatial and temporal variation, rather than mining.

Similarly, there was no evidence of any changes to fish and aquatic macrophytes attributable to mining. The fish assemblage sampled in the Nepean River following the commencement of extraction of these longwalls was comparable with that sampled prior to extraction and no fish kills or any other observations that may suggest an impact due to mining have been observed.

Over the course of the monitoring program large changes in the distribution of aquatic macrophytes have occurred. There is no evidence these are attributed to mining. Changes to bank and river bed morphology due to recent flood events appears to have resulted in substantial localised changes in the coverage of macrophytes independent of mining. Refer to the relevant End of Panel Reports for greater analysis of aquatic ecology within the mining area.

Table 22 and Table 23 provide a summary of predicted and observed impacts on aquatic ecology for the reporting period for Appin Area 7 and Appin Area 9.

<b>Table 22 : Predicted vs Observed Impacts for Aquatic Ecology for Appin Area 7.</b>			
<b>Aspect</b>	<b>Predicted Impacts</b>	<b>Observed Impacts</b>	<b>Completed Actions</b>
Aquatic Ecology	Exposure of wetted substrata in some limited shallow areas of the river, potentially arising due to minor reductions in water depth caused by net uplift of the river bed	No reported change in water level apart from the normal fluctuations associated with rainfall and WaterNSW releases. No exposed wetted substrata observed	n/a
	Potential water loss or reduced flow due to fracturing of the river bed. However, this was not expected to result in significant water loss or reduced flow due to the flooded nature of this reach	No fracturing observed in the Nepean River and no water loss observed	n/a
	Components of aquatic ecology such as flow characteristics, connectivity and water quality should not be impacted by any predicted subsidence	No reported surface water flow diversions, impacts on water quality or connectivity of aquatic plant components	n/a
	Alterations to the composition of macrophyte beds due to small reductions in water depth. However, this is not expected to have a significant impact on the overall habitat in the survey area	No alterations to the composition of macrophyte beds observed. No mining induced dieback has been observed though some changes in distributions likely associated with recent high flow events and associated scouring of banks.	n/a
	Possible that gas emissions may have impacts on water quality	No evidence of significant impacts on water quality due to gas releases	n/a
	Potential impacts on fish and macroinvertebrates due to mine subsidence are considered unlikely	No evidence of mining induced impact on either fish or macroinvertebrates	n/a



**Table 23: Predicted vs Observed Impacts for Aquatic Ecology for Appin Area 9.**

Location	Attribute	Predicted Impacts	Observed Impacts	Completed Actions
Nepean River	Ponding, flooding and scouring of stream banks	There are unlikely to be any measurable impacts on the availability or connectivity of aquatic habitats in the downstream reach of the Nepean River due to its flooded nature and very low gradient.	None identified during observations of aquatic macroinvertebrates, fish and aquatic macrophytes at aquatic ecology monitoring sites in 2017.	n/a
	Fracturing of bedrock and diversion of surface flows	It is considered unlikely that there would be any net loss of water from the catchment. No significant changes in the quantity or quality of permanent aquatic habitat.	None identified during observations of aquatic macroinvertebrates, fish and aquatic macrophytes at aquatic ecology monitoring sites in 2017.	n/a
	Gas releases	Minor gas releases, associated iron precipitate and reductions in concentrations of dissolved oxygen are likely to occur due to extraction.	None identified during observations of aquatic macroinvertebrates, fish and aquatic macrophytes at aquatic ecology monitoring sites in 2017.	n/a
Drainage Lines	Fracturing of bedrock and diversion of surface flows	Effects to aquatic habitat and biota due to any diversion of flows and draining of pools in drainage lines would be minimal, due to the limited aquatic habitat provided by these areas.	No fracturing observed in drainage lines.	n/a

### **Terrestrial Ecology**

Assessments of significance have been completed for an endangered community and threatened flora and fauna species in the mining area. The assessments focused on flora and fauna that could potentially be impacted by subsidence. The following aspects were assessed:

- Native vegetation communities;
- Threatened flora; and
- Threatened fauna and fauna habitat.

Plant communities, fauna habitats, threatened species, populations and ecological communities have not been significantly impacted by subsidence during the reporting period as outlined in Table 24 below. No future terrestrial monitoring is required in Appin Area 7.

**Table 24: Predicted vs Observed Impacts for Terrestrial Ecology for Appin Area 7 and Area 9.**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Vegetation communities and fauna habitat	Minor impacts to riparian habitats on the Nepean River through changes in water levels, desiccation, gas release and minor fracturing	No impacts observed	n/a
	Minor impacts to vegetation due to rock falls, an increase in ponding, flooding or cracking to drainage lines and creeks	No impacts observed	n/a
Threatened flora	Unlikely that any threatened flora would be significantly impacted	No impacts observed	n/a
Threatened fauna	Unlikely that threatened fauna or habitats will be significantly impacted	No impacts observed	n/a

### **Cultural Heritage**

#### *European Heritage*

No historical sites are located above the mining area.

#### *Aboriginal Heritage*

Based on the subsidence predictions provided by MSEC (2008) for Longwalls 705 to 710, it is unlikely that there will be impacts to the archaeological sites resulting from the extraction of the longwalls (Biosis, 2008).

Bradcorp 1 is an Aboriginal site located over 500m south-west of the commencing (western) end of Longwall 901. The site is outside the area predicted to experience subsidence, tilts, curvatures or strains (MSEC 2012).

No impacts to aboriginal heritage sites were recorded during the reporting period.

### **Surface Infrastructure**

Surface infrastructure located within or near the mining areas includes the following:

- Optical fibre cables (Telstra, Optus, NextGen and Powertel);
- Main Southern Railway and associated infrastructure;
- HW2 Hume Highway and associated infrastructure;
- Local roads and drainage culverts;
- Power Infrastructure;
- Copper telecommunications cables;
- Potable water and Sewerage networks;
- Building structures, pools, water tanks and farm dams;
- Groundwater bores;

- Heritage structures;
- The Nepean Twin Bridges at Douglas Park;
- Pumps in the Nepean River;
- The Upper Canal, Cataract Tunnel and associated infrastructure; and
- Survey Control Marks.

A summary of the observed impacts during reporting period for Appin Area 7 is provided in Table 25. Impacts attributed to Appin Area 9 are summarised in Table 26.

**Table 25: Predicted vs Observed Impacts for Surface Infrastructure for Appin Area 7 FY18**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Local Road	Minor cracking and localised heaving of the road surface in some locations above the longwall	No reported impacts	n/a
HW2 Hume Highway	No impacts on the safety or serviceability of the highway after the implementation of the management strategies	No adverse impacts to safety or serviceability. Several impacts have been reported as a result of the extraction of LW707.	RMS have undertaken 3 interventions on the M31 to rehabilitate impacts to the pavement
Main Southern Railway	No impacts on the safety or serviceability of the railway after the implementation of the management strategies	Changes in track geometry recorded and remediated in accordance with the established Management Plan. No adverse impacts to safety and serviceability	Track geometry realigned in accordance with Management Plan.
Douglas Park Twin Bridges	Impacts unlikely after the implementation of the TARP	No reported impacts	n/a
Moreton Park Road Bridge (south)	Impacts unlikely after the detailed investigation, analysis and implementation of the TARP	No reported impacts	n/a
Power Infrastructure	Impacts unlikely, but minor mitigation measures may be required	No reported impacts	n/a
Copper telecommunications cables	Impacts unlikely	No reported impacts	n/a
Optical fibre cables	Impacts unlikely with the implementation of the management strategies including OTDR monitoring and mitigation	Small levels of signal loss measured and a high loss / break in DGPK 102	High loss / break in DGPK 102 was reported to relevant authorities and asset owners and has been fully repaired
Building structures	Typically Category A Tilt Impacts, with 1 x Category B Tilt Impact. Typically Category 0 Strain Impacts, With 6 x Category 1 Strain Impacts, 4 x Category 2 Strain Impacts	Two claims made to SA NSW for impacts to houses, due to the extraction of longwall 707	n/a

Pools	In ground pools could be more susceptible to ground strains	Two impacts have been reported and lodged with SA NSW	n/a
Water tanks	Impacts unlikely	No reported impacts	n/a
Farm dams	Potential for minor cracking or leakage	One dam impact reported	South32 delivering water as required
Heritage structures	Impacts unlikely	No reported impacts	n/a
Groundwater bores	Potential for blockage or reduction in the capacity of the groundwater bores	No reported impacts	n/a
Pumps in the Nepean River	Impacts unlikely	No reported impacts	n/a
The Upper Canal, Cataract Tunnel and associated infrastructure	Impacts unlikely	No reported impacts	n/a
Survey control marks	Small far-field horizontal movements which could require re-establishment	Small far-field horizontal movements	n/a

**Table 26: Predicted vs Observed Impacts for Surface Infrastructure for Appin Area 9 FY18**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Local Road	Minor cracking and localised heaving of the road surface in some locations above the longwall	Minor cracking reported	n/a
Main Southern Railway	No impacts on the safety or serviceability of the railway after the implementation of the management strategies	Changes in track geometry recorded and remediated in accordance with the established Management Plan. No adverse impacts to safety and serviceability	Track geometry realigned in accordance with Management Plan.
Douglas Park Twin Bridges	Impacts unlikely after the implementation of the TARP	Small amount of closure recorded across the valley (~8mm). No reported impacts	n/a
Moreton Park Road Bridge (south)	Impacts unlikely after the detailed investigation, analysis and implementation of the TARP	No reported impacts	n/a
Power Infrastructure	Impacts unlikely, but minor mitigation measures may be required	No reported impacts	n/a
Copper telecommunications cables	Impacts unlikely	No reported impacts	n/a
Optical fibre cables	Impacts unlikely with the implementation of the management strategies including OTDR monitoring and mitigation	No reported impacts	n/a

Potable Water network	Impacts unlikely, but minor mitigation measures may be required	No reported impacts	n/a
Sewerage Network	Impacts unlikely, but minor mitigation measures may be required	No reported impacts	n/a
Building structures	Typically Category A Tilt Impacts, with 1 x Category B Tilt Impact. Typically Category 0 Strain Impacts, With 6 x Category 1 Strain Impacts, 4 x Category 2 Strain Impacts	14 claims made to SA NSW for impacts to house has been made, due to the extraction of Longwall 901	n/a
Pools	In ground pools could be more susceptible to ground strains	Three claims made to SA NSW for impacts to a pool has been made, due to the extraction of Longwall 901 (claim included with house impact mentioned above)	n/a
Water tanks	Impacts unlikely	No reported impacts	n/a
Farm dams	Potential for minor cracking or leakage	No reported impacts	n/a
Heritage structures	Impacts unlikely	No reported impacts	n/a
Groundwater bores	Potential for blockage or reduction in the capacity of the groundwater bores	Five reported private bore impact affecting the water supply due to the extraction of Longwall 901.	South32 is negotiating Water Management Plans with landholders, investigating impacts and delivering water where appropriate
Pumps in the Nepean River	Impacts unlikely	No reported impacts	n/a
The Upper Canal, Cataract Tunnel and associated infrastructure	Impacts unlikely	No reported impacts	n/a
Survey control marks	Small far-field horizontal movements which could require re-establishment	Small far-field horizontal movements	n/a

## West Cliff (Appin North) Monitoring and Management Programs

Longwall 38 ceased extraction on the 1<sup>st</sup> of February 2016. West Cliff (Appin North) subsidence monitoring has moved into the post-mining phase and inspections are being carried out in accordance with the Longwall 37-38 Extraction Plan.

Surface features in the vicinity of mining include:

- The Georges River and associated tributaries;
- Rocky outcrops and steep slopes;
- Local roads;
- An aero-club airfield;
- Aboriginal and European heritage; and
- Buildings and infrastructure.

Monitoring activities include:

- Water flow, pool water levels and water quality monitoring;
- Photographic and observational monitoring to identify mining-induced fractures, strata gas releases, iron staining and rock falls;
- Aquatic ecology monitoring;
- Aboriginal and European heritage items; and
- Buildings and infrastructure.

Monthly monitoring of Georges River and its tributaries is undertaken by the Illawarra Coal Environment Field Team (ICEFT) with a fortnightly targeted inspection of Georges River pools that are observed to be below baseline level. Low pool levels recently observed on the Georges River are due to the current rainfall deficit reducing baseflows in the River and limiting available release from upstream Brennans Creek Dam. A Georges River catchment water balance is currently being scoped up which will help inform success criteria for proposed Georges River remediation, as well as inform the Georges River Improvement Plan.

Monitoring activities include:

- Photographic and observational monitoring including clifflines and landscape features;
- Water flow, pool water levels and water quality monitoring; and
- Shallow groundwater level monitoring

### ***Landscape Features***

Post-mining monitoring of natural features above and adjacent to Longwall 37 & 38 includes regular inspections of the Georges River as well as riparian features and cliffs.

Pool water levels, flows, water quality, photographic and observational monitoring are undertaken to identify any impacts such as fractures, strata gas releases, iron staining or rock falls from cliffs, steep slopes or rock outcrops. There were no new impacts identified as the level of subsidence for Longwall 38 has diminished (Table 27).

**Table 27: Predicted vs Observed Impacts for Landscape Features for West Cliff (Appin North) Area 5 during the reporting period.**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Georges River and tributaries	Negligible environmental consequences including: negligible diversion of flows or changes in the natural drainage behaviour of pools; negligible gas releases and iron staining; and negligible increase in water cloudiness. over at least 80% of the stream length subject to vertical subsidence >20mm.	No new impacts observed	n/a

No subsidence impact or environmental consequence greater than minor.

Cliffs	<p>Cliffs of "special significance": Negligible impact (that is occasional rock falls displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs) within any longwall mining domain.</p> <p>Other cliffs: Minor impacts (that is occasional rock falls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 3% of the total face area of such cliffs within any longwall mining domain)</p>	No impacts observed	n/a
Access Track	Minor impacts	No impacts observed	n/a

**Surface Water**

The monitoring program provides a basis for the comparison of flow, pool level and water quality in the area before, during and after mining as outlined in the West Cliff (Appin North) Colliery Area 5 Longwalls 37 to 38 EP.

During the reporting period the pH, DO, ORP and salinity levels in the Georges River and tributary sites maintained a similar variability, with no significant change from the baseline range, along with no significant change in trend or extended adverse changes being observed. No TARP trigger levels were attained for pH.

The levels of Manganese, Nickel and Zinc in the Georges River maintained similar pre Longwall 38 variability, with no significant change to the observed ranges as a result of extraction of Longwall 38.

During monitoring for Longwall 38, below-baseline levels were reported for Georges River pools; GR\_Pool 60, GR\_Pool 59, GR\_Pool 58, GR\_Pool 57, GR\_Pool 56, GR\_Pool 54 and GR\_Pool 44. These pools have been reported during the extraction of previous longwalls and have been attributed to Longwall 35 impacts. During significant rainfall events and increased mitigatory flow from Brennans Creek Dam these pools continue to show water levels similar to baseline. However, these water levels decrease during periods of low rainfall and reduced releases from Brennans Creek Dam.

Remediation options for impacted sections of the Georges River as a result of Longwalls 32 to 38 have been proposed in the Georges River Remediation Plan which is awaiting final approval from government stakeholders.

A summary of the observed surface water impacts for Longwall 38 is provided in Table 28.

**Table 28: Predicted vs Observed Impacts for Surface Water for West Cliff (Appin North) Area 5.**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Georges River	<p>Negligible environmental consequences including: negligible diversion of flows or changes in the natural drainage behaviour of pools; negligible gas releases and iron staining; and Negligible increase in water cloudiness. Over at least 80% of the stream length subject to vertical subsidence &gt;20mm. No subsidence impact or environmental consequence greater than minor.</p>	<p>Based on analysis of the long-term water quality records for designated upstream and downstream sites of Longwall 38, no significant water quality impacts were observed or measured within the Georges River. Fracturing and diversion of flow with lower pool levels. Pool water levels respond to increased releases from Brennans Creek Dam.</p>	<ul style="list-style-type: none"> <li>• Monitoring program continued</li> <li>• Reported to key stakeholders</li> <li>• Reported in End of Panel Report and AEMR</li> <li>• Monitoring program reviewed</li> <li>• Impacts reviewed against Performance Measures</li> <li>• Technical specialist notified and advice on CMA's sought</li> <li>• Impacts to Georges River included in Remediation Plan- to be approved and implemented</li> </ul>

**Groundwater**

Post mining monitoring of groundwater in the Hawkesbury Sandstone in the Westcliff/Appin North subsidence area has continued as outlined in the Longwall 37-38 Extraction Plan.

No adverse interconnection of aquifers and aquitards has been observed within 20m of the plateau surface and no increased rate of groundwater recharge into the plateau has been observed in the post-mining period.

No TARP trigger levels related to aquifer or aquitard interconnection or changes in recharge have been observed in the post-mining period.

Water levels in Piezometers GR27, GR28, GR70 and WC54 were not affected by subsidence during or after extraction of Longwall 38. The water level in WC95 fell by approximately 9m and was reported as a Level 1 TARP during Longwall 38 extraction. During the reporting period the water level in WC95 reacted positively to rainfall events, exhibited a decreased rate of recession and showed a general increase of higher water levels. It remains within predicted levels for this reporting period.

No increased groundwater inflow to the West Cliff (Appin North) mine workings following extraction of Longwall 38 has occurred and no TARP trigger levels have been reached or exceeded.

**Aquatic Ecology**

The latest round of aquatic ecology monitoring was completed in November 2017. The monitoring program focuses on three main indicators:

- Aquatic habitat, including fish habitat, aquatic macrophytes and riparian vegetation;
- Aquatic macroinvertebrates sampled in accordance with the Australian River Assessment System (AUSRIVAS); and
- Fish sampled using backpack electrofishing.



The results of the November 2017 survey were compared with those obtained in May 2002, March 2005, November 2007, September 2008, May 2010, May 2012, December 2012, November 2013, December 2014, November 2015 and November 2016. The November 2017 survey provided the third year of post-extraction monitoring for Longwall 37 and the second year of post-extraction monitoring for Longwall 38.

During the November 2017 survey, the flow diversions and reductions in pool water levels previously observed at Site 9, which is adjacent to Longwalls 35 and 36, were less apparent. It was likely that recent rainfall and releases from Brennans Creek Dam were maintaining water levels and flow here. The fracturing observed here previously during the November 2013 aquatic ecology survey was attributed to extraction of Longwall 35. This was associated with a direct loss of aquatic habitat, a potential reduction in numbers of macroinvertebrate taxa, evidence of a reduction in aquatic habitat quality and the desiccation of macrophytes adjacent to affected areas. Although water was present at Site 9 in November 2017 fewer macroinvertebrate taxa were found in the AUSRIVAS sample collected than during previous surveys. Fewer taxa were also present in the samples collected further downstream at Sites 10 and 11 than in previous surveys. This suggests that mining induced fracturing and flow diversions previously observed in this section of the river are affecting aquatic macroinvertebrates. Possibly due to impacts on the availability and connectivity of aquatic habitat due to mining induced flow diversions and fracturing in this section of the river. Preliminary assessment of SIGNAL2 Indices (a biotic index of water pollution) does not suggest an effect of mining on water quality in the river. Further analysis of AUSRIVAS macroinvertebrate data will be undertaken as part of the West Cliff Area 5 Aquatic Ecology Reporting due in the third quarter of 2018.

While these impacts were first attributed to extraction of Longwall 35, it is likely that a cumulative effect of extraction of subsequent longwalls 36 to 38 may have contributed to the severity, extent and rate of recovery of impacts to aquatic ecology attributed to Longwall 35. The most recent rock fractures associated with flow diversions were identified in the river channel and rockbars in late 2015, and were attributed to Longwall 38. No further fractures have been identified since this time. As Longwall 38 was the final longwall to be extracted from West Cliff Area 5 further fracturing and flow diversions is not expected.

Fish data collected in November 2017 suggest that fish at Site 9 have been affected by the reductions in pool water levels that have occurred here following mining. There were no fish caught during backpack electrofishing and bait trapping at this Site. Fish (including native carp gudgeons (*Hypseleotris* spp.) and longfinned eel (*Anguilla reinhardtii*)) were caught at sites downstream of here, suggesting effects on fish are localised to areas directly affected by physical mining impacts.

The November 2017 survey on the Georges River provided the second year of after extraction monitoring for West Cliff Area 5. Additional monitoring of aquatic ecology would allow for an assessment of long-term impacts to aquatic ecology from mining. It would also allow for an assessment of the success of remediation efforts to repair the fracturing in the Georges River and reduce the potential for reductions in pool water levels and associated impacts to aquatic ecology that may occur, particularly during low rainfall and flow conditions.

A summary of predicted and observed impacts on aquatic ecology is provided in Table 29.

**Table 29: Predicted vs Observed Impacts for Aquatic Ecology for West Cliff (Appin North) Area 5.**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Aquatic Ecology	Threatened species, threatened populations, or endangered ecological communities: - negligible environmental consequences	Mining impacts in the Georges River due to extraction of Longwall 35, recovered to some degree in December 2014, but have persisted in subsequent surveys.  There is no evidence to suggest the extraction of Longwalls 36 to 38 has had any impact on aquatic ecology, though it is possible that extraction of these longwall may have contributed to the severity, extent and rate of recovery of impacts to aquatic ecology attributed to Longwall 35.  At this stage impacts to aquatic ecology appear restricted to the areas directly affected by physical mining impacts, though there was iron staining present in the river downstream of Site 9 downstream to Site 10, located adjacent to Longwalls 36 and 37. No impacts have been detected at downstream control Site 11. Further analysis will be undertaken to confirm the extent of any impacts to aquatic ecology and if they have persisted downstream of the areas directly affected by physical mining impacts.	n/a

### **Terrestrial Ecology**

A baseline Terrestrial Flora and Fauna Assessment (Flora Search, 2009; Biosphere, 2009) was undertaken in support of the Bulli Seam Operations Environmental Assessment, the Study Area for these assessments included the Longwalls 37 and 38 Study Area. Supplementary field surveys for terrestrial biodiversity were undertaken by Niche (2013), for the purposes of the Longwall 37 and 38 EP.

Subsidence effects are unlikely to have a significant impact on any threatened flora or fauna species (Niche, 2013). However, impacts may lead to the alteration of habitat and the alteration of the natural flow regimes of rivers, stream, floodplains and wetlands following longwall mining (Niche, 2013).

Visual inspections of vegetation communities within the Longwalls 37 and 38 Study Area are undertaken as a part of routine landscape water monitoring programs. Post-mining monitoring focuses on detecting changes to vegetation communities and fauna habitat present within the Longwalls 37 and 38 Study Area.

No impacts to vegetation have been observed in the post-mining period.

**Table 30: Predicted vs Observed Impacts for Terrestrial Ecology for West Cliff (Appin North) Area 5.**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Ecology	Threatened species, threatened populations, or endangered ecological communities: - negligible environmental consequences	No impacts observed.	n/a

## **Cultural Heritage**

### *European Heritage*

No historical sites were located above Longwall 38.

### *Aboriginal Heritage*

There were no post mining impacts identified as a result of longwall extraction in the reporting period. Impacts have previously been noted to Aboriginal shelter sites Georges River No. 2 (AHIMS # 52-2-2243) and Georges River No. 3 (52-2-2243). These impacts were a result of subsidence movements from Longwall 35 and Longwall 36. See relevant End of Panel reports for more information.

## **Surface Infrastructure**

Subsidence monitoring programmes are developed in consultation with key stakeholders and ensure that all key infrastructure and other surface features located above the extraction areas are closely monitored to assess subsidence movements and impacts.

Westcliff (Appin North) Area 5 concluded active mining with the completion of Longwall 38 on 1/2/2016. The area has undergone post mining monitoring as part of the approved monitoring program and no survey monitoring has been undertaken in FY18. There were no reported impacts to any built features in FY18 in Westcliff 5.

All survey reports are checked, reviewed and assessed by the Illawarra Coal Survey Team with additional reviews undertaken by the Illawarra Coal Subsidence Management Review Committee which meets on a monthly basis.

## **Environmental Research Program**

Illawarra Coal has undertaken research to develop an improved understanding and prediction of subsidence impacts. Understanding strata conditions and properties contributes significantly to the prediction of subsidence impacts. Testing of overburden strata (core and in situ) has been completed during the review period to further define the mechanical, hydrogeological and geochemical properties of rock strata. This work has been undertaken in the Area 7 and 9 mining domains.

A regional network of pore pressure monitoring bores with vertical arrays of transducers has been installed to assess and quantify the height and impacts of subsurface fracturing. This network was further developed during the reporting period as part of the exploration program.

Analysis of the available groundwater level data from shallow and deep groundwater systems indicates that mining is not having an unexpectedly strong influence on groundwater levels in the deep groundwater systems, e.g. the Bulli Seam and Scarborough Sandstone. These depressurisation effects are in areas and horizons where there is very little productive groundwater resource or extraction for anthropogenic purposes. Furthermore, and more importantly for environmental and anthropogenic groundwater users, the data shows that the mining impact on groundwater levels in the Bulgo Sandstone and Hawkesbury Sandstone is in line with predictions and the approved BSO environmental approvals.

Drawdowns of up to 10 metres are observed in the Hawkesbury Sandstone, however these mining influences are temporary, and water levels generally recover within months of longwalls being completed. Based on the analysis of heads around the Nepean River piezometers, gradients toward the river were preserved, which maintains base flows to the rivers.

Comparison of the predicted groundwater levels and drawdowns from the EA Groundwater Assessment (Heritage Computing, 2010) with observed data for previous reporting periods suggests that the model is a useful tool for groundwater assessment. The match between modelled and observed water levels is generally good to fair.

Illawarra Coal implements targeted research to improve the understanding and prediction of environmental consequences on significant natural features resulting from subsidence impacts. The research is directed at improving the prediction, assessment, remediation and/or avoidance of subsidence impacts and environmental consequences on significant natural features.

During the reporting period Illawarra Coal continued to implement the Swamp Rehabilitation Research Plan (SRRP) in consultation with the Department of Planning and Environment and WaterNSW. The objectives of the SRRP are to:

- Investigate methods to rehabilitate swamps subject to subsidence impacts and environmental consequences;
- Establish a field trial (for a 5 year duration or longer) for rehabilitation techniques at a swamp or swamps that have been impacted by subsidence; and
- Include a schedule for subsequent trials, development of work plans and ongoing reporting.

Detailed monitoring programs have been implemented to provide a basis for the design and implementation of any swamp mitigation or remediation required. Swamp rehabilitation options have been developed from rehabilitation programs in the Georges River and from swamp rehabilitation techniques used for non-mining related impacts in the Blue Mountains and other areas. Research programs and projects undertaken by Illawarra Coal will develop further understanding of the factors which influence swamp health and function, if and how swamps have been changed due to mining and what rehabilitation methods may be required for swamp restoration. A detailed site investigation was implemented at swamp 1B during 2018 as well as electrical resistivity testing in swamps prior to and after mining. Major research programs have been established to assess the impacts of mining on regional populations of Giant Dragonfly and Littlejohns Treefrog.

Remediation works were undertaken from 2002 – 2005 to reduce impacts to the Georges River at Pools 8, 9, 14, 15 and 16, Marhnyes Hole and Jutts Crossing. These previous mitigation works demonstrate that remediation of mining induced subsidence impacts can be achieved within acceptable environmental limits. The following grouting techniques have previously been implemented:

- Hand mortaring;
- Pattern grouting; and
- Deep angled hole grouting.

The works have proven successful, with flows and water levels during low flow conditions being restored in areas where rehabilitation has been completed. Further rehabilitation is proposed for the Georges River where impacts occurred from Longwalls 35 and 38. The plan has been developed in consultation with key Government stakeholders. As part of these works Illawarra Coal will undertake research into the implementation and effectiveness of the rehabilitation techniques.

Illawarra Coal submitted a revised Underground Coal Wash Emplacement Trial on the 13<sup>th</sup> of October 2013. The revised Plan proposed to defer the trial for 5 years for the following reasons:

- The trial replicates what has been demonstrated by another Southern District Colliery;
- The declaration of Dharawal National Park has eliminated a significant area of potentially suitable roadways for underground coalwash emplacement; and
- Illawarra Coal's focus on diverting material from surface emplacement via alternative beneficial uses continues.

Illawarra Coal supported a number of research projects relating to beneficial coalwash use during the reporting period and this has opened up significant potential for diverting coalwash from emplacement.

There have been no updates to the Coal Wash Emplacement Trial Plan in the reporting period. There is currently no available underground storage areas suitable for coalwash material, however alternative beneficial use of coalwash continues to be successfully implemented.

## **6.16. HYDROCARBON CONTAMINATION**

Refer to section 6.5.

## **6.17. METHANE VENTILATION**

The in-seam gas content of the Bulli Seam in the Appin and West Cliff (Appin North) areas is in the order of 12 to 14 cubic metres of methane per tonne of in-situ coal. Both operations maintain a comprehensive underground methane drainage program which includes a network of drill holes and pipes to recover a large proportion of this gas by in-seam and cross-measure drainage. Methane drainage is necessary to provide a safe, compliant and productive underground mining environment.

Drainage gas extraction, utilisation and venting rates are reported on a monthly basis and these readings are used by Illawarra Coal for Greenhouse Gas (GHG) accounting. During this period the Appin and West Cliff (Appin North) monitoring systems, procedures and figures reported were audited (reasonable assurance) as required by statutory and internal requirements.

## **6.18. MINE SAFETY GAS DRAINAGE**

At West Cliff (Appin North), no surface gas drainage activities were undertaken as underground operations have ceased.

In Appin Areas 7 and 9, gas drainage is now entirely undertaken by the underground gas drainage network before being piped to the surface and utilized by the offsite EDL Plants (West and East). When there is more gas available from the mine than can be consumed by EDL, the flaring systems are initiated to abate the methane content of the gas.

Based on operational times of flares at intervals of 15 minutes the flares at the Appin West Gas Drainage Plant ran for approximately 107 days, and the flares at the Appin East Plant 19 days during the reporting period.

Mine safety gas drainage well sites in Appin Areas 7 and 9 have been rehabilitated. During the reporting period a successful level of grass cover over the rehabilitated gas well areas has been achieved.

### **Mine Methane Extraction**

#### ***Appin***

The methane gas extracted from the coal seam by the underground gas extraction network is directed to the surface, via the gas drainage plants, from where it is piped to the electricity generation plants and used to generate electricity. The electricity generation plants are operated by EDL. A total of 987 ktCO<sub>2</sub>-e was recovered and transferred (i.e. abated) to the EDL Power Plant.

#### ***West Cliff (Appin North)***

The West Cliff (Appin North) Methane Drainage Extraction Plant and the gas blower station was decommissioned following the completion of Longwall mining in Area 5 in FY16.

### **Mine Ventilation Fans**

#### ***Appin***

During the reporting period, approximately 1135 kt CO<sub>2</sub>-e was emitted to atmosphere from the Appin Mine Ventilation System, down 24% when compared to FY17. The average CH<sub>4</sub> concentration was 0.29% (down from 0.36% in FY17) and the average CO<sub>2</sub> concentration was 0.22% (up from 0.19% in FY17).

### **West Cliff (Appin North)**

During the reporting period, approximately 707 kt CO<sub>2</sub>-e was emitted to atmosphere from the Appin North Mine Ventilation system. The average CH<sub>4</sub> concentration was 0.52% and the average CO<sub>2</sub> concentration was 0.24%.

### **WestVAMP**

The WestVAMP project was designed to consume low purity methane in air mix (mine vent air) to produce electricity. The project was completed during the 2007/08 reporting period and was decommissioned during FY16 as a result of decreased power generation performance and the impending movement of underground mining operations to the Appin Areas. The project was a significant Greenhouse Gas reduction initiative that complemented the ongoing reductions achieved by the Appin and Tower Power Plant Projects.

The CSIRO are conducting tests on 3 Ventilation Air Methane units which can abate methane, produce power and purify the gas in the ventilation air to produce a fuel. This testing will continue through FY19.

## **6.19. HAZARDOUS MATERIAL MANAGEMENT**

### **Storage**

Oils are stored in purpose built facilities with appropriate bunding and firefighting provision. A licensed contractor is engaged to remove and recycle and/or dispose of used oil and grease products through appropriately licensed facilities.

Diesel fuel is brought to the Appin East (Central), Appin West and West Cliff (Appin North) 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.

The chlorine dioxide dosing plant at Brennans Creek Dam is still in use. This includes storage of approximately 5000 L of Sodium Hypochlorite and 5000 L of Hydrochloric Acid.

All explosives / detonators for the Appin operations are currently stored at the explosives storage facility located at the Appin West and Appin East (Central) mine site. Storage facility information is provided below.

**Table 31: Explosives and Detonator Storage – Appin**

Site	Type	Capacity
Appin East (Central)	1.1D Explosive type E	300 kg
	1.1D Explosive type A	250 kg
	1.1B Detonators	5000 detonators
Appin West	1.1D Explosive	2000 kg
	1.1B Detonators	5000 detonators

Details of the bulk chemical storage locations associated with the Appin operation are provided in the tables below.

**Table 32: Summary of Dangerous Goods Storage on the Appin West Site.**

Depot	Class	Type of Storage	Product Name	Maximum Volume (L)	Normal Storage (L)
2	8	Above Ground Tank	Hydrochloric acid	12,000	12,000

3	C1	Above Ground Tank	Diesel	42,200	40,000
4	8	Above Ground Tank	Sodium Chlorite	3,000	2,700
5	8	Above Ground Tank	Hydrochloric Acid	3,000	2,700

**Table 33: Summary of Dangerous Goods Storage on the Appin East (Central) Site.**

Depot	Class	Type of Storage	Product Name	Maximum Volume (L)	Normal Storage (L)
2	C1	Above Ground Tank	Diesel	36,600	36,000
3	8	Above Ground Storage	Ferric Chloride	3000	3000
4	8	Above Ground Storage	Sodium Hypochlorite	3000	3000

There is one monitoring gauge (moisture scanner) at the Appin East (Central) Surface Elevator Belt that contains low emission radioactive isotopes. This gauge is licensed and maintained as per the legal requirements. The gauge is housed in an appropriate container and is inspected and tested in accordance with legislative requirements.

There are several monitoring gauges (moisture scanners) in the WCCPP that contain low emission radioactive isotopes and these gauges are licensed and maintained as per legal requirements. All gauges are housed in appropriate containers and are inspected and tested in accordance with legislative requirements.

## 6.20. NORTH CLIFF

The North Cliff Mine Site and access road is located between O'Hares Creek and Stokes Creek. The majority of the site is gently sloping in a northerly direction towards O'Hares Creek. The mine site covers an area of approximately 10.3 hectares of which approximately 6.5 hectares is undisturbed by mining activities. The North Cliff site is shown in Plan 10.

Access to the site is along 10B and 10C Fire Trails from an intersection on the Bulli/Appin Road, 6 km northwest of Bulli Pass. The 4.5 km long access road is included in the mine site Coal Lease CCL724.

### Land Ownership and Approvals

The North Cliff Mine Site and access road is subject to CCL724, which includes the surface and land below to an unlimited depth over the mine site and to a depth of 15m over the access road. Consent to establish the mine was granted in 1981 by the Minister for Planning and Environment under Section 101 of the Environment Planning and Assessment Act 1979 and subsequently amended under Section 102 of the Act.

### History

Mining operations commenced at the site in 1983, with mining operations restricted to a single unit Continuous Miner. The ROM product was brought to the surface through the No.4 shaft and into a 400 t surge bin, from which the product was loaded into trucks and transported to West Cliff (Appin North) Colliery for processing.

Mining operations ceased at North Cliff in 1990 at which time all underground equipment was removed from the site. The two shafts were temporarily sealed with concrete caps with additional security fencing and associated signage installed to prevent unauthorised access. A number of the buildings and associated structures, and various other pieces of equipment were also removed from site. Periodic inspections are undertaken by the Site Environmental Representative.

### Remaining Infrastructure

As specified above, most of the infrastructure that was located on the North Cliff site was removed following closure of the mine in 1990. The major structures remaining on the site include:

- No.3 shaft head frame;
- No.4 shaft head frame; and
- Sub-station base slabs.

There are also various items of redundant equipment on the site, however these are not posing an environmental or safety hazard. There has been no equipment removed from site during the reporting period.

### **Site Security**

The North Cliff Site is enclosed with a 1.8 metre high fence with two locked entry gates. The site security fencing is inspected on a regular basis.

### **Site Rehabilitation**

An area on the site between the two shafts was used for the disposal of spoil excavated from the sinking on the shafts. The spoil heap, which covers an area of approximately 3.5 ha and containing 55,000 m<sup>3</sup> of loosely tipped shale and sandstone, has been graded, shaped and regenerated with local vegetation species.

The West Cliff (Appin North) Conceptual Closure Plan details the remaining site-specific closure works to be undertaken at this site. A summary is provided below:

- Remove infrastructure;
- Fill and seal No. 3 and No. 4 shafts in accordance with DTI requirements;
- Demolish and remove all concrete slabs and bitumen surfaces including hardstand areas;
- Remediate any contaminated soil by removal, encapsulation or land farming on site;
- Backfill lagoon with wall material and clean material;
- Topsoil bare or stripped areas, where appropriate;
- Re-profile site as per the final landform design to reduce the slope lengths by constructing contour banks and armouring channels to prevent erosion;
- Revegetate as per the final revegetation/landscape plan utilising local species. Rip and seed to stabilise the bare soil using an appropriate method (such as hydro-seeding/hydro-mulching); and
- Develop ongoing maintenance management plans.

Post Closure works will include:

- Monitor frequently until vegetation establishment, and then on a minimum 12 monthly basis for at least 5 years after works have been completed (or site sold); and
- Carry out weed control and replanting/reseeding as necessary.

### **Water Management**

Surface drainage is mainly carried in open channels to the site pond located at the northwest corner of the site. The pond is a permeable structure that filters the water that passes through the wall. Water that overflows the dam in wet weather events or passes through the wall flows through open sedge-land before entering an unnamed creek and into O'Hares Creek. There is no environmental impact associated with these discharge events on the receiving environment. No issues were identified with the site drainage system during the reporting period. No hydrocarbons or chemicals are stored at the Site.



## **Air Quality**

The generation of windblown dust from the North Cliff Mine Site is unlikely to cause any adverse impacts on air quality on the community due to the isolated location of the site. A large proportion of the disturbed areas are largely compacted hence further reducing the likelihood of generating significant emissions of wind blow dust.

## **Noxious Weeds**

The site management measures to monitor and control the growth of noxious weeds on the mine site include the use of a weed control specialist to inspect the mine site periodically. No issues were identified during the reporting period.

## **Archaeological Sites**

Archaeological surveys were carried out in 1977 and 1983. The studies identified one aboriginal site, a single axe groove on an exposed rock shelf; located within the fenced mine site area. No damage occurred to these sites during the development or operation of the mine. No damage was identified at this site during the reporting period.

## **Environmental Inspections**

Four environmental inspections of the North Cliff site were completed during the reporting period. The inspections cover the following aspects:

- Site Security and Safety;
- Surface Drainage;
- Erosion;
- Weed Management;
- Archaeological Sites;
- Dust; and
- Hydrocarbon Management.

## **6.21. PUBLIC SAFETY**

No incidents involving the general public occurred during the reporting period. Safety risks associated with the site activities are addressed and controlled by the mechanisms listed in Table 34.

**Table 34: Site Safety Risks and Control Mechanisms**

<b>Potential Safety Risk</b>	<b>Control Mechanism</b>
External persons attending site	Site reception office – sign in/out procedure in place for visitors. Site inductions / awareness sessions for persons undertaking activities on site. Company representative accompanies visits to the North Cliff site.
General vehicle traffic	Designated and sign posted roads and rules. Periodic speed monitoring along Wedderburn Road. Key locked gates to site (North Cliff).
Public roadway conditions	Routine daily inspections of public roads for evidence of coal spilled from trucks. Use of road sweepers to clean roads as required Coal Trucks - Loads covered before travelling on public roads. All truck leaving the West Cliff (Appin North) site must pass through the truck wash located to the east of the clean coal bins.
Exposure to hazardous chemicals	Designated storage facilities and signage. Chernalert system in place. Rules and procedures in place for bringing chemicals into site.
Personnel Health and Hygiene	Surveillance / monitoring program in place for noise, respirable dust, hazardous materials exposure. PPE requirements enforced and periodically audited. Hazardous areas are delineated with warning signs and notices.
Radiation apparatus	Certified and registered installations – annual inspections by certifying officer. Licences in place for all radiation apparatus.
Heavy vehicle movements on site	Reversing alarms. South32 Fatal Risk standards. Authorised / licensed operators.
Working at heights	Standards and procedures for working at height activities.
Confined Spaces	Standards and procedures for working in confined spaces.
Explosive atmospheres	Explosion protected and intrinsically safe equipment – monitoring of the underground environment.
Fire	Firefighting infrastructure in place to protect persons and property.
Potential at risk activities	Formal risk assessment / task analysis process in place to assess risks and ensure sufficient controls are in place prior to the work/activity commencing.
Surface and underground vehicles	Vehicle standards in place - rotating beacons / seat belts / roll bar protection where relevant. Light vehicle policy for surface vehicles.

## 7. WATER MANAGEMENT

### 7.1. WATER SUPPLY AND USE

#### Appin West

Mine water is processed at the Appin West Water Treatment Plant (WTP) to produce treated water. This treated water is supplied to the Appin Mine underground mining operations. Any shortfall in underground supply is made up using potable water provided by Sydney Water. Potable water is used for site administration buildings, workshops, the bathhouse and as a back-up for underground operations.

#### Water Treatment Plant Improvements

The upgrading of the WFP to cater for the increased processing demand is presently under way with commissioning expected to be completed by November 2018. Key drivers for this upgrade include minimising dependency on Sydney Water, environmental compliance and an increase in demand for underground water requirements with the Area 9 mining domain.

The staged upgrade process entails project components of pre-treatment, integrated membrane system and bulk storage and blending. The newly constructed plant is expected to cater a throughput capacity of 4.7 ML/day with an additional 2.0 ML of surface storage.

#### Appin East (Central)

Potable water is supplied by Sydney Water to the Appin East (Central) mine site via a 600 kL surface tank. This tank provides potable water for the Bathhouse, workshops, administration buildings, Appin No.2 shaft area, Energy Development Limited Appin East (Central) Power Plant and nearby mine-owned cottages.

During this reporting period Appin East (Central) underground has been operated on recycled mine water (supplied underground from Appin West WFP) and Sydney Water supplies from Appin East (Central) Pit Top tanks. Surface water runoff from rainfall is captured in the main surface dam and is used as supply for the truck washing facilities, dust suppression on haulage roads and stockpiles and dirty equipment hose down. In addition, a pipeline has been installed to temporarily dilute discharge from Brennans Ck Dam to reduce salinity levels in-line with the EPL. This pipeline will potentially be used as future water supply to the West Cliff (Appin North) Washery during drought as projects under PRP19/EIP2 are completed (see Section 6.3).

Table 35 provides an overview of the potable water usage associated with the Appin operations for the reporting period.

**Table 35: Potable Water Usage for the Appin Operations**

Area	Usage FY17 (ML)	Usage FY18 (ML)	Variance (ML)	Comments
Appin East (Central) & West	692	906.49 ML	214.49	Increased due to a greater volume of water being pumped to the West Cliff (Appin North) washery to reduce increased salinity levels

An estimate of the volume of clean and dirty water stored on site at the end of the reporting period is provided in Table 36.

**Table 36: Stored Water - Appin**

Water Type	Volumes Held (m3)		
	Start of Reporting Period	At End of Reporting Period	Storage Capacity
Clean water	2.8	2.8	2.8
Dirty water	30	30	33.3

Controlled discharge water (salinity trading schemes)	2.4	2.4	2.4
Contaminated water	N/A	N/A	N/A

## West Cliff (Appin North)

West Cliff (Appin North) Colliery Site is primarily reliant on recycled water. Some potable water is trucked to site and stored in a surface tank for use in the bathhouse and office facilities. Potable water was pumped from Appin East (Central) for use in WestVAMP (now redundant) and the longwall until operations ceased in February 2016. Recycled water is sourced from Brennans Creek Dam (BCD) from where it is pumped, following chlorination treatment, for use in the following areas:

- West Cliff (Appin North) Underground operations;
- West Cliff (Appin North) Coal Preparation Plant and associated infrastructure; and
- West Cliff Pit Top (Appin North).

Annual recycled water usage from BCD for the West Cliff (Appin North) surface operations for this reporting period was approximately 736.1 ML. Approximately 58.62ML of water from BCD was utilised underground for mining related activities. This is significantly higher than the previous reporting period due to an emphasis placed on lowering BCD levels. Lower BCD levels were necessary for higher dam free board to prevent spill during rain events.

A total of 0.69ML of potable water was consumed at Appin North (Westcliff) during the reporting period, significantly less than the previous year due lower personnel onsite at Appin North.

A summary of the water usage for the reporting period, compared to the previous reporting period, is provided in Table 37.

**Table 37: Water Usage Comparison**

Type	Usage FY17 (ML)	Usage FY18 (ML)	Comment
Potable Water	1.88	0.69	Reduced surface personnel at Appin North
Recycled (BCD) Water	674	736.10	Increased usage in the WCCPP, and on surface roads as dust suppressant

An estimate of the volume of clean and dirty water stored on site at the end of the reporting period is provided in Table 38.

**Table 38: Stored Water – West Cliff (Appin North)**

Water Type	Volumes Held (m3)		
	Start of Reporting Period	At End of Reporting Period	Storage Capacity
Clean water	307	307	307
Dirty water	200	200	237
Controlled discharge water (salinity trading schemes)	N/A	N/A	N/A
Contaminated water	N/A	N/A	N/A

## **Appin Ventilation No.6 Shaft Site**

Under Surface Water License No. 10WA117285, issued by NSW Office of Water (NOW) on the 15<sup>th</sup> of November 2011, water can be pumped from the Nepean River and used on Ventilation No.6 Shaft site for operational purposes. The Licence allows up to 53 ML to be diverted - Comprising of 40 ML for mining use and 13 ML for industrial use in any one year commencing 1 July. During the reporting period 0.1 ML was pumped from the Nepean River.

### **7.2. SURFACE WATER**

Surface water management at the BSO is undertaken in accordance with EPL 2504 and the approved BSO Water Management Plan. Specifics of the site water management systems are provided in the BSO Water Management Plan which is available on the South32 regulatory information website.

#### **Appin West**

The filter modules at Point 23 have undergone routine maintenance, including replacement of the filters and screens. No additional works have been completed at the site. The active oil separator (spin separator) underwent routine service, and the passive separator (baffle plate system) also underwent routine maintenance.

#### **Appin East (Central)**

The silt trap associated with the main dam has undergone standard maintenance including silt removal and the dynasand and first flush systems have undergone standard maintenance to ensure systems are fully operational.

#### **West Cliff (Appin North)**

The seep that was identified in the reclaim pond at Brennans Creek Dam in March 2010 continues to be monitored regularly with results including flow measurements, piezometer readings and visual inspections, reported through to the consultant geotechnical engineer periodically. A V-notch weir and concrete bunding was installed in FY16 to improve the accuracy of monitoring. There has been no change to the characteristics (i.e. volume, clarity etc.) of the seep for the reporting period.

Surveillance reports are prepared every 5 years by the consultant geotechnical engineer. The latest report was submitted to the Dams Safety Committee in March 2017. Intermediate inspections are being conducted regularly by Illawarra Coal.

Surface run-off associated with the emplacement area, operates in accordance with the approved Coal Wash Emplacement Area Management Plan which is available on the South32 website.

## **Appin Ventilation No.6 Shaft Site**

During the reporting period surface runoff was captured on site surface dams prior to discharge into Harris Creek via LDP36. Water quality checks were carried out prior to any discharge.

### **7.3. GROUNDWATER MANAGEMENT**

#### **Appin**

During the reporting period excess groundwater from the Appin operations was pumped to the surface at Appin West for treatment via the Appin West WTP. The treated water is re-used underground and/or discharged via LDP24. Discharge volumes at LDP24 are made available to the public via the web based environmental monitoring report which is issued every 14 days.

## West Cliff (Appin North)

Water for underground use is delivered from BCD to the underground operations via a gravity fed pipeline. Groundwater and surplus mine water is collected in pits and pumped to the surface for use in the West Cliff (Appin North) CPP. During the reporting period approximately 58.62ML of water was delivered underground with approximately 431.33 ML of surplus underground water pumped to the surface for use in the CPP or treated and release to BCD.

### 7.4. RAINFALL

Figure 11 below displays the annual rainfall for the region since FY11 at Menangle, NSW.

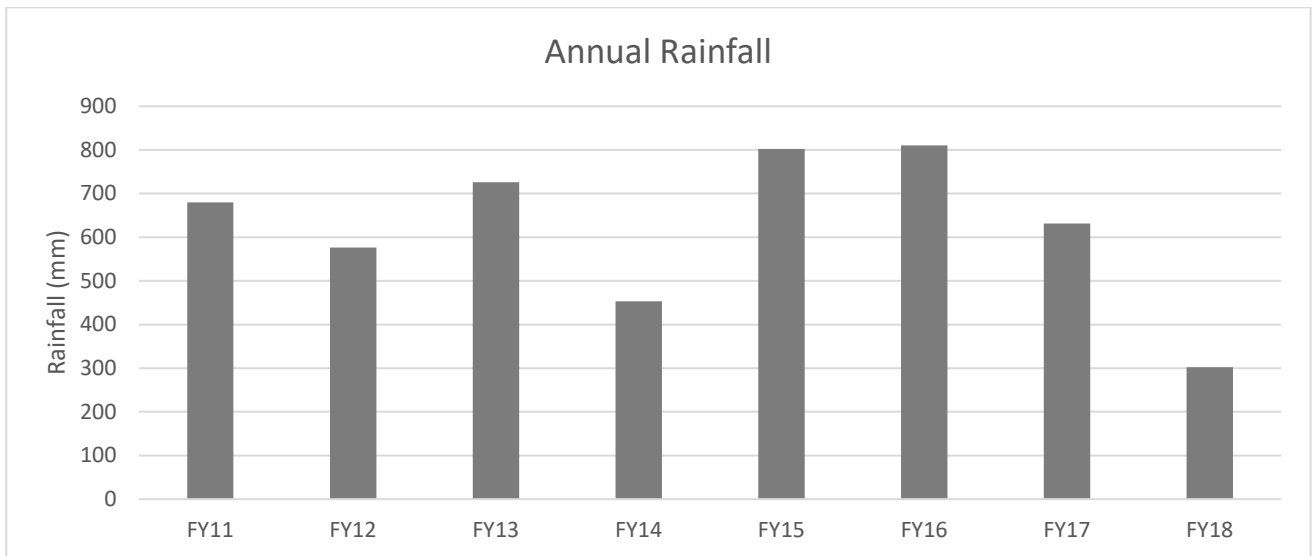


Figure 11: Annual rainfall – Menangle (BOM site #68216).

## 8. REHABILITATION

### 8.1. REHABILITATION FOR THE REPORTING PERIOD

#### Buildings

No rehabilitation of buildings was undertaken during the reporting period.

#### Rehabilitation of Disturbed Land

During the previous reporting period six gas wells were grouted to surface and well sites began rehabilitation with topsoil emplacement and grass seeding. These sites continue to progress to a level of successful rehabilitation. There are no other gas drainage wells in the mining area and no other well rehabilitation has occurred.

Progressive rehabilitation of the West Cliff (Appin North) Emplacement has been undertaken during the reporting period in accordance with the approved West Cliff (Appin North) Coal Wash Emplacement Area Management Plan. Refer to Appendix A: Annual Rehabilitation Report for further detail of the success of the rehabilitation of the Emplacement area. Plan 11 – Land Preparation Plan outlines the rehabilitation undertaken over the reporting period.

The rehabilitation summary is provided in Table 38.



Figure 12: Stage 2 emplacement rehabilitation after two years showing dense cover of shrubs and high native species diversity.

### 8.2. REHABILITATION TRIALS AND RESEARCH

No rehabilitation trials were conducted during the reporting period.

### 8.3. FURTHER DEVELOPMENT OF THE FINAL REHABILITATION PLAN

The BSO Mining Operations Plan (also known as the Rehabilitation Management Plan) addresses the rehabilitation requirements and objectives for all domains associated with the Appin and West Cliff (Appin North) combined BSO. The MOP outlines a range of post land use options that are potentially available for the BSO sites upon completion of operations. The future final land use objectives are yet to be decided upon and agreed due to timing of the eventual closure of BSO related sites. There has been no further development of this plan.

The Rehabilitation Cost Estimate (RCE) for the BSO was reviewed in FY18 according to the latest RCE tool from the DPE, and will be submitted along with this Annual Review.

The latest RCE is attached as Appendix G: Rehabilitation Cost Estimate to this document.

**Table 39: Rehabilitation Status.**

Location	Area Affected/Rehabilitation (ha)		
	Previous Report (FY17)	This Report (FY18)	Forecast (FY19)
A Total Mine Footprint	46580	28377 <sup>6</sup>	28377
B Total Active Disturbance	156	147	147
C Land Being Prepared for Rehabilitation	6	9 <sup>7</sup>	5
D Land Under Active Rehabilitation	26	14	23
E Completed Rehabilitation	36	37	37

<sup>6</sup> Previous years total included Dendrobium mine lease footprint. FY18 total consists of the size of the Project Approval boundary for BSO (BSO mining lease footprint) only.

<sup>7</sup> Landform Establishment & Growth Medium Development phases



## 9. COMMUNITY

At the completion of this reporting period, the Appin Mine (consisting of Appin West, Appin North and Appin East operations) employed close to 1,000 full time employees and contractors.

The closest township to Appin West surface operations is the village of Douglas Park, which is located approximately 4 km to the north west of the surface operations. The current underground mining operations (i.e. Area 7 and Area 9) are located on the outskirts of the Douglas Park village.

The closest township to Appin North surface operations is the village of Appin, which is located approximately 4 km to the north west of the operations.

Appin East Pit Top is located on the outskirts of Appin.

### 9.1. ENVIRONMENTAL COMPLAINTS

During this reporting period 27 complaints were received in relation to BSO operations (including Pit Tops, Mine Safety Gas Drainage projects, and exploration work). Details of the complaints received and the actions taken are provided in Appendix D: BSO Community Complaints Report FY18. A summary of all complaints received across the BSO in FY18 is included Figure 18. An analysis of complaints since 2012 is included in Figure 19.

All complaints received are recorded in the South32 information management system in accordance with the Environmental Protection Licence and Development Consent conditions. The Illawarra Coal Community Call Line is a 24 hour, 7 day per week call centre for enquiries and complaints. A Company representative responds to the contact and liaises with operational personnel to attend to any issue(s) of concern within a reasonable timeframe.

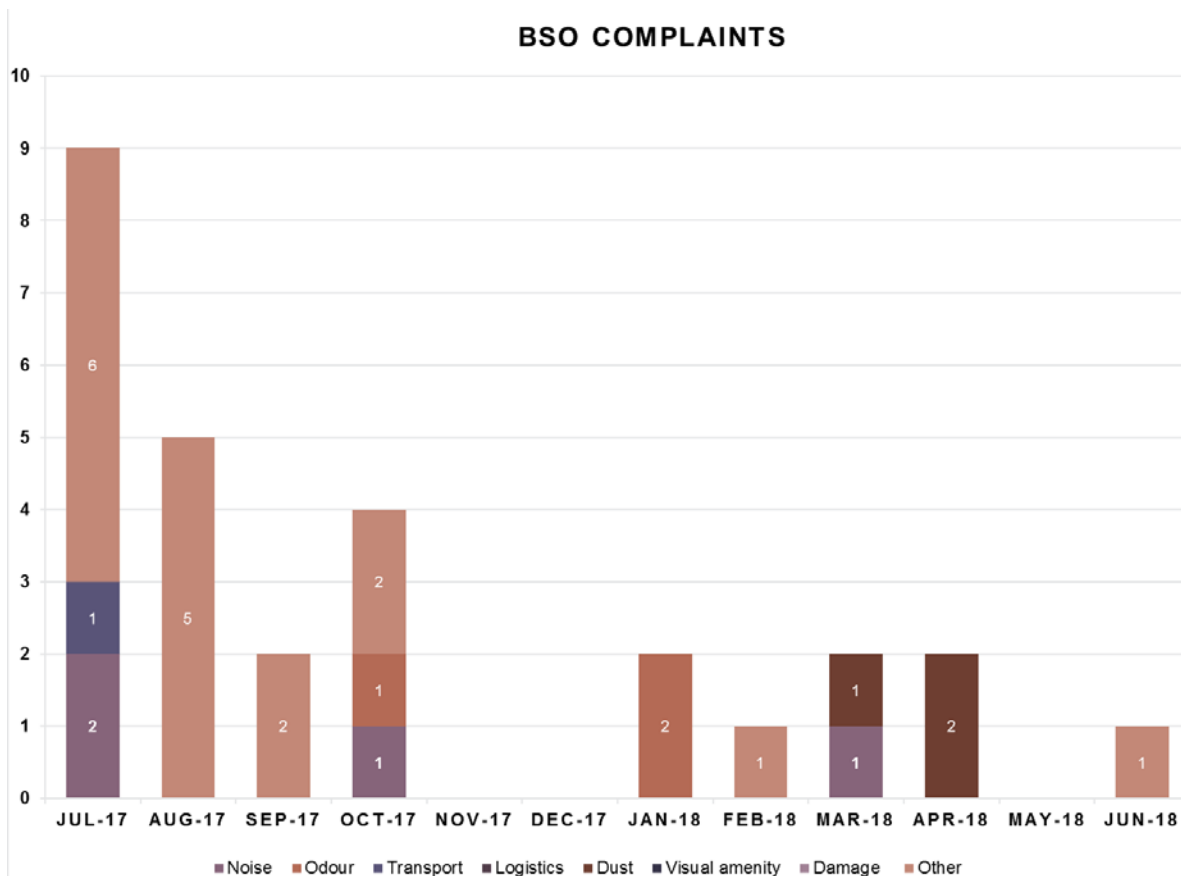


Figure 13: Summary of complaints for FY18.

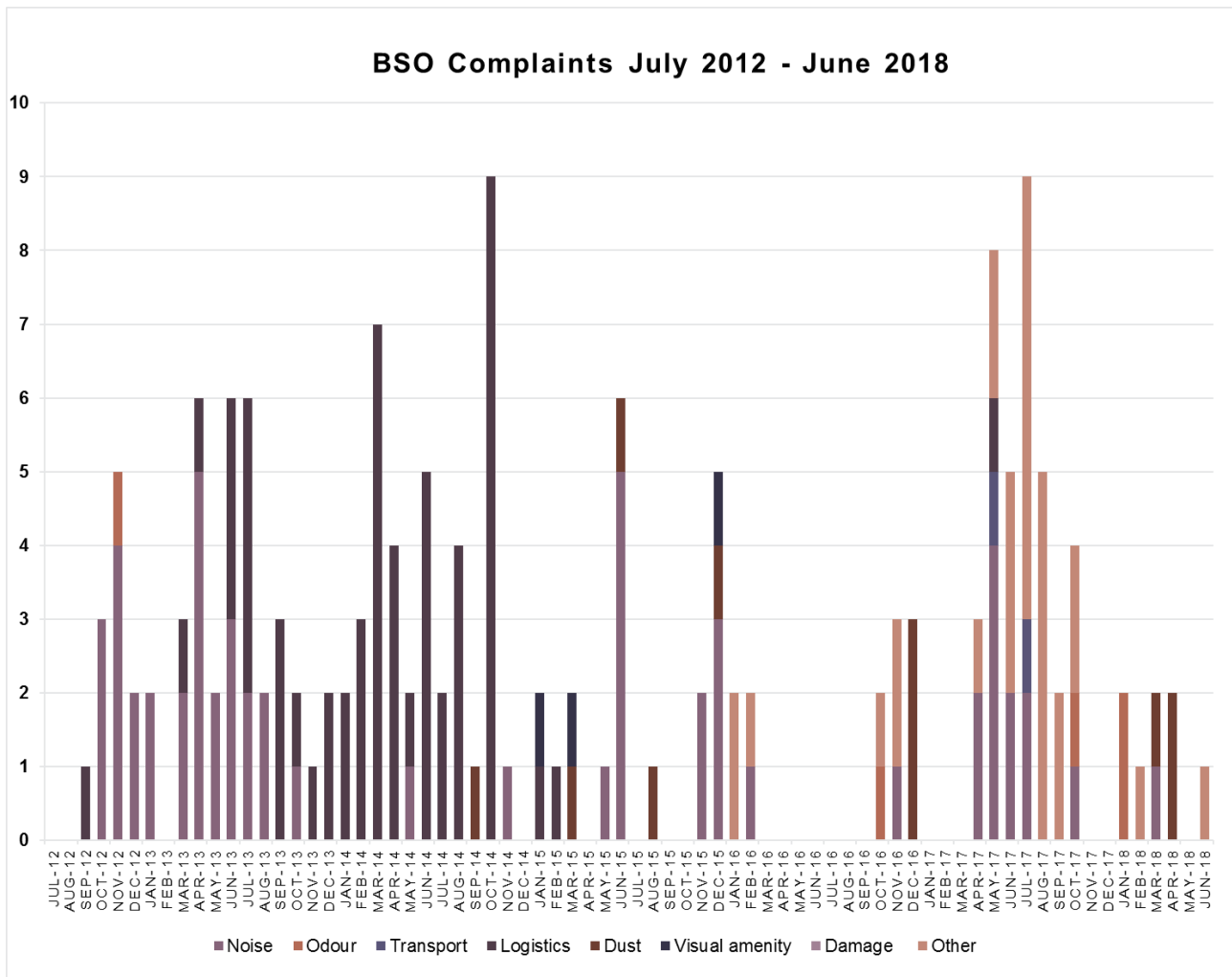


Figure 14: Analysis of community complaints since 2012 for the BSO.

## 9.2. COMMUNITY ENAGEMENT

Illawarra Coal’s External Affairs and Communications team manages regular community engagement activities as per the Illawarra Coal Stakeholder Engagement Management Plan, with the support of operational and functional team members as appropriate. The plan identifies key stakeholders and appropriate communication and engagement methods.

Key regional stakeholders include:

- Communities surrounding the Appin Mine operations;
- Local government;
- State government agencies and authorities including Department of Planning and Environment, Water NSW, Office of Environment and Heritage, Sydney Catchment Authority, Subsidence Advisory NSW and others;
- Employees and contractors;
- Community and Special Interest groups;
- The indigenous community – Tharawal Aboriginal Land Council and others;
- Local schools and volunteer groups; and

- The broader regional community.

Community information is provided in accordance with the Illawarra Coal Stakeholder Engagement Management Plan. Communication methods include:

- Community newsletters via letter box drops;
- Door knocks;
- Media releases and other media activities;
- Community notice boards;
- Community perception surveys;
- The 'Regulatory Information' webpage on the South32 website; and
- Stakeholder group presentations and information sessions.

Illawarra Coal directly manages the following Appin Mine stakeholder committees and working groups:

- Illawarra Coal Community Consultative Committee;
- Douglas Park Advisory Panel; and
- Illawarra Coal Community Partnerships Program Board.

Table 39 provides a summary of the information presented to the Illawarra Coal Community Consultative Committee during the reporting period.

**Table 40: Summary of Information Presented to the Illawarra Coal Community Consultative Committee during the Reporting Period.**

<b>Month</b>	<b>Presentation</b>
August 2017	Discussed the following: Illawarra Coal update on mining operations; Water Filtration Plant upgrade delay; Fogger Cannon trial; Resources Regulator audit of Appin mining and exploration lease areas; South32 Environmental Improvement Program; subsidence impacts; Mine Safety Gas Management; community investment and community complaints to date. Visited the proposed site for the Cumberland Plain Woodland Enhancement Project.
September 2017	Discussed the following: Illawarra Coal update on mining operations; Georges River Environmental Improvement Program; subsidence impacts; community complaints to date; and community investment. Visited the old growth tree site recently protected by South32.
November 2017	Discussed the following: Illawarra Coal update on mining operations; Aquatic Ecology Report; subsidence impacts; Environmental Improvement Program; Mine Safety Gas Management; community complaints to date; Cumberland Plain Woodland Enhancement Project; and community investment. Visited the Appin West Water Filtration Plant.

**Table 40: Summary of Information Presented to the Illawarra Coal Community Consultative Committee during the Reporting Period.**

January 2018	Discussed the following: Illawarra Coal update on mining operations; subsidence impacts; Environmental Improvement Program; Mine Safety Gas Management; Ballast Borehole update; community complaints to date; Cumberland Plain Woodland Enhancement Project; and community Investment.
March 2018	Discussed the following: Illawarra Coal update on mining operations; Appin Water Filtration Plant; subsidence impacts; Ballast Borehole update; proposed Cumberland Plain Woodland Enhancement project in Douglas Park; Mine Safety Gas Management; community complaints to date; Cumberland Plain Woodland Enhancement Project; Mountbatten Stud; exploration activities in the Menangle and Razorback areas and community investment.
April 2018	Special meeting combined with Dendrobium Community Consultative Committee to visit the Appin West Emplacement Area. The following was also discussed: Dendrobium Next Domain Project (outside Appin Mine area); and Western Exploration Area.
May 2018	Discussed the following: Illawarra Coal update on mining operations; Ballast Borehole update; Mine Safety Gas Management; Mountbatten Stud; Exploration and Mine lease boundaries; Western Exploration Area; community complaints to date; and community investment.

The minutes of community meetings are made available to the public on the South32 'Regulatory Information' webpage.

### 9.3. DOUGLAS PARK ADVISORY PANEL

A purpose-formed community representative group, the Douglas Park Advisory Panel, was established by Illawarra Coal in April 2010 to provide input to the preparation of the Ventilation Shaft No. 6 Environmental Assessment. Since approval and commencement of construction, meetings have continued with other local issues discussed including Mine Subsidence. The Douglas Park Advisory Panel operates under agreed Terms of Reference and is facilitated by Illawarra Coal. The Panel comprises 7 representatives of the Douglas Park Township.

Table 40 below provides a summary of the information presented to the Douglas Park Advisory Panel during the reporting period.

**Table 41: Douglas Park Advisory Panel Meetings during the Reporting Period.**

Month	Presentation
August 2017	Discussed the following: Ventilation Shaft 6 update; update on Illawarra coal mining operations; environmental impacts; Mine Safety Gas Management update; Concrete Ballast Borehole Project; Cumberland Plain Woodland Enhancement Program and community investment.
October 2017	Discussed the following: Ventilation Shaft 6 update; update on Illawarra coal mining operations; Mountbatten House condition and heritage management requirements;

**Table 41: Douglas Park Advisory Panel Meetings during the Reporting Period.**

	environmental impacts; Mine Safety Gas Management update; Concrete Ballast Borehole Project; and community investment.
January 2018	Discussed the following: Ventilation Shaft 6 update; update on Illawarra coal mining operations; Mountbatten House condition and heritage management requirements; environmental impacts; Mine Safety Gas Management update; Concrete Ballast Borehole Project; air quality data reporting from Ventilation Shaft 6; and community investment.
March 2018	Discussed the following: Ventilation Shaft 6 update; update on Illawarra coal mining operations; Mountbatten House condition and heritage management requirements; environmental impacts; Mine Safety Gas Management update; Concrete Ballast Borehole Project; changes to the Mine Subsidence Compensation Act; and community investment.
May 2018	Discussed the following: Ventilation Shaft 6 update including dust control management; update on Illawarra coal mining operations and staff changes; environmental impacts including groundwater piezometer readings; Mine Safety Gas Management update; Concrete Ballast Borehole Project; Future exploration licence project; overview of Bulli Seam faults and dykes; and community investment.

During the reporting period, members of the Douglas Park Advisory Panel were also kept informed of operational matters relating to Appin Mine operations in Douglas Park through email updates.

#### **9.4. COMMUNITY PARTNERSHIPS PROGRAM**

Illawarra Coal has an overriding commitment to supporting the communities in which we operate. As part of this commitment, we established the Illawarra Coal Community Partnerships Program (CPP) to provide support for community projects and initiatives in the regions surrounding our Bulli Seam Operations.

Since being established in 2004, the program has provided support to a range of community groups and not-for-profit organisations.

The CPP is funded by three cents per saleable tonne of coal from Illawarra Coal's Bulli Seam Operations. The program is administered by a board of community and Illawarra Coal representatives, which ensures community-based decision making on the allocation of funds.

During the past 12 months the Board has committed over \$124,000 for community projects in the local Wollondilly area.

Some local not-for-profit groups to benefit from program funding in 2017/18 included:

- Lifeline Macarthur – Telephone Crisis Support Training Course;
- Douglas Park Reserve – Terracing of slopes;
- Appin Historical Society – Upgrade to Appin Memorial park; and
- Appin Public School – Mobile computer lab.

The CPP Board continued its support for Life Education with funding to Appin, Douglas Park and Wilton Public Schools to enable children to visit the Life Education mobile learning centre. Life Education aims to empower the young to make the best choices for a safe life, through leading drug and health education programs. Illawarra Coal has supported Life Education in the Wollondilly area since 2008.

## **9.5. CAMP QUALITY CONVOY**

For the thirteenth consecutive year, Illawarra Coal has helped raise money for children with cancer and launch another successful i98FM Illawarra Convoy. Held in November 2017, Appin North's access road became the muster ground and starting point for the Convoy and the mine's external truck movements were stopped for approximately five hours to avoid heavy traffic travelling in opposite directions on the mine access road. More than 714 trucks and 927 motorbikes participated in the Convoy which is organised by local radio station i98FM. The event raises funds for the Illawarra Community Foundation which assists families living in the Illawarra and South Coast regions experiencing potentially life-threatening illness gain access to a variety of activities and resources.

Over \$1.9 million was raised during the 2017 Convoy, with over \$11 million raised since the inaugural event in 2005.

## **9.6. COMPLAINTS/ENQUIRIES MANAGEMENT**

Illawarra Coal maintains a 24-hour Community Call Line and a general email address. These avenues are promoted as the primary point of contact throughout Illawarra Coal's suite of communications for persons who seek to lodge a complaint or make a general enquiry.

Complaints and enquiries are recorded in an internal event reporting system, and processes are in place ensure the complaint / enquiry is responded to within 24hours and actioned in a timely manner. Complaints and resolutions are reported on the South32 website each month in the Community Complaints Report.

All complaints recorded during the reporting period are attached as Appendix D: BSO Community Complaints Report FY18.

## 10. INDEPENDENT AUDIT

The Illawarra Coal Environmental Management System has been certified to the International Standard ISO14001 since May 2003. The BSO operations were recertified with ISO14001 environmental certification following an external audit in February 2018.

The Appin East (Central) and West sites, West Cliff (Appin North) Colliery and the West Cliff (Appin North) CPP are included in Illawarra Coal's schedule of certified ISO 14001:2015 sites. Each of these operational sites, as well as the Emplacement Area has been regularly audited for compliance against this Standard.

KPMG undertook a reasonable assurance audit for NGER (National Greenhouse and Energy Reporting) for the reporting period.

The audits/management reviews undertaken during the reporting period are provided in Table 41.

**Table 42: Environmental Audits Undertaken During Reporting Period**

Date	Type	Internal	External	Comments
Feb 2018	Annual ISO14001		x	Recertified
Ongoing	Management plan governance checks (Internal EMS audits)	x		

The auditing process requires demonstration of adequacy of systems to manage environmental aspects and impacts related to site activities. The systems audited include legal compliance, document control, records, corrective action, monitoring and control, training and management of risks.

An Independent Environmental Audit of the BSO is undertaken every three years. The most recent Audit was conducted in January-March 2017. The review identified 10 medium level non-conformances, 5 administrative non-conformances and 5 observations. Eight of the ten non-conformances related to exceedances of water discharge concentration limits; the other two reported non-conformances related to project noise exceedances.

There are no remaining actions to address outstanding recommendations made in the 2017 Independent Environmental Audit Report.

## **11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD**

There were no reportable environmental incidents during the reporting period.

Please refer to the following reports for compliance information:

Appendix C: 2017/18 EPA Annual Return for details of non-compliances against EPL2504.

Appendix E: BSO EPBC Approval 2010/5350 Compliance Report; and

Appendix F: BSO Consent Compliance Report and Summary of Non-compliances



## **12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD**

### **12.1. MINE OPERATIONS**

During the next reporting period underground operations will continue in Area 7 and Area 9.

### **12.2. PROJECTS**

The Appin West Water Filtration Plant will continue to be upgraded with expected completion in November FY19.

Underground construction, service borehole works and electrical commissioning activities at the Vent Shaft 6 concrete/ballast borehole will occur in FY19.

The Appin North (Westcliff) administration building will undergo modifications in FY19 to increase office space.

### **12.3. ENVIRONMENTAL MANAGEMENT**

The next reporting period will have the following activities:

- Commissioning of the upgraded Appin West Water Filtration Plant;
- Continuation of the Environment Improvement Program (EIP2) to improve water quality and aquatic health in the Georges River downstream of licensed discharge point 10 (refer to section 6.3 of this report), including new water quality limits for LDP10 by June, 2019;
- Continuation of *Persoonia hirsuta* Research Program; and
- Continually improving process control systems for BCD discharge.

## 13. REFERENCES

Illawarra Coal, Bulli Seam Operations Air Quality and Greenhouse Gas Management Plan

Illawarra Coal, Bulli Seam Operations Environmental Management Strategy

Illawarra Coal, BSO Mining Operations Plan – October 2012 – September 2019

Illawarra Coal, West Cliff Stockpile and Slope Stability Management Plan.

Illawarra Coal, BSO Water Management Plan.

Illawarra Coal, West Cliff Coal Wash Emplacement Area Management Plan.

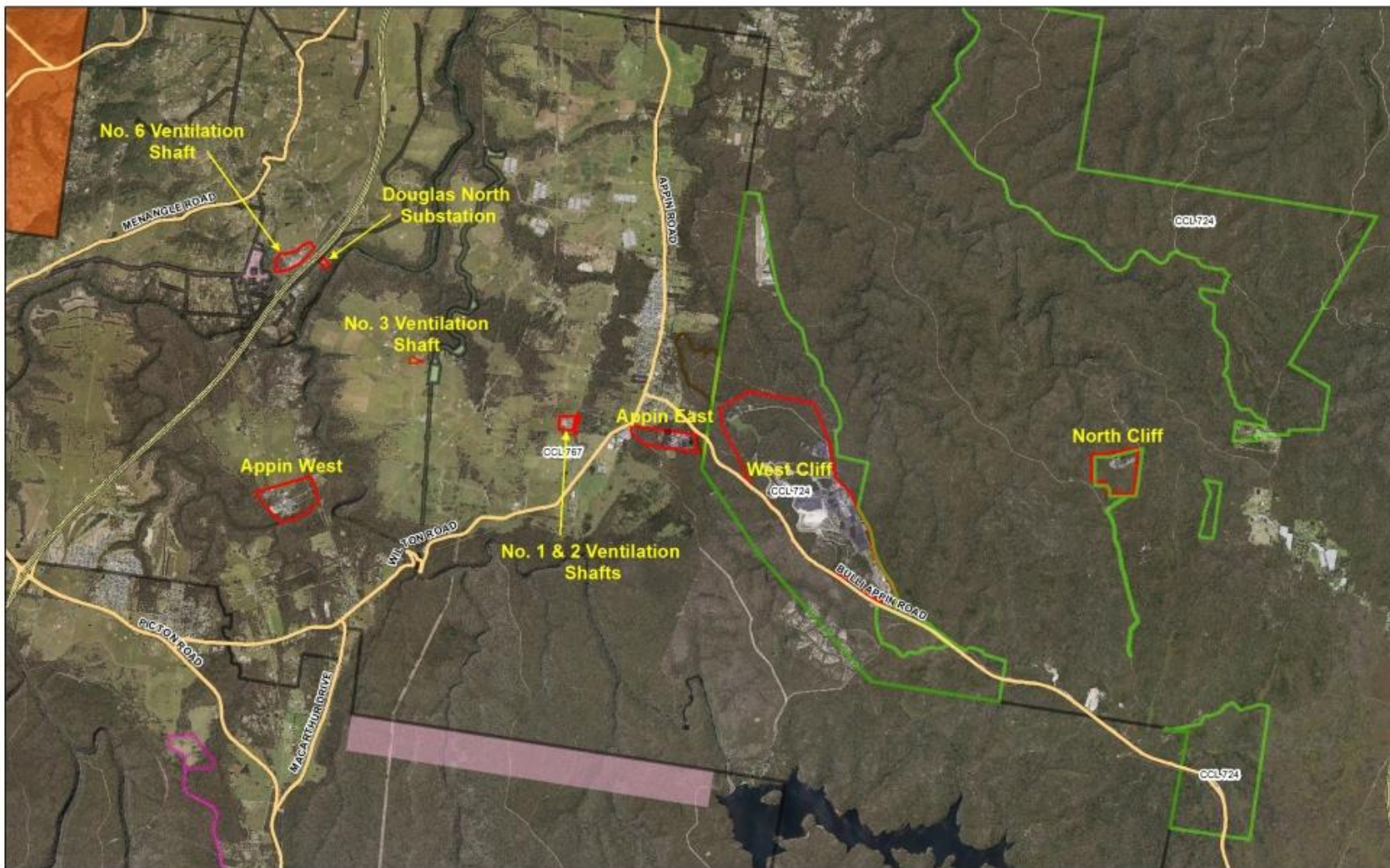
Illawarra Coal, BSO Waste Management Plan.

NSW Department of Planning & Environment (2015). Annual Review Guideline, Post approval requirements for State Significant Developments, October 2015.

NSW EPA (2016), Environment Protection Licence No.2504.

## **14. PLANS**

### **PLAN 1 - REGIONAL LOCATION PLAN**



Illawarra Coal

**Legend**

	CCL 724		CL 381		ML 1433		ML 1566		ML 1698		Domain Boundaries
	CCL 767		CL 388		ML 1473		ML 1574		MPL 200		
	CCL 768		ML 1382		ML 1510		ML 1678		MPL 201		

**Bulli Seam Operations**

Regional Location Plan

Date: Jan. 2016  
Author: D. Gregory

Horizontal Datum  
MGA - Zone 56



**PLAN 2 - APPIN EAST (CENTRAL) MINE SITE**



	<b>Legend</b>				
	<ul style="list-style-type: none"> <li><span style="color: green;">●</span> Noise Monitoring</li> <li><span style="color: purple;">▲</span> Discharge Volume Monitor</li> <li> Dust</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: green;">●</span> HVAS</li> <li><span style="color: blue;">★</span> Meteorological Monitoring Station</li> <li> Spillway Overflow</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: blue;">◆</span> Surface Water Monitor</li> <li><span style="color: orange;">◆</span> Temperature</li> <li> Potentially Contaminated Surface Water</li> <li> Overland Flow</li> </ul>	<ul style="list-style-type: none"> <li><span style="border: 1px solid red; display: inline-block; width: 10px; height: 10px;"></span> Domain Boundary</li> <li><span style="color: red;">●</span> Chemical Storage</li> </ul>	
<b>Bulli Seam Operations</b> Annual Environmental Management Report Appin East		Date: 20th of August, 2015 Author: B. Davis		Horizontal Datum MGA - Zone 56	
Plan No. - HSE 2012-133-REV-1					


**PLAN 3 – APPIN WEST MINE SITE**





**PLAN 4 – NO.1 & NO.2 SHAFT SITE**



	<b>Legend</b>	<ul style="list-style-type: none"> <li><span style="border: 1px solid black; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Cadastral Parcels</li> <li><span style="background-color: #f0f0f0; border: 1px solid black; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Crown Land</li> <li><span style="border: 2px solid red; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Domain Boundary</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: blue; font-weight: bold;">—</span> Creeks</li> <li><span style="color: yellow; font-weight: bold;">—</span> Bull Seam 5m Contours</li> </ul>		


Responsible Officer	Job Title	Date
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**Bulli Seam Operations**  
 Annual Environmental Management Report  
 Domain 6 - Appin No. 1 & No. 2 Shafts

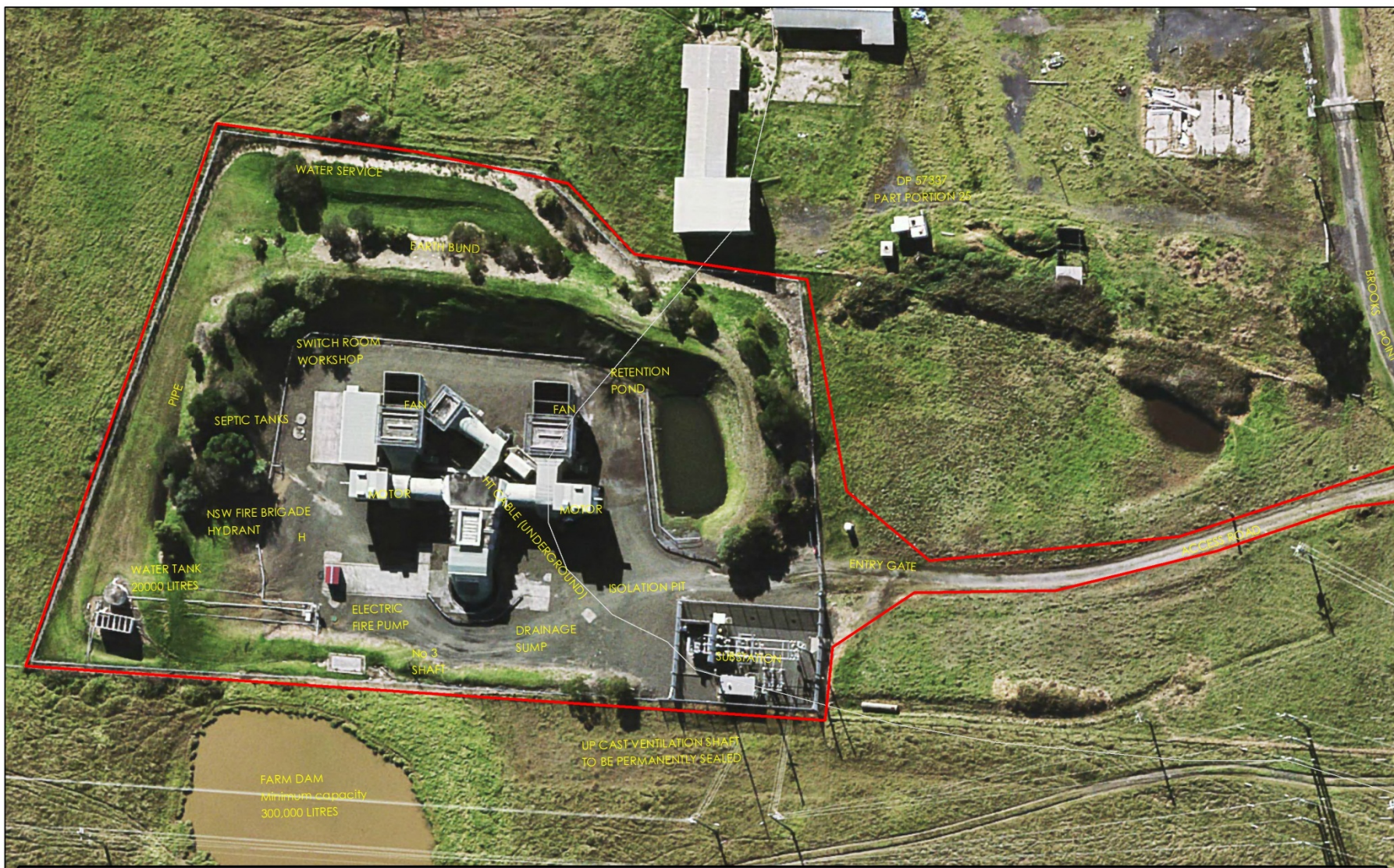
Date: 20th of August, 2015  
 Author: B. Davis

Horizontal Datum  
 MGA - Zone 56

Plan No. - HSE-2012-136-REV-1



**PLAN 5 – NO.3 SHAFT SITE**



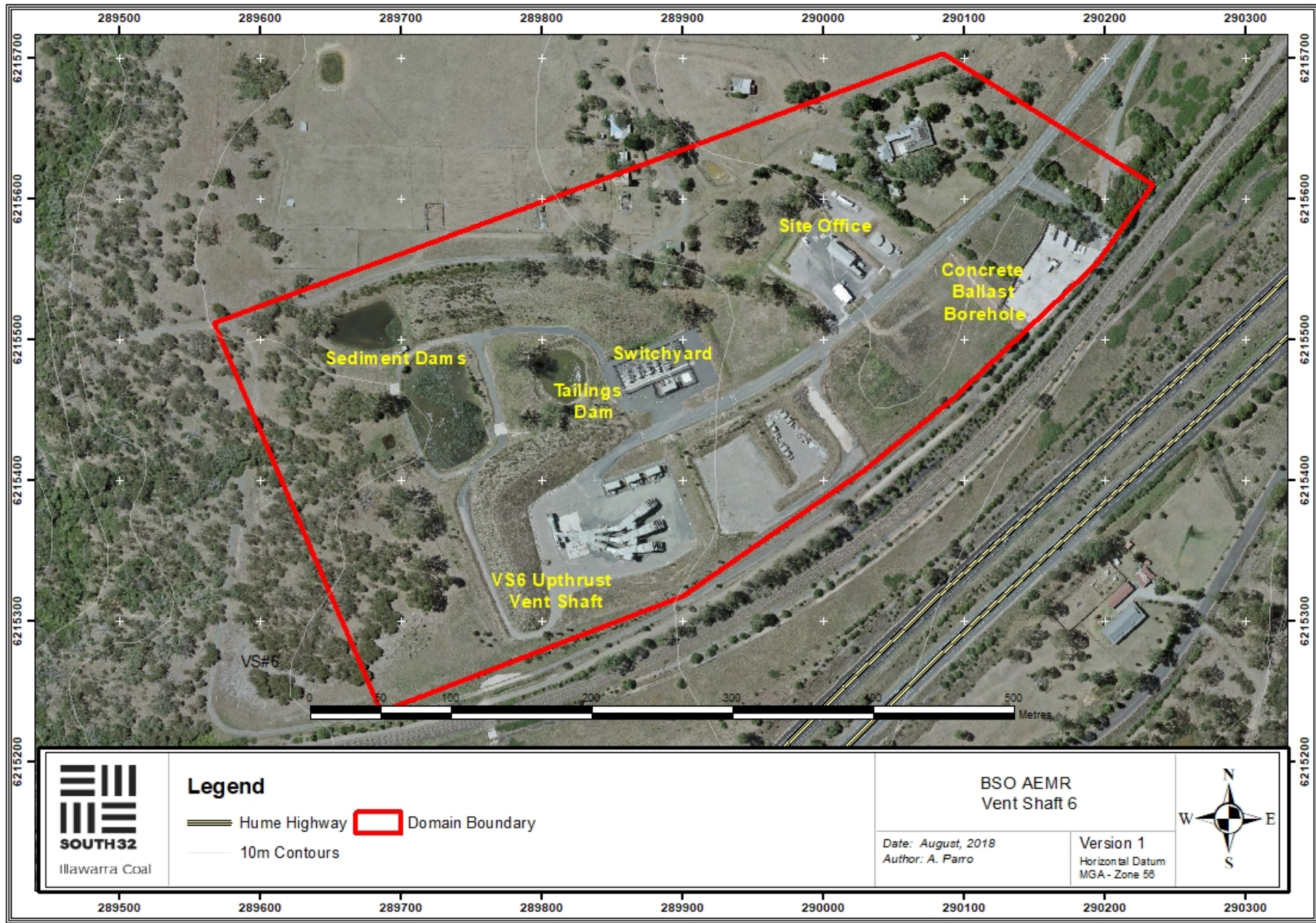
**Legend**  
 Domain Boundary     Overall 10m Contours

**Bulli Seam Operations**  
**Annual Environmental Management Report**  
**Vent Shaft No.3**

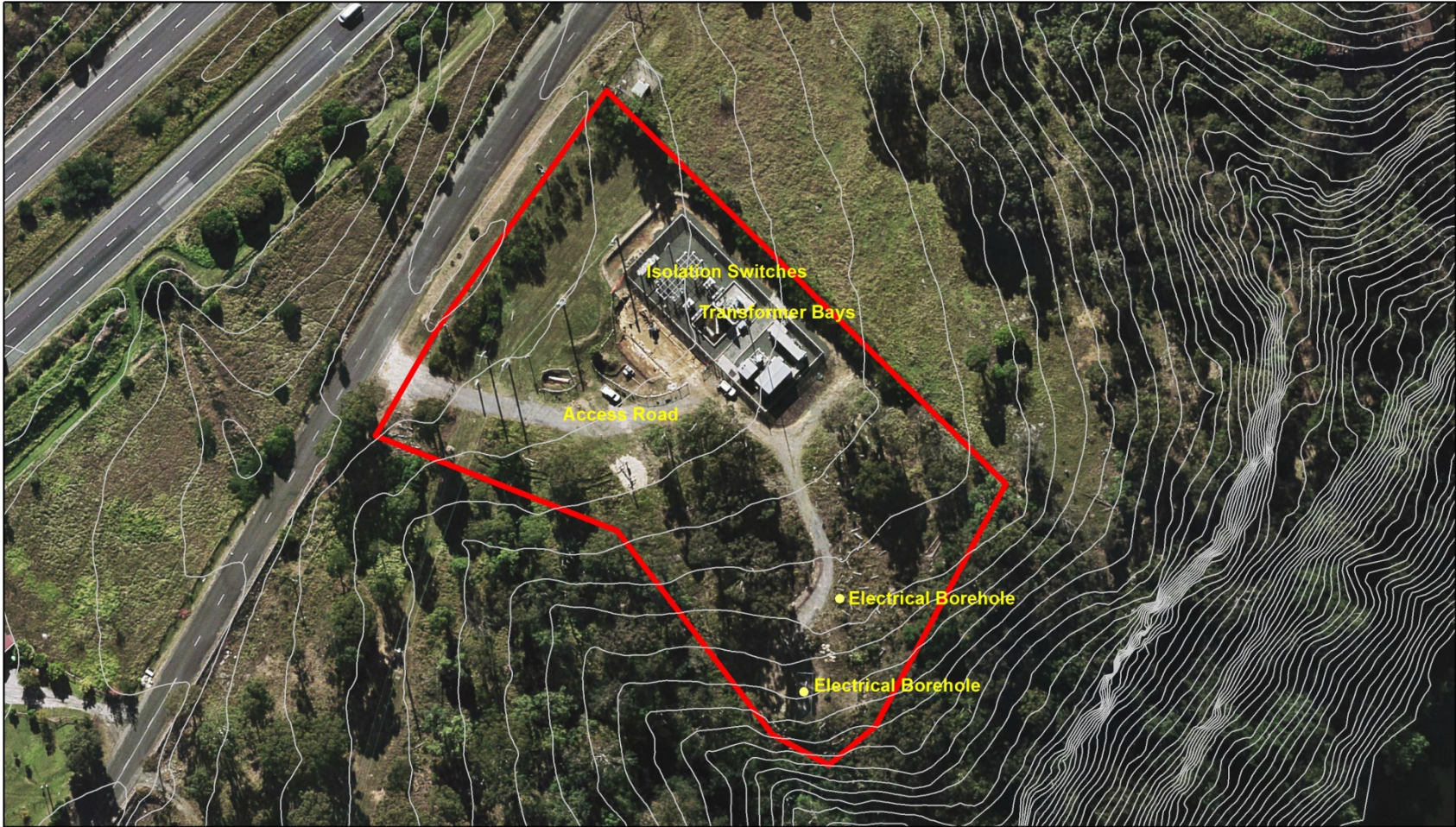
Date: 24th of August, 2015 Author: D. Thomas	Horizontal Datum MGA - Zone 56
Plan No. - HSE-2012-134-REV-1	





**PLAN 6 – NO.6 SHAFT SITE**

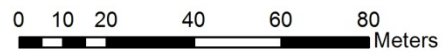


**PLAN 7 – DOUGLAS NORTH SUBSTATION**



**Legend**

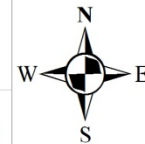
-  1m Contours
-  Domain Boundary



**Douglas North Substation**

Date: 20th of August, 2015  
 Author: B. Davis

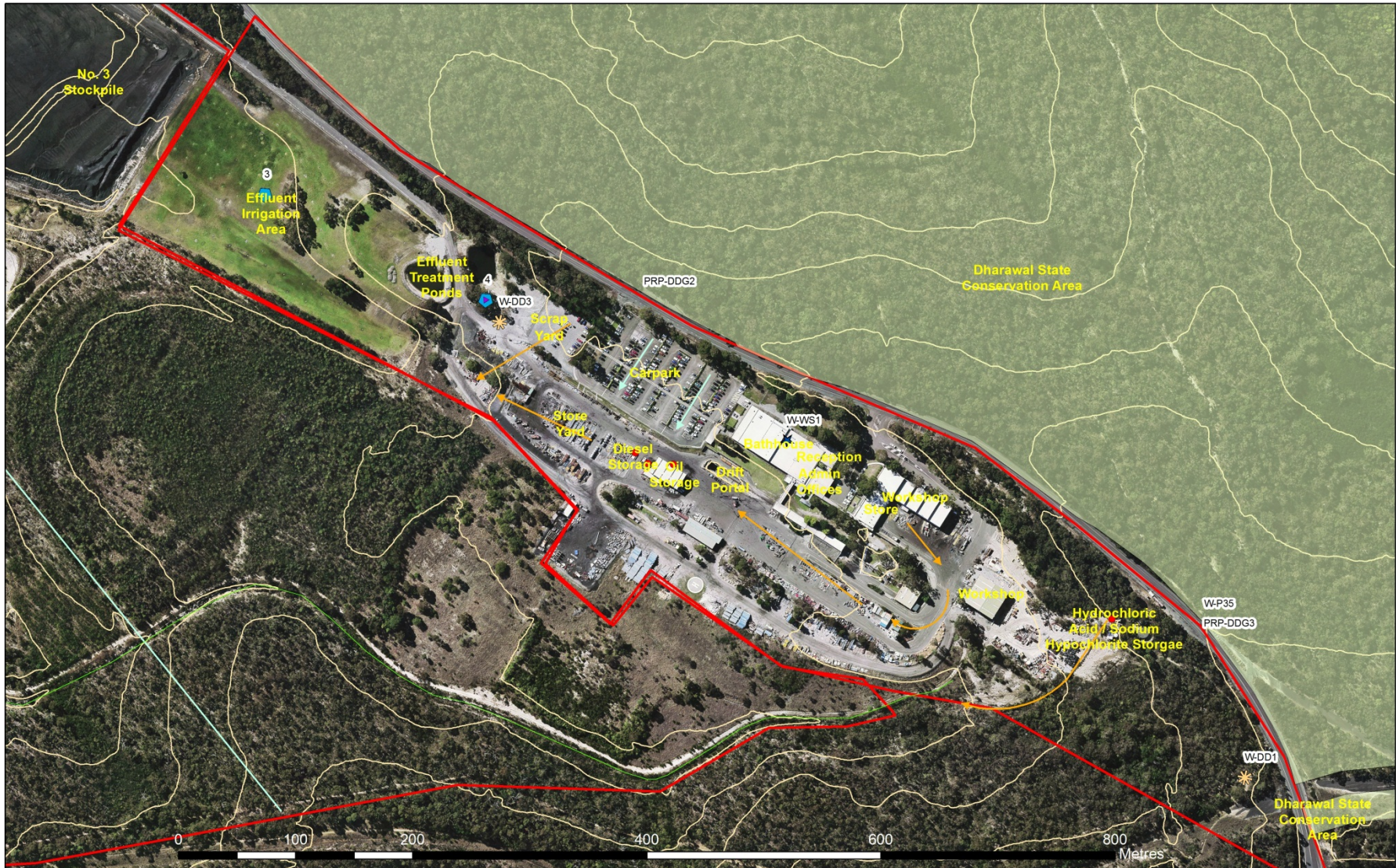
Version 1  
 Horizontal Datum  
 MGA - Zone 56



HSE-2014-139-Rev 1

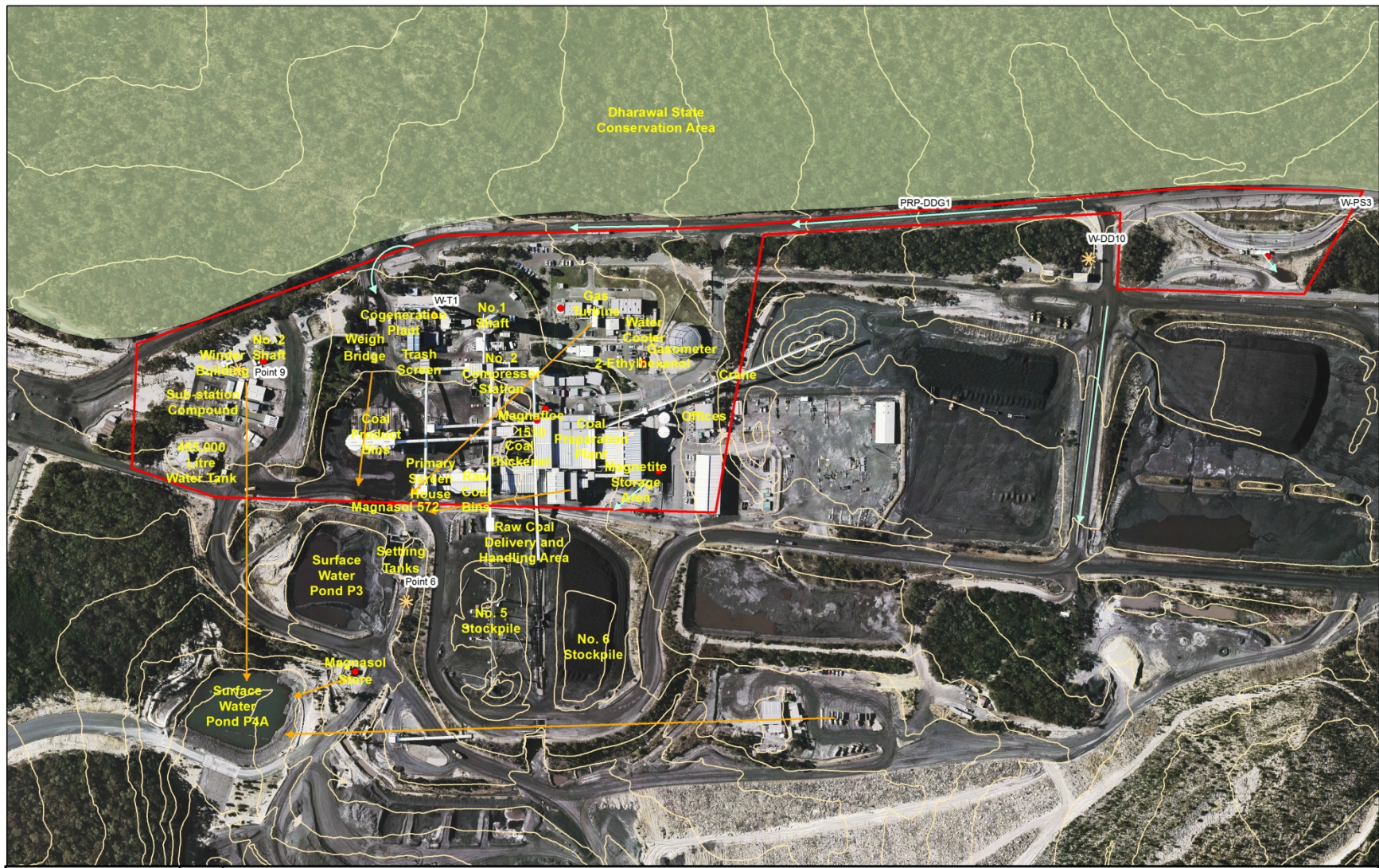


**PLAN 8 – WEST CLIFF SOUTH SITE**



	<b>Legend</b>			
	<ul style="list-style-type: none"> <li> Discharge Volume Monitor</li> <li> Dust</li> <li> HVAS</li> <li> Meteorological Monitoring Station</li> </ul>	<ul style="list-style-type: none"> <li> Noise Monitor</li> <li> Spillway Overflow</li> <li> Surface Water Monitor</li> <li> Temperature</li> </ul>	<ul style="list-style-type: none"> <li> Potentially Contaminated Surface Water</li> <li> Diverted Natural Flow</li> <li> Overland Flow</li> </ul>	
<b>Bulli Seam Operations</b> <b>Annual Environmental Management Report</b> <b>West Cliff South</b>				
Date: 20th of August, 2015 Author: B. Davis		Horizontal Datum MGA - Zone 56		
Plan No. - HSE-2012-132-REV-1				

**PLAN 9 – WEST CLIFF NORTH SIDE**



	<b>Legend</b>		
	<ul style="list-style-type: none"> <li> Discharge Volume Monitor</li> <li> Dust</li> <li> HVAS</li> <li> Meteorological Monitoring Station</li> </ul>	<ul style="list-style-type: none"> <li> Noise Monitor</li> <li> Spillway Overflow</li> <li> Surface Water Monitor</li> <li> Temperature</li> </ul>	<ul style="list-style-type: none"> <li> Potentially Contaminated Surface Water</li> <li> Overland Flow</li> <li> West Cliff North</li> <li> Chemical Storage</li> </ul>

**Bulli Seam Operations**  
**Annual Environmental Management Report**  
**West Cliff North**

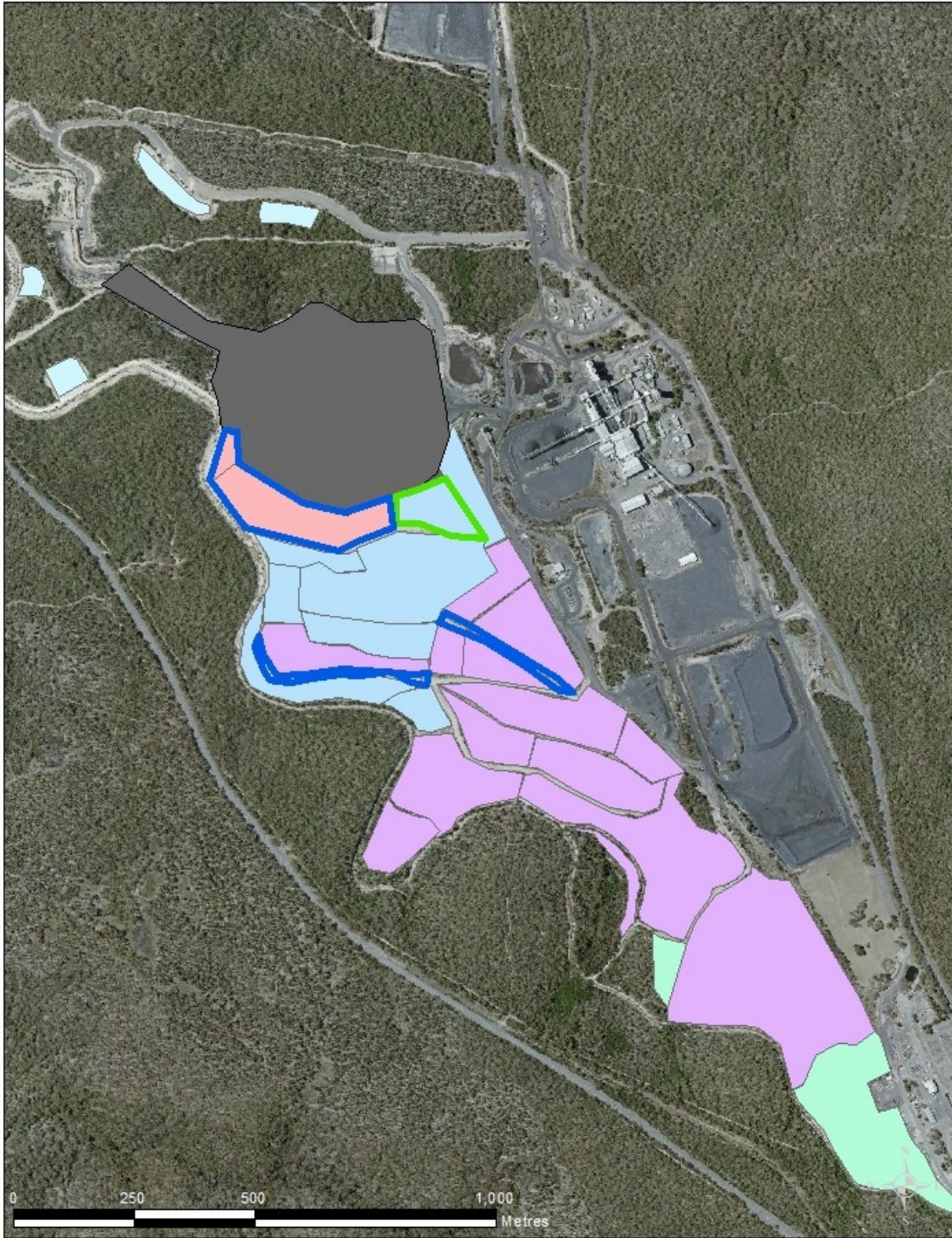
Date: 20th of August, 2015	Horizontal Datum MGA - Zone 56
Author: B. Davis	
Plan No. - HSE-2012-131-REV-1	



**PLAN 10 – NORTH CLIFF SITE**



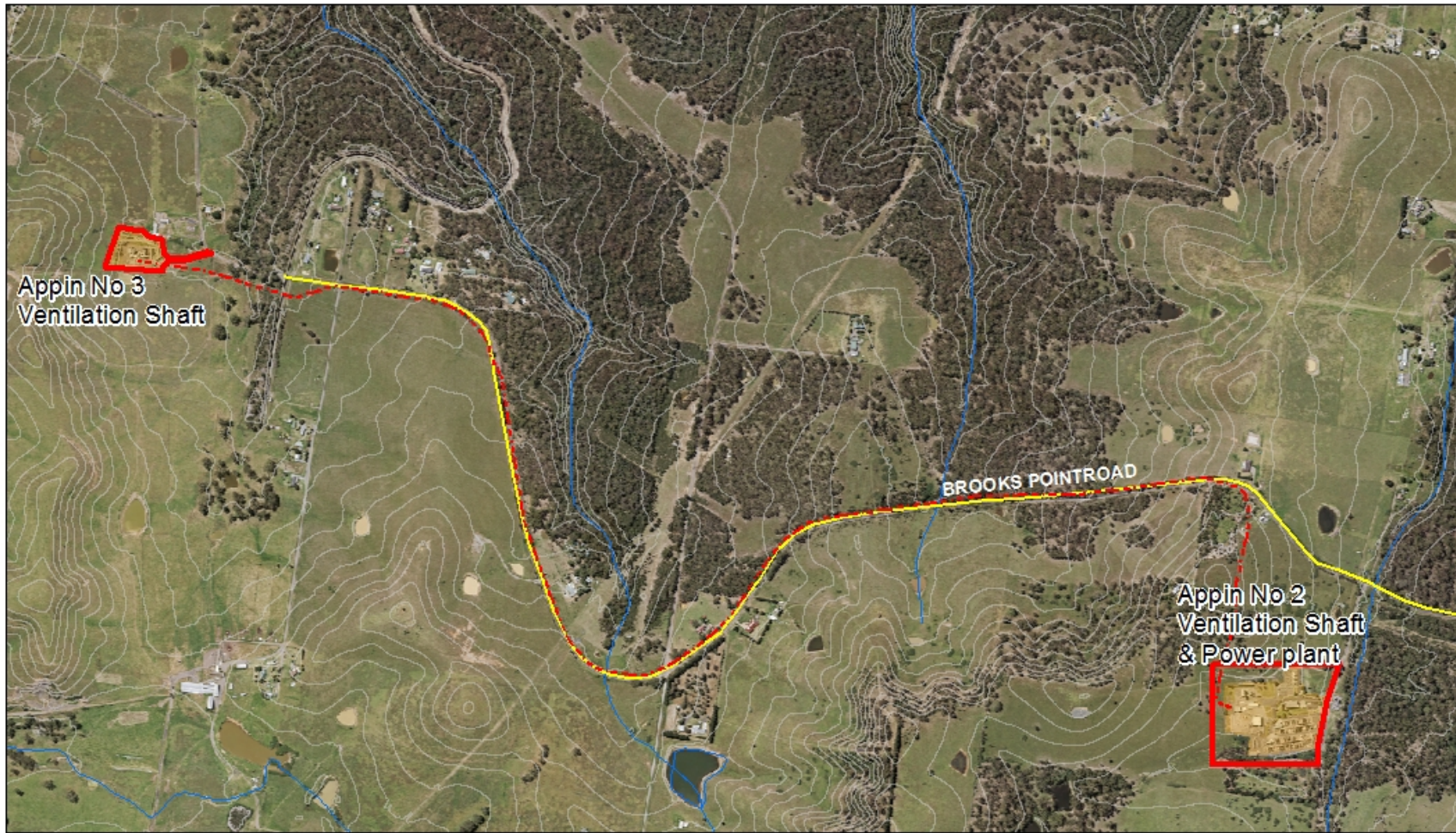
**PLAN 11 – LAND PREPARATION PLAN – WEST CLIFF EMBLACEMENT**



 <b>SOUTH32</b> Illawarra Coal	<b>Legend</b> <ul style="list-style-type: none"> <li><span style="border: 2px solid blue; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Rehabilitation Works (Seeding) Planned for FY19</li> <li><span style="border: 2px solid green; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Rehabilitation Works (Seeding) in FY18</li> <li><span style="background-color: grey; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Active Coalwash Emplacement</li> <li><span style="background-color: lightblue; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Soil Stockpile</li> <li><span style="background-color: pink; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Ecosystem and Land Use Development</li> <li><span style="background-color: lightblue; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Ecosystem and Land Use Establishment</li> <li><span style="background-color: red; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Growth Media Development</li> <li><span style="background-color: lightgreen; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Landform Establishment</li> </ul>		<b>Land Preparation Plan West Cliff Emplacement</b>	
	Date: July, 2018 Author: D. Gregory		Version 1 Horizontal Datum MGA - Zone 56	

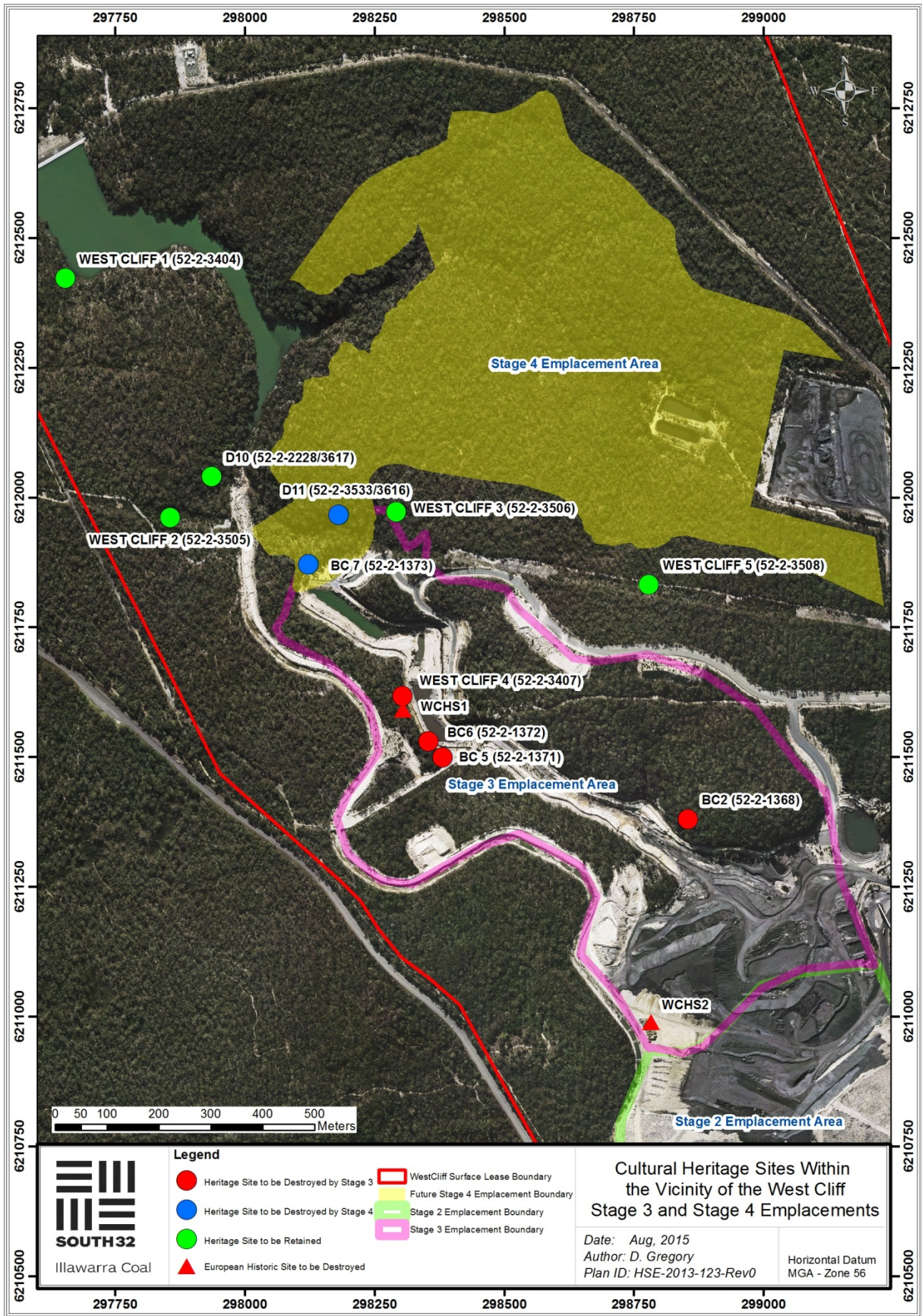


**PLAN 12 – APPIN EAST GAS DRAINAGE PLANT AND PIPELINE UPGRADE**

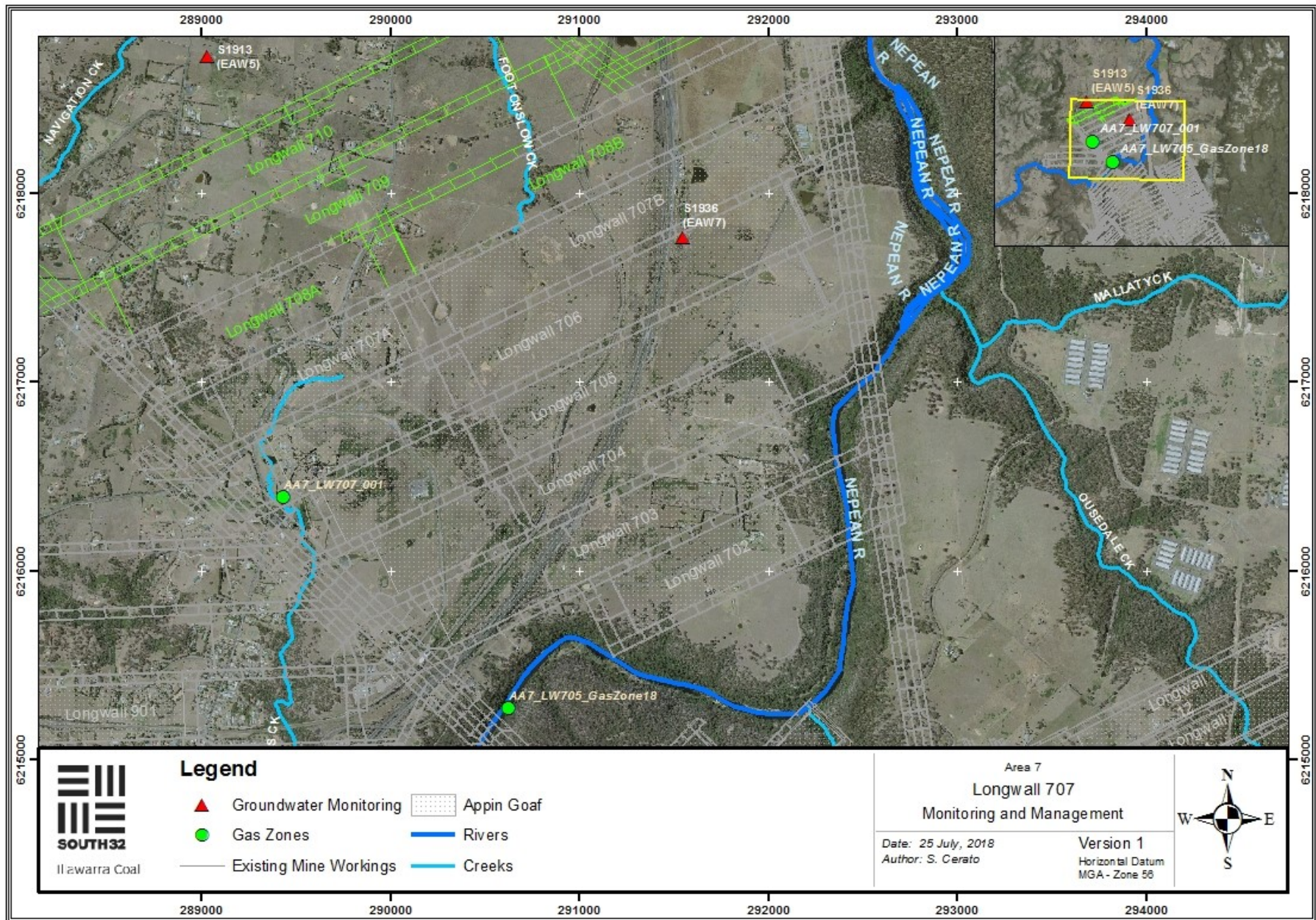


 <p>SOUTH32 Ilzwarra Coal</p>	<p><b>Legend</b></p> <ul style="list-style-type: none"> <li><span style="color: yellow;">—</span> Brooks Point Road</li> <li><span style="color: red; border-bottom: 1px dashed red;">—</span> Appin East Gas Drainage Pipeline</li> <li><span style="color: blue;">—</span> Creeklines</li> <li><span style="border: 1px solid red; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> Domain Boundaries</li> <li><span style="border-bottom: 1px solid gray; width: 15px; display: inline-block; vertical-align: middle;"></span> 5m Contours</li> </ul>	<p>BSO Annual Review Appin East Gas Drainage Plant Upgrade</p>		
		<p>Date: 20 September, 2017 Author: A. Parro</p>	<p>Version 1 Horizontal Datum MGA - Zone 56</p>	

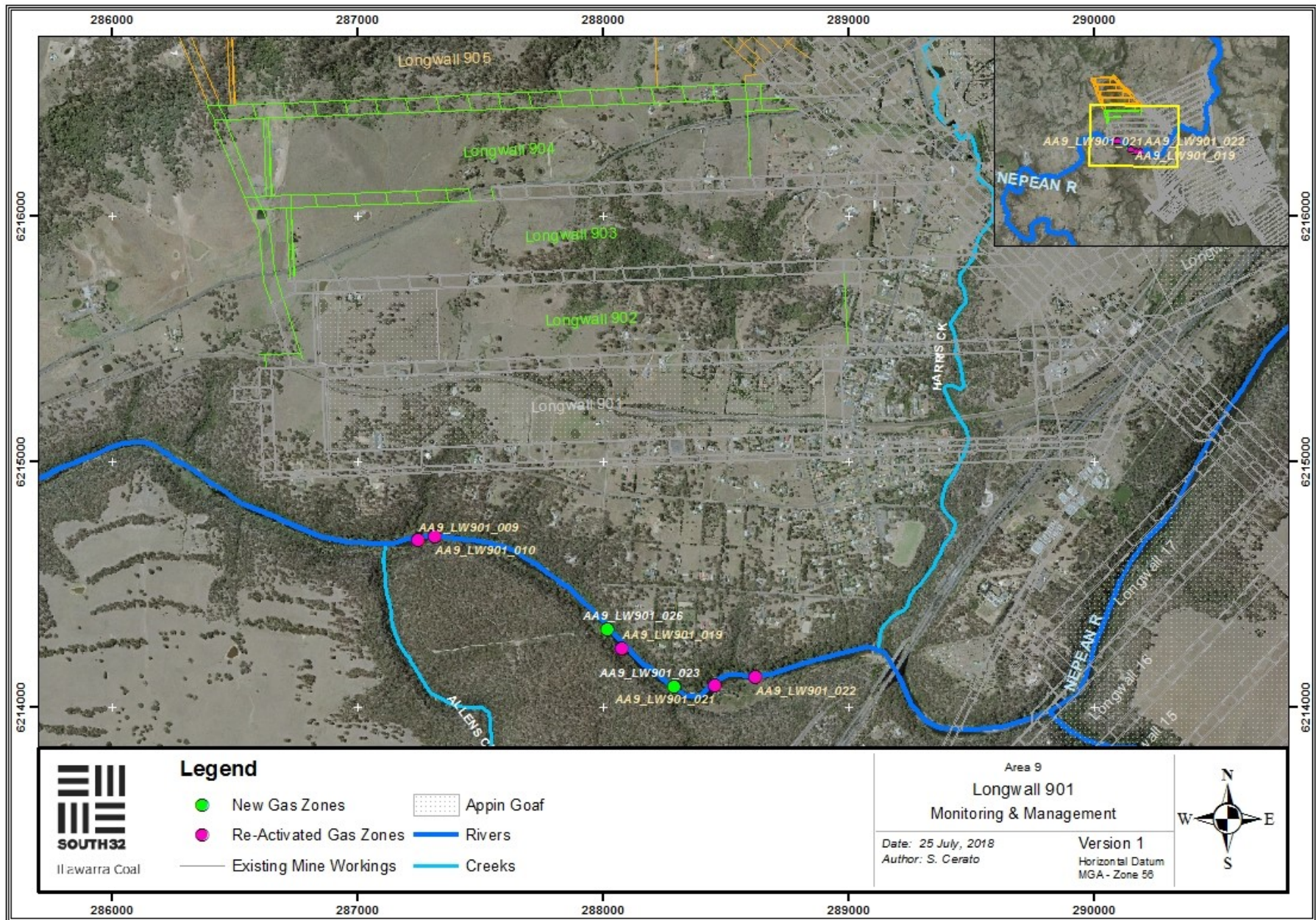
**PLAN 13 – WEST CLIFF EMBLACEMENT CULTURAL HERITAGE SITES**



**PLAN 14 – APPIN AREA 7 FY18 SUBSIDENCE IMPACTS**

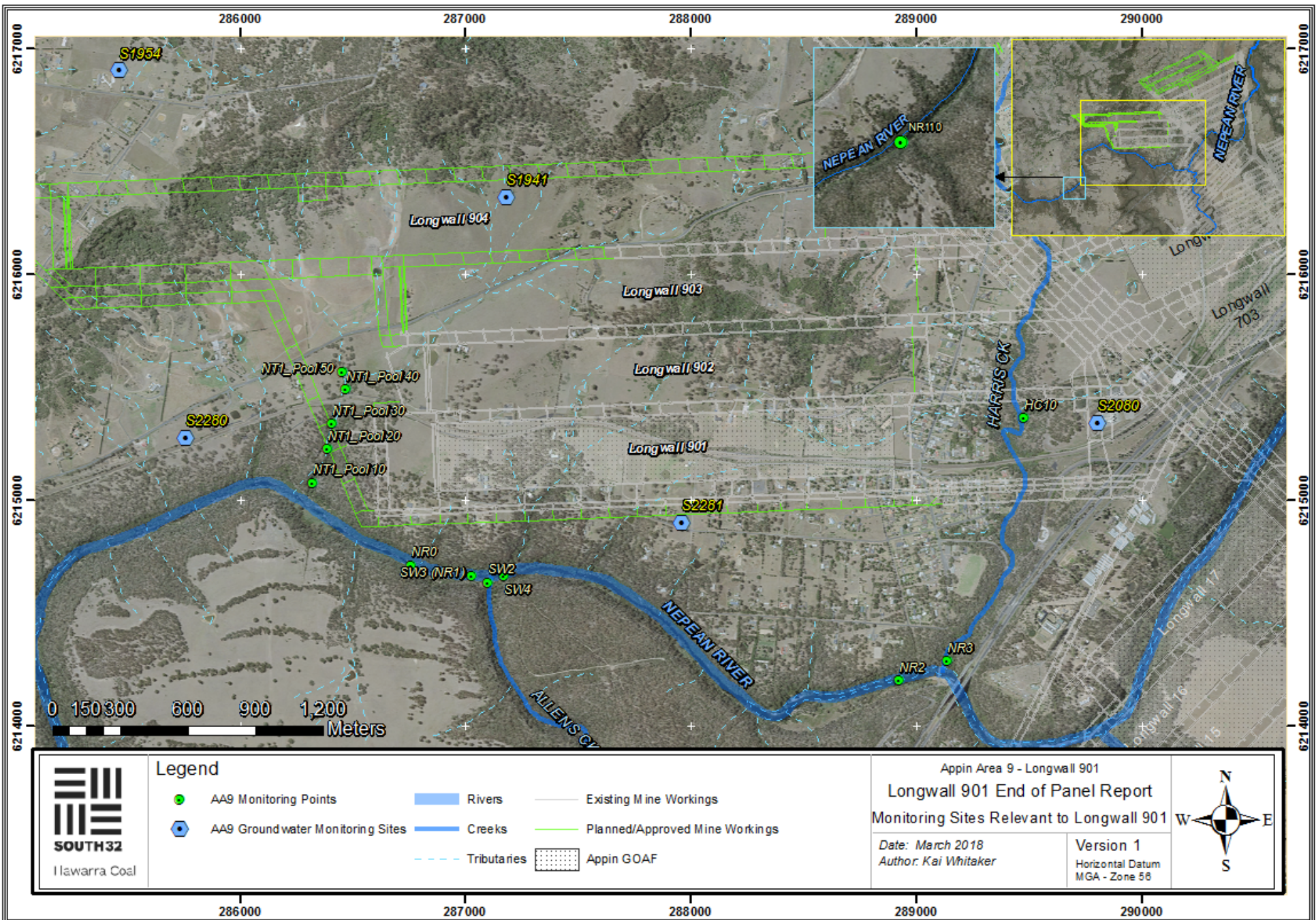


**PLAN 15 – APPIN AREA 9 FY18 SUBSIDENCE IMPACTS**

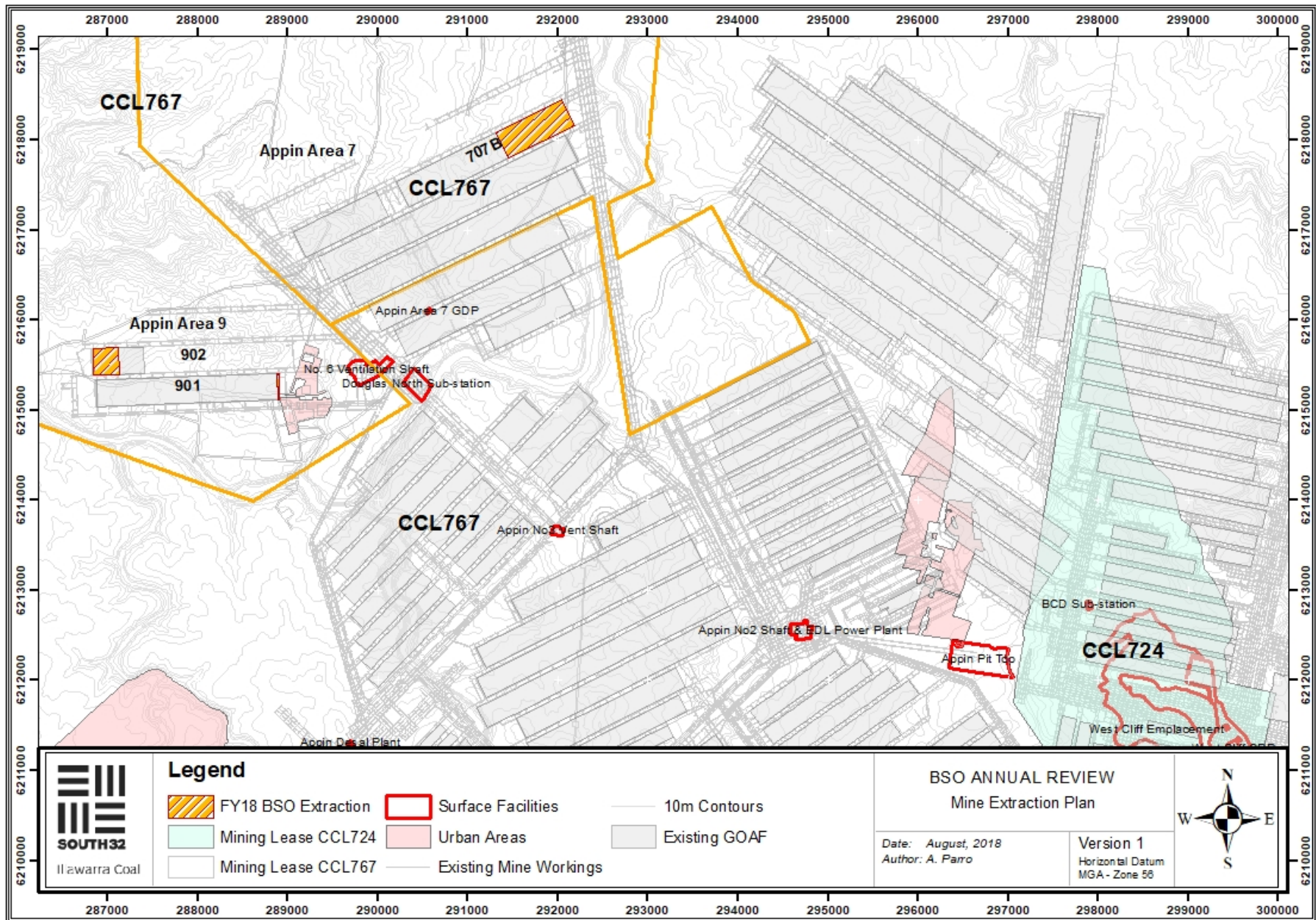




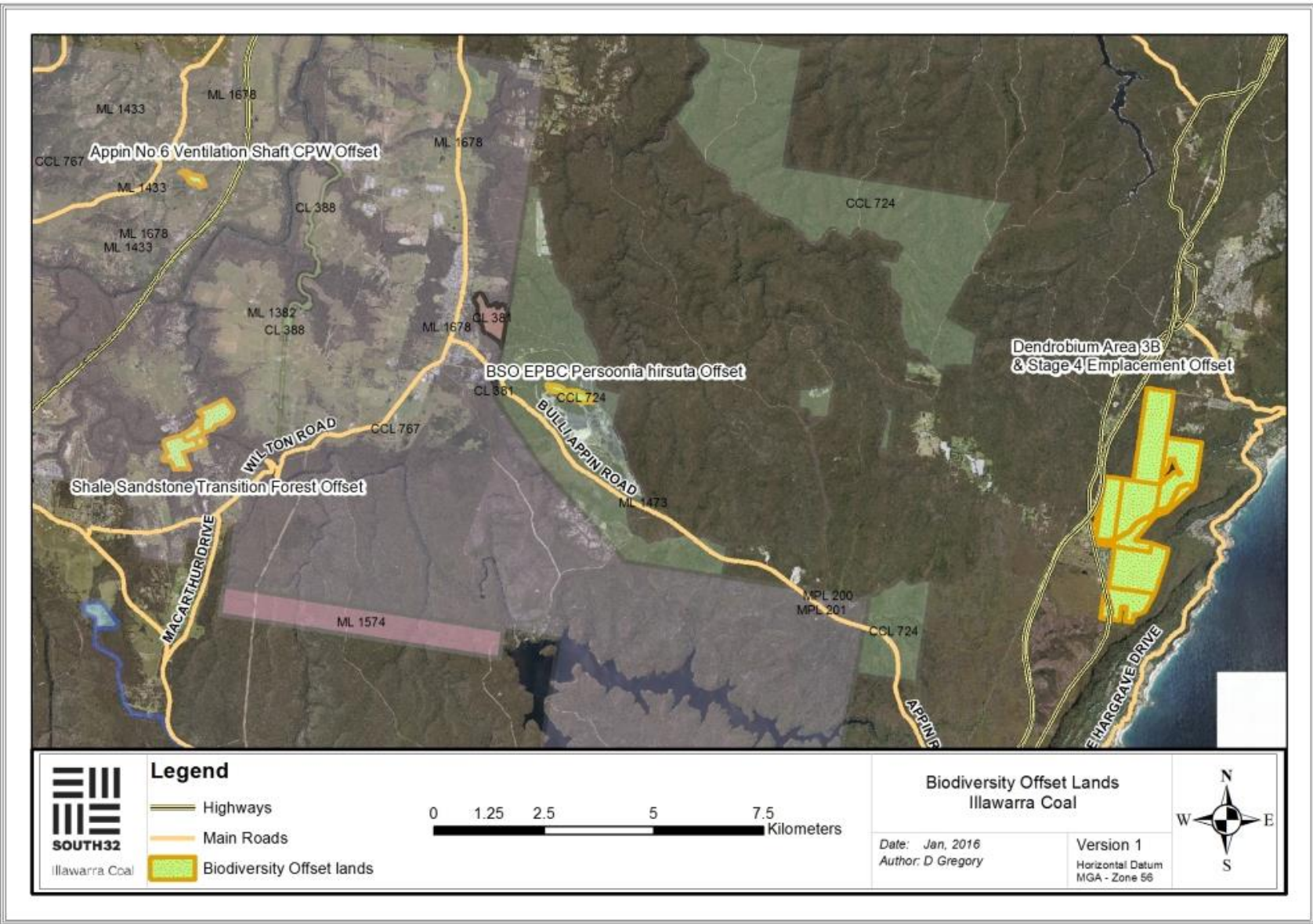
**PLAN 16 – GROUNDWATER MONITORING SITES IN AREA**



**PLAN 17 – MINE EXTRACTION PLAN**



**PLAN 18 – BIODIVERSITY OFFSET LOCATIONS**



# APPENDICES

## APPENDIX A: ANNUAL REHABILITATION REPORT

**APPENDIX B: ANNUAL PERSOONIA HIRSUTA CONDITION MONITORING REPORT**



**APPENDIX C: 2017/18 EPA ANNUAL RETURN**

**APPENDIX D: BSO COMMUNITY COMPLAINTS REPORT FY18**

**APPENDIX E: BSO EPBC APPROVAL 2010/5350 COMPLIANCE REPORT**

## APPENDIX F: BSO CONSENT COMPLIANCE REPORT AND SUMMARY OF NON-COMPLIANCES

Schedule 2 Administrative Conditions		
Condition	Condition Summary	Status
	<p><u>Obligation to Minimise Harm to the Environment</u> Prevent and/or minimise any harm to the environment.</p>	Management Plans developed and implemented to minimise harm to the environment.
	<p><u>Terms of Approval</u> Carry out projects in accordance with the EA, Statement of Commitments, PPR and conditions of this approval.</p>	Management Plans and monitoring developed to meet EA, Statement of Commitments, PPR and conditions of this approval.
	<p><u>Terms of Approval</u> If there is any inconsistency between the above documents, the more recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.</p>	Not triggered during the Reporting Period.
	<p><u>Terms of Approval</u> Comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of: (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted in accordance with this approval; and (b) The implementation of any actions or measures contained in these documents.</p>	Requirements from the Secretary are included in the Management Plans.
	<p><u>Limits on Approval – Mining Operations</u> Carry out mining operations on the site until 31 December 2041.</p>	Not triggered during the Reporting Period.
	<p><u>Limits on Approval – Coal Extraction and Production</u> Ensure that no more than 10.5 million tonnes of ROM coal is extracted from the site in a financial year, or transport more than 9.3 million tonnes of product coal from the site in a financial year.</p>	FY18- ROM Coal- BSO extracted 1.771MT of 'Run of Mine' FY18 – Product Coal transported – 1.834 MT total
	<p><u>Limits on Approval – Appin Ventilation Shaft No.6</u> Operate Appin Ventilation Shaft No. 6 until 31 December 2041, unless otherwise agreed by the Secretary.</p>	Not triggered during the Reporting Period.
	<p><u>Limits on Approval – Hours of Operation</u></p>	Mining operations and construction are in accordance with hours of operation.

Undertake mining operations and mine ventilation activities 24 hours a day, 7 days a week.

Comply with the construction and operating hours listed in Table 1A for the Appin Ventilation Shaft No.6,

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Surrender of Consents and Approval

Surrender all existing development consents and project approvals for mining operations relied on by the Proponent for the site (other than this approval) in accordance with Sections 75YA and 104A of the EP&A Act.

Letters sent on 29 July 2014 to DoPE and 1 Aug 2014 to WSC advising that Illawarra Coal Holdings Pty Ltd surrenders all existing development consents and project approvals for mining (including Wollondilly Shire Council approvals for: Shaft and Electrical Substation 22 January 1972; Appin Mine 22 February 1972; West Cliff Mine 17 April 1975; West Cliff Extended 3 September 1986; Washing of Appin Coal at West Cliff 25 March 1997) operations relied on by the Proponent for the site (other than the Bulli Seam Operations Approval), subject to and in accordance with the regulations.

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Surrender of Consents and Approval

Prior to the surrender of these consents and/or approvals, the conditions of this approval (including any notes) shall prevail to the extent of any inconsistency with the conditions of these consents and/or approvals.

Conditions transferred to updated management plans.

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Structural Adequacy

Ensure all new buildings and structures, and any alterations or additions to existing buildings and structure that are part of the project are constructed in accordance with the relevant requirements of the BCA and any additional requirements of the MSB where the building or structure is located on land within declared Mine Subsidence Districts.

New buildings and structures were project managed by the engineering team to the relevant building codes.

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Demolition

Ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

No demolition carried out in the reporting period.

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Operation of Plant and Equipment

Ensure that all plant and equipment used at the site is maintained in a proper and efficient condition and is operated in a proper and efficient manner.

Operations are conducted in accordance with approved management plans.

Daily, weekly and monthly inspections of plant, equipment and site areas are conducted. This includes a number of system generated maintenance work orders. Regular site environmental inspections are undertaken to address inspections for leaking machinery and equipment.

Mine machinery and equipment are maintained and serviced accordingly.

Staged Submission of Strategies, Plans or Programs

Submit any strategies, plans or programs required by this approval on a progressive basis.

Management Plans submitted as required.

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Strategic Biodiversity Offsets

Provide a biodiversity offset pursuant to this approval (including any biodiversity offset that is required under the conditions of a subordinate approval issued in accordance with this approval), the Secretary may, in consultation with OEH, accept in satisfaction of the requirement for the biodiversity offset, the provision of land that has conservation values which exceed the conservation values required to meet the relevant offsetting requirement.

Biodiversity offset strategy is in place.

Schedule 3 – Specific Environmental Conditions – Underground Mining

Condition	Condition Summary	Status/Other Documents
1.	<p><u>Subsidence – Performance Measures – Natural and Heritage Features, etc.</u></p> <p>Ensure that the project does not cause any exceedances.</p>	<p>For all observed impacts, the appropriate TARP's were applied, actions implemented and key stakeholders notified as required by the approved Subsidence Management Plan and Extraction Plan. See Section 6.15 of this AR for summary of the predicted vs observed impacts.</p>
2.	<p><u>Offsets</u></p> <p>Provide a suitable offset to compensate for the impact or environmental consequence.</p>	<p>Condition not triggered during Reporting Period.</p>
3.	<p><u>Performance Measures – Built Features</u></p> <p>Ensure that the project does not cause any exceedances of performance measure.</p>	<p>For all observed impacts, the appropriate TARP's were applied, actions implemented and key stakeholders notified as required by the approved Subsidence Management Plan and Extraction Plan. See Section 6.15 of this AR for summary of the predicted vs observed impacts.</p>
4.	<p><u>Performance Measures – Built Features</u></p> <p>Any dispute between the Proponent and the owner of any built feature over the interpretation is to be settled by the Secretary</p>	<p>For all observed impacts, the appropriate TARP's were applied, actions implemented and key stakeholders notified as required by the approved Subsidence Management Plan and Extraction Plan. See Section 6.15 of this AR for summary of the predicted vs observed impacts.</p>
5.	<p><u>Extraction Plans</u></p> <p>Prepare and implement an Extraction Plan for first and second workings within each longwall mining.</p>	<p>SMP's and Extraction Plans prepared as required. Approved plans are available on the regulatory website. <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
6.	<p><u>Extraction Plans</u></p> <p>Ensure that the management plans include an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval and a detailed description of the measures that would be implemented to remediate predicted impacts.</p>	<p>Link to Subsidence Management Plans and Extraction Plans <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
7.	<p><u>First Workings</u></p> <p>Carry out first workings within the project area, other than in accordance with an approved extraction plan.</p>	<p>Link to Subsidence Management Plans and Extraction Plans <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
8.	<p><u>Payment of Reasonable Costs</u></p>	<p>Condition not triggered during Reporting Period.</p>

Pay all reasonable costs incurred by the Department to engage suitably qualified, experienced and independent experts to review the adequacy of any aspect of an Extraction Plan.

	<u>Improved Understanding and Prediction of Subsidence Impacts</u>	
9.	Prepare and implement a program to improve its prediction and understanding of subsidence impacts (in particular sub-surface impacts and impacts on groundwater resources).	See section 6.15 of this AEMR for information on the BSO Environmental Research Program.
	<u>Improved Understanding and Prediction of Environmental Consequences on Significant Natural Features</u>	
10.	Prepare and implement a Research Program and allocate \$1,000,000 in total to this program for expenditure over a period of seven years from the date of the program's approval.	As above.

#### Schedule 4 – Specific Environmental Conditions – General

Condition	Condition Summary	Status/Other Documents
1.	<u>Noise – Noise Impact Assessment Criteria</u> Ensure that the noise generated does not exceed the identified criteria at any residence on privately-owned land or on more than 25 percent of any privately-owned land.	No exceedances of the noise criteria LAeq (15min) (for Appin East receivers) are attributed to mine related noise.
2.	<u>Noise – Noise Impact Assessment Criteria</u> Ensure noise generated does not exceed the identified criteria at any residence on privately-owned land or on more than 25 percent of any privately-owned land.	As above.
3.	<u>Noise Mitigation</u> Implement noise mitigation measures upon receiving written request from identified residents.	Noise barrier erected in FY17 at Appin West Gas Drainage Plant after community complaint. Noise levels were within compliance.
4.	<u>Operating Conditions</u> The Proponent shall: (a) implement best management practice, including all reasonable and feasible noise mitigation measures, to minimise the construction, operational and road traffic noise generated by the project; (b) operate a comprehensive noise management system on site that uses real-time noise monitoring data for mining operations and the implementation of noise mitigation measures to ensure compliance with the relevant conditions of this approval; and (c) regularly assess the real-time noise monitoring to ensure compliance with the relevant conditions of this approval, to the satisfaction of the Secretary.	Link to Noise Mgmt. Plan <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a>
5.	<u>Noise Management Plan</u> Prepare and implement a Noise Management Plan.	Plan submitted and approved. <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-</a>



document. Updated document submitted and awaiting approval.

6.	<p><u>Road Traffic Noise Mitigation</u></p> <p>If after the end of June 2013, road traffic noise generated by the project (including employee vehicles) results in an exceedance by more than 2 dB(A) of the NSW criteria for road traffic noise on Douglas Park Drive or Macarthur Road at any residence on privately-owned land, then the Proponent shall, upon receiving a written request from the landowner, implement reasonable and feasible noise mitigation measures (such as double-glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner. If within 3 months of receiving this request from the landowner, 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 the matter to the Secretary for resolution.</p>	Condition not triggered during Reporting Period.
7.	<p><u>Air Quality &amp; Greenhouse Gas – Odour</u></p> <p>Ensure that no offensive odours are emitted from the site.</p>	Condition not triggered during Reporting Period. Complaint received for odour during the reporting period, however it has been attributed to other sources or non-offensive.
8.	<p><u>Greenhouse Gas Emissions</u></p> <p>Implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site.</p>	Link to Air Quality and GHG Mgmt. Plan <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a>
9.	<p><u>Air Quality Criteria</u></p> <p>Ensure all reasonable and feasible avoidance and mitigation measures are employed so that the particulate emissions generated by the project do not exceed the criteria.</p>	Link to Air Quality and GHG Mgmt. Plan <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a>
10.	<p><u>Air Quality Acquisition Criteria</u></p> <p>If the particulate matter emissions generated by the project exceed the criteria in Tables 7, 8 and 9 at any residence on privately-owned land or on more than 25 percent of any privately owned land, then upon receiving a written request for acquisition from the landowner the Proponent shall acquire the land in accordance with the procedures in Conditions 5 - 6 of Schedule 5.</p>	Condition not triggered during Reporting Period.
11.	<p><u>Operating Conditions</u></p> <p>Implement best practice air quality management on site, including all reasonable and feasible measures to minimise the off-site odour, fume and dust emissions generated by the project, including from any spontaneous combustion on site.</p>	Link to Air Quality and GHG Mgmt. Plan <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a>
12.	<p><u>Air Quality &amp; Greenhouse Gas Management Plan</u></p> <p>Prepare and implement a detailed Air Quality &amp; Greenhouse Gas Management Plan.</p>	Link to Air Quality and GHG Mgmt. Plan <a href="http://www.bhpbilliton.com/home/society/regulatory/Documents/_coal/illawarra/bulliseam/131113_coal_illawarra_bulliseam_AirQualityandGreenhouseGasManagementPlanV2.pdf">http://www.bhpbilliton.com/home/society/regulatory/Documents/_coal/illawarra/bulliseam/131113_coal_illawarra_bulliseam_AirQualityandGreenhouseGasManagementPlanV2.pdf</a>

13.	<p><u>Meteorological Monitoring</u></p> <p>Ensure that there is a suitable meteorological station operating in the vicinity of the site.</p>	<p>Weather station installed at West cliff Mine, Appin Mine and No. 6 Shaft.</p>
14.	<p><u>Compensatory Water Supply</u></p> <p>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.</p>	<p>Water supplied as per the management plan.</p>
15.	<p><u>Surface Water Discharge</u></p> <p>Ensure all surface water discharges from the site (including from the Brennans Creek Dam) comply with the discharge limits (both volume and quality) set for the project in any EPL.</p>	<p>Surface water discharge monitored in accordance with the EPL.</p> <p><a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
16.	<p><u>Surface Water Management Plan</u></p> <p>Prepare and implement a Surface Water Management Plan.</p>	<p>Plan submitted and approved. Link to Surface Water Mgmt. Plan</p> <p><a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
17.	<p><u>West Cliff Coal Wash Emplacement Area – West Cliff Coal Wash Emplacement Area Management Plan</u></p> <p>Prepare and implement a West Cliff Coal Wash Emplacement Area Management Plan.</p>	<p>Plan submitted, and approved by the DoPE.</p> <p><a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
18.	<p><u>West Cliff Coal Wash Emplacement Area Biodiversity Offset Strategy</u></p> <p>Provide a suitable biodiversity offset strategy to compensate for the impacts of Stage 4 of the West Cliff Coal Wash Emplacement Area.</p>	<p>Throughout the period from 2013-2016, Illawarra Coal undertook numerous meetings and held discussions with senior officers of the Department of Environment and Planning, Office of Environment and Heritage, relevant Ministerial Offices and Water NSW in relation to the suitability of the proposed offsets.</p> <p>In March 2016, the final Strategic Biodiversity Offset was submitted to the Department of Planning and Environment for approval. The final Strategy was endorsed by OEH.</p>
19.	<p><u>West Cliff Coal Wash Emplacement Area Biodiversity Offset Strategy</u></p> <p>Provide appropriate long-term security for the offset areas by 31 December 2012.</p>	<p>As above.</p>
20.	<p><u>Underground Coal Wash Emplacement Trial</u></p> <p>Prepare and undertake an Underground Coal Wash Emplacement Trial.</p>	<p>Illawarra Coal submitted a revised Underground Coal Wash Emplacement Trial to the Department October 2013. The revised</p>

Plan proposed to defer the trial for 5 years for the following reasons:

The trial replicates what has been demonstrated by another Southern District Colliery

The declaration of Dharawal National Park has eliminated a significant area of potentially suitable roadways for underground coalwash emplacement

Illawarra Coal's focus on diverting material from surface emplacement via alternative beneficial uses continues.

Following discussions with the Department, further commitments have been included in the Plan to report on the research annually in the Annual Review/AEMR during the deferred period.

21.	<p><u>Project Surface Infrastructure Management – Gas Drainage Management Plan</u> Prepare and implement a Gas Drainage Management Plan.</p>	<p>Plans submitted and approved. <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
22.	<p><u>Surface Activities Management</u> Prepare and implement a Surface Activities Management Plan.</p>	<p>Link to Mgmt. Plan <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
23.	<p><u>Upper Canal</u> The Proponent shall not cause any damage to the Upper Canal during the construction and operation of the Appin East Mine Gas Safety Management Project.</p>	<p>A dilapidation survey of the canal was completed, no impacts identified to date.</p>
24.	<p><u>Heritage – Heritage Management Plan</u> Prepare and implement a Heritage Management Plan.</p>	<p>Plan submitted and approved. Link to Heritage Mgmt. Plan <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
25.	<p><u>Transport – Monitoring of Coal Transport</u> Keep accurate records of the amount of coal transported from the site (on a daily basis) and make these records publicly available on its website at the end of each financial year.</p>	<p>Documents are maintained in the Illawarra Coal document registers. Records are on our website: <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
26.	<p><u>Traffic Management Plan</u> Prepare and implement a Traffic Management Plan.</p>	<p>Plan was developed and submitted to the Director General on 21/12/2013. Plan was formally approved July 2015.</p>

	<u>Visual – Visual Amenity and Lighting</u>	
27.	Minimise the visual impacts, and particularly the off-site lighting impacts, of the main infrastructure area and associated ancillary surface works.	Lighting setup in accordance with consent conditions.
	<u>Waste</u>	
28.	Minimise the waste (including coal reject) and ensure that the waste generated by the project is appropriately stored, handled and disposed of.	Waste management in accordance with the waste management plan.
	<u>Waste</u>	Link to Waste Mgmt. Plan <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a>
29.	Prepare and implement a Waste Management Plan.	
	<u>Bushfire Management</u>	
30.	Ensure that the project is suitably equipped to respond to any fires on site; and assist the Rural Fire Service and emergency services as much as possible if there is a fire in the surrounding area.	Sites are equipped to manage bushfires. Asset protection zones are maintained.
	<u>Rehabilitation – Rehabilitation Objectives</u>	
31.	Rehabilitate the site to describe satisfactory level.	Rehabilitation conducted in accordance with rehabilitation management plan.
	<u>Progressive Rehabilitation</u>	
32.	Carry out the rehabilitation of the site progressively.	Rehabilitation conducted in accordance with rehabilitation management plan.
	<u>Rehabilitation Management Plan</u>	Plan submitted and approved in 2012. Link to Mining Operations Plan/RMP <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a>
33.	Prepare and implement a Rehabilitation Management Plan.	
	<u>Biodiversity</u>	Management plan is in place <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a>
34-36	Proponent shall enter into a suitable arrangement to offset the clearing of Cumberland Plain Woodland to develop the Appin East Mine Gas Safety Management Project	Biobanking agreements and retirement of credits address this condition.

#### Schedule 5 – Additional Procedures

Condition	Condition Summary	Status/Other Documents
1.	Notification of Landowners Notify affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the project is again complying with the relevant criteria.	Condition not triggered during Reporting Period.
2.	Independent Review As required commission a suitably qualified, experienced and independent person, to consult with the landowner to determine his/her concerns, conduct	Condition not triggered during Reporting Period.

monitoring to determine whether the project is complying with the relevant criteria.

	<p><b>Independent Review</b></p> <p>If the independent review determines that the project is complying with the relevant criteria in Schedule 4, then the Proponent may discontinue the independent review with the approval of the Secretary.</p> <p>If the independent review determines that the project is not complying with the relevant impact assessment criteria in Schedule 4, and that the project is primarily responsible for this non-compliance, then the Proponent shall:</p> <p>(a) implement all reasonable and feasible mitigation measures, in consultation with the landowner and appointed independent person, and conduct further monitoring until the project complies with the relevant criteria; or</p> <p>(b) secure a written agreement with the landowner to allow exceedances of the relevant criteria,</p> <p>to the satisfaction of the Secretary.</p> <p>If the independent review determines that any relevant acquisition criteria in schedule 4 are being exceeded and that the project is primarily responsible for this non-compliance, then upon receiving a written request from the landowner, the Proponent shall acquire all or part of the landowner's land in accordance with the procedures in Conditions 4-5 below.</p>	Condition not triggered during Reporting Period.
3.		
4.	<p><b>Land Acquisition</b></p> <p>Make a binding written offer to the landowner within 3 months of receiving a written request.</p>	Condition not triggered during Reporting Period.
5.	<p><b>Land Acquisition</b></p> <p>Pay all reasonable costs associated with the land acquisition process.</p>	Condition not triggered during Reporting Period.

#### Schedule 6 – Environmental Management, reporting and Auditing

Condition	Condition Summary	Status/Other Documents
1.	<p><u>Environmental Management Strategy</u></p> <p>Prepare and implement an Environmental Management Strategy for the project.</p>	<p>Strategy submitted and approved. Link to Environmental Management Strategy.</p> <p><a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
2.	<p><u>Management Plan Requirements</u></p> <p>Ensure management plans required under this approval are prepared in accordance with any relevant guidelines.</p>	<p>Management Plans are prepared in accordance with relevant guidelines.</p>
3.	<p><u>Adaptive Management</u></p> <p>Assess and manage project-related risks.</p>	<p>Condition not triggered during Reporting Period.</p>
4.	<p><u>Annual Review</u></p> <p>Review the environmental performance of the projects.</p>	<p>As discussed in this review</p>
5.	<p><u>Revision of Strategies, Plans and Programs</u></p> <p>Review and revise strategies, plans and programs within 3 months of the annual review, the submission of an incident</p>	<p>Plans were reviewed as required by the recommendations in the last Triennial Audit Report.</p>

report, submission of an audit report and/or modification to the conditions of this approval.

6.	<p><u>Community Consultative Committee</u> Establish and operate a new Community Consultative Committee (CCC) which must be operated in general accordance with the <i>Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects</i> (Department of Planning, 2007, or its latest version), and be operating by 30 September 2012.</p>	<p>Community Consultative Committee is operational in accordance with the Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects.</p>
7.	<p><u>Reporting – Incident Reporting</u> Notify the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment and provide a detailed report on the incident.</p>	<p>Condition not triggered during Reporting Period.</p>
8.	<p><u>Regular Reporting</u> Regularly report on the environmental performance on the website.</p>	<p>Link to BSO 14 Day EPL Reporting and BSO Project Approval monitoring requirements. <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
9.	<p><u>Independent Environmental Audit</u> Commission and pay the full cost for independent environmental auditor of the project.</p>	<p>Environmental Resources Management Australia Pty Ltd (ERM) was engaged by IC to carry out an Independent Environmental Audit of the BSO in FY17 A copy of the Audit findings can be found on South32 Regulatory webpage. <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>
10.	<p><u>Independent Environmental Audit</u> Within 6 weeks of the completion of this audit provide a copy of the audit report.</p>	<p>As above.</p>
11.	<p><u>Access to Information</u> From 30 June 2012, make copies of specified documents publically available on the website and keep them up to date.</p>	<p>All approved plans, strategies and monitoring results are on the south32 Regulatory Webpage. <a href="http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document">http://www.south32.net/our-operations/australia/illawarra-coal/regulatory-document</a></p>

## **APPENDIX G: REHABILITATION COST ESTIMATE**

Rehabilitation cost estimate provided only for Department of Planning and Environment (Resources Regulator, formerly the Department of Industry, Division of Resource and Energy). The Rehabilitation Cost estimate is commercial in nature. Please contact the Department or Illawarra Coal representative for further information.