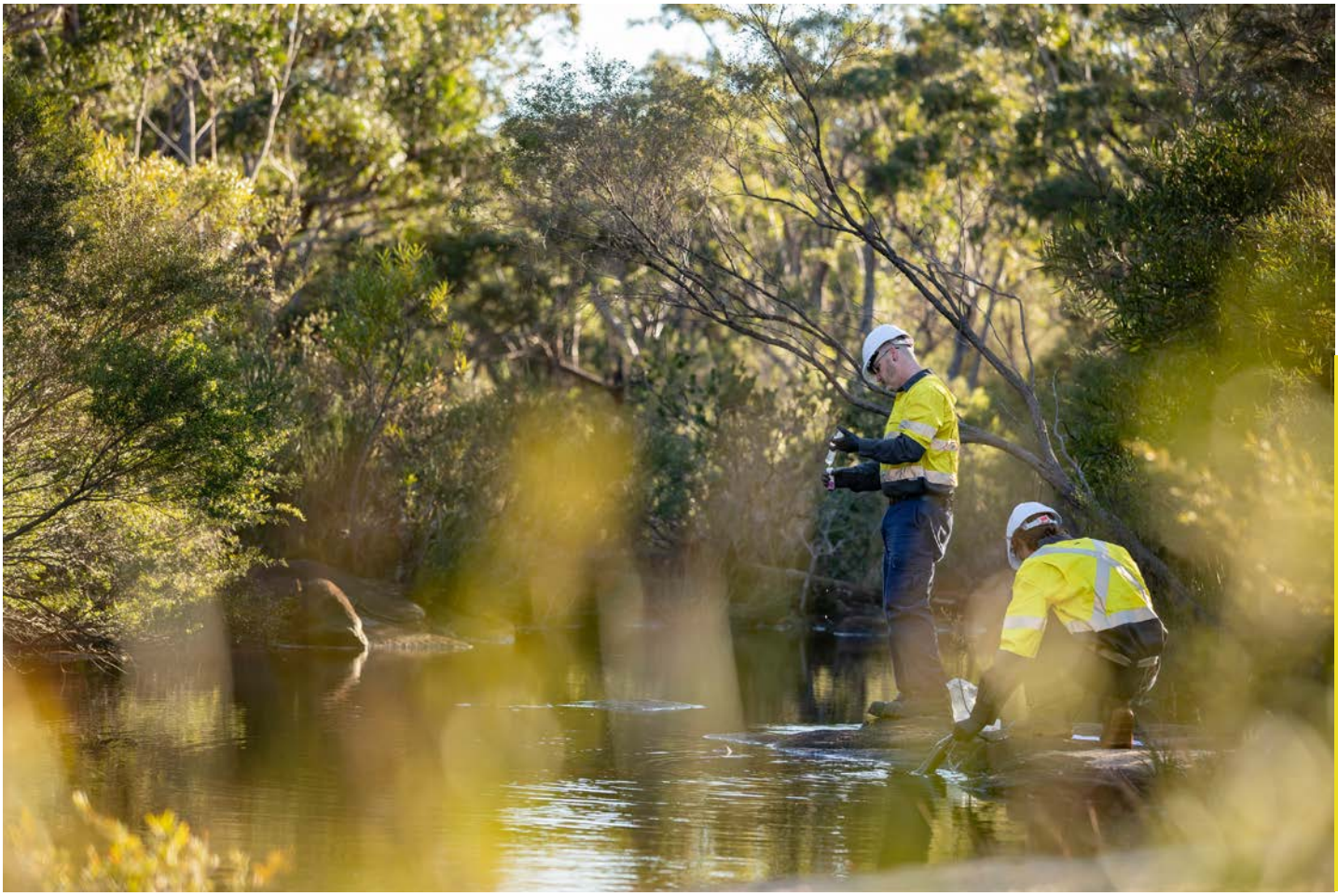
SOUTH32

ILLAWARRA
METALLURGICAL COAL

DENDROBIUM MINE AND
CORDEAUX COLLIERY



ANNUAL REVIEW FY19

CONTENTS

Table 1: Annual Review Title Block	
Name of operations	Dendrobium Mine Cordeaux Colliery
Name of operator	South32 Illawarra Metallurgical Coal
Development consent / project approval #	DA 60-03-2001
Name of holder of development consent / project approval	Dendrobium Coal Pty Ltd
Mining lease #	CCL768, ML1510, ML1566 (Dendrobium) CCL 768 (Cordeaux)
Name of holder of mining lease	Dendrobium Coal Pty Ltd (ML1510 and ML1566) and Illawarra Coal Holdings Pty Ltd (CCL768).
Water approval #	10WA118772
Name of holder of water approval	Illawarra Coal Holdings Pty Ltd
Water access licence #	37465 36473 42385 42386
Name of holder of water access licence	Illawarra Coal Holdings Pty Ltd (37465, 42385, 42386) Dendrobium Coal Pty Ltd (36473)
MOP/RMP start date	01 October 2015
MOP/RMP end date	01 July 2022
Annual Review start date	01 July 2018
Annual Review end date	30 June 2019

I, Neville McAlary, certify that this audit report is a true and accurate record of the compliance status of Dendrobium Mine and Cordeaux Colliery for the period 01 July 2018 – 30 June 2019 and that I am authorised to make this statement on behalf of Illawarra Coal Holdings Pty Ltd and Dendrobium Coal Pty Ltd.

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	Neville McAlary
Title of authorised reporting officer	General Manager Dendrobium Mine
Signature of authorised reporting officer	
Date	27 September 2019

1. STATEMENT OF COMPLIANCE

Table 2: Statement of Compliance

Development Approval	Purpose	Issue Date	Expiry date	Compliant?
DA 60-03-2001	Dendrobium Underground Coal Mine and associated surface facilities and infrastructure	20/11/2002	21/12/2023	
MOD-11-2-2002	Permitting the access of construction traffic to the Bradford Breaker Emplacement Area (Drift Spoil Emplacement Area 1) via Cordeaux Road and Benjamin Road, Mt Kembla.	28/02/2002	21/12/2023	
MOD-36-5-2002-I	Application for commencement of vehicles accessing Benjamin Road.	15/08/2002	21/12/2023	
60-03-2001 MOD3	Modification to Development Consent (Dept. Planning)	28/08/2003	21/12/2023	No
60-03-2001 MOD4	Modification to Development Consent (Dept. Planning)	05/4/2006	21/12/2023	
60-03-2001 MOD5	Modification to Development Consent (Dept. Planning)	30/11/2006	21/12/2023	
60-03-2001 MOD6	Area 3 Consent Modification	08/12/2008	31/12/2030	
60-03-2001 MOD7	Strategic Biodiversity Offset	02/04/2015	31/12/2030	
60-03-2001 MOD8	Surface Supply Upgrade	13/07/2018	31/12/2030	
Mining Lease / Sub-Lease	**Number**			
Mining lease	1510	24/04/2002	24/04/2023	Yes
Consolidated Coal Lease	768	05/12/2014	07/10/2029	Yes
Mining Lease	1566	07/09/2005	07/09/2026	Yes
Environment Protection Licence				
EPL 3241	Dendrobium	August 2000	n/a	Yes
EPL 611	Cordeaux	1/12/99	n/a	Yes
Water Approval				
Water Supply Works	10WA118772	1/07/2013	27/06/2028	Yes
Ground Water Access Licences				
37465	10AL119249	N/A		Yes
36473	10AL118771	N/A		Yes
42385	10AL123125	N/A		Yes
42386	10AL123124	N/A		Yes

The predictions and Statement of Commitments from the Dendrobium Environmental Assessment (EA) are incorporated into the Dendrobium Development Consent DA 60-03-2001. An assessment of compliance with the conditions of DA 60-03-2001 is considered to be an assessment of compliance against the predictions in the EA. Compliance against the Development Consent is assessed in “Appendix C: Dendrobium Mine Consent Condition Compliance”.

Table 3: Non-compliances against relevant approvals

Relevant approval	Condition #	Condition description (summary)	Compliance status	Comment	Where addressed in Annual Review
DA 60-03-2001	Condition 7 of Schedule 4	The Noise Monitoring Program must be implemented.	Non-compliant	Noise monitoring has not been undertaken at the location as specified in the Noise Management Plan for R6a.	Section 11 of this report
DA 60-03-2001	Condition 27 of Schedule 4	Agreement to be established with Wollongong City Council for the maintenance of Stones Road	Non-compliant	The existing Deed has expired. The Deed has been reissued and is dated 28 August 2019.	

2. INTRODUCTION

2.1. BACKGROUND

This Annual Review for Dendrobium Mine and Cordeaux Colliery details the environment and community performance for the 12-month period ending 30 June 2019 and meets the requirements set out in the *Post approval requirements for State significant mining developments - Annual Review Guideline* (NSW DPE, October 2015).

The Annual Review has been prepared to meet the requirements of Condition 5 of Schedule 8 of the Dendrobium Development Consent DA 60-03-2001 (the consent) and the NSW Resources Regulator requirement to submit an Annual Environmental Management Report (AEMR) under the Mining Lease for Dendrobium Mine and Cordeaux Colliery.

A copy of the report is publicly available via the South32 website under Dendrobium Mine:

https://www.south32.net/what-we-do/places-we-work/illawarra-metallurgical-coal/documents.

2.2. OVERVIEW OF OPERATIONS

Dendrobium Mine

Dendrobium Mine is an underground mining operation approved in November 2001 by the Minister of Department of Urban Affairs and Planning. The mine is owned and operated by Dendrobium Coal Pty Ltd, a subsidiary company of Illawarra Coal Holdings, a wholly owned subsidiary of South32 Limited. It is operated on a continuous basis, 24 hours a day and 7 days a week.

The mining operations are located immediately adjacent to Mt Kembla, approximately 8 km west of Wollongong, NSW, on the Woronora Plateau. Mt Kembla village is located within 500 m of the Pit Top site and has close historical links with coal mining.

Dendrobium Mine extracts coal from the Wongawilli Seam of the Southern Coalfield. Three mining areas make up the approved mine plan for Dendrobium and are named Areas 1, 2 and 3 (including 3A 3B and 3C). Longwall mining is currently being undertaken in Area 3B (refer to Plan 1A and B). The mine primarily produces hard coking coal and is approved to produce up to 5.2 million tonnes per annum until 31 December 2030. Dendrobium Mine is comprised of a number of sites as detailed below.

Dendrobium Pit Top

The Pit Top consists of:

- Administration buildings;
- Workshop, machinery and equipment storage areas;
- People and materials access to the underground workings via the Dendrobium tunnel;
- A sediment pond;
- A grey water treatment and oily water separation facility.

The Pit Top layout is shown in Plan 2.

Kemira Valley Coal Loading facility (KVCLF) (ML1510)

Coal is transported from the underground workings to KVCLF via a conveyor network, reaching the surface via the Kemira Valley Tunnel. The coal is then fed through a coal sizer, into a rill tower and deposited onto a 150,000-tonne capacity stockpile. Coal is loaded onto trains via an enclosed rail-loading chute. The Kemira Valley Layout is shown in Plan 3.

Kemira Valley Rail Line

The private rail line is used to transport the coal from KVCLF to the Dendrobium Coal Preparation Plant (DCPP).

Ventilation Shaft 1

The fan housings associated with Ventilation Shaft 1 were decommissioned in October 2008 and relocated to Ventilation Shaft 3. This shaft now provides intake air to the underground workings. The Ventilation Shaft 1 site layout is outlined in Plan 4.

Ventilation Shaft 2/3 Site (ML 1566)

Construction of Ventilation Shafts 2 and 3 commenced during 2006 and was completed in 2008. Ventilation Shaft 2 (downcast) and Shaft 3 (upcast) provide ventilation to the current and future underground workings in Area 3. The Ventilation Shaft 2/3 site layout is outlined in Plan 5.

Dendrobium Coal Preparation Plant (DCPP)

The DCPP is located within the Port Kembla Steelworks. The plant provides washing facilities for Dendrobium coal product prior to being blended with Bulli Seam coal in the coke making process at the Port Kembla Steelworks.

Dendrobium Next Domain Project

South32 Illawarra Metallurgical Coal (S32IMC) has submitted an application to the Department of Planning, Industry and Environment (DPIE) for the Dendrobium Mine – Plan for the Future (the Project). The Environmental Impact Statement was submitted to the Department on 22 July 2019. The application is for the continuation of mining activities in two additional Dendrobium Mine underground mining areas (Area 5 and Area 6), within the existing mining lease. The project would provide an ongoing and essential local supply of metallurgical coal to the BlueScope Steelworks.

More information on the project can be located at: https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/dendrobium-mine.

Cordeaux Colliery

Cordeaux Colliery is owned and operated by Endeavour Coal Pty Ltd, a wholly owned subsidiary of South32. Coal production ceased in March 2001 and recovery of longwall mining equipment was completed on 12 April 2001. Following cessation of mining, the Colliery was placed on care and maintenance. Throughout this reporting period, Cordeaux Colliery maintained this status.

The Cordeaux Colliery Pit Top functions as office space and a storage facility. The Pit Top is used as a base for exploration activity across the Dendrobium and Appin mining leases and exploration tenements, and also for access into the catchment.

Dendrobium Mine's future underground mining operations consider Cordeaux Colliery Pit Top and the Corrimal No. 3 shaft site to be of potential significant strategic value.

As part of the Project, S32IMC will be seeking a contemporary Development Consent for the site. The Project would include adaptive reuse of the Cordeaux Pit Top to reduce travel time for men and materials while development and mining operations occur in Area 6. More information on the Project can be located at: https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/dendrobium-mine.

The Cordeaux Colliery Pit Top is wholly contained within an area of approximately 11.9 ha located within WaterNSW Special Areas (Plan 11 and 12). Cordeaux Colliery was serviced by four vertical shafts consisting of:

- People and Materials access shaft.
- Bulk Coal Winder (BCW) shaft. The BCW shaft was also the second means of egress and contained the mine's two main ventilation fans.
- Corrimal No.3 Shaft – mine ventilation fan shaft (Ex-Corrimal Mine). This fan was used to complement ventilation flow through Cordeaux Colliery.
- Corrimal No.2 Shaft - mine ventilation fan shaft (Ex-Corrimal Mine). This fan was used to complement ventilation flow through Cordeaux Colliery.

Cordeaux Colliery is considered a "zero discharge site", prohibiting liquid discharge directly to the surface lands of the WaterNSW Special Areas. Cordeaux Colliery Pit Top has approximately 40% of its area dedicated to surface water management (Plan 13).

As Cordeaux Colliery is currently deemed to be under care and maintenance, there were limited mining activities associated with the site and as a result, limited potential for environmental impacts.

2.3. MINE CONTACTS

The site contacts for Dendrobium Mine and Cordeaux Colliery are provided in Table 4.

Table 4: Site Contacts

Position	Name	Number
General Manager Dendrobium Mine	Neville McAlary	(02) 4255 4874
Superintendent Exploration Cordeaux	Richard Walsh	(02) 4224 6202
Lead Environment	Chris Schultz	(02) 4286 3384
Specialist Environment - Dendrobium	Tom McMahon	(02) 4255 4463

3. APPROVALS

Current development consent approvals, leases and licences for Dendrobium Mine and Cordeaux Colliery are included in Table 5, Table 6, Table 7 and Table 8.

Dendrobium Mine

Table 5: Development Consent and Modifications associated with Dendrobium Mine

Development Approval	Purpose	Issue Date	Expiry date
DA 60-03-2001	Dendrobium Underground Coal Mine and associated surface facilities and infrastructure	20/11/2002	21/12/2023
MOD-11-2-2002	Permitting the access of construction traffic to the Bradford Breaker Emplacement Area (Drift Spoil Emplacement Area 1) via Cordeaux Road and Benjamin Road, Mt Kembla.	28/02/2002	21/12/2023
MOD-36-5-2002-I	Application for commencement of vehicles accessing Benjamin Road.	15/08/2002	21/12/2023
60-03-2001 MOD3	Modification to Development Consent (Dept. Planning)	28/08/2003	21/12/2023
60-03-2001 MOD4	Modification to Development Consent (Dept. Planning)	05/4/2006	21/12/2023
60-03-2001 MOD5	Modification to Development Consent (Dept. Planning)	30/11/2006	21/12/2023
60-03-2001 MOD6	Area 3 Consent Modification	08/12/2008	31/12/2030
60-03-2001 MOD7	Strategic Biodiversity Offset	02/04/2015	31/12/2030
60-03-2001 MOD8	Surface Supply Upgrade	13/07/2018	31/12/2030

Table 6: Mining Leases associated with Dendrobium Mine

Mining Lease / Sub-Lease	Number	Issue Date	Expiry Date	Mine Site
Mining lease	1510	24/04/2002	23/04/2023	Dendrobium
Consolidated Coal Lease	768	29/10/1991	07/10/2029	Dendrobium
Mining Lease	1566	07/09/2005	06/09/2026	Dendrobium

Table 7: Licences associated with Dendrobium Mine

Licences/Consents	Number	Issue Date	Expiry Date
Licence to Store – Explosives (SafeWork NSW)	XSTR100152	5/03/2018	10/01/2023
Radiation Licence (EPA)	5061173	27/07/2019	27/07/2020
Environment Protection Licence	3241	August 2000	n/a
Water Approval (Natural Resource Access Regulator)	10WA118772	1/07/2013	27/06/2028
Groundwater Access Licence	37465	N/A	
Groundwater Access Licence	36473	N/A	

Groundwater Access Licence	42385	N/A	
Groundwater Access Licence	42386	N/A	
Exploration Licence	A143	28/07/1979	7/11/2023
Exploration Licence	A374	24/10/1986	24/10/2022
WaterNSW Access Consent	D2018/39689	27/07/2018	13/03/2020

Table 8: Current Mining Approvals for Dendrobium Mine

Licences/Consents	Number	Issue Date
Area 3B SMP Approval	N/A	11/07/2019
Mining Operations Plan	DOC19/681058	19/08/2019

Cordeaux Colliery

Cordeaux Colliery is held under CCL 768. The relevant consents, leases, and licences for Cordeaux Colliery are presented in Table 9.

Table 9: Consents Leases and Licences for Cordeaux Colliery

Facility/Document	Number	Issue Date	Expiry Date
Environment Protection Licence	611	27/07/2000	n/a
Development Consent (Wollongong City Council)	D74/134	20/12/1974	n/a
Exploration Licence	A338	08/10/1984	08/10/2019
WaterNSW Access Consent	D2018/39689	27/07/2018	13/03/2020
Consolidated Coal Lease	768	29/10/1991	07/10/2029
Mining Lease	ML25	31/10/1975	As per CCL768
Mining Lease	ML28	31/10/1975	As per CCL768
Mining Lease	ML23	02/09/1981	As per CCL768
Mining Lease	ML24	02/02/1976	As per CCL768
Mining Lease	ML30	18/10/1976	As per CCL768
Mining Lease	Lease No. 66 portion D1106	18/10/1976	As per CCL768
Mining Purposes Lease	MPL205	29/09/1982	As per CCL768

4. OPERATIONS DURING THE REPORTING PERIOD

4.1. MINING

Dendrobium Mine

The Run of Mine (ROM) product for the reporting period was 4,679,517 tonnes with a saleable product yield of 74%. A comparison showing the ROM production at Dendrobium Mine for past reporting periods is provided in Figure 1. During this reporting period, Dendrobium continued longwall mining in Area 3B. Development will continue in Area 3B Main Gates and Wonga Mains.

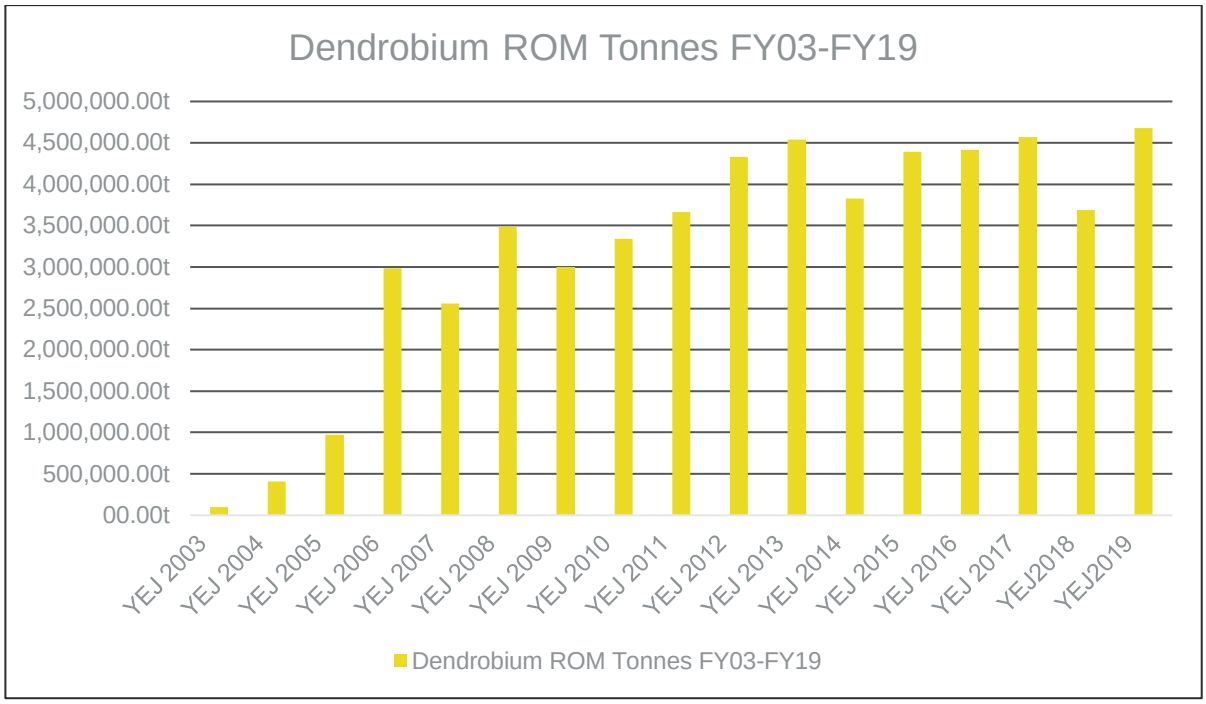


Figure 1: ROM Production.

The start and finish dates for longwalls in the current Dendrobium mining domain is provided in Table 10.

Table 10: Area 3 Longwall Start and Finish Dates

Longwall Number	Start Date	Finish Date
7	4 May 2011	23 January 2012
8	24 February 2012	29 December 2012
9	9 February 2013	2 June 2014
10	20 January 2014	20 January 2015
11	18 February 2015	26 January 2016
12	22 February 2016.	31 January 2017
13	4 March 2017	19 April 2018
14	22 May 2018	26 February 2019
15	9 April 2019	Estimated Q2 FY20

4.2. MINERAL PROCESSING

Dendrobium Mine

Mineral processing of the ROM coal produced at Dendrobium Mine is undertaken at the DCPP. Coal wash is emplaced at the West Cliff Emplacement Area. Additional information on the emplacement operations is provided in the Bulli Seam Operation Annual Review. The production and waste summary for Dendrobium Mine is outlined in Table 11.

Table 11: Production Summary

Material	Approved limit	Previous Reporting Period	This Reporting Period	End of Next Reporting Period (Estimate)
Waste Rock/Overburden	N/A	0	0	0
ROM Coal/Ore	5,200,000	3,691,454	4,679,517	5,200,000
Coarse reject (Coal Wash Tonnes)	N/A	956,278	1,199,303	1,270,125
Saleable product	N/A	2,735,176	3,610,034	4,200,000

4.3. ORE AND PRODUCT STOCKPILES

Dendrobium Mine

A 150,000-tonne capacity stockpile, located at KVCLF, is used to store ROM coal prior to it being loaded into trains for transport to the DCPP. Train movements are limited to between 6am and 11pm as required by the Dendrobium Development Consent. During the reporting period, 2,794 trains were loaded at KVCLF, transporting 4,654,011 tonnes of coal.

4.4. EXPLORATION

Dendrobium Mine

Drilling Program

Prior to commencing any exploration within CCL768, a Review of Environmental Factors (REF) is prepared and submitted to WaterNSW and DPIE – Division of Resources & Geoscience for approval. A total of 39 exploration boreholes (coal quality/resource definition) were completed in FY19. The majority of these holes were completed over the Dendrobium Project Area 5. Exploration holes typically targeted the Bulli and Wongawilli coal seams extending towards the American Creek Coal Member. The purpose of the exploration boreholes was to assess coal thickness, depth of seam, coal quality, gas content, and to assist in determining possible future mining conditions by conducting geotechnical tests on the core samples. The completed holes also include one surface-to-inseam lateral hole which was drilled to delineate a potential dyke zone in the next mining domain.

Furthermore, exploration was involved in the drilling of a series of other environmental/approval holes for the purpose of groundwater and/or swamp monitoring. These included:

- 1 x borehole for groundwater analysis in Area 5;
- 8 x pre/post mining monitoring over approved mining areas to assess height of fracturing due to mining; and
- 5 x shallow boreholes drilled for groundwater monitoring around the Avon Dam reservoir.

Seismic Program

Seismic reflection surveys involve the use of artificially-generated sound ('seismic') waves to image sub-surface geological conditions. The sound reflects off the coal seam and receiving devices (geophones) are placed in a line on the surface to detect the seismic signal that is reflected back from subsurface geological features, such as changes in rock type or faults. The sound wave is generated by the initiation of a 500-gram charge, placed into a shot hole. Shot holes are 14 m deep so the sound wave is not affected by any subsurface weathering and to ensure the safety of the seismic team. Shot holes are drilled every 15 m to ensure high quality of data for the detection of seam displacement faults, with geophones placed every 7.5 m.

In FY19, three seismic lines were acquired. Figure 2 provides an overview of the locations of the exploration boreholes drilled and seismic lines acquired during the reporting period.

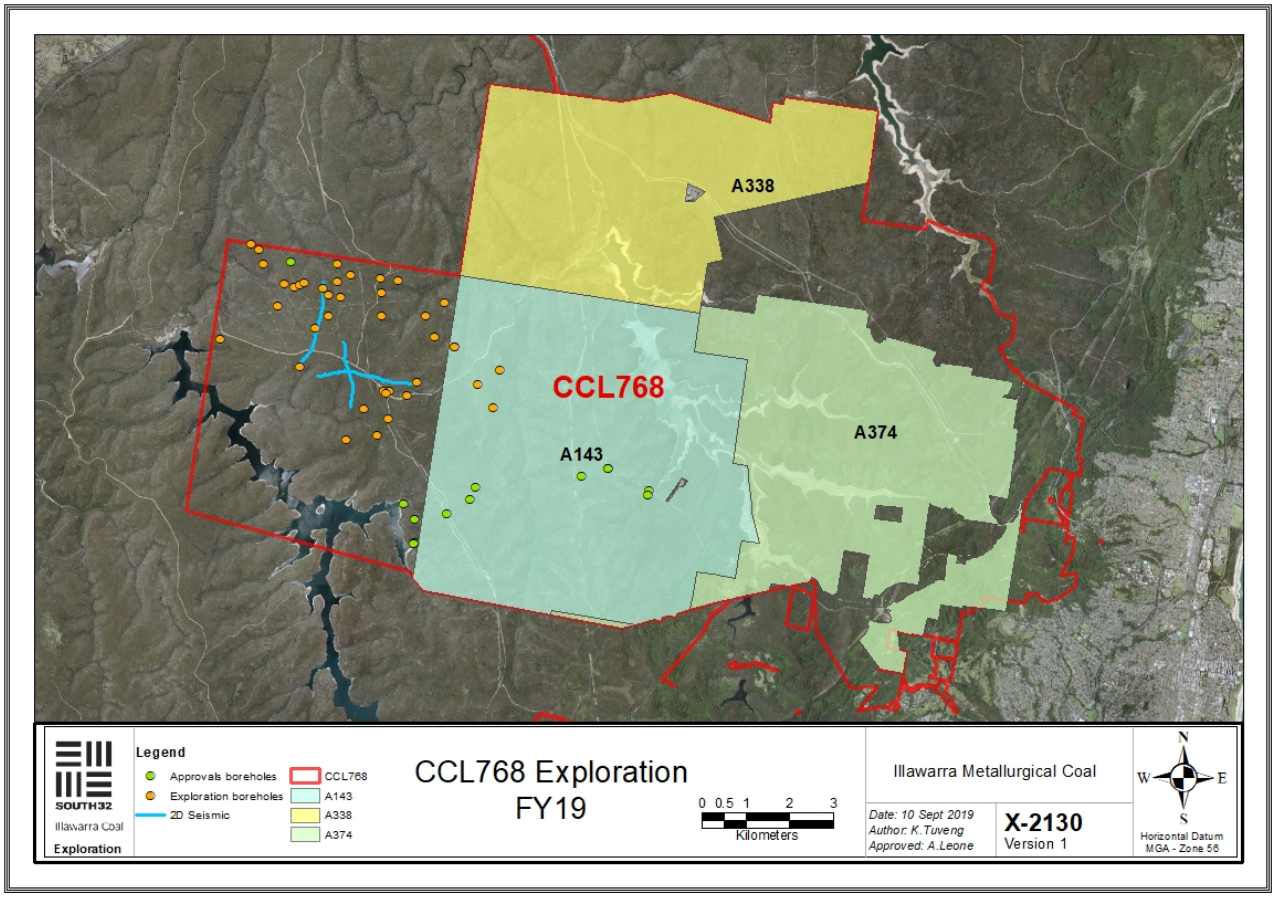


Figure 2: Exploration Locations

Rehabilitation / Remediation

All of the exploration boreholes that were completed during the reporting period (shown in Plan 6) have been or are in the process of being rehabilitated. A small selection of these holes contain a piezometer string, used for groundwater monitoring. The piezometers are embedded in the sealing cement, attached to surface head-works or an in-ground pit with a data logger. Once monitoring is no longer required the sites are remediated and then rehabilitated. Remediation includes the removal of any monitoring headwork/standpipes and cutting off the surface casing to below ground level. During rehabilitation, erosion control works and re-vegetation is undertaken as required. In the rehabilitation cost estimation model (CCL768) the following items are covered:

- Removal of all material associated with the drilling activities from the site;
- Removal of above ground tanks;
- Filling in of any sumps and re-contouring/stabilising the site (if required) to prevent erosion; and

- Returning topsoil, rocks and logs, set aside from the site during initial setup, to arrest water flow over disturbed ground and provide structure for emergent seedlings.

Cordeaux Colliery

No land preparation works occurred at the Cordeaux site as it is under care and maintenance.

4.5. Construction

Dendrobium Mine

Site Security and Fatigue Management Project

S32IMC has commenced works to construct site entry control points to manage the risk of unauthorised entry to the Dendrobium sites and portals and effectively manage fatigue amongst the workforce.

The works were approved in December 2018 and commenced shortly thereafter. The construction work has been performed across all S32IMC sites, including Cordeaux Colliery, using sub-contractors specialising in the different fields of work.

The work included the installation of approximately 6,000 m of fencing, 17 turnstiles, 6 swinging gates, 15 boom gates and trenching for power and comms to the various installations. A large pine tree was required to be removed at the Dendrobium Pit Top adjacent to the warehouse.

S32IMC estimate completion of site security activities in October 2019.

Sediment Pond Car Park

Construction commenced during the reporting period on the sediment pond car park upgrade. This includes the replacement of the pipeline from the sediment pond to the grey water treatment plant, the sealing of the surface and the construction of stairs to the main car parking area. This project is planned to be completed by July 2019.

Compressor Upgrades

Preliminary planning work to upgrade the existing compressor on site has begun (possible locations for the upgrade are being assessed).

Off-Site Storage Facility

An off-site storage facility was leased during the reporting period for critical spares and consumables associated with Dendrobium Mine and Appin Mine. The facility is located in Unanderra. The off-site storage facility not only addresses the Dendrobium space constraints but allows less congestion and traffic overall on sites.

Rail Refuse Bin

The removal of the rail refuse bin, within the DCPP, located within the BlueScope Steel precinct, was completed in FY19 in lines with the Rail Refuse Bin Demolition Management Plan.

Remediation of the Embankment (Bike Shed)

Embankment stabilisation works behind the bike shed located on the Dendrobium Pit Top were initiated during the reporting period and are due to be completed early FY20.

Electrical Infrastructure

Electricity for Dendrobium Mine is currently supplied via a 33kV line originating from BlueScope Steel, Port Kembla. Dendrobium has completed planning to upgrade this surface electrical infrastructure to draw pit top power supply from the Endeavour Energy network. Construction is planned to commence early FY20.

4.6. Operations in next reporting period

Dendrobium Mine

During the next reporting period, Dendrobium will continue longwall mining in Area 3B. Development will continue in Area 3B Main Gates and Wonga Mains.

The planned activities for FY20 include a continuation of exploration in Areas 3B and 5 in support of the current mining domain (pre/post-mining monitoring hole and resource definition) as well as future mining domains (geological/geotechnical investigation and resource definition). It is also proposed to explore in Area 3C to increase geological and mineability understanding. In summary, the exploration plan in FY20 includes:

- Area 5:
    - Completing the surface-to-inseam dyke definition drilling;
    - Completing the large-diameter coring for coke oven testing;
    - Continuation of exploration drilling (JORC resource improvement and modelling forecast);
    - Geotechnical investigations; and
    - 2D seismic data acquisition.
- Area 3A/B:
    - Pre/post-mining monitoring boreholes;
    - Exploration boreholes in advance of the longwall; and
    - A variety of approval boreholes at the request of various Government agencies.
- Area 3C:
    - Re-commencement of exploration drilling to improve the resource definition and geological understanding of this area.

Construction activities in the next reporting period are detailed in Section 12.

Cordeaux Colliery

During the next reporting period, Cordeaux Colliery will remain on care and maintenance.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The actions arising from the previous Annual Review are detailed in Table 12. Note that no actions from the regulatory agencies were received regarding the FY18 Annual Review.

Table 12: Actions arising from previous Annual Review

Action Required	Requested by	Where covered in this Report
Continue Longwall Mining in Area 3B and development in Area 3B Main Gate and Wonga Mains.	S32IMC	Section 4.1
Progress the upgrade of electrical infrastructure to draw the Pit Top power supply from the Endeavour Energy network.	S32IMC	Section 4.5 and Section 12
Progress the project to upgrade the existing compressor at the Dendrobium Pit Top.	S32IMC	Section 4.5 and Section 12
Implement erosion and sediment control improvements at the Dendrobium Pit Top, including drainage and the grey water treatment system and sealing of unsealed areas.	S32IMC	Section 4.5
Additional monitoring to be implemented using real-time and handheld noise monitoring units to identify feasible noise reduction initiatives.	S32IMC	Section 6.8
Continue to maintain the environmental management system in accordance with ISO14001.	S32IMC	Section 10.1
Update Environmental Management Plans as needed.	S32IMC	Section 10.1
Progress the rehabilitation activities for redundant sites.	S32IMC	Section 8

6. ENVIRONMENTAL PERFORMANCE

6.1. Air Pollution

Dendrobium Mine

Air quality management is an environment aspect within the Environmental Management System for the Dendrobium operation. At the Dendrobium Pit Top, the following dust controls were utilised during the reporting period:

- the use of a vacuum sweeper truck which operates on a regular basis; and
- the use of an automatic dust suppression spray system along the portal road.

At the Kemira Valley site, the following dust controls were utilised during the reporting period:

- automatic dust suppression system on the stockpile. Eight sprays are located around the base of the stockpile whilst a further two sprays are located at the top of the rill tower. The spray system is programmed to activate if wind velocities exceed 10 m/s and/or when the coal moisture level drops below the trigger level of 8%. The sprays can also be activated by site personnel via a dial up system when required;
- dust suppression system in the train loading chamber. This system ensures that the moisture level of the coal is adequate to minimise the potential for fugitive dust emissions whilst being transported from the Kemira Valley site to the DCPP via the Kemira Valley rail line;
- enclosed train loading facility that enables coal to be loaded into the train without fugitive emissions;
- doors on the rill tower to minimise the fugitive emissions from the rill tower. A program to replace damaged doors was implemented during the reporting period;
- dust suppression system on the Kemira Valley conveyor (including sprays at the top and bottom of the Sizer, the jib pulley, and also around the Nebo Mains transfer point) that ensures that the coal moisture content is adequate to prevent dust emissions from the conveyor; and
- wind protection on conveyor gantries.

The dust suppression systems at both the Pit Top and Kemira Valley use recycled water.

Air Quality Monitoring System

During the reporting period, Dendrobium's air quality monitoring program consisted of five dust deposition gauge (DDG) sites and two High Volume Air Samplers (HVAS) as required by the approved Air Quality Management Plan and Environmental Protection Licence (EPL).

The DDGs (shown in Plan 7) are:

- located around the site to monitor control effectiveness and throughout the community to determine amenity impacts; and
- measured on a monthly basis for ash content, combustible matter, total insoluble matter and total solids (analysis is performed at a NATA (National Association of Testing Authorities) accredited laboratory).

The results from the DDGs are compared to the amenity goal of 4 g/m^2/month for total insoluble solids as outlined in Table 13 and visually analysed to determine the percentage contribution of dirt, coal, vegetation and insect matter.

Additional DDGs may be deployed around the operations and throughout the community for investigative purposes.

Two HVAS measure total suspended particulates (TSP) and particulate matter less than 10 micrometres (PM_{10}). The HVAS (shown on Plan 7) are:

- located on site (Pit Top and Kemira Valley);
- analysed for TSP and PM_{10} on a monthly basis over a 24-hour period in accordance with the approved Air Quality Management Plan and EPL requirements (samples are analysed by a NATA accredited laboratory); and
- compared to the air quality standards (from the Dendrobium Development Consent) outlined in Table 13.

Results from the air quality monitoring program are reported:

- via the South32 website in the 14-day report; and
- annually in the EPL Annual Return and Annual Review.

Table 13: Relevant Standard for Air Quality

Pollutant	Goal	Averaging Period
Particulate matter < 10 µm (PM_{10})	50 µg/m^3	24-hour
	30 µg/m^3	Annual
Total Suspended Particulates (TSP)	90 µg/m^3	Annual
Deposited Dust (insoluble solids)	4g/m^2/month	Annual

Dust Deposition Gauge Results

Dust levels measured in the dust deposition gauges located within the community (Point 13 & 18 are operational control gauges) were below the amenity goal of 4 g/m^2/month (Insoluble Solids). These results have improved over the past year with the exception Point 6 and 17, however they have remained well below the amenity goal. This was possibly due to rainfall overtopping the bottles. The coal percentage was lower than the average for the past year. Figure 3 shows the 12-month averages for each of the sites monitored since FY08.

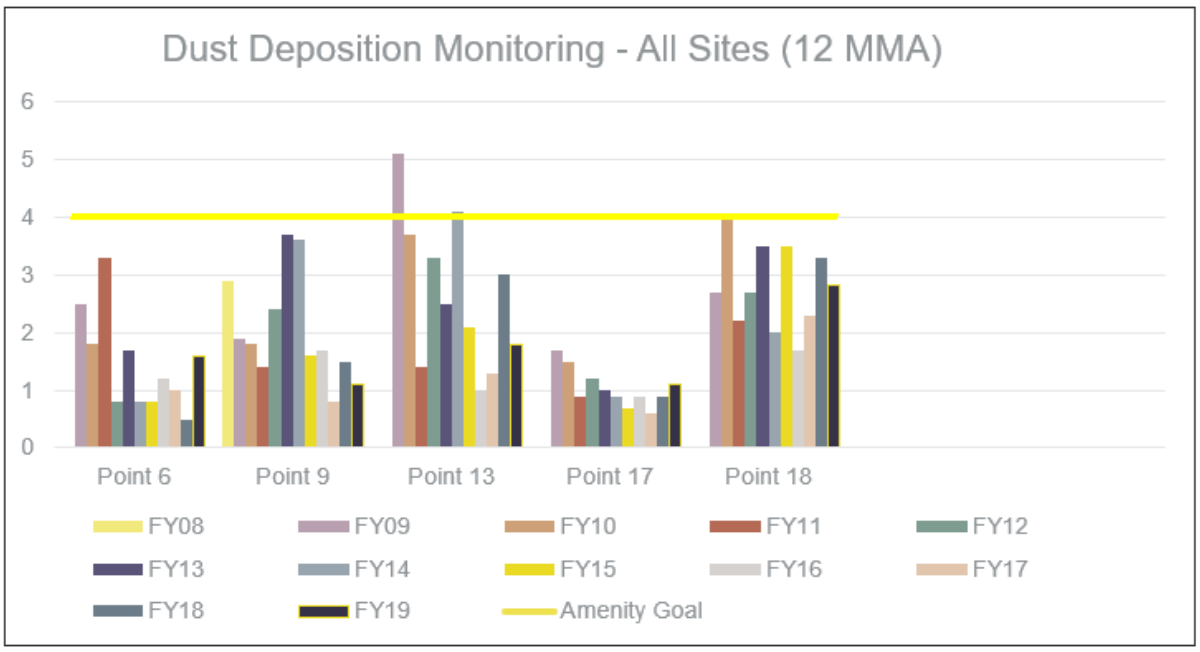


Figure 3: Dust Deposition Gauge results

HVAS Results

Dust levels from the High-Volume Air Sampler (HVAS) for the reporting period complied with the relevant standards specified in Table 12. Historical trends of monitoring data show a general gradual decline, all below short and long-term criterion. The 24-hour average PM_{10} results for Kemira Valley (Point 20) and the Pit Top sites (Point 21) are provided in Figure 4 and the annual average TSP results and PM_{10} results for Point 20 and Point 21 are shown in Figure 5.

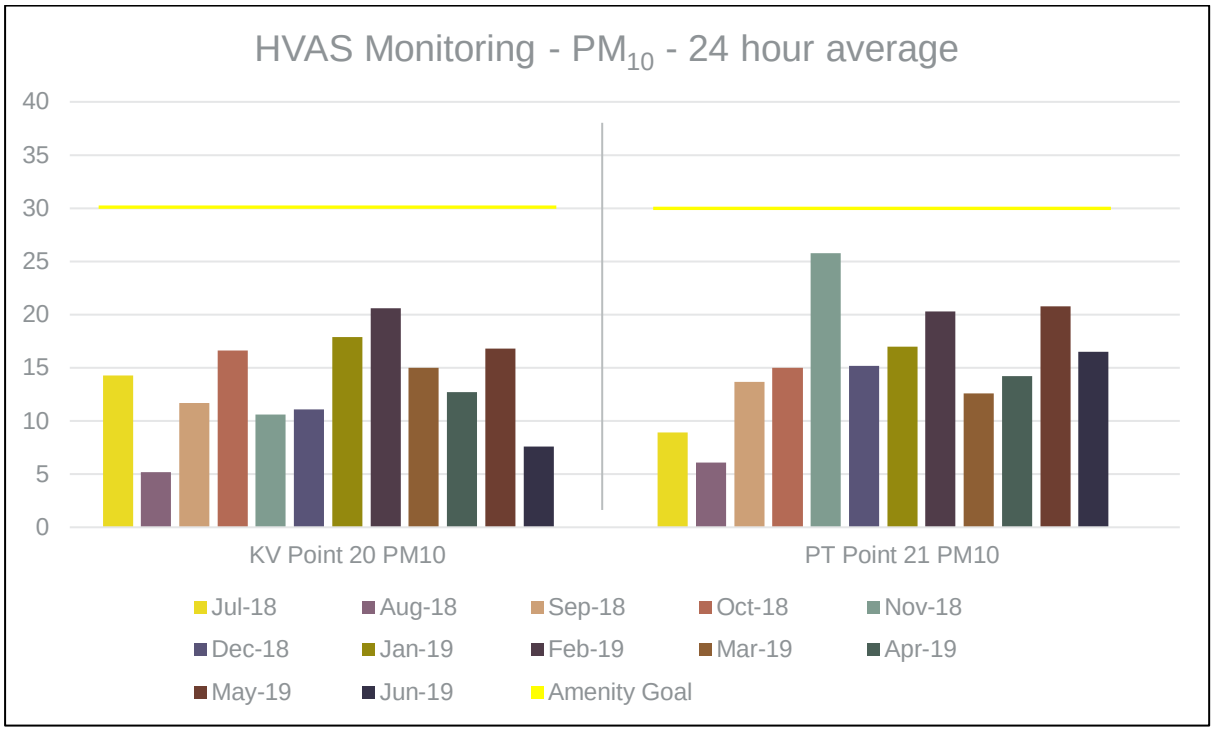


Figure 4: 24-hour average HVAS Results (PM_{10})

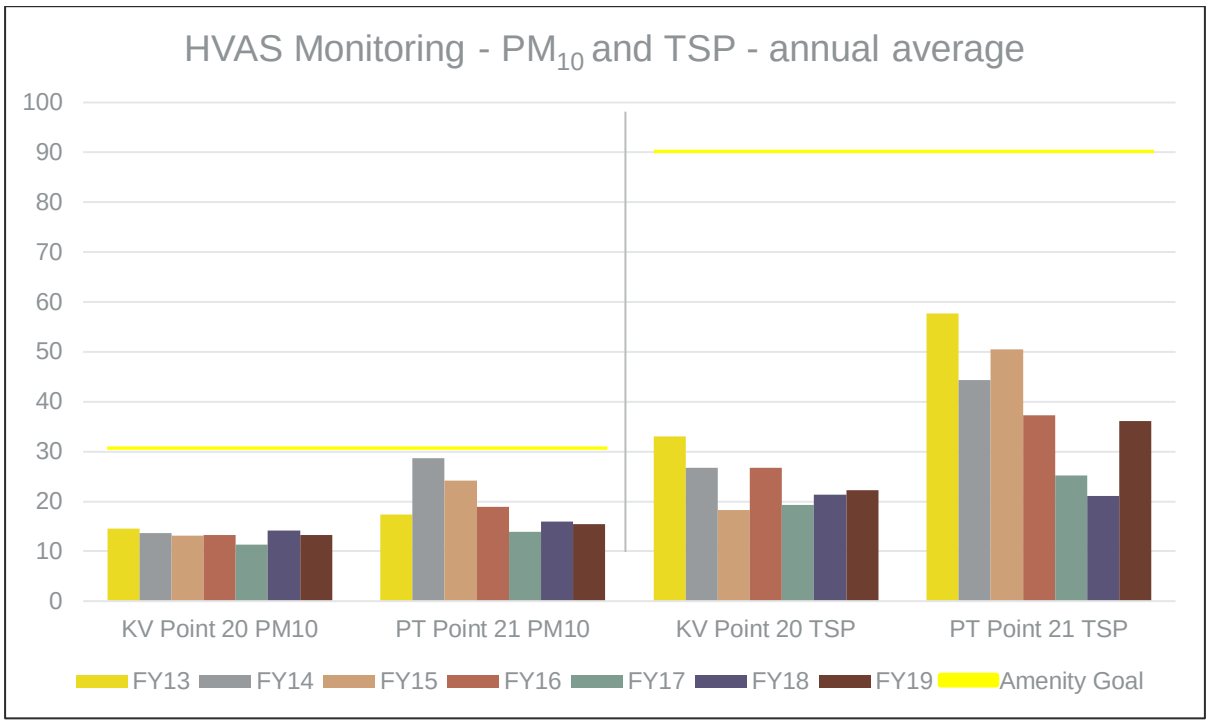


Figure 5: Annual average HVAS Results

Cordeaux Colliery

Air pollution is not monitored at Cordeaux Colliery as there is no coal handling or coal transport from the site. Trafficable and storage areas are sealed.

Ventilation Shaft 1

No air pollution issues are considered relevant for the Ventilation Shaft 1 as the site has been rehabilitated or is covered with gravel. Ventilation Shaft 1 is an intake shaft and therefore there are no emissions.

Ventilation Shaft 2/3

No air pollution issues are considered relevant for the Ventilation Shaft 2/3 as the site has been rehabilitated or is covered with gravel. Odour levels are low, and the site is in a remote location. No complaints have been received.

Dendrobium Coal Preparation Plant

Air quality at the DCPP is managed under the BlueScope EPL 6092 with quarterly reporting to BlueScope Steel undertaken.

6.2. Erosion and Sediment

Dendrobium Mine

Erosion and sediment control at Dendrobium is managed in accordance with the approved Water Management Plan and Landscape Management Plan. These plans address erosion and sediment controls for the Dendrobium Pit Top, KVCLF, Ventilation Shaft 1 and 2/3 sites and the Kemira Valley Rail Line.

Erosion Control

Both the Dendrobium Mine Pit Top and KVCLF predominantly consist of sealed surfaces and vegetated areas. As limited soil is exposed, the potential for erosion is low.

Sediment Control

Sediment control structures are inspected and maintained on a regular basis. Sediment is removed from drainage pits along the dirty water drainage system and the grey water treatment plant (GWTP) by an industrial vacuum tanker as required. The sediment pond assists in settling out suspended solids before surface water enters the GWTP.

Ventilation Shaft 1 & 2/3

Erosion is not a significant issue at the ventilation shaft sites as disturbed areas have been rehabilitated or stabilised with gravel.

Cordeaux Colliery

Erosion is not a significant issue at the Cordeaux Colliery Pit Top site as the majority of the mine surface is sealed with stormwater run-off directed to appropriate holding dams and filter systems. There are minimal exposed earthen areas.

6.3. Surface Water Pollution

Dendrobium Mine

Mine Subsidence

The surface water monitoring program enables Dendrobium to maintain a database of regional water quality and to determine any changes to surrounding water quality. Potential water quality impacts as a result of mining are described in Section 6.14.

Mine Site Surface Facilities

The surface water monitoring network for surface facilities consists of five regular sites (see Plans 8A and 8B) which include sites upstream and downstream of both the Pit Top and Kemira Valley, as well as the mine dewatering discharge point (LDP5) located at Marley Place.

The monitoring program includes:

- recording of field observations;
- in-situ monitoring for temperature, pH and conductivity; and
- analysis of the water by a NATA accredited laboratory covering pH, conductivity, total suspended solids (TSS), metals (specified for Point 5) and oil and grease.

Monitoring and Results

The majority of the monitoring sites are located in natural watercourses that flow through the Dendrobium Pit Top and Kemira Valley sites, in particular Brandy and Water Creek and American Creek respectively. Variations in water quality in response to local geology and rainfall were within expectations during the reporting period. Results from the downstream sites are compared to the results from upstream sites at each location. These comparisons are discussed in detail below. Meteorological data for the year is provided in Figure 6.

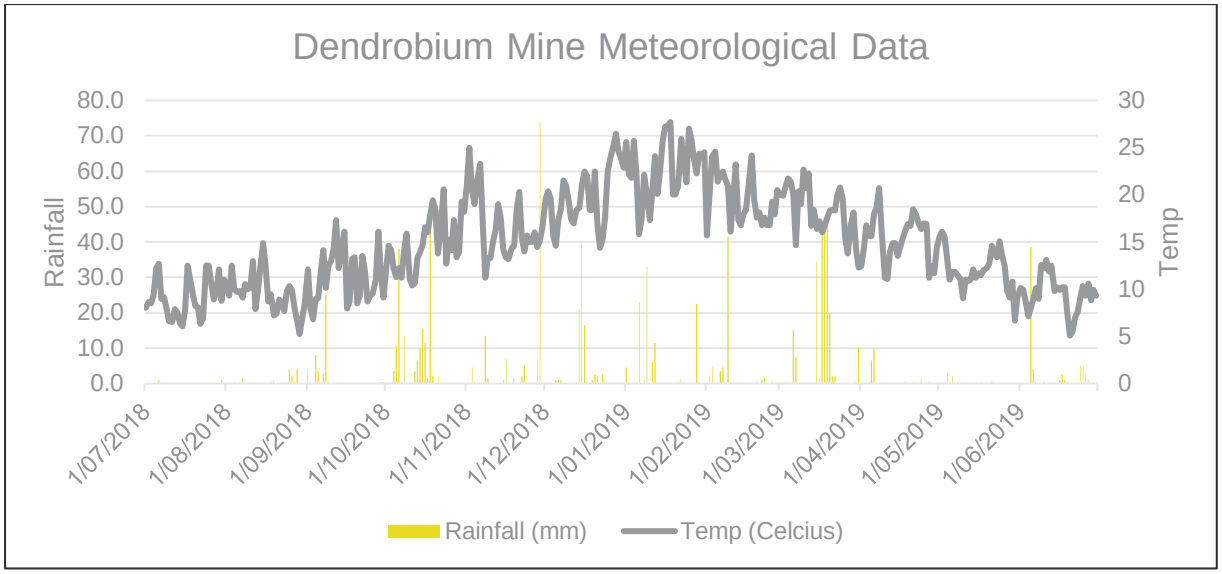


Figure 6: Rainfall and temperature

Kemira Valley Coal Loading Facility

During the reporting period, there has been no significant difference between the upstream and downstream results for points Dend 7 (upstream of the KVCLF) and Dend 10 (downstream of the KVCLF). Results indicate that the water management system in operation at the Kemira Valley site is effective with minimal influence on the surrounding Brandy and Water Creek. The results are summarised in Table 14 and Table 15. Overall trends show water quality has been stable in relation to the Kemira Valley site. Graphs depicting trends in water quality over previous years is provided in Appendix E.

Table 14: Summary of Water Quality Results – Dend 7 (Upstream of KVCLF)

Parameter	Units	Min	Max	FY Average
pH	pH units	7.7	8.4	8.1
Total Suspended Solids	mg/L	<5	175[1]	40.5[1]
Oil and Grease	mg/L	<5	14[2]	6.1[2]
Conductivity	µS/cm	257.0	806.0	537.8

Table 15: Summary of Water Quality Results – Dend 10 (Downstream of KVCLF)

Parameter	Units	Min	Max	FY Average
pH	pH units	7.7	8.4	8.2
Total Suspended Solids	mg/L	<5	187.0[1]	39.8[1]
Oil and Grease	mg/L	<5	6[2]	5.3[2]
Conductivity	µS/cm	276	851.0	553.8

Dendrobium Pit Top

A comparison of the water quality results from Dend 12 (Table 16 upstream of Pit Top) and Dend 13 (Table 17 downstream of Pit Top) indicate that there is no significant variation in total suspended solids, oil and grease levels, or pH. Average water quality remained below the default trigger values from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 for slightly disturbed ecosystems in south-east Australia. Overall trends show water quality has been stable in relation to the Dendrobium Pit Top site. Graphs depicting trends in water quality over previous years is provided in Appendix E.

Table 16: Summary of Water Quality Results – Dend 12 (Upstream of Pit Top)

Parameter	Units	Min	Max	Average
pH	pH units	6.8	8.2	7.8
Total Suspended Solids	mg/L	<5	15[1]	7.1[1]
Oil and Grease	mg/L	<5	16[2]	6.4[2]
Conductivity	µS/cm	125.0	322.0	263.0

[1] Influenced by upstream source and was not related to the Mine Operations
[2] Sampling/analysis error as downstream showed no spikes of elevated oil and grease levels

Table 17: Summary of Water Quality Results – Dend 13 (Downstream of Pit Top)				
Parameter	**Units**	**Min**	**Max**	**Average**
pH	pH units	7.3	8.2	7.9
Total Suspended Solids	mg/L	<5	18[3]	8.9[3]
Oil and Grease	mg/L	<5	<5	<5
Conductivity	µS/cm	176	714	430.6

Monitoring and Results – Licenced Discharge Point LDP5

Water from the old Kemira Mine workings and KVCLF sediment ponds (during and after rain events) is discharged through Licenced Discharge Point 5 (LDP5), located at Marley Place (refer to Plan 8B). Brine from the S32IMC Appin West Water Filtration Plant is transported by truck to Marley Place and discharged through LDP5. A total volume of 2,138.3 ML (including 71.9 ML of brine from Appin West Water Filtration Plant) was discharged in this reporting period. A summary of the monitoring requirements and limits for the reporting period for LDP5 are provided in Table 18. Long-term average trends have shown stable results within limits. Graphs depicting trends in water quality over previous years is provided in Appendix E.

Table 18: Monitoring Requirements and Prescribed Limits for LDP5				
Parameter	**Units**	**Frequency**	**Sampling Method**	**Licence Limit**
Arsenic	mg/L	Monthly	Grab sample	1.3
Conductivity	µS/cm	Monthly	Grab sample	----
Copper	mg/L	Monthly	Grab sample	0.08
Nickel	mg/L	Monthly	Grab sample	5
Oil and Grease	mg/L	Monthly	Grab sample	10
Total suspended solids	mg/L	Monthly	Grab sample	30
Zinc	mg/L	Monthly	Grab sample	0.4
pH	pH	Monthly	In situ[4]	6.5-9.0

The monitoring results from the LDP5 sampling program are reviewed monthly. The monitoring results are reported to the relevant external stakeholders via the:

- EPL Annual Return (see Appendix A);
- Annual Review; and
- South32 website (14-day report).

A summary of monitoring results for the reporting period is provided in Table 19. The reporting period saw 100% of samples below the limit of reporting. This is in-line with long-term trends. Graphs depicting trends in water quality over FY19 is provided in Appendix E.

[3] Influenced by upstream source and was not related to the Mine Operations

[4] An in situ reading for pH is taken however the results reported in the 14-day report are from the grab sample collected at the same time.

Table 19: EPL Annual Return Monitoring Summary

Parameter	Units	Min	Average	Max	EPL Limit
Arsenic	mg/L	0.009	0.011	0.014	1.3
Conductivity	µS/cm	1800	2005	2400	NA
Copper	mg/L	<0.001	<0.001	<0.002	0.08
Nickel	mg/L	0.011	0.014	0.021	5
Oil and Grease	mg/L	<5	<5	<5	10
pH	pH	8.1	8.3	8.9	6.5 - 9.0
Total suspended solids	mg/L	5	6	11	30
Zinc	mg/L	0.032	0.038	0.050	0.4

The Annual Return information is available online via the link: http://www.epa.nsw.gov.au/prpoeoapp/ (EPA website – search for Licence No. 3241). A copy of the 2018/19 EPA Annual Return has been provided as Appendix A.

Pollution Reduction Programs

No pollution reduction programs were required to be carried out during the reporting period.

Cordeaux Colliery

Due to the cessation of coal mining, the amount of dirty water generated at the surface of the mine has significantly reduced. Water from the surface areas is captured in the dirty water lagoon then transferred using a pump to the upper level mine water holding lagoons for settlement. This water is then transferred to underground mine workings via a gravity fed pipeline, negating the need for surface discharge. The water returned to the mine is of good quality containing no contaminants.

During the reporting period approximately 3.28 ML of water was discharged from the mine water holding lagoons to the underground workings.

Figure 7 shows the trends for water quality results for pH and conductivity of water within the mine holding lagoons from 2000 to 2019. Since cessation of underground pumping operations in 2002, water quality in the mine water holding lagoon has greatly improved and remained generally stable. During the reporting period, monitoring results within the mine water holding lagoons continue to reflect good water quality. The pH ranged between 7.5 and 9.12 and conductivity remained below 350µS/cm. Oil and grease results were mostly below the limit of reporting except for April 2018 where a result of 8mg/L was reported, 3mg/L above the limit of reporting.

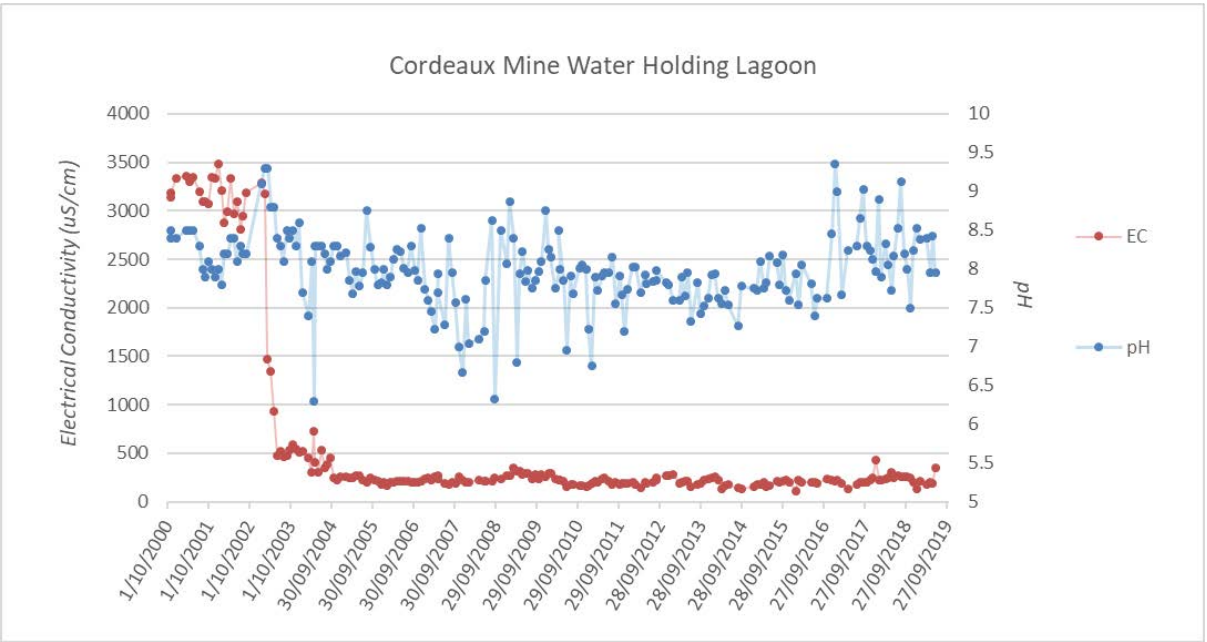


Figure 7: Water Quality Data from the Mine Water Holding Lagoon.

The clean area catchment run-off from the Cordeaux Pit Top site (including the sealed employee car parking area) reports to the sand filter lagoon and leaves site to the local environment via the sand filter underflow. Water quality from this point is analysed on a nominal monthly basis. Water quality analysis for this reporting period shows the discharge water quality was between pH 7.85 and 8.76, with conductivity ranging between 194 and 533 µS/cm. All results for oil and grease were below the limit of reporting (i.e. less than 5 mg/L). Results from the Cordeaux Filter Lagoon underflow for the period 1999 to 2019 are shown on Figure 8.

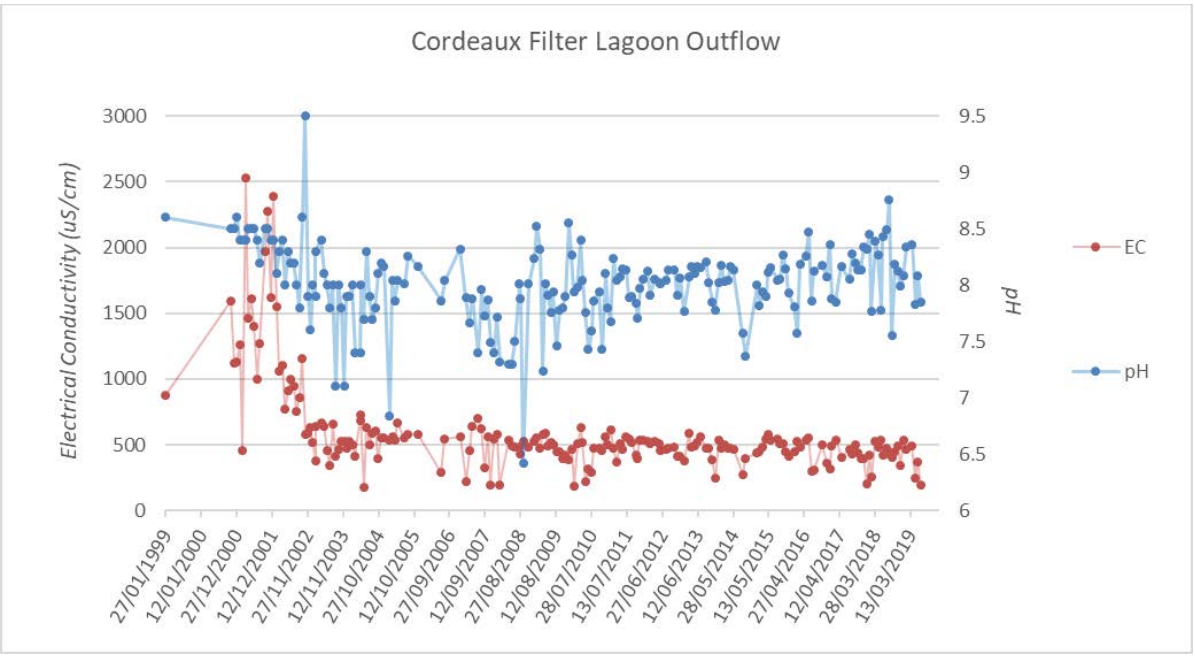


Figure 8: pH and Conductivity at the Cordeaux Filter Lagoon Underflow.

Water quality from the Cordeaux Filter Lagoon Outflow improved following cessation of operations in 2002. Since then water quality has remained generally stable.

The long-term data suggests that the existing storage capacity and water management is adequate in managing the current activities and rainfall events.

6.4. Contaminated Land

Dendrobium Mine

No significant land pollution events occurred during the reporting period at Dendrobium Mine. Basix Environmental Solutions (BES, 2010) completed a preliminary contamination assessment of the Dendrobium Mine Pit Top and KVCLF in March 2010. The results from subsequent soil sampling were provided in previous Annual Reviews and indicated that:

- Polycyclic aromatic hydrocarbon levels were below the National Environment Protection Measure health investigation level criteria for parks, recreation open space and playing fields;
- Total petroleum hydrocarbon levels were below the Dutch Intervention Value of 5,000 mg/kg; and
- Minor oil staining of sealed surfaces occurred. For the majority of the Pit Top, it is likely that any potential contamination (existing under sealed surfaces or on unsealed road verges storage areas) is minor and not likely to export off site.

Cordeaux Colliery

Cordeaux Colliery has a small localised area which has been affected by leaching from the slag base at the surface switch yard. This was first noted in 2005 as vegetation in the localised area appeared to have been adversely affected. No increases in impacts have been observed in this reporting period.

Rehabilitation planning for sites will include investigations to identify land contamination. If areas of contamination are identified that require remedial works, this will then be completed in an appropriate manner in accordance with the requirement/agreement of stakeholders and relevant Government agencies.

Corrimal No.3 Shaft

On 4 April 2017, S32IMC identified that two transformers had been vandalised at the Corrimal No. 3 Ventilation Shaft which resulted in the spilling of oil at the site. The site is located north of Picton Road in proximity to Fire Trail No. 8, Cataract NSW. The spill was reported to relevant Government agencies. A clean up notice was issued by WaterNSW and a Remedial Action Plan (RAP) was submitted. The works mainly consisted of removal of some of the above ground structures, removal of transformer bunds and footings and removal of impacted soils and sediments. Validation works associated with the RAP were completed in the transformer yard and associated areas of the site and the report submitted to WaterNSW, who advised that they consider the requirements under the Clean Up Notice 4/2017 to be fully discharged.

Monitoring continues at Corrimal No. 3 as per the Trigger Action Response Plan (TARP) and Water Quality Management Plan with results provided to WaterNSW. The next scheduled detailed sampling event is scheduled for November 2019.

6.5. Threatened Flora/Fauna

Dendrobium Mine

No threatened species were identified on the Dendrobium Pit Top site, KVCLF or Ventilation Shaft 1 or 2/3 sites during this reporting period. Results from the flora and fauna monitoring undertaken via the Subsidence Management Plan (SMP) process are detailed in Section 6.14 of this report.

Cordeaux Colliery

No activities have occurred at Cordeaux Colliery that would affect threatened flora or fauna species.

Ventilation Shafts 1, 2 and 3

No activities have been undertaken at Ventilation Shaft 1 or Ventilation Shaft 2/3 that could potentially affect threatened flora or fauna species.

6.6. Weeds

Dendrobium Mine

Weeds are managed in accordance with the Dendrobium Landscape Management Plan. Dendrobium carried out regular maintenance which included weed control during the reporting period.

Within the Dendrobium Pit Top area, some of the more accessible areas were targeted for weed species removal. This included the removal and / or treatment of Crofton Weed, Lantana, Privet, Ginger Lily and other woody and herbaceous weeds. Kemira Valley operations targeted accessible areas for Mysorethorn removal and/or treatment. Weed treatment was also undertaken along the Kemira Valley Rail Line.

Cordeaux Colliery

Weeds are controlled on a routine basis by the site contract gardener through targeted spray activities. Weed growth within the area of the boundary fire break zone is addressed as required.

Ventilation Shafts 1, 2 and 3

Weed management is conducted at Ventilation Shaft 1 and Ventilation Shaft 2/3 in accordance with the Dendrobium Landscape Management Plan.

6.7. Blasting

Dendrobium Mine

No surface blasting activities were undertaken during the reporting period. Minor blasting activities underground are undertaken using approved management plans.

Cordeaux Colliery

Cordeaux Colliery is under care and maintenance and no blasting was undertaken.

6.8. Operational Noise

Dendrobium Mine

Noise Management Strategies

Noise management is an important aspect of the Dendrobium operations as the Pit Top and Kemira Valley sites are located adjacent to residences in Mt Kembla and Kembla Heights. Quarterly noise monitoring is conducted to satisfy requirements of the Dendrobium Development Consent and the approved Noise Management Plan.

Noise management strategies in place include:

- low frequency reversing alarms installed on all underground and surface-based vehicles;
- rail track related noise management program;
- replacement of steel rollers with polyurethane coated rollers on the Kemira Valley conveyor;

- removal of steel belt clips at Kemira Valley Tunnel;
- self-imposed night time noise curfew limiting mobile equipment and ballast movements around the Dendrobium Pit Top (from 10pm to 6.15am);
- employee/contractor environment and community awareness training;
- replacement of old compressor units with quieter noise attenuated units; and
- Load Haul Dump vehicles have been upgraded to quieter coal tram machinery.

Noise from the rail operations on the Kemira Valley Rail Line has been a community concern since the commencement of operations under the Dendrobium Development Consent.

The rail line is located within 200 m of more than 500 receivers within the Mount Kembla, Cordeaux Heights and Unanderra communities. The track geometry consists of relatively tight curves which can increase the likelihood of squeal events caused by the wheel / track interface and / or brake related issues. Noise issues have been addressed by the Rail Noise Working Group (RNWG) through the below objectives:

- review noise results and identify rail noise mitigation options;
- improve targeted track maintenance; and
- develop strategies for positive proactive community engagement.

During previous reporting periods, the RNWG has undertaken numerous rail trials and noise monitoring campaigns to identify noise sources and minimise the rail noise generated in the local area.

S32IMC conducted the following Environment Improvement Program / Rail Noise Investigation during FY16, FY17, FY18 and FY19:

- Stage 1 (undertaken in FY16): undertake a study of rail noise factors to identify and differentiation in rail noise between assets; define proportion of noise contribution from brake, wheel, and flange sources; and establish any relationship between squeal and potential causal factors where possible. Stage 1 identified braking noise as the priority noise source to be further investigated.

- Stage 2: Development of a strategic plan to reduce rail noise based upon the evidence/findings from Stage 1. The Strategic Plan included the following actions:

    - Pacific National undertook brake shoe dyno testing with the manufacturer & Transport NSW. The findings included:

        - Non-conforming fit (centre contact) between brake shoe and shoe chair (different radii) leads to vibration & brake noise generation.

        - Chocking the non-conforming shoe and shoe chair removes vibration and reduces brake noise generation.

        - Shoe key fitment was not a contributing factor.

        - With non-conforming fit of the brake shoe, an elevation in temperature made it easier to produce squeal (with a conforming fit, temperature made no difference).

        - Position of the brake block on the wheel profile affected noise generation (tapering).

        - Wagon Fleet Testing: Measurement of wagon attributes across good and bad brake noise performers to determine if there is a difference in attributes including:

            - Brake force and brake cylinder pressure;

- Shoe chair radii and brake shoe radii;
- Shoe key fitment; and
- Rotational resistance of shoe chair around brake beam.

Stage 1 identified that a non-conforming brake shoe fit was a contributing factor for nuisance noise (squeal) and a program of works was developed to complete on track testing of conforming brake shoes.

Modified Brake Shoes (larger version) with a more conforming fit were fitted to an entire train (22 wagons) in FY17 to allow for comparison of modified and unmodified trains. Track side and on-board monitoring of the modified and unmodified trains have shown that the conforming fit brake shoe is successful at reducing duration, loudness and frequency (number of squeal occurrences).

During FY18 the large version backing plate radius brake shoes were installed on all NHBH-type coal wagons operating on the Kemira Valley line. Monitoring undertaken in February 2018 confirmed that there was a sustained reduction in mid frequency brake noise using the larger backing plates.

Rail related noise complaints have since dropped considerably since the introduction of the modified brake shoe.

During FY19, after a period of significantly reduced rail noise complaints, issues were identified with wheel squeal on a corner of track near William James Drive, particularly on the train movement towards Kemira Valley. The issues were discussed at the RNWG and the following actions were taken:

- Review and trialling of different train speeds;
- Track adjustments;
- Track tamping; and
- Installation of a new greasing unit.

A noise monitor was utilised at an adjacent property to monitor noise prior to and post implementation of these improvements. The monitoring indicated that there was a reduction in the frequency and level of squeal events. Feedback from the resident on whose property the noise monitor was located also indicated that there has been a significant improvement.

Noise Monitoring Program

The program includes noise monitoring of the Pit Top site, the KVCLF and the rail operations. Attended noise monitoring is carried out quarterly at three locations as shown on Plan 9.

The rail haulage noise measurements are completed annually. This monitoring has been undertaken as per the approved Noise Management Plan.

The results from the attended noise monitoring are compared to the noise criteria for Dendrobium Mine and KVCLF for daytime, evening, and night time periods as set out in the Dendrobium Development Consent. The LA_{eq} noise criteria are shown in Table 20.

Table 20: Monitoring Requirements and Prescribed Limits

Location	Noise Criteria LAeq, 15 min (dBA)			Noise Criteria for Dendrobium Operations, LA1, 1min (dBA)
	Daytime (7am -6pm)	Evening (6pm-10pm)	Night time (10pm – 7am)	
R1	40	40	39	49
R6a	40	40	37	47
R39a	37	35	35	45

Attended noise monitoring was conducted on a quarterly basis throughout the reporting period.

During the reporting period Dendrobium achieved 100% compliance against the LAeq, 15min criterion, although there were two exceedances of noise impact assessment criteria. These are discussed in Section 11.

A summary of the results is provided below.

Location R1 (17 High Street)

R1 is located to the north of the Pit Top. There were no exceedances of the noise criteria. The LA_{eq} 15-minute results for R1 for FY19 are provided in Figure 9 and trends showing average results in Figure 10.

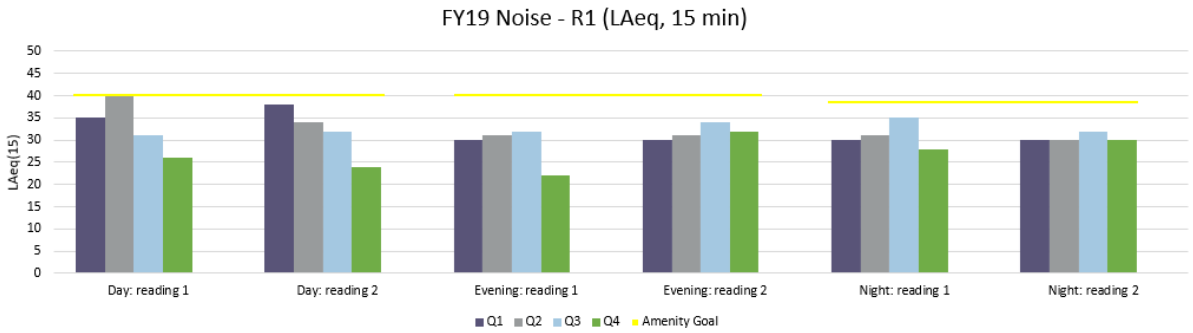


Figure 9: Site R1 Noise Compliance (LAeq, 15 min) – FY19

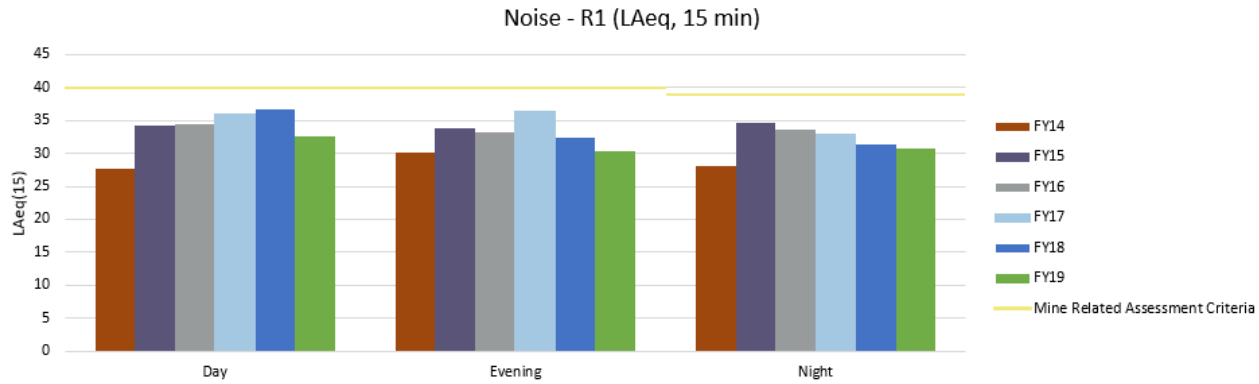


Figure 10: Site R1 Noise Compliance (LAeq, 15 min).

Location R6a (374 Cordeaux Road)[5]

R6a is located to the east of the Dendrobium Pit Top. There were two exceedances of the noise criteria. The LA_{eq} 15-minute results for R6a for FY19 are provided in Figure 11 and trends showing average results in Figure 12.

[5] It was identified that noise monitoring had not been undertaken at the exact location as detailed in the Noise Management Plan. See Section 11 for further information.

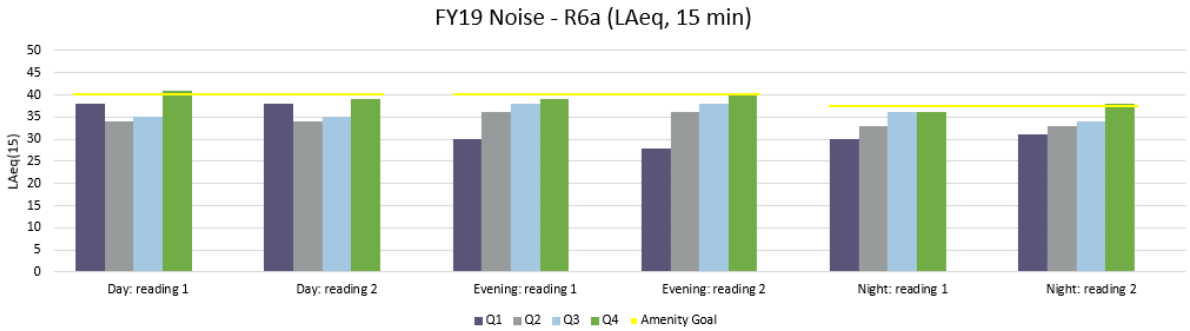


Figure 11: Site R6a Noise Compliance (LAeq, 15 min) – FY19

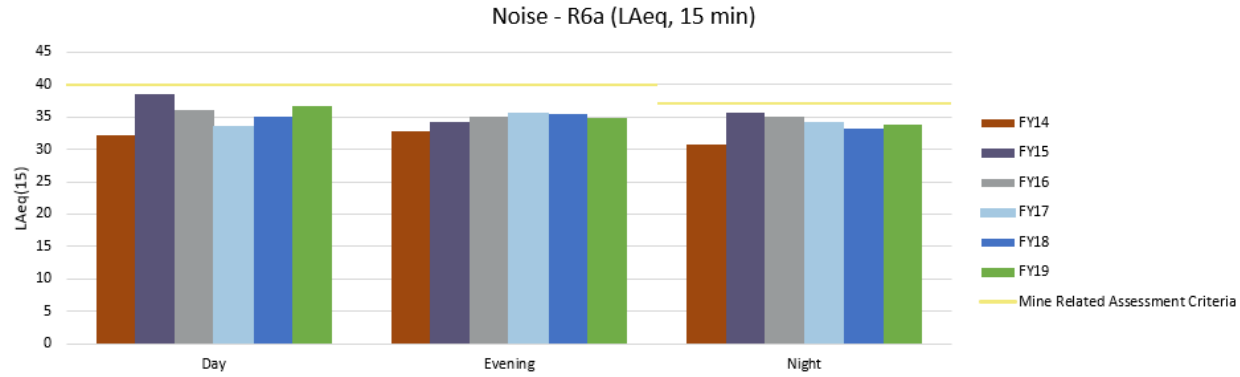


Figure 12: Site R6a Noise Compliance (LAeq, 15 min).

Location R39a

R39a is located to the south-east of KVCLF at Figtree Farm. There were no exceedances of the noise criteria. The LAeq 15-minute results for R39a are provided in Figure 13 and trends showing average results in Figure 14.

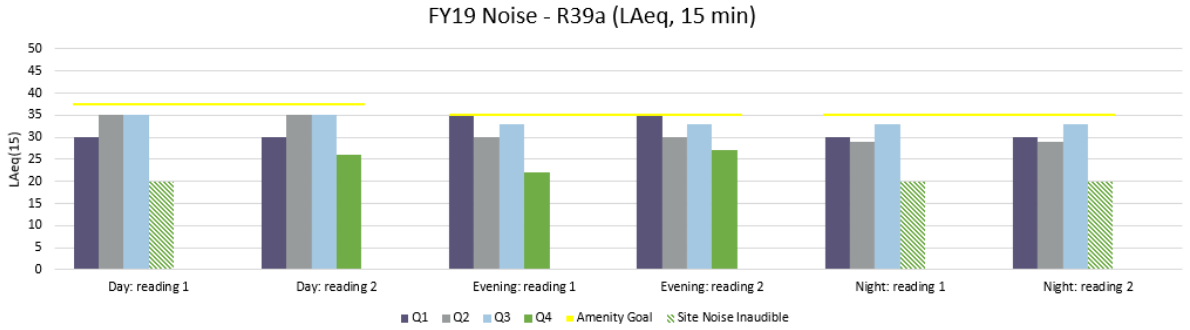


Figure 13: Site R39A Noise Compliance (LAeq, 15 min) – FY19

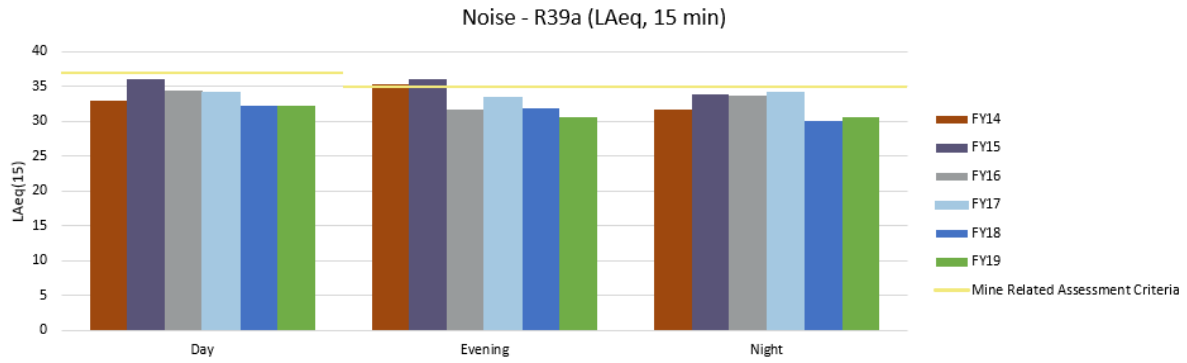


Figure 14: Site R39A Noise Compliance (LAeq, 15 min).

Rail Haulage

A summary of the rail haulage noise criteria is presented in Table 21. The noise levels from all locomotives in use on the Kemira Valley Rail line are governed by these specific noise limits.

Table 21: Rail Haulage Noise Criteria.

Operating Conditions	Speed and Location of Measurement	Noise Limits LA1 (1 min) (dBA)
Idle with compressor radiator fans and air conditioning operating at maximum load occurring at idle	Stationary 15m contour	70dBA
All other throttle settings under self-load with compressor radiator fans and air conditioning operating	Stationary 15m contour	87dBA 95dBLin
All service conditions	0-50 km/h 15m from centreline of track	87dBA 95dBLin

Attended rail haulage noise measurements for the 82-class locomotive was conducted in September 2018. A minor exceedance for the 315kHz frequency was recorded for idle operating conditions (as defined in the NSW EPA Industrial Noise Policy). High frequency sounds are heavily attenuated by distance (Stokes Law). As the measurement distance was 15 metres away from the rail line and the train does not operate in idle within this distance of a receiver, the exceedance is considered to be non-material. Overall noise (LA_{eq} and L_{eq}) were compliant.

Cordeaux Colliery

Noise is not considered a significant issue at Cordeaux Colliery as the site is in care and maintenance.

6.9. Visual, Stray Light

Dendrobium Mine

Lighting at Dendrobium is managed in accordance with the Lighting Management Plan. The Dendrobium Pit Top site is shielded by established vegetation with minimal stray light leaving the site. Solar lighting along the sediment pond road has been installed this reporting period and is in accordance with the requirements in the Lighting Management Plan.

The Kemira Valley site is shielded within the valley and the majority of the lighting is turned off during night-time operations unless work is being carried out on site. No complaints regarding lighting at Kemira Valley were received during the reporting period.

Cordeaux Colliery

Cordeaux Colliery is located in bushland with no immediate residential receivers. No complaints regarding lighting were received during the reporting period.

6.10. Aboriginal Heritage

Dendrobium Mine

The Dendrobium Area 3B Longwalls 9-18: Heritage Impact Assessment sets out the requirements to satisfy the Consent Conditions for Aboriginal Heritage management in Dendrobium Area 3. Aboriginal Heritage Impact Permit (AHIP) No: 1132005 was issued to Illawarra Coal Holdings Pty Ltd on 18 December 2012. AHIP No: 1132005 allows for potential impacts (associated with subsidence movements from longwall mining) to Aboriginal archaeological sites within Dendrobium Area 3B. The management measures described in this Aboriginal Heritage Plan are the same as those to be implemented for AHIP No: 1132005.

Cordeaux Colliery

Sites of archaeological and natural significance were identified and assessed as part of previous longwall extraction approval processes. The assessments concluded that no significant effects would occur to the identified features as a result of longwall mining at Cordeaux Colliery.

Archaeological assessments and surveys were conducted in 2003 in relation to surface rehabilitation works planned for the Cordeaux sites. The assessments and surveys identified no items of aboriginal significance that will be disturbed by the potential rehabilitation activities.

6.11. Natural Heritage

Dendrobium Mine

Items of natural heritage are identified in the SMP process. Details regarding natural heritage and European heritage are reported in Section 6.14 of this report.

Cordeaux Colliery

Natural heritage is not considered a significant issue at Cordeaux Colliery as the site is in care and maintenance.

6.12. Spontaneous Combustion

Dendrobium Mine

Spontaneous combustion has not been an issue at Dendrobium Mine. The coal and overburden characteristics at Dendrobium Mine are unlikely to lead to spontaneous combustion.

Cordeaux Colliery

Spontaneous combustion has not been an issue at Cordeaux Colliery. The coal and overburden characteristics at Cordeaux Colliery are unlikely to lead to spontaneous combustion.

6.13. Bushfire

Dendrobium Mine

During the reporting period, bushfire mitigation works were carried out in accordance with the Bushfire Management Plan. Asset protection and fire trails are maintained or established in the following areas:

- Asset Protection Zones maintained:
  - 28-38 Harry Graham Drive – Kembla Heights;
  - Northern Side of Cordeaux Road – Mount Kembla; and
  - Dendrobium 1, 2 and 3 ventilation shafts.
- Fire Trail Maintenance:
  - Containment Line southern side of Dendrobium Mine Pit Top;
  - Benjamin Road Fire Trail – Kembla Heights;
  - Stones Road Fire Trail – Kembla Heights; and
  - Access to Dendrobium 1, 2 and 3 ventilation shafts.

Cordeaux Colliery

Bushfire management at the Cordeaux Pit Top is achieved through the formation of a fire break around the site boundary, and the establishment of an extensive firefighting water pipeline (with booster pump facility) around the site. A tanker filling station for charging the fire line has been installed in proximity to the fire pump (Note: the fire line is not maintained in a charged state). Maintenance of fire line pressure was previously automated by a pressure-controlled jockey pump.

Clearing of excessive vegetation from within the pit-top boundary fire break zone is completed as required, determined by annual inspections. To prevent the possibility of bush fires produced by contact with live power lines, line clearing is undertaken to selectively clear vegetation with the potential to encroach on power lines.

Prior to the onset of the summer months each year, S32IMC undertakes inspections of its property boundaries to determine appropriate bush fire mitigation and hazard reduction works to be undertaken prior to the hotter drier summer months of the bushfire season.

The Rural Fire Service radio repeater is located in the man and materials tower at the Cordeaux Pit Top site.

6.14. Mine Subsidence

Dendrobium Mine

Mining using the longwall method results in subsidence (lowering) of the land surface. Dendrobium Mine has an approved SMP for each of its mining areas (1, 2, 3A and 3B) which describes the ongoing program of subsidence monitoring and management at the mine. These SMPs were developed in accordance with Condition 7, Schedule 3 of the Dendrobium Mine Development Consent (DA 60-03-2001).

The management of subsidence is undertaken in consultation with the Dendrobium Community Consultative Committee (DCCC), WaterNSW, Dams Safety Committee (DSC), and DPIE, including the Resources Regulator, Water Division and Biodiversity and Conservation. The implementation of the plan relates to monitoring and management of natural features, including:

- Surface and groundwater;
- Landscapes, including steep slopes, cliffs, land suitability and areas prone to erosion or flooding;

- Terrestrial and aquatic ecology;
- Aboriginal and European heritage; and
- Infrastructure (man-made features).

During the reporting period Longwall 14 extraction was completed on 26 February 2019. Longwall 15 extraction commenced on 9 April 2019, and, as of 30 June 2019, had extracted approximately 600 metres. Mine subsidence monitoring and reporting was carried out in accordance with the approved SMP for Area 3B and supporting management plans.

The monitoring program for Longwalls 14 and 15 is defined by the Area 3B SMP and supporting management plans which include:

- Dendrobium Area 3B Asset Protection Plan;
- Dendrobium Area 3B Groundwater Management Plan;
- Dendrobium Area 3B Swamp Impact, Monitoring, Management and Contingency Plan (SIMMCP); and
- Dendrobium Area 3B Watercourse Impact, Monitoring, Management and Contingency Plan (WIMMCP).

A summary of monitoring commitments for this reporting period are provided in Table 22. Additional information is provided in the Longwall 14 End of Panel report, Area 3B SMP and supporting management plans, which can be accessed from the South32 Website:

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

Table 22: Subsidence monitoring program for Dendrobium Mine

SMP Commitments for the Reporting Period	Monitoring Frequency	Monitoring Undertaken
Subsidence Monitoring		
Airborne Laser Scanning (ALS) over Areas 3A and 3B – including 3D Digital Terrain Model (DTM)	ALS to be undertaken at conclusion of each longwall and 12 months after extraction is complete in each area	As per SMP commitments
Area 3B 2D monitoring lines Swamps and Trib X Lines Avon Dam (+ LA4 Trib)	Monthly during mining for key features during active subsidence Every 500m Extraction of Longwall	As per SMP commitments Tributary surveys complete 8/2018, 9/2018, 10/2018, 12/2018, 01/2019, 02/2019, 3/2019 Swamp surveys complete 7/2018, 8/2018, 9/2018, 10/2018, 12/2018, 1/2019, 2/2019, 3/2019 Avon Dam and LA4 surveys complete 8/2018, 10/2018, 1/2019, 4/2019

Table 22: Subsidence monitoring program for Dendrobium Mine		
SMP Commitments for the Reporting Period	**Monitoring Frequency**	**Monitoring Undertaken**
3D control survey	Conclusion of each longwall and 12 months after the completion of each area	As per SMP commitments
Water Courses		
Observational, Photo Point and Water Monitoring		
Native Dog, Wongawilli and Donalds Castle Creeks, WC21, WC15, LA4, DC13, LA6, ND1, WC6, WC7, WC8, WC9, WC12, WC16 and WC18 Swamps 5, 10, 11, 13, 14, 23, 35a, 35b, 1a, 1b, 8, 3 and 4	Monthly 2 years pre and post mining, weekly when longwall is within 400m of monitoring site	As per SMP commitments
Water Quality		
Wongawilli Creek WWU1, WWU4, WC Pool 49, WWM2, WC_Pool 46, Wongawilli Ck (FR6), WC21_S1, WC21 Pools 30 and 53, WC15_Pool 9, WC12_Pool 1 Lake Avon LA4_S1, LA4_S2, LA5_S1, LA5_S2, LA3 Pool 4, LA2 Pool 5, LA1, NDC4 and NDC1 Donalds Castle Creek DCU3, DCL3, DC_Pool 22, DC13_Pool 2b Sandy Creek SCk_Rockbar 5	Monthly monitoring during and post mining for two years or until required	As per SMP commitments
Flow		
Wongawilli Creek WWU, WWL, WC21S1 and WC15S1, WC12S1 Donalds Castle Creek	Continuous 1 hour logging intervals	As per SMP commitments

Table 22: Subsidence monitoring program for Dendrobium Mine		
SMP Commitments for the Reporting Period	**Monitoring Frequency**	**Monitoring Undertaken**
DCU, DC13S1 and DCS2 Lake Avon LA4S1, LA2S1, LA3S1 Native Dog Creek NDT1S1		
Aquatic Ecology		
• Macroinvertebrate sampling and assessment using the AUSRIVAS protocol and quantitative sampling using artificial collectors • Individuals of the genus Austrocorduliidae and Gomphomacromiidae are identified to species level if possible • Fish are sampled using back-pack electrofisher and baited traps	• Two baseline monitoring campaigns prior to mining during autumn and spring • Monitoring during mining in autumn and spring • Monitoring post-mining for two years or as otherwise required • Monitoring target sites as mining progresses through the domain	As per SMP commitments
Terrestrial Fauna – Threatened Frog Species		
• Surveys are conducted along creeks with a focus on features susceptible to impacts • Potential breeding habitat for Littlejohn's Tree Frog and Giant Burrowing Frog will be targeted • Standardized transects to record numbers of individuals between surveys for each site	Surveys are undertaken in optimal periods over the season	As per SMP commitments
Swamps		
Observational, Photo Point and Water Monitoring		
Impact Sites: • Swamps 1A, 1B, 3, 4, 5, 8, 10, 11, 13, 14, 23,35A and 35B Reference Sites:	Monthly 2 years pre and post mining, weekly when longwall is within 400m of monitoring site Reference sites 6 monthly	As per SMP commitments

Table 22: Subsidence monitoring program for Dendrobium Mine		
SMP Commitments for the Reporting Period	**Monitoring Frequency**	**Monitoring Undertaken**
• Swamps 2, 7, 15a, 22,24, 25, 33, 84, 85, 86, 87 and 88		
Erosion Monitoring		
Impact Sites: • Swamps 1A, 1B, 3, 4, 5, 8, 10, 11, 13, 14, 23, 35A and 35B Reference Sites: Swamps 2, 7, 15A, 22, 24, 25, 33, 84, 85, 86, 87 and 88	Ground based surveys to be completed for each longwall after each longwall or to define any new erosions identified by ALS survey	As per SMP commitments
Shallow Groundwater Level		
Impact Sites: • Swamps 1A, 1B, 3, 4, 5, 8, 10, 11, 12, 13, 14, 23, 35A and 35B Reference Sites • Swamps 2, 7, 15A, 22, 24, 25, 33, 84, 85, 86, 87 and 88	For open hole sites: • Monthly baseline monitoring • Weekly monitoring during active subsidence • Monthly monitoring post mining for two years to be reviewed annually For instrumented sites: Automatic groundwater level monitoring (4-hour interval or similar) • Monitoring post mining for five years to be reviewed annually	As per SMP commitments
Soil Moisture		
Impact Sites: • Swamps 3, 4, 5, 8, 10, 11, 13, 14, 23, 35A and 35B Reference sites: • Swamps 2, 7, 15A, 22, 24, 25, 33, 84, 85, 86, 87 and 88	Monthly baseline for 2 years prior to mining Weekly monitoring when longwall is within 400m of swamp • 6 monthly monitoring for 2 years post mining	As per SMP commitments
Terrestrial Flora – Composition and Distribution of Species		

Table 22: Subsidence monitoring program for Dendrobium Mine		
SMP Commitments for the Reporting Period	**Monitoring Frequency**	**Monitoring Undertaken**
15m transects consisting of 30 0.5m X 0.5m quadrats. The monitoring records: • Presence of all species within each quadrat • Percentage foliage cover and vegetation height • Observations of dieback or changes in community structure • Photo point monitoring at each transect	Surveys are undertaken in spring and autumn each year	As per SMP commitments
Terrestrial Flora – Swamp Size and Ecosystem Function		
Detailed mapping including use of LiDAR data to indicate the location and extent of upland swamp boundaries followed by ground-truthing of these boundaries and vegetation sub-communities	Baseline mapping prior to mining Repeat mapping at 5-year intervals or as determined by observational monitoring	As per SMP commitments
Terrestrial Fauna – Threatened Frog Species		
Surveys are conducted along creeks with a focus on features susceptible to impacts • Potential breeding habitat for Littlejohn's Tree Frog and Giant Burrowing Frog will be targeted • Standardized transects to record numbers of individuals between surveys for each site • Tadpole counts to be undertaken as part of the breeding habitat monitoring transects	Surveys are undertaken in optimal periods over the season	As per SMP commitments
Landscape		
Targeted Sites		
• Cliffs - A3-CL1, A3-CL2, A3-CL3, A3-CL4, A3-CL5, DA3-CF19, DA3-CF20, DA3-CF21, DA3-CF22, DA3-CF23, DA3-CF24, DA3-	• Baseline monitoring campaign prior to mining • Monthly monitoring during subsidence	As per SMP commitments

Table 22: Subsidence monitoring program for Dendrobium Mine		
SMP Commitments for the Reporting Period	**Monitoring Frequency**	**Monitoring Undertaken**
CF25, DA3-CF26, DA3-CF41, DA3-CF42, DA3-CF43 • Steep Slopes - A3-SL1, A3-SL2, A3-SL3, A3-SL4, A3-SL5, A3-SL6, A3-SL7, A3-SL8, A3-SL9 • Watercourses / Swamps - Refer to Dendrobium Area 3 Watercourse and Swamp Monitoring TARP's • Fire Trails A3-FR1, A3-FR2, Fire Roads 6A, 6N and 6Q	• Monitoring to continue 6 monthly for 2 years following the completion of mining	
Inspection of Active Mining Area – Landscape Features, Vegetation, Watercourses		
• All mapped cliff, steep slopes, and watercourse, swamp and fire trail sites in subsidence area. Refer to Dendrobium Area 3B SMP Figure 5.3, 15.1 and 18.1 for location of sites • General observation of active mining areas. • During mining recording includes impacts to: - Drainage - Disturbance of site erosion - Aggradations - Inundation - Rock fracturing - Changes in runoff - Changes in vegetation - Impacts to fauna / fish - Rockfalls - Soil cracking - Slumping	• Weekly monitoring when longwall extraction is within 400m	As per SMP commitments
Terrestrial Fauna		
• A number of sites located across and around Areas 2, 3A and 3B. Refer to Dendrobium Area 3A	• Two baseline monitoring campaigns 1 year prior to mining during autumn and spring	As per SMP commitments

Table 22: Subsidence monitoring program for Dendrobium Mine		
SMP Commitments for the Reporting Period	**Monitoring Frequency**	**Monitoring Undertaken**
SMP Figures 21.1, 21.2 and 21.3 and 3B Figure 20.1 • Monitoring parameters include: - Vegetation communities - Vegetation condition - Changes in vegetation - Tree health - Swamp vegetation - Threatened species • Control sites	• 6 monthly monitoring during mining in autumn and spring • 6 monthly monitoring post mining for two years or as otherwise required	
• A number of sites located across and around Areas 2, 3A and 3B. Refer to Dendrobium Area 3A SMP Figures 21.1, 21.2 and 21.3 and 3B Figure 20.1 • Monitoring parameters include: o Species and habitat characteristics • Targeted surveys and monitoring of known populations of threatened frog species	• Two baseline monitoring campaigns 1 year prior to mining • 6 monthly monitoring during mining • 6 monthly monitoring post mining for two years or as otherwise required	As per SMP commitments
Aboriginal Archaeology		
• Re-recording of the principal components identified by Sefton (Sefton 2000) • Macro and micro recording using digital photography (Navin Officer (2003) • Detailed elevation plans of shelter walls recording structural and surface features including but not limited to the art, graffiti, joints, bedding planes, exfoliation scars, cracks, mineral and microorganism growth, drip line and water seepage locations	• Baseline archival recording: prior to longwall mining • First impact assessment recording: following initial subsidence movement of the site • Sandstone shelter aboriginal sites will be monitored during mining • Further impact assessment recording: 12 months after undermining or final subsidence movement of the site	As per SMP commitments

Subsidence Movements

Subsidence movements resulting from the extraction of Longwall 14 were measured at the following survey points and lines:

- Avon Dam Closure Lines;
- Wongawilli Creek Closure Lines;
- Dendrobium Area 3B 3D monitoring points;
- Wongawilli Creek Tributary Cross Lines;

- Donalds Castle Creek Cross Lines;
- Swamp 1a, 1b and 5 Cross Lines; and
- ALS of the area.

Subsidence parameters measured during the extraction and at the completion of Longwall 14 were generally similar to or less than what was predicted within the Area 3B SMP. For further detail on the subsidence movements measured for Longwall 14, refer to the Longwall 14 End of Panel Report. This report can be accessed via the South32 website: https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

Landscape Features

The S32IMC Environmental Field Team (ICEFT) have conducted detailed monitoring and inspections on landscape features including swamps, watercourses, rock outcrops and the general area within Dendrobium Area 3B. This monitoring was conducted in accordance with the Dendrobium Area 3B SMP, WIMMCP (versions dated December 2013, June 2015, October 2015, October 2017 and March 2019) and the SIMMCP (versions dated December 2013, June 2015, October 2015, October 2017 and March 2019). During the period of extraction updated TARPs for the WIMMCP were developed in consultation with relevant government agencies.

Monitoring of water levels, water flow, water quality and key landscape features were also conducted by specialist consultants.

Thirty-seven new, or updates to existing, surface impacts were identified by the ICEFT during the FY19 reporting period. Eighteen of these impacts were observed within watercourses, and 19 impacts were observed to landscape features such as access tracks, cliff lines and steep slopes. For further information refer to the Longwall 14 End of Panel Report and Table 23.

Surface Water and Shallow Groundwater

HGEO (hydrogeologist consultants) completed an assessment of pre, during and post-mining data after the completion of Longwall 14.

During Longwall 14, Wongawilli Creek (FR6) recorded a Level 1 trigger for both electrical conductivity (EC) and dissolved oxygen (DO).

Donalds Castle Creek (FR6) recorded a Level 3 trigger for EC, at least partly attributed to upstream subsidence related stream diversions. Continued monitoring and investigations along the watercourse was recommended to confirm the exact source of the elevated EC readings.

Flow and catchment yield modelling analyses indicate that the headwater catchments at sites within DC13 (DC13S1: -17 % change; Level 2 Trigger), Donalds Castle Creek (DCS2: -20 % change; Level 3 Trigger), WC21 (WC21S1: -24% change; Level 3 Trigger), WC15 (WC15S1: -10% change; Level 1 Trigger), and LA4 (LA4S1: -6% change; Level 1 Trigger) have been affected by the extraction of Area 3B longwalls. Yield changes remained below trigger levels at both DCU and Wongawilli Creek for the reporting period.

Changes to the TARP assessment for surface flows have been proposed and are currently being reviewed by agencies. The new assessment method will be implemented for the next End of Panel report.

Wongawilli Creek

Towards the end of 2017, the water level in Pool 43a on Wongawilli Creek fell below baseline levels (impact number DA3B_LW13_015, dated 28/11/2017). The observation triggered a TARP Level 3 because a previously reported fracture (first observed on 18/12/2013) is present in the sandstone

forming the pool base. Water level returned to baseline levels during FY19 and have been sustained at that level since.

Upland Swamps – Shallow Groundwater and Soil Moisture

Longwall 14 passed within 400 m of shallow groundwater and soil moisture sites within four swamps: Swamps 11, 13, 14 and 23.

Analysis of shallow groundwater levels indicated that a Level 3 TARP was triggered in Swamp 11. The swamp has previously exhibited low groundwater levels similar to the baseline period, however the extent of prolonged drying indicates recent levels are likely the result of mine subsidence.

Swamp 13 was reported as a Level 3 trigger for groundwater and soil moisture which is likely mining related however it is noted that similar groundwater levels were observed in reference swamps away from mining influence.

ICEFT reported a decline in groundwater levels in Swamp 14 however further specialist analysis revealed that reference sites exhibited the same decline in groundwater levels, indicating it was due to climatic conditions.

ICEFT also reported a decline in soil moisture levels in Swamp 23 prior to Longwall 14. Specialist assessment concluded that this was not mining related.

For further information, refer to the End of Panel Surface Water and Shallow Groundwater Assessment: Longwall 14 (Area 3B). For more information please refer to the Longwall 14 End of Panel Report on the S32IMC website: https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

Aquatic Ecology

The aquatic ecology monitoring program is based on a Before, After, Control, Impact (BACI) design that provides a measure of variability at Potential Impact and Control Sites before, during and after extraction. This enables changes in the key indicators associated with mining-related impacts to be distinguished from natural variability.

Monitoring is undertaken in Wongawilli and Sandy Creeks, and some of the tributaries in Dendrobium Area 3A and 3B and at comparable control sites established on Wongawilli, Sandy, Donalds Castle and Kentish Creeks.

The reductions to flow and pool water level in Wongawilli Creek were present towards the start of Longwall 14 however returned to baseline levels following a rainfall event. The reduction in availability of aquatic habitat and to longitudinal connectivity was therefore temporary.

The reductions of pool water levels and flow WC21, WC15 and LA4 following the extraction of Dendrobium Area 3B Longwalls 9 to 14 represent a local loss of aquatic habitat and biota. The loss of habitat in WC21 is relatively severe at the scale of individual pools / watercourses. The loss of aquatic habitat in these watercourses is expected to have resulted in a reduction in connectivity of remaining habitat and a loss of aquatic biota. Due to the impacts observed during extraction of Longwalls 9 to 13, it is difficult to quantify what proportion of the observed impacts are associated with extraction of Longwall 14 alone. Nevertheless, it is likely that extraction of this longwall has contributed to the observed physical mining impacts, reductions in aquatic habitat and assumed loss of some associated aquatic biota. No TARPs have been triggered with respect to Wongawilli Creek as there has not been a loss in aquatic habitat for longer than 1 year. The reductions in aquatic habitat for over 2 years in WC21 and Donalds Castle Creek constitute two level 3 TARP triggers.

Terrestrial Ecology and Swamps

An annual terrestrial ecology report was prepared for 2018 and forms the basis of assessment for the Longwall 14 End of Panel Report.

The results of the total species richness analysis showed the response to mining at individual swamps is complex, with Swamp 15A(2) and Swamp 15B showing a decline and subsequent increase in TSR following mining and changes in shallow groundwater. Meanwhile Swamp 1A, Swamp 1B and Swamp 5 displayed no significant decline in total species richness despite observed changes in shallow groundwater availability.

When accounting for yearly effects, a statistically significant change in species composition post-mining was detected at Swamp 15B and Swamp 15A(2). As with total species richness, these changes were observed immediately following mining and have continued at Swamp 15B and Swamp 15A(2) for at least four years post-mining.

The analysis of LiDAR data was used to assess the extent of upland swamps and their composite vegetation communities. It has detected that the extent of all upland swamps (impact and control swamps) within the study area has decreased substantially during 2018, from the 2014 baseline.

A reduction in habitat of the Littlejohn's Tree Frog was observed within streams impacted by subsidence.

For more information refer to the Longwall 14 End of Panel Report on the S32IMC website: https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

Cultural Heritage

The assessment of cultural heritage and archaeological sites potentially impacted by Longwall 14 was conducted by Niche Environment and Heritage. Five Aboriginal archaeological sites were inspected as part of the assessment. These sites were inspected because they were within the zone of possible subsidence associated with Longwall 14. Two of the five sites inspected had subsidence related impacts relating to Longwall 14. The art panels recorded at the sites have not been directly impacted by subsidence movements. There were no European heritage sites identified as being potentially affected by the extraction of Longwall 14. For more information refer to the Longwall 14 End of Panel Report on the S32IMC website: https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

Summary of Impacts

The observed impacts were generally less than or consistent with those predicted in the assessments undertaken prior to mining. A summary of the observed impacts during the reporting period is provided in Table 23. For further detail on impacts associated with Longwall 14, refer to the Longwall 14 End of Panel Report. The locations of the impacts are shown in Figure 15.

Table 23: Impacts identified during the Reporting Period

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3B_LW14_001	Surface Cracking	*Fire Trail 6N*	3/07/2018	1	Soil cracking on access track, approximately 5m length, 0.02m width, 0.1m depth.	4/07/2018
DA3B_LW14_002	Surface Cracking	*Fire Trail 6N*	7/07/2018	1	Five soil cracks along a 30m section of *Fire Trail 6N.* The largest crack is approximately 3m long,	8/08/2018

					0.01m wide and 0.01m at deepest measurable point.	
DA3B_LW14_003	Surface Cracking	*Fire Trail 6N*	7/07/2018	1	Four soil cracks along a 70m section of *Fire Trail 6N*. The largest crack is approximately 4.5m long, 0.03m wide and 0.23m at deepest measurable point.	8/08/2018
DA3B_LW14_004	Surface Cracking	*Fire Trail 6N*	13/08/2018	1	Five soil cracks along a 40m section of *Fire Trail 6N.* The largest crack is approximately 5 m long, 0.025m wide and 0.122m at the deepest measurable point.	29/08/2018
DA3B_LW14_005	Surface Cracking	*Fire Road 6AA*	13/08/2018	1	Two soil cracks along a 10m section of *Fire Road 6AA*. The largest crack is approximately 3.3m long, 0.007m wide and 0.066m at the deepest measurable point.	29/08/2018
DA3B_LW14_006	Surface Cracking	Access Track	19/08/2018	1	Two soil cracks along a 10m on an access track. The largest crack is approximately 2.1m long and 0.01m wide.	29/08/2018
DA3B_LW14_007	Surface Cracking	*Fire Road 6AA*	28/08/2018	1	Singular soil crack on *Fire Road 6AA*. The soil crack is approximately 3m long, 0.01m wide and 0.07m at the deepest measurable point.	29/08/2018
DA3B_LW14_008	Surface Cracking	*Fire Road 6A*	28/08/2018	1	Two soil cracks along a 20m section of *Fire Road 6A*. The largest soil crack is approximately 4.5m long, 0.02m wide and 0.15m at the deepest measurable point.	29/08/2018
DA3B_LW14_009	Surface Cracking	*Fire Road 6A*	3/09/2018	1	Three soil cracks along 20 m of *Fire Road 6A*. The largest continuous crack is 5m long, 0.02m wide and 0.4m deep.	3/09/2018
DA3B_LW14_010	Surface Cracking and Uplift	*Fire Road 6A*	10/09/2018	2	Continuous soil crack and uplift along Fire Trail 6A. The crack is approximately 12m long, 0.05m wide with a maximum uplift of 0.03m and 0.26m at the deepest measurable point.	20/09/2018
DA3B_LW14_011	Soil Cracking, Rock Fracture and Uplift	Rail Corridor	16/9/2018	1	Soil crack, rock fracture and uplift on rail corridor adjacent to Fire Road 6A.	20/09/2018
DA3B_LW14_012	Surface Cracking	*Fire Road 6A*	16/9/2018	1	Multiple surface cracks within a 20m section. Longest crack measuring approximately 9m long, 0.01m wide and 0.03m deep.	20/09/2018

DA3B_LW14_013	Surface Cracking	Access Track	26/09/2018	2	Surface cracking on access track adjacent to *Fire Road 6A.* The crack is approximately 14m long, 0.01m wide and 0.05m deep at the deepest measurable point.	27/09/2018
DA3B_LW14_014	Surface Cracking	Access Track	13/11/2018	1	Surface cracking on access track adjacent to Swamp 13. The crack is 1.1m long, 0.06m wide and 0.15m deep.	16/11/2018
DA3B_LW14_015	Rock Fracturing and Rockfall	*Step/ledge of Lake Avon*	5/12/2018	1	Rockfall and rock fracturing on Lake Avon rock ledge. The rock fracturing has a maximum length of 1.8m, a maximum width of 0.01m and a maximum depth of 0.29m. The rock fall is approximately 4m x 1.5m x 0.5m.	18/12/2018
DA3B_LW14_016	Rock Fracturing, Uplift and Rock Displacement	*WC15*	21/01/2019	2	Multiple fractures, uplift and dislodged sections of rock on *WC15*. The longest fracture is up to 4.0m long and 0.03m wide.	24/01/2019
DA3B_LW14_017	Rock Fracturing	*WC15*	20/02/2019	2	Rock fracturing to *WC15*. The rock fracturing has a maximum measurable length of 0.8m, a maximum width of 0.025m and a maximum measurable depth of 0.17m.	21/02/2019
DA3B_LW14_018	Rock Fracturing	*WC15*	20/02/2019	2	Rock fracturing to *WC15*. The rock fracture has a maximum measurable length of 0.7m, a maximum width of 0.015m and a maximum measurable depth of 0.10m.	21/02/2019
DA3B_LW14_019	Rock Fracturing and Uplift	*WC15*	20/02/2019	1	Rock fracturing to *WC15*. The rock fracture has a maximum measurable length of 4.5m, a maximum width of 0.05m, a maximum measurable depth of 0.7m.	21/02/19
DA3B_LW14_020	Rock Fracturing	*WC15*	20/02/2019	2	Rock fracturing to *WC15*. The rock fracture has a maximum measurable length of 1.3m, a maximum width of 0.05m and a maximum measurable depth of 1.13m.	21/02/19
DA3B_LW14_021	Rock Fracturing	*WC15*	20/02/2019	2	Rock fracturing to *WC15*. The rock fractures have a maximum measurable length of 1.1m and a maximum width of 0.01m.	21/02/19
DA3B_LW14_022	Rock Fracturing	*WC15*	20/02/2019	2	Rock fracturing to *WC15*. The rock fracture has a maximum measurable	21/02/19

					length of 2.9m, and a maximum width of 0.05m.	
DA3B_LW14_023	Rock Fracturing	*WC15*	1/04/2019	1	Rock fracturing to *WC15_Pool 22*. The rock fracture has a maximum measurable length of 0.35m, and a maximum width of 0.001m.	3/04/19
DA3B_LW14_024	Rock Fracturing & Rock Fall & Soil Cracking	*A3b-SS9-Pt2 (Steep Slope)*	9/04/2019	1	Rock fracturing, rockfall and soil cracking at SLMMP site '*A3b-SS9-Pt2'.*	10/04/2019
DA3B_LW14_025	Rock Fracturing	*Steep Slope/Step*	9/04/2019	1	Rock fracturing and displacement at a steep slope/ step between WC15 and Fire road 6P.	10/04/2019
DA3B_LW14_026	Rock Fracturing & Movement	*Steep Slope/Step*	10/05/2019	2	Rock fracturing and displacement at a steep slope/step between *WC15* and *Fire road 6P.* The movement between the rock and soil has resulted in a fracture with a maximum measurable length of 22m, a width of 0.13m and a measurable depth of less than 5m.	16/05/2019
DA3B_LW14_027	Rock Fracturing	*Steep Slope/Step*	10/05/2019	1	Rock fracturing at cultural heritage site 'Site 1 – DB 1'. The impact is comprised of two rock fractures with the largest having a maximum measurable length of 1m, and a maximum width of 0.03m.	16/05/2019
DA3B_LW14_028	Rock Fracturing	*Sandstone outcrop*	10/05/2019	1	Rock fracturing at sandstone outcrop between *WC15* and *Fire road 6P.* The impact is comprised of two rock fractures with the largest having a maximum measurable length of 0.75m, and a maximum width of 0.015m.	16/05/2019
DA3B_Longwall 13_035 (Update)	Rock Fracturing	*WC15*	23/04/2018	2	Additional fracturing with flow diversion was observed on *WC15.* The largest fracture is up to 3.7m long, with the widest fracture up to 0.02m wide.	27/04/2018 24/01/2019
DA3B_Longwall 13_042 (Update)	Rock Fracturing	*WC15*	16/05/2018	2	Additional fracturing and rock fragmentation was observed at WC15_Pool 22. The new rock fracturing has a maximum measurable length of 0.2m and a maximum width of 0.002m.	17/05/2018 3/04/2019

DA3B_Longwall 13_043 (Update)	Rock Fracturing & Rock Fall & Iron Staining	*LA4*	16/05/2018	2	Rock fracturing to *LA4_ Step 0*. The additional fracturing has a maximum length of 1.5m and a maximum width of 0.01m. An increase of iron staining was also identified evident.	17/05/2018 06/08/2018
DA3B_Longwall 13_044	Rock Fracturing	*LA4B*	26/07/2018	2	Rock fracturing to the base of a step on tributary *LA4B*. Maximum length of 1.7m, horizontal depth of 1.05m and a width of 0.1m.	08/08/2018
DA3B_Longwall 13_045	Rock Fracturing	WC15	8/07/2018	2	Rock fracture across a rock bar on tributary *WC15*. The fracture is approximately 0.3m long, 0.03m wide and 0.03m at the deepest measurable point.	08/08/2018
DA3B_Longwall 13_046	Rock Fracturing	WC15	1/04/2019	1	Rock fracturing to the base of a step on tributary *WC15*. Maximum length of 1.2m, and a width of 0.02m.	3/04/2018
DA3B_LW15_001	Rock Fracturing and Rock fall	*Step/Outcrop*	29/05/2019	1	Rock fracturing and rock fall at a step adjacent to Swamp 23.	31/05/2019
DA3B_LW15_002	Rock fall	*Step/Outcrop*	29/05/2019	1	Rock fall at a step adjacent to Swamp 23.	31/05/2019
DA3B_LW14_015 (Update)	Rock fall	*Step- Lake Avon*	5/12/2019 and 11/06/2019	2	Rock fall on Lake Avon cliff edge.	6/12/2018 12/06/2019
DA3B_LW15_003	Rock Fracturing	*LA4A*	17/06/2019	1	Rock fracturing and associated rock fragmentation at *LA4A_Step 3A*.	19/06/2019
Donalds Castle Ck (FR6)	Water Quality	*Donalds Castle Creek*	25/03/2019	3	Electrical conductivity trigger.	28/03/2019
Wongawilli Creek (FR6)	Water Quality	*Wongawilli Creek*	3/10/2018	2	Dissolved oxygen trigger.	16/10/2018
Wongawilli Creek (FR6)	Water Quality	*Wongawilli Creek*	3/10/2018	1	Electrical conductivity trigger.	16/10/2018
S13_01	Soil Moisture	*Swamp 13*	12/10/2018	3 (ICEFT & HGEO)	Soil moisture level below baseline.	15/10/2018 16/10/2018 HGEO (August 2019)
S13_02	Soil Moisture	*Swamp 13*	12/10/2018	3 (ICEFT & HGEO)	Soil moisture level below baseline.	15/10/2018 16/10/2018 HGEO (August 2019)
S13_03	Soil Moisture	*Swamp 13*	12/10/2018	3 (ICEFT & HGEO)	Soil moisture level below baseline.	15/10/2018 16/10/2018 HGEO (August 2019)

23_02	Soil Moisture	*Swamp 23*	23/09/2018	1 (ICEFT) No Trigger (HGEO)	Soil moisture level below baseline.	21/09/2018 HGEO (August 2019)
14_02	Groundwater	*Swamp 14*	12/02/2019	2 (ICEFT) No Trigger (HGEO)	Shallow groundwater rate of recession.	13/02/2019 HGEO (August 2019)
13_01	Groundwater	*Swamp 13*	5/12/2018	3 (ICEFT) Unclear (HGEO)	Shallow groundwater level below baseline.	06/12/2018 HGEO (August 2019)
DCS2	Catchment Yield	*Donalds Castle Creek*	2019	3	-20 % yield change during the extraction of Longwall 14.	HGEO (August 2019)
DC13S1	Catchment Yield	*DC13*	2019	2	-17 % yield change during the extraction of Longwall 14.	HGEO (August 2019)
WC21S1	Catchment Yield	*WC21*	2019	3	-24 % yield change during the extraction of Longwall 14.	HGEO (August 2019)
WC15S1	Catchment Yield	*WC15*	2019	1	-10 % yield change during the extraction of Longwall 14.	HGEO (August 2019)
LA4S1	Catchment Yield	*LA4*	2019	1	-6 % yield change during the extraction of Longwall 14.	HGEO (August 2019)
Swamp 15B	Terrestrial Ecology (Flora)	*Swamp 15B*	2019	2	A statistically significant difference in Total species richness and species composition.	Biosis (June 2019)
Swamp 15A (2)	Terrestrial Ecology (Flora)	*Swamp 15A (2)*	2019	2	A statistically significant difference in species composition.	Biosis (June 2019)
Swamp 1A	Swamp Size	*Swamp 1A*	2019	1	Two years of decline in total swamp extent greater than the mean (±SE) decline of the control group.	Biosis (June 2019)
Swamp 1A	Ecosystem Function	*Swamp 1A*	2019	2	Trending decline in the extent of subcommunities for three consecutive monitoring periods greater than the mean (±SE) decline in the control group.	Biosis (June 2019)
Swamp 1B	Swamp Size	*Swamp 1B*	2019	1	Two years of decline in total swamp extent greater than the mean (±SE) decline of the control group.	Biosis (June 2019)

Swamp 1B	Ecosystem Function	*Swamp 1B*	2019	2	Trending decline in the extent of subcommunities for two consecutive monitoring periods greater than the mean (±SE) decline in the control group.	Biosis (June 2019)
Swamp 5	Ecosystem Function	*Swamp 5*	2019	2	Trending decline in the extent of subcommunity MU43 for three consecutive monitoring periods greater than the mean (±SE) decline in the control group.	Biosis (June 2019)
SC10C	Terrestrial Ecology (Fauna)	*SC10C (Sandy Creek Tributary)*	2019	1	Significant impacts to local populations of Littlejohn's Tree Frog.	Biosis (June 2019)
DC(1)	Terrestrial Ecology (Fauna)	*Donalds Castle Creek*	2019	1	Significant impacts to local populations of Littlejohn's Tree Frog.	Biosis (June 2019)
DC13	Terrestrial Ecology (Fauna)	*DC13 (Donalds Castle Creek Tributary)*	2019	3	Significant impacts to local populations of Littlejohn's Tree Frog.	Biosis (June 2019)
WC21	Terrestrial Ecology (Fauna)	*WC21 (Wongawilli Creek Tributary)*	2019	3	Significant impacts to local populations of Littlejohn's Tree Frog.	Biosis (June 2019)
Donalds Castle Creek	Aquatic Ecology	*Donalds Castle Creek*	2019	3	Reduction in aquatic habitat for >2 years or complete loss of habitat following the active subsidence period.	Cardno (June 2019)
WC21	Aquatic Ecology	*WC21 (Wongawilli Creek Tributary*	2019	3	Reduction in aquatic habitat for >2 years or complete loss of habitat following the active subsidence period.	Cardno (June 2019)
Browns Road Site 11.	Cultural Heritage	*Sandstone Shelter*	10/05/2019	1	The sandstone shelter at *Browns Road Site 11* has experienced diagonal and vertical cracking with block fall and exfoliation expedited with subsidence.	Niche (June 2019)
Site 1-DB1.	Cultural Heritage	*Sandstone Shelter*	10/05/2019	1	The sandstone shelter at *Site 1 DB-1* has experienced diagonal and vertical cracking with block fall and exfoliation expedited with subsidence.	Niche (June 2019)

Cordeaux

In consideration of the time elapsed since the last longwall panels were extracted at Cordeaux Colliery, the continued effects of subsidence will be negligible to nil and pose no threat to the safety of infrastructure or the public.

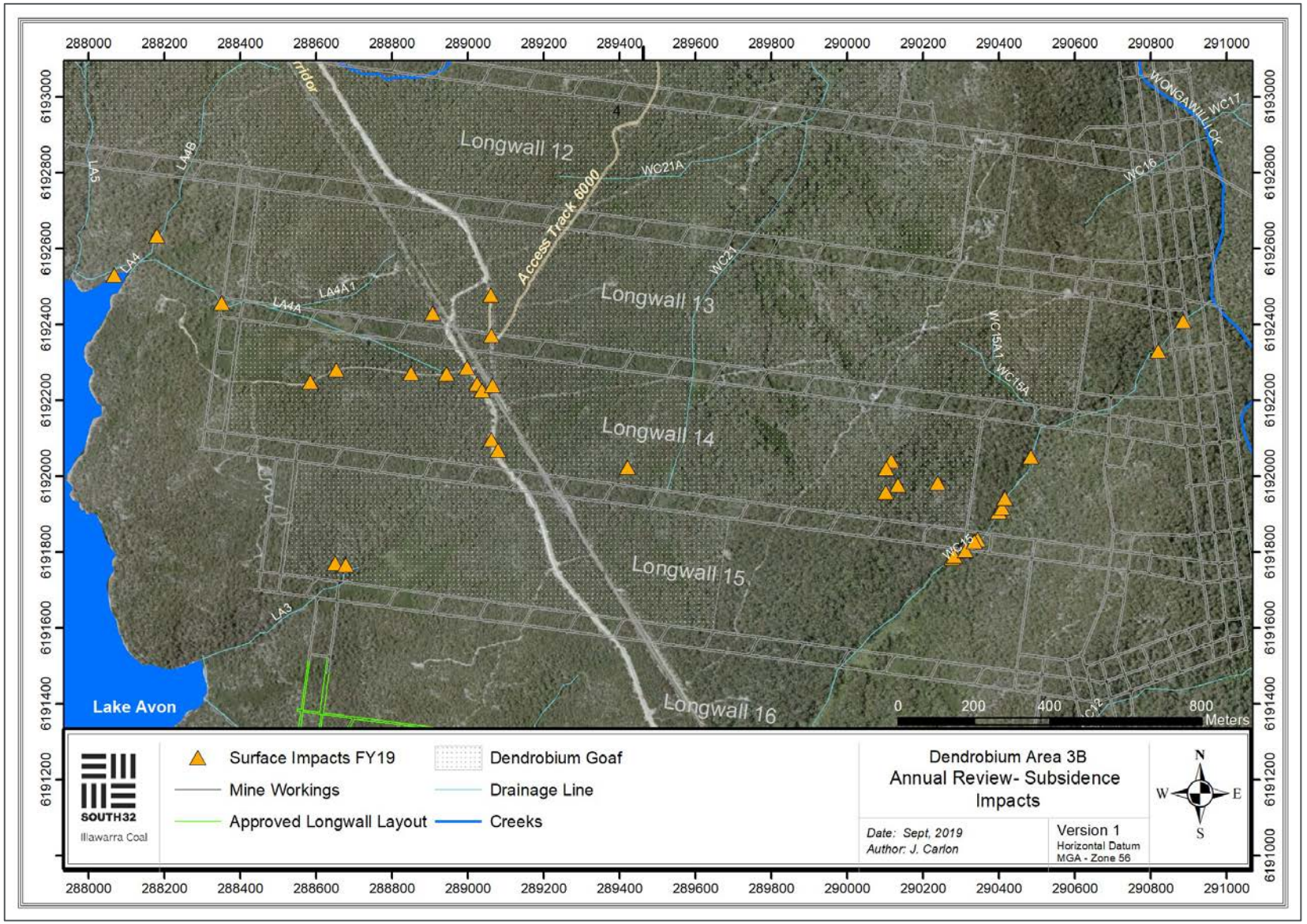


Figure 15: Subsidence impacts associated the Dendrobium Mine observed during the reporting period.

6.15. Hydrocarbon Contamination

Dendrobium Mine

Hydrocarbon bunded areas utilised during the reporting period were located as follows:

- along the Pit Top portal road;
- at the rear of the workshop; and
- at the diesel refuelling area.

Bunded areas are checked weekly and are pumped out when required to maintain sufficient capacity. In addition to the permanent bunded areas, portable bunds are used for transient storage or transportation of oils and fuels around the site. Spill kits and/or bins containing absorbent material are located around the site in areas where there is a higher potential for spillage. Surface personnel are made aware of the locations of these spill kits and absorbent material bins in their work area. The contents of the spill kits and the oil absorbent material bins are checked on a regular basis.

There were no externally reportable incidents of hydrocarbon contamination in the reporting period associated with Dendrobium Mine.

Cordeaux Colliery

Corrimal No. 3 Shaft

S32IMC has implemented and actioned a RAP following a transformer oil spill as a result of vandalism at the Corrimal No 3 Ventilation Shaft. See more detail in Section 6.4.

6.16. Hazardous Material Management

Dendrobium Mine

Explosives

A Licence to Store Explosives is in place for the Dendrobium premises. Limited quantities of explosives were stored at Dendrobium over the reporting period.

Dangerous Goods

The Dangerous Goods kept at Dendrobium Mine include compressed gases, flammable and combustible liquids, and corrosive substances. Volumes stored are below the manifest quantities to require a Dangerous Goods Licence to be issued by SafeWork NSW.

A Site Emergency Information Container is installed adjacent to the front gate in accordance with legislative requirements. This information box includes the site manifest along with Safety Data Sheets (SDSs) for each of the dangerous goods kept on site.

Combustible Liquids

Dendrobium Pit Top has two bulk combustible liquid storage containers, one for diesel and one for hydraulic oil (~16100 L). These materials are delivered to site by tanker. These are stored in accordance with the requirements of AS 1940-2017: The storage and handling of flammable and combustible liquids.

Other Substances

S32IMC assesses new substances before their use on site by completing a Substance Evaluation Form and a risk assessment. SDSs and substance evaluations are available electronically from ChemAlert. Regular inspections of the storage sites are undertaken to ensure compliance with relevant standards.

Cordeaux Colliery

Cordeaux has one bulk storage tank (underground diesel tank 42,000 L holding capacity) and minor volumes of gas cylinders, and transient stores of oils/lubricants. The diesel fuel is brought to site by fuel tankers. A bulk diesel fuel system has been installed utilising underground tank storage with locked bowser delivery. The majority of fuel used is for exploration equipment and field vehicles. An Environmental Protection Plan (EPP) has been developed for the below ground diesel fuel storage system (May 2011) in accordance with the *Underground Petroleum Storage Systems (UPSS) Regulations 2008* requirements. Tank integrity testing and an analysis of the surrounding groundwater has been completed. The results confirm the absence of any leaks/contamination. A new digital monitoring system has been installed on the diesel tank to better account for fuel-in and fuel-out of the system. This will also assist in monitoring any fuel loss that could be attributed to tank leakage.

Changes to the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 commenced on 1 September 2019. These will be included in the next reporting period.

6.17. Methane Ventilation

Dendrobium Mine

During the reporting period, the underground mine workings were ventilated by drawing fresh air into the mine (intake air) via the Dendrobium Mine Portal Tunnel, Kemira Valley Portal Tunnel, and air intake Shafts No.1 and 2. The ventilation air drawn through the mine was extracted via the No.3 Shaft Main Mine Ventilation Fans. Three mine ventilation fans are installed at the No.3 Shaft site with two fans operating at any one time. Mine ventilation air was drawn through the mine at an average rate of 95 m^3/s with the discharge air (mine vent air) having an average concentration of methane (CH_4) of 0.11% and an average concentration of carbon dioxide (CO_2) of 0.09%.

Currently there are no mine methane abatement technologies or opportunities available which are viable due to the low methane concentration of the mine vent air.

Cordeaux Colliery

Cordeaux Colliery had no methane drainage extraction plant to support its underground gas management activities. Following cessation of mining (the site is in care and maintenance), the emissions to the atmosphere via the main mine ventilation fans significantly decreased. The mine ventilation fans were shut down and the shafts temporarily sealed in December 2003.

6.18. Public Safety

Public and workplace safety is a major consideration for S32IMC. Site safety risks and control mechanisms associated with the Dendrobium operations are provided in Table 24.

Table 24: Site Safety Risks and Control Mechanisms

Potential Safety Risk	Control Mechanism
Safety on site	All personnel, including employees and contractors, are required to undertake a site induction prior to working on the site. This induction outlines a number of areas of importance, including their responsibilities in regard to safety. In addition to the site induction, awareness material is presented in a number of different ways, which include: • safety scrums/training days that are attended by all persons working on site and which allow for two-way communication between management and the workforce; • Toolbox talks; • Posters located around the site; and • Periodic business updates. The Dendrobium facilities and the Pit Top site has 24-hour surveillance of the front car park and entry areas. Fencing of the sediment ponds at both the Pit Top and

	Kemira Valley sites minimises the potential for injury to the public. Prior to visitors entering the main Pit Top area they are required to sign in at reception in the administration building, located closest to the car park. From this point the visitor can make enquiries and collect equipment, such as PPE, if required. Cordeaux Colliery Pit Top area is enclosed by a chain wire security fence around the perimeter of the site. The site access gates are locked at all times that S32IMC personnel are not in attendance. At risk infrastructure on site has been maintained to ensure no threat to the general public. The site is currently on care and maintenance. When closure of the site occurs (at a time not yet determined), the site will be left in a permanently safe condition to the satisfaction of relevant authorities. Remote sites (including Corrimal #3 shaft) have remained fenced and locked during this reporting period. There are additional site security upgrades planned for FY20. This will include boom gates and turnstiles which will further restrict site access to authorised personnel only.
Road Safety	A Drivers' Code of Conduct is in place at Dendrobium to ensure appropriate driver behaviour by all those who drive through the village to the mine including employees, contractors and truck transports, as required by the Dendrobium Development Consent and Traffic Management Plan. The Code of Conduct is communicated to all employees and contractors during the site induction and copies are periodically distributed to major suppliers and transport companies. Compliance with the Code of Conduct is strictly enforced. Lane alignment and roadway markings have been upgraded at the Cordeaux Colliery entrance on Picton Road to provide for safer traffic movements when entering and exiting the site.
Rail Safety	Rail facilities are fenced, with the main sites patrolled on a regular basis by a contracted security firm. Signage and security cameras are in place. Site inspections are undertaken to maintain safety systems Community announcements, newsletters and letter box drops are used to communicate relevant safety information to the public.

Public Safety around mining areas

The current Dendrobium Longwall mining activities are occurring within WaterNSW land. S32IMC has developed procedures for working around and accessing potentially unstable ground. The controls are outlined in the document "Working around Rock falls, cliff lines and unstable areas" (ICAP0145). The controls currently in place are listed in Table 25.

Table 25: Site Safety Risks and Control Mechanisms – WaterNSW land

Potential Safety Risk	Control Mechanism
Rock falls	Signs installed around potentially unstable areas that may be impacted by mining. S32IMC employees and contractors working around potentially unstable areas (Site Induction, Emergency Response Training, 4WD training, active communications, sign-in and sign-out process).

6.19. Waste Management

Dendrobium Mine

General Waste

General waste bins are transported from Dendrobium Pit Top to Cleanaway's depot at Charcoal Place, Unanderra. The waste is then tipped onto a sorting pad and is directed into its correct waste stream for recycling or disposal. Dendrobium Mine's main solid waste streams and volumes are listed in Table 26. The volume of waste recycled and disposed of, and the recycling efficiency for Dendrobium Pit Top is listed in Table 27.

Table 26: Waste Streams and Total Volumes		
Waste Stream	**Treatment / Disposal**	**Volume (tonnes)**
Timber	Recycled off site	56.08
Cardboard and paper	Recycled off site	6.73
Steel and Scrap Metal	Recycled off site	204.15
Commingle	Recycled off site	4.32
General Waste (ResourceCo)	Recycled off site	141.57
Particulate (diesel) filters	Off-site treatment and disposal	90.08
General Waste	Landfill	430.22

Table 27: Recycling Efficiency for Reporting Period		
Total Recycled (tonnes)	**Total Disposed (tonnes)**	**% Recycled**
412.55	520.30	44.23

Waste Reduction and Recycling

In February 2019, S32IMC and its main waste contractor began redirecting wastes from landfill, to a unique processing facility in an attempt to reduce the waste footprint of S32IMC. A Cleanaway and ResourceCo joint venture Resource Recovery Facility, located in Wetherill Park, processes dry non-recyclable waste. Combustible materials are turned into Processed Engineered Fuel (PEF), diverting approximately 94% of waste material from landfill (note that this opportunity was not available for the full FY). There are two distinct grades of PEF manufactured, Low Calorific Value (CV) and High CV, which have independent finished product streams. Both processed engineered fuels comply with the requirement of the Clean Energy Regulator under the Emissions Reduction Fund.

Based on FY19 waste figures from Dendrobium, 430 tonnes of general waste was generated on site. Redirecting this waste to the recycling facility is an alternative end-of-life treatment and final disposal of products opportunity. Recent trends have shown an increase of recycling with a relative decrease in landfill (Figure 16).

It is forecasted that in FY20 better yields will be achieved and higher volumes redirected to the recovery facility as segregation and acceptance standards are better understood and implemented on a site-based level.

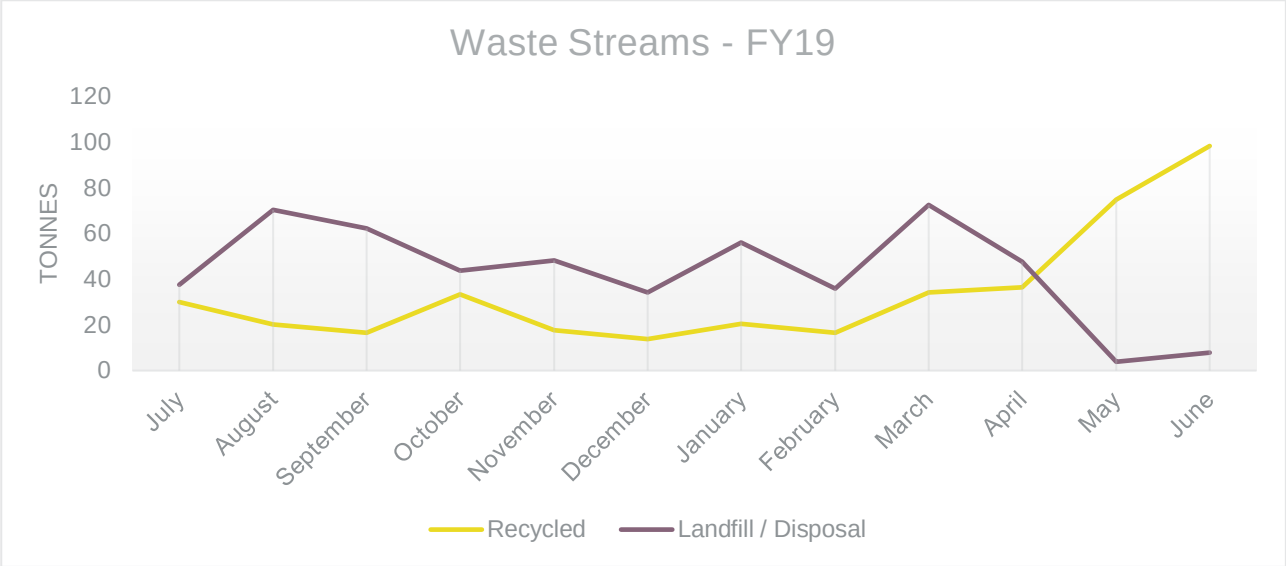


Figure 16: Recycled and landfill waste streams for FY19

Oil and Grease Containment and Disposal

Oil and grease produced onsite is transported from the Pit Top for processing by a licenced contractor offsite. Oil sumps and traps are in place and are periodically inspected by site personnel and emptied as required by a licenced contractor. Oil and grease volumes removed from site during the reporting period are included in Table 28.

Table 28: Oil and Grease Volumes

Waste Stream	Volume (tonnes)
Oil	47.5
Oily Water/Sludge/Grease	27.08
Hydraulic Oil	4.12

Coal Wash Management

During the reporting period, S32IMC diverted approximately 402,000 tonnes of coal wash for beneficial uses in the local region (i.e. as an engineered fill in housing developments and Roads and Maritime Services (RMS) road infrastructure projects, and for the development of arterial and agricultural roads), with over 3.5 Mt diverted since 2009. S32IMC has a long-term agreement with Lend Lease at Calderwood, and with the RMS on the Albion Park Bypass project, that should see a large volume of coal wash diverted for beneficial uses in FY20 and beyond. S32IMC has also developed a pipeline of major projects that will require engineered fill for the next five years.

S32IMC 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. S32IMC has aligned itself with three universities (University of Wollongong (UOW), University of Sydney and University of Newcastle) and two other industry partners (RMS and Douglas Partners) 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 three-year project will be finalised in mid-2020.

S32IMC will continue to research, develop and implement alternative uses for coal wash in order to minimise the volume emplaced at the West Cliff Emplacement Area in future. S32IMC is currently supporting an ACARP

funded project with the UOW and CSIRO, identifying opportunities to utilise coal wash in value added products (i.e. used for underground strata support or as a geopolymer binder in bricks and pavements).

Considerable previous work has been carried out on the alternative uses of coal wash, including ongoing monitoring of potential contaminants when coal wash is used for landfill or emplacements.

The economics, environmental and social factors of finding alternative uses for coal wash have changed. From initial discussions with users of coal wash and, in particular, fine tailings in previous and current trials, the major concerns and barriers to many other potential uses are:

- Meeting the standards/legislation for the use of industrial materials. In some cases, standards don't exist and there is a need to develop standards that will have widespread approval.
- Testing of coal wash to ensure it is fit-for-purpose.
- Finding suitable low-cost economic binders and components for pasting and blending.
- Transport costs for moving coal wash to alternative processing and utilisation sites.

Previous and current research carried out by the Faculty of Engineering and Information Science at the University of Wollongong, has delivered the below research projects:

- Brickmaking using coal wash – research in the 1990s, shown to be viable, but not economic at that time.
- Polymer linings for roadways - developed a strong understanding of the surface binding properties of coal and stone.
- Pasting trials at Peabody's Metropolitan mine to produce pillars, reducing the transport of fine coal wash sludge over public roads with the inherent environmental issues.
- Pasting of Glencore's Liddell fine tailings to produce a cemented product that can be Dry Stacked in the mine void, potentially eliminating the need for future tailings dams, as well as reducing acid mine drainage and heavy metal leaching, so that the quality of ground water is significantly improved.
- Producing manufactured soils by blending fine coal wash and green waste, carried out by SOILCO with technical support from the University of Wollongong and TAFE NSW Illawarra Institute.
- The Utilization of Washery Tailings: presentation to the Mining Engineers association of India, Ahmedabad, June 2017.
- A previous Australian Research Council, (ARC) project that blended fine coal wash with steelmaking BOS slag, to produce a "concrete", used successfully in extending the breakwaters at Port Kembla harbour.
- A current ARC project aimed at blending fine coal wash with bottom ash from power stations and bitumen, to produce a product suitable for road surfaces.
- Development of a novel hybrid FRP tubular standing roof supports for longwall mining, which can use unscreened coal wash rejects as a component of the fill material.

S32IMC will continue to be involved in research, the development of, and implementation of alternative uses for coal wash in order to minimise the volume emplaced at the West Cliff Emplacement Area.

Ventilation Shafts 1, 2 and 3

During the reporting period, any waste brought to Ventilation Shaft 2/3 site was taken off site and disposed of through the Dendrobium Mine processes. No activities are undertaken at Ventilation Shaft 1 and therefore there is no waste generated.

DCPP

Waste at the DCPP is managed under the BlueScope contract with Veolia Waste Management.

Cordeaux Colliery

General Waste

General waste produced at Cordeaux Colliery was negligible throughout the reporting period as the site is on care and maintenance and the waste generated is predominantly from personnel utilising offices on site. Periodically, Cleanaway Waste Management Services attend site to remove general waste from the bins. The amount of waste from Cordeaux Colliery is shown in Table 29. Waste such as cardboard, paper and batteries are set aside for recycling or reuse. As the site has been on care and maintenance since 2001, the volume of waste generated has been consistent over this period.

Table 29: General Waste Volumes for Reporting Period

Waste Stream	Treatment / Disposal	Volume (tonnes)
Commingle	Recycled off site	2.68
General Waste	Landfill	30.46
Oily Water/Sludge	Treated off site	4.58
Timber	Recycled off site	1
Steel	Recycled off site	7.96

Sewage Treatment / Disposal

All bathhouse and sewage effluent is contained on site. Bathhouse water is treated and then pumped underground through an old goaf area. The sewage is transported off site by a licenced contractor for treatment and disposal.

Oil and Grease Containment and Disposal

No bulk oils or greases are stored on site. Oil sumps and traps remain in place and are periodically inspected by site personnel and emptied as required by a licenced contractor.

7. WATER MANAGEMENT

7.1. Groundwater

Dendrobium Mine

The Dendrobium groundwater monitoring program was undertaken during the reporting period as defined in the approved Water Management Plan and Groundwater Monitoring Plan. The purpose of the program is to analyse the water quality and quantity within the mine and mining area to satisfy health, safety and environmental aspects of the Development Consent and South32 Policies and Standards. The Plans were developed in consultation with the DSC, Department of Planning and Environment (now DPIE), WaterNSW, and the Department of Resources and Energy (now Resources Regulator).

Monthly water sampling is performed underground with samples analysed onsite and at NATA accredited laboratories. Mine water usage, water flows and volumes within the mine are analysed and reported regularly (i.e. on a daily to weekly basis). Surface and underground vibrating wire piezometers are utilised to monitor groundwater response to mining. Monthly reports are prepared and submitted to the DSC, WaterNSW and DPIE summarising water quality and the water balance at Dendrobium. During the reporting period, Dendrobium operated under a Principal TARP as outlined in the "Avon and Cordeaux Reservoir DSC Notification Area Management Plan". During this period the mine operated at 'Normal' in the Principal Response Flowchart (Figure 17).

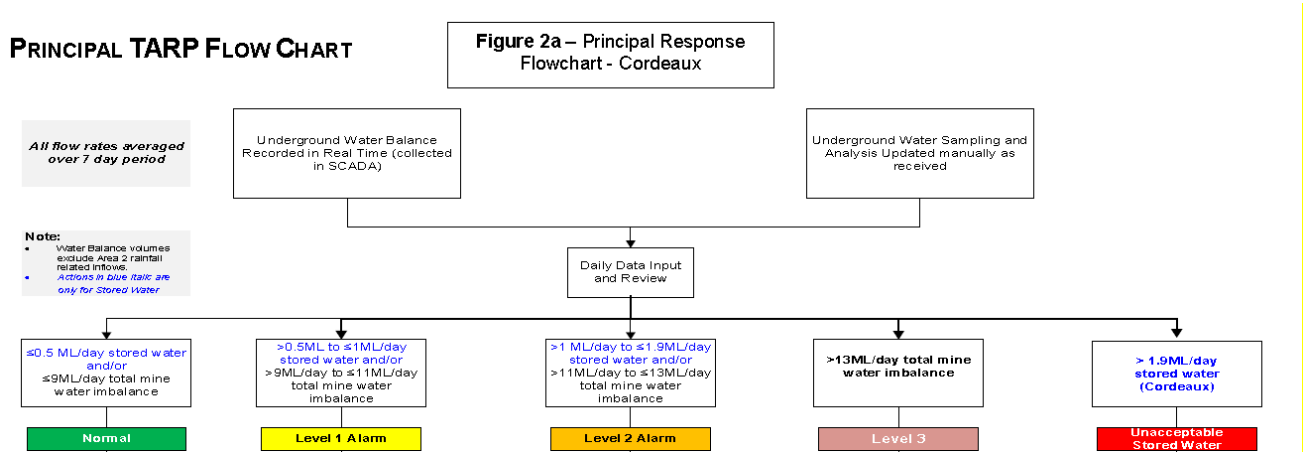


Figure 17: Principal Response Flowchart in "Cordeaux Reservoir DSC Notification Area Management Plan".

A summary of the mine water balance for the reporting period is provided in Figure 18.

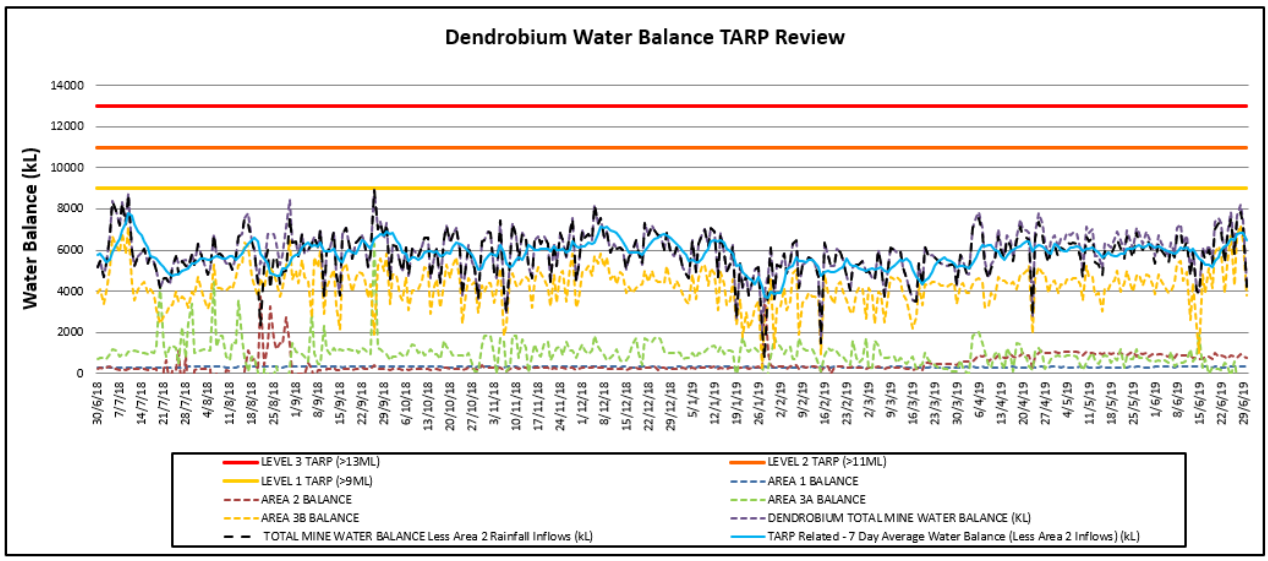


Figure 18: Mine Water Balance

The groundwater reporting to the mine workings during normal conditions is characteristic of coal measure water. This water is higher in salinity and age based on water chemistry and isotope analysis. Water samples from inflow events have been typical of near seam coal and shale water. Geochemistry, algal and isotope analysis is conducted monthly to determine probabilistic proportions of any modern rain or dam water entering the workings. The water balance for the reporting period is shown in Table 30.

Table 30: Water Balance Statistics for the reporting period

Statistic	Total Water Balance	7 Day average Water Balance Less Area 2 Inflows (TARP related)	Units
Mean	5918.0	4212.32	kL/day
Maximum	8901.6	8901.6	kL/day
Minimum	1507.3	680.7	kL/day
Total	2160076.2	2114116.1	kL

Mining of Longwall 14 resulted in continued depressurisation of the target coal seam and overlying strata. The observed changes in groundwater levels are in line with (or less than) numerical model predictions that support mining approvals.

As expected, the greatest depressurisation is within the Wongawilli Coal Seam, and decreases with height above the seam. Incremental drawdown in the Scarborough and Bulgo Sandstones is apparent in the areas immediately to the south-west of Longwall 14. Estimated groundwater drawdown in the Hawkesbury Sandstone since prior to the start of mining in Area 3A (November 2009) is greatest above and immediately adjacent to extracted longwalls, with maximum drawdown up to 52.8 m, just north of Longwall 9.

Observations at monitoring bores installed above mined longwalls indicate that the Hawkesbury Sandstone undergoes fracturing to the ground surface, accompanied by depressurisation of most shallow strata. There is evidence that drainage of the Hawkesbury Sandstone above goafs is not complete in all areas and some perched groundwater horizons remain.

Between 2015 and 2018, a series of monitoring bores were installed along the barrier zone between Lake Avon reservoir and Area 3B. Observations at those bores indicate depressurisation of the upper Colo Vale Sandstone in response to longwall extraction, and variable drawdown in the Hawkesbury Sandstone. A hydraulic gradient towards the lake is preserved in the Hawkesbury Sandstone at S2313, whereas at S2314 and S2376 the hydraulic gradient is locally reversed towards the mine, implying movement of groundwater

from the lake toward the mine. The Dendrobium Regional Groundwater Model (2016) estimates that seepage loss between Lake Avon and Longwalls 12 to 16 would be less than 0.28 ML/day (or 0.17 ML/day/km of shoreline adjacent to extracted longwalls). This estimate is consistent with numerical modelling predictions.

The numerical model developed by Hydrosimulations in 2014 and updated in 2016 was assessed to be accurate with respect to estimated groundwater levels within the Hawkesbury Sandstone at the end of Longwall 14. The model overestimates drawdown in the Bulgo and Scarborough Sandstones and is therefore conservative.

Seepage losses from Lake Avon was also estimated using a specific local scale numerical model at approximately 0.44 ML/km per day following the extraction of Longwall 14. The estimate is of a similar magnitude to those from regional numerical modelling and is within the tolerable loss limit of 1 ML/day prescribed by the DSC.

Cordeaux Colliery

A total of 3.28ML was pumped from the surface to Cordeaux underground workings during the reporting period.

7.2. Surface Water

Dendrobium Mine

Water Supply and Use

Underground and surface operations at Dendrobium utilise a combination of potable and recycled mine water.

Potable Water use

Potable mains water (supplied by Sydney Water), is currently used for the longwall hydraulic roof supports (emulsions used underground require high quality water for batching) and surface amenities such as the kitchen and bathhouse facilities. Potable water usage for the reporting period was 66.9ML, which is an increase compared to the previous reporting period.

Recycled Water use

Recycled water is sourced from the Nebo Workings and used for various purposes on the surface and for underground operations. These include:

- Surface Operations:
    - dust suppression along the Portal Road;
    - cleaning of vehicles and equipment in the wash down bay;
    - general hose down; and
    - cleaning and firefighting.

- Underground Operations:
    - secondary support activities;
    - development and production units; and
    - dust suppression and firefighting supply.

Surface Water Management

Surface water runoff is separated into three streams at the Pit Top site. The three runoff streams include:

- Clean water – This system collects runoff originating from the surrounding undisturbed land on the upstream (western) side of the site. This water is piped via sealed drains through the site into American Creek;

- Oily Water – This system captures potentially contaminated water runoff from the workshop area and diesel fuel dispensing area. This is diverted into the oily water separator and then into the grey water treatment plant. Treated water is then pumped into the old Nebo Mine workings; and
- Dirty Water – This system captures general site runoff from site roads and the car park. This runoff is directed into the Pit Top sediment pond via a series of drains and pits that are cleaned out on a regular basis using an industrial vacuum truck. Settled water is pumped from the sediment pond into the grey water treatment plant based on pond level. The treated water is then pumped into the old Nebo Mine Workings.

At the Kemira Valley site, surface water is separated into two streams, which include:

- Clean Water – This system captures clean runoff originating from the upstream side of the site. The runoff is diverted around the western side of the site and through a culvert beneath the rail line and into Brandy and Water Creek; and
- Dirty Water – This system captures all site runoff from the roads and stockpile area. The runoff is treated and reused in the site dust suppression system and/or the firefighting system. If there is excess water in the sediment ponds, water may be disposed via the mine water discharge pipeline into Allans Creek via Licenced Discharge Point 5.

The Pit Top Sediment Pond and Kemira Valley Sediment Ponds are managed in accordance with the Water Management Plan. The stored water for the reporting period is provided in Table 30.

Runoff from the Corrimal shaft sites and O'Briens drift is classified as clean storm water runoff therefore runoff is diverted into the natural drainage systems.

Stored water at Dendrobium Mine during the reporting period is shown in Table 31.

Table 31: Stored Water - Dendrobium

Water Type	Start of Reporting Period[6]	End of Reporting Period	Storage Capacity
Clean Water (ML) – Pit Top Tank	0.35	0.35	0.35
Dirty Water (ML) - Kemira Valley Main Sedimentation Pond	6	6	14
Dirty Water (ML) - Pit Top Sedimentation Pond	0.4	0.4	1.1
Dirty Water (ML) - Kemira Valley Buffer Dam	1	1	3.9
Dirty Water (ML) - Kemira Valley Fire Tank	0.5	0.5	0.5
Controlled Discharge Water (salinity trading schemes)	N/A		
Contaminated Water	N/A		

[6] Levels are largely dependent on rainfall. Ponds are generally maintained at low levels for maximum storage potential for rainfall events.

Rainfall

Dendrobium rainfall recorded during the reporting period was 914 mm, an increase when compared to the previous reporting period in which 480 mm rainfall was recorded. Table 32 presents the rainfall for this reporting period and previous reporting periods.

Table 32: Rainfall at Dendrobium

Year	Total Rainfall (mm)
FY11	1299
FY12	1318
FY13	1532
FY14	1482
FY15	1303
FY16	1064
FY17[7]	931
FY18[7]	480
FY19[7]	914

Cordeaux Colliery

Water Supply and Use

Potable water use at Cordeaux Colliery is generally for personal consumption, showering and toilet facilities. Potable water is brought to site by road tanker as required. During the reporting period the potable water used by site was 195 kL.

Surface Water Management

The surface facilities at Cordeaux Colliery have been designed to prevent dirty water run-off from the site entering WaterNSW land. The design ensures effective treatment of run-off from potentially dirty areas such as the coal bins, workshop area and machinery hard-stand areas. Drainage from these areas is still directed to a dirty water holding lagoon. The clean and dirty water surface drainage circuits of the site remain in place.

As the site is on care and maintenance, the amount of dirty water generated from the surface areas has significantly reduced. Water from hardstand areas is captured in the dirty water lagoon then transferred by pump to the upper level mine water holding lagoons for settlement. The water is then transferred to underground mine workings via a gravity fed pipeline. This arrangement negates any surface discharge. The water returned to the mine is essentially of good quality, containing no contaminants. Details of the monitoring and pumping volumes are provided in Section 7.1 of this report. A summary of the stored water for the reporting period at Cordeaux Colliery is provided in Table 33.

[7] Rainfall recorded at Dendrobium Area 3B Gauge

Table 33: Stored Water - Cordeaux			
Water Type	**Start of Reporting Period**	**End of Reporting Period**	**Storage Capacity**
Clean Water (ML) – Surface Storage Tank	0.2	0.2	0.225
Dirty Water (ML) – Dirty Water Area Lagoon	0.85	0.85	1.0
Controlled Discharge Water (ML): Mine Water / Storm water Lagoon	2.0	2.0	5.5
Controlled Discharge Water (ML): Sand Filter Lagoon	0	0	0
Contaminated Water	N/A		

Rainfall

Rainfall for the Cordeaux surface facilities is recorded on a daily basis from a rainfall gauge located at Cordeaux Mine. The Cordeaux site received a total of 904 mm of rainfall during the reporting period, which was an increase from the previous reporting period (455.5 mm). Table 34 shows the total recorded rainfall for past reporting periods.

Table 34: Rainfall at Cordeaux	
Year	**Total Rainfall (mm)**
FY11	1203.1
FY12	1396.2
FY13	1277.6
FY14	885.5
FY15	1493.1
FY16	1013.7
FY17	1375.7
FY18	455.5
FY19	904

Ventilation Shafts 1, 2 and 3

No water usage occurs on the Ventilation Shaft 1 or Ventilation Shaft 2/3 site. Due to their location within WaterNSW Special Areas, the surface facilities at the Ventilation shafts have been designed to control sediment entering the surrounding WaterNSW land by capturing stormwater from disturbed areas and directing this water to sediment ponds. Rehabilitation of disturbed areas has been undertaken.

DCPP

Water produced from the DCPP is managed through the BlueScope EPL. S32IMC advises BlueScope if discharges of water from the DCPP occurs.

7.3. Water Licence

Dendrobium Mine has a Water Supply Works Approval and four water access licences. These are shown in Table 35.

Table 35: Water Take Dendrobium Mine

Approval Number	Water Act 1912 licence No.	Reference No.	Water Access Licence (WAL) No.	Approval Kind	Water Sharing Plan	Water Source	Entitlement	Total
10WA118772	10BL161946	10AL118771	36473	Water Supply Works	Greater Metropolitan Region Groundwater Sources	Sydney Basin South Groundwater Source	75 Units	2127 Units
		10AL119249	37465	Water Supply Works	Greater Metropolitan Region Groundwater Sources	Sydney Basin South Groundwater Source	3962 Units	
10WA118772		10AL123125	42385	Water Supply Works	Greater Metropolitan Region Groundwater Sources	Sydney Basin Nepean Groundwater Source	1840 Units	
10WA118772		10AL123124	42386	Water Supply Works	Greater Metropolitan Region Groundwater Sources	Sydney Basin Nepean Groundwater Source	3653 Units	

No compensatory water was supplied to other users during the reporting period.

8. REHABILITATION

8.1. Rehabilitation for Reporting Period

Dendrobium Mine

The rehabilitation security cost estimate for the Dendrobium operations was reviewed. No major changes to the existing security estimate were identified. A copy of the latest security cost estimate is provided as Appendix B. A rehabilitation summary associated with the Dendrobium operation is provided in Table 36.

Table 36: Dendrobium Mine and Cordeaux Colliery Rehabilitation Summary

Location	Area Affected/Rehabilitation (ha)				
	To date	FY2018 (Last Report)	FY2019 (This Report)	FY2020 (estimated)	Reason for Variation
A: Total Mine Footprint	18,816	18,816	18,816	18,816	N/A
B: Total Active Disturbance	29.46	29.46	29.46	29.46	N/A
C: Land being prepared for rehabilitation	0	0	0	0	N/A
D: Land under active rehabilitation	0	0	0	0	N/A
E: Completed rehabilitated area (Areas previously completed, currently includes Corrimal No. 1 and 2 Shafts, Ventilation Shaft 2/3, Dendrobium Subsidence Event, Bradford Breaker, and Stage 2 Pathway).	7.97	7.97	7.97	7.97	N/A

The integrity of sediment and erosion control structures is regularly inspected. Adequate sediment control structures are in place to reduce the risk of off-site contamination. A clean water diversion channel has been constructed to divert clean water around the site, and drainage channels have been established within the site to divert seepage around infrastructure areas.

Weed species in the Ventilation Shaft 1 and 2/3 areas remain at very low densities and are generally located in disturbed areas or highly trafficked such as roadways. Inspections will continue to monitor the presence of weed species.

The agreed post rehabilitation land use is native bushland. Further rehabilitation will be undertaken at mine closure following decommissioning of site infrastructure.

No site buildings were renovated or removed during the reporting period.

Mining Operations Plan

The following Mining Operations Plan amendments were submitted to the Department of Planning, Industry and Environment, Resources Regulator in FY19:

- Survey 16 Addendum - Proposed Surface Exploration in Dendrobium Area 5 (Approved 7 August 2018)
- Survey 16 Addendum 2 - Proposed Surface Exploration in Dendrobium Area 5 (Approved 25 February 2019)
- O'Briens Drift and O'Briens Gap Switchyards Demolition Management Plan (Approved 17 June 2019)
- Proposed Surface Exploration in Dendrobium Area 3B (Approved 17 June 2019)

- Addendum to Mining Operations Plan, Dendrobium Mine and Cordeaux Colliery (Approved 17 June 2019)
    - WC21 and Donalds Castle Creek Rehabilitation Plan (Dated September 2017)
    - Watercourse Impact, Monitoring, Management and Contingency Plan, Dendrobium Area 38 (Dated March 2019)
    - Swamp Impact, Monitoring, Management and Contingency Plan, Dendrobium Area 38 (Dated March 2019)

It is planned for the Mining Operations Plan to be converted to a Rehabilitation Management Plan (RMP) in FY20, pending the release of the RMP Guideline by the Resources Regulator.

Further Development of the Final Rehabilitation Plan

A Landscape Management Plan has been developed to meet the requirements of the Development Consent. This document outlines rehabilitation and closure requirements for the sites associated with Dendrobium Mine. As referenced in the Landscape Management Plan, the Dendrobium Mine Conceptual Closure Plan has been developed in line with the Division of Resources and Geoscience and internal South32 requirements. The Conceptual Closure Plan document outlines areas that are required to be rehabilitated after the closure of the mine. A review of the Dendrobium Mine Conceptual Closure Plan is planned to be undertaken in FY20.

Legacy Sites and Rehabilitation Program

The Legacy Sites and Rehabilitation Program in the reporting period consisted predominantly of initial site investigations and approvals planning. This has included:

- Appointment of a dedicated project manager in February 2019.
- Overall review of the legacy sites including inspections, desktop review of archived files and reviews of current legislation, regulations and guidelines relevant to the works. S32IMC procedures and policies have also been reviewed to develop an understanding of the means of internal approvals and associated personnel.
- Investigations to confirm tenure and land ownership for numerous sites where this data has not been available.
- Grouping of projects with primary criteria being governed by the external approval pathways that vary dependent upon land ownership and tenure.
- Prioritisation of projects including review of previous documents, risk assessments and other relevant information.
- Commencement of external approvals process of multiple higher priority projects including procurement of relevant studies, and planning documentation.
- Submission of external approval applications and liaison with external stakeholders.
- Preparation of tender documents and calling tenders for upcoming projects.

The following activities are planned for FY20:

- Demolition and rehabilitation of three redundant switchyards including Summit Park – Mt Keira, O'Brien's Gap, and O'Brien's Drift.
- Demolition and rehabilitation of pumphouse at O'Brien's Gap.

- Demolition and rehabilitation of powerline circuits within residential areas including the BlueScope to Dendrobium circuit and the Figtree to Wongawilli circuit.

- Site investigations and planning for the rehabilitation of the O'Brien's Drift coal handling facility.

- Site investigations and planning for the rehabilitation of other redundant S32IMC powerline circuits located in National Parks and Wildlife Service and WaterNSW managed lands.

Exploration

Disturbance associated with exploration activities is progressively rehabilitated following completion of the activity.

Cordeaux Colliery

No rehabilitation was undertaken at the Cordeaux Colliery Pit Top site during the reporting period.

Please see Section 6.4 for more information on the Corrimal No 3 Shaft rehabilitation.

8.2. Biodiversity Offsets

Maddens Plains

A proposal was put forward by S32IMC to provide an offset for mining impacts from the Dendrobium Coal Mine and Bulli Seam Operations Project through the conservation of a 598-hectare site at Maddens Plains near Helensburgh.

The area of land met the offset requirements for any impacts on:

- the upland swamps at the Dendrobium Coal Mine; and

- the vegetation communities at the Bulli Seam Operations Project.

The land also had additional offsetting values as it would:

- secure land with significant ecological value in perpetuity within the National Park estate; and

- improve habitat corridors between the Illawarra Escarpment State Conservation Area, the Dharawal Nature Reserve and the WaterNSW Special Areas.

In April 2015, the Dendrobium Mine Development Consent was modified by adding Condition 15 of Schedule 2 to enable the provision of Strategic Biodiversity Offsets (SBO), whereby S32IMC could provide land that has conservation values which exceed the conservation values required to meet relevant offsetting requirements prescribed in a condition of an approval, and that the excess conservation values could be relied upon to meet future offsetting requirements under the Dendrobium Mine Development Consent and the Bulli Seam Operations Project Approval (08_0150).

A Biodiversity Offset Strategy was required in accordance with Condition 6 of the Dendrobium Mine Area 3B SMP approval, which was granted by the Director - General of the Department of Planning and Infrastructure on 6 February 2013. S32IMC has provided SBO to satisfy offsetting requirements under DA 60-03-2001 (and subordinate approvals granted under this consent) in the form of 598 hectares of land (Maddens Plains) secured in perpetuity by transfer to the National Parks Estate. Plan 14 shows the area of Madden Plains.

9. COMMUNITY

9.1. Community Complaints

Dendrobium Mine

S32IMC operates a 24hr Community Call Line (free call 1800 102 210) and a general email address ICEnquiries@south32.net. The call line and email address enable the community to request and provide feedback about operational activities and lodge complaints on any aspect of the Dendrobium operations. The call line number and email address have been advertised throughout the reporting period in all correspondence distributed to the community.

All complaints are investigated and the details, including any follow up actions required, are recorded in the internal event reporting system. Complaint information is provided to the DCCC, S32IMC management, and government agencies on a regular basis.

A total of 44 community complaints were received during the reporting period (compared to 22 received in FY18). The majority of complaints made during the reporting period were from one resident. Complaints made, and the resolutions to these complaints, are reported each month on the S32IMC website. A summary of the complaints recorded is provided in Appendix D. Figure 19 displays the complaints for the reporting period. Figure 20 shows the complaints received since FY2017.

As discussed in Section 6.8 Noise Management Strategies, the RNWG has undertaken numerous rail trials and noise monitoring campaigns to identify noise sources and minimise the rail noise generated in the local area.

Additional noise investigations have been undertaken during this reporting period to identify feasible initiatives to further reduce noise emissions from the rail line and site to minimise the likelihood of community complaints. An overview of the identified initiatives is provided in Section 6.8 Noise Management Strategies.

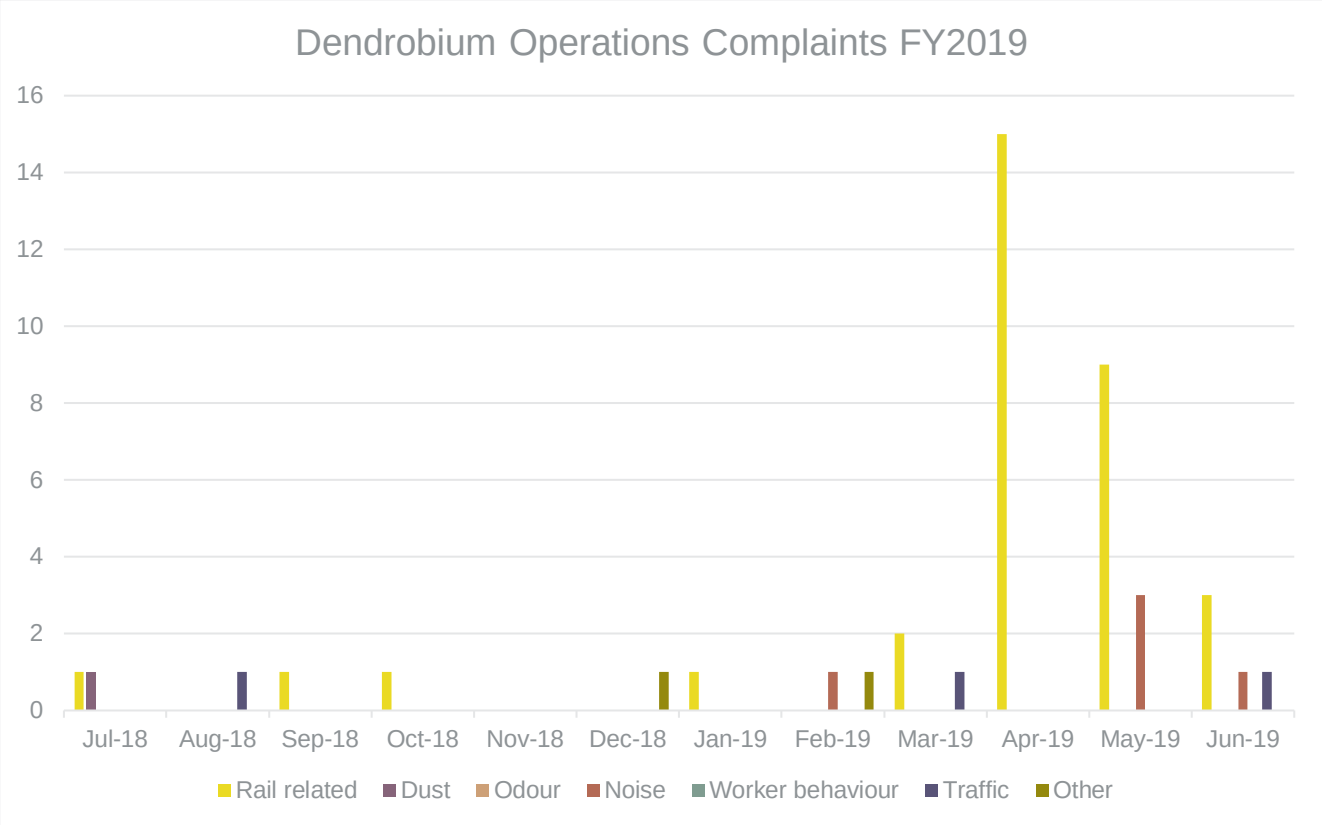


Figure 19: **Dendrobium Community Complaints**

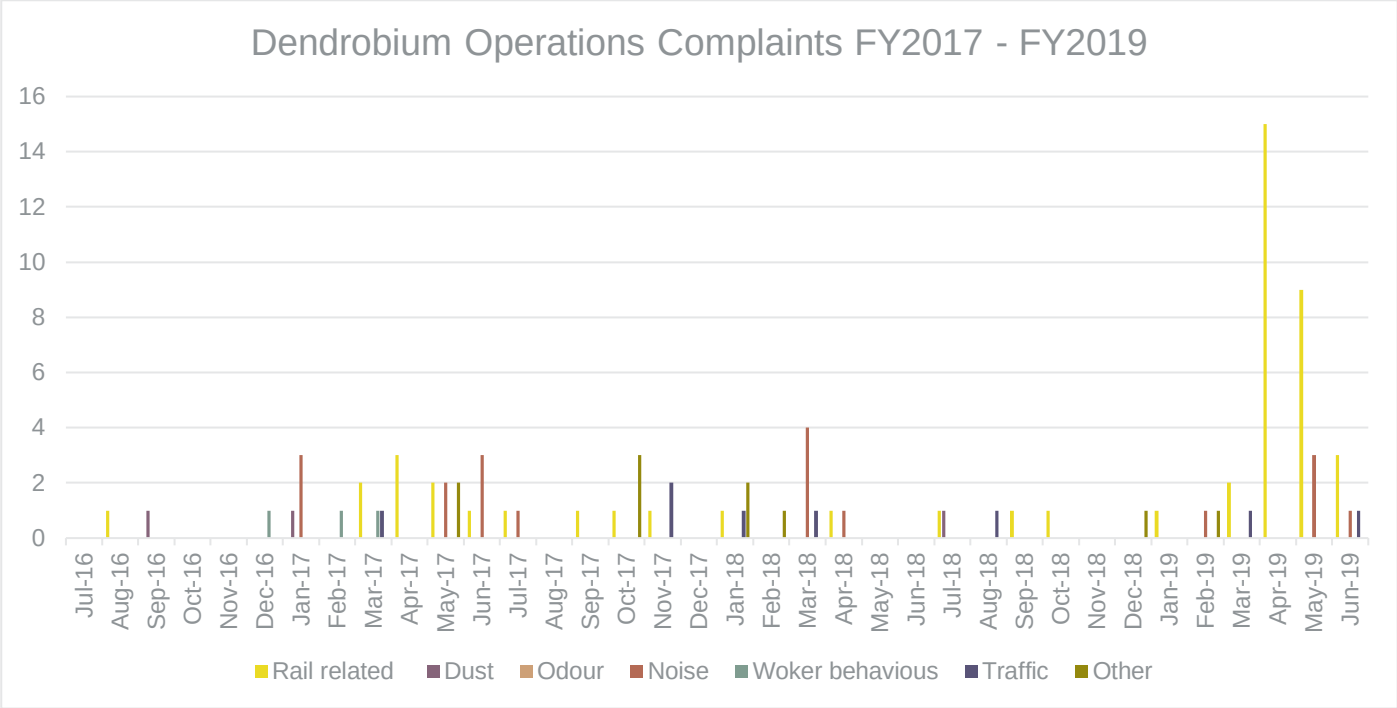


Figure 20: **Dendrobium Community Complaints FY2017 – FY2019**

Cordeaux Colliery

There were no community complaints for Cordeaux Colliery received during the reporting period.

9.2. Community Liaison

Dendrobium Mine

Community Consultation

Due to the location of the Dendrobium Pit Top facilities and Kemira Valley Coal Loading Facility, it is essential that frequent and effective communication occurs between the mine personnel and the residents of Mt Kembla and surrounding areas. S32IMC takes a proactive approach to community consultation by advising residents of issues in advance, including scheduled construction activities or unusual traffic movements. The consultation occurs using a variety of methods including:

- Community newsletters and other letterbox drops;
- DCCC meetings;
- Plan for the Future working group meetings;
- Dendrobium Community Enhancement Committee meetings;
- Dendrobium section on the South32 Regulatory Information webpage;
- Participation in community events and activities;
- Community Perception Surveys; and
- Individual landholder visits/meetings.

Dendrobium Community Consultative Committee

The DCCC was established in January 2002 in accordance with the Dendrobium Development Consent. The committee provides a mechanism to bring the community, environmental groups, local councils and S32IMC together:

- to establish good working relationships between the company, the community and other stakeholders in relation to Dendrobium Mine;
- for the ongoing communication of information and discussion of mining operations and the environmental performance of the mine;
- to discuss community concerns and review the resolution of community complaints;

- to discuss communication of relevant information on the mine and its environmental performance to the wider community, including results of environmental monitoring, environmental management reports and the results of audits; and
- to work together towards outcomes of benefit to the mine, immediate neighbours and the local and regional community.

The committee is comprised of an Independent Chairperson, local community members, environmental group representatives, representatives from Wollongong City Council and Wollondilly Shire Council and S32IMC representatives as outlined in Table 37.

Table 37: Membership of the DCCC as at 30 June 2019

Name	Member Category
Mike Archer	Independent Chairperson
Alex Beccari	Community Representative
Phil Diamond	Community Representative
Phil Grant	Community Representative
Vivien Twyford	Community Representative
Phill Clunas	Community Representative
Jennifer Evans	Community Representative
Cr Noel Lowry	Wollondilly Shire Council
Ron Zwicker	Wollongong City Council
Neville McAlary	S32IMC
Chris Schultz	S32IMC
Ben Fitzsimmons	S32IMC

The Independent Chairperson Mike Archer was appointed to the Chair in October 2013 and reappointed in October 2015.

DCCC meetings cover discussions on the longwall and development activities, Subsidence Management Plans/Extraction Plans, approval processes, environmental compliance, End of Panel Reports, community complaints and community programs.

Newsletters and Information Sheets

During the reporting period, S32IMC distributed community newsletters to the local community (Mt Kembla, Kembla Heights and communities located along the KVRL) covering a range of topics including:

- operations updates, including longwall and development progress;
- environmental improvement works;
- events and organisations supported by Dendrobium Mine; and
- DCCC and DCEC activities, including information on inspections and projects supported.

Dendrobium Community Enhancement Program

The Dendrobium Community Enhancement Program (DCEP) was established in 2002 to facilitate funding for community projects with a vision to create a strong community and positive environment for the residents in the zone of influence of Dendrobium Mine. Since inception, S32IMC has contributed over $1.9 million to the fund and continues to contribute three cents per saleable tonne of coal from the Dendrobium operations (adjusted for CPI).

The program is administered by the Dendrobium Community Enhancement Committee (DCEC) which comprises of an independent Chairperson, community representatives and S32IMC representatives. The

committee met regularly during the reporting period, with extraordinary meetings also convened to conduct business planning and review of operations.

Individuals and organisations in the local community are encouraged to apply for funding. Applications for funding under the DCEP are assessed against a range of selection criteria, which can be viewed at:

https://www.south32.net/what-we-do/places-we-work/illawarra-metallurgical-coal/documents.

Cordeaux

No specific community liaison was undertaken for Cordeaux Colliery during the reporting period.

10. INDEPENDENT AUDITS

10.1. Environmental Audits

During this reporting period the performance of Dendrobium's Environmental Management System and overall HSEC Management System was assessed in a comprehensive series of audits (shown in Table 38). SAI Global has endorsed a "governance check" process as a part of the ISO14001 certification. This process involves reviewing relevant environmental management plans annually and incorporates both a desktop review and in-field verification. If non-conformances are identified during audits, they are recorded and tracked via the action tracking system utilised by S32IMC.

Table 38: Environmental Audits Undertaken During Reporting Period

Date	Type	Internal	External	Comments
Ongoing	Governance Check	X		Governance Checks are conducted internally as a part of ISO14001 certification. A schedule has been developed and checks are undertaken as per the schedule.
June 2019	ISO14001		X	ISO14001 surveillance audit.
June 2019	Self Assessment	X		Assessment undertaken against the elements of the South32 Environment Standard by Global Environment Team.

In the ISO14001 Audit undertaken by SAI Global in June 2019, one major non-conformance and three minor non-conformances were identified.

Major Non-conformance

- Failure to undertake management review in the reporting period. Action: Management review has been conducted for Dendrobium Mine.

Minor non-conformances

- Document review – documents out of date/out of review period. Action: Document reviews being progressed. All documents identified as out of date during the audit have been updated.
- Governance Reviews – schedule not met. Action: Schedule has been reinstated. Governance reviews are being undertaken in accordance with schedule.
- Findings from Triennial Audit not captured in action tracking system. Action: The actions have been identified (they were captured) and now updated in the action tracking system.

Triennial Independent Audit

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned to perform an independent environmental audit (IEA) of the Dendrobium Mine Development. This IEA was completed in May 2018. The primary purpose of the audit was to satisfy Condition 6 of Schedule 8 of the Dendrobium Development Consent 60-30-2001 (as modified), which requires the commissioning of an independent audit every 3 years, unless the Secretary directs otherwise.

All actions from the 2017/2018 IEA were either completed in the previous or the current reporting period. A summary of the actions and status is included in Appendix F.

The next IEA is scheduled to be completed before 31 December 2020.

10.2. Environmental Risk Register

Environmental risks associated with the site operations are recorded in the Environmental Aspects and Impacts Register. The Environmental Aspects and Impacts Register are reviewed annually and is the basis of the Environmental Improvement Plan.

11. INCIDENTS, NON-COMPLIANCES AND EXCEEDANCES DURING THE REPORTING PERIOD

11.1. Site Compliance - Dendrobium

During the reporting period, Dendrobium Mine was generally compliant with legislation and approvals as listed in Section 3. Non-compliances and exceedances of criteria recorded during the reporting period are listed in Table 39 and Table 40 respectively. It is noted that an exceedance of criteria is not necessarily classified as a non-compliance. Non-compliance against legislation has also been included in this section.

No regulatory action occurred in the reporting period (see Table 41).

The Dendrobium Mine Compliance Report, which reports compliance against the conditions in DA 60-03-2001, is attached as Appendix C.

Table 39: Non-compliances during the reporting period

NC1	
Non-compliance	Failure to undertake noise monitoring at designated location in Noise Management Plan. This is a non-compliance with Condition 7 of Schedule 4 of DA 60-03-2001.
Date	15 May 2019
Details of non-compliance	It was identified that noise monitoring had not been undertaken at location R6a at the exact location as detailed in the Noise Management Plan. The location utilised was approximately 25 metres away (adjacent to the road).
Location	374 Cordeaux Road, Mt Kembla
Cause of non-compliance	The alternative monitoring location had been utilised for an extended period of time and had not been noted in the handover between personnel.
Actions taken to mitigate adverse effects of non-compliance	No actions taken at the time as it was identified post the monitoring event.
Actions taken to prevent reoccurrence	Correct location identified with monitoring team.
NC2	
Non-compliance	Volume data not available in 14-day report for LDP24 and LDP25 since December 2018. This was a non-compliance with Section 66 (6) of the Protection of the Environment Operations Act 1997.
Date	25 June 2019
Details of non-compliance	It was identified in a review of the 14-day report available on the South32 website that the volume discharge data had not been updated in the report since December 2018. The data had been collected but was not updated in the spreadsheet.
Location	N/A

Cause of non-compliance	There had been a change in personnel undertaking this activity.
Actions taken to mitigate adverse effects of non-compliance	The required data was updated in the 14-day report available on the South32 website.
Actions taken to prevent reoccurrence	The requirement to comply with the 14-day reporting provisions was communicated to the Environment Team.
NC3	
Non-compliance	Stones Road Maintenance Deed has not been renewed. This is a non-compliance with Condition 27 of Schedule 4 of DA 60-03-2001.
Date	30 June 2019
Details of non-compliance	It was identified in the previous reporting period that the Stones Road Maintenance Deed had expired on 17 May 2018. The Deed has since been reissued and is dated 28 August 2019.
Location	N/A
Cause of non-compliance	There was no check in place to ensure the Deed was renewed prior to expiry.
Actions taken to mitigate adverse effects of non-compliance	The renewal process was progressed with Wollongong City Council. Maintenance activities have continued to be undertaken in accordance with the Deed.
Actions taken to prevent reoccurrence	The renewal of the Deed has been included in the site obligations management system.

Table 40: Exceedances of criteria during the reporting period

EX1	
Exceedance	Exceedance of noise impact assessment criteria at R6a in Condition 1 of Schedule 4 of DA 60-03-2001.
Date	13 June 2019
Details of exceedance	Exceedance of noise impact assessment criteria: • R6a (374 Cordeaux Road), a measurement of 41 dBA was recorded on 4:25 pm (an exceedance of the 40 dBA (day) criteria by 1 dBA). A second measurement was undertaken at 4:40 pm that recorded a result of 39 dBA, and • R6a (374 Cordeaux Road), a measurement of 38 dBA was recorded at 10:52 pm (an exceedance of the 37 dBA (night) criteria by 1 dBA). A second measurement had been undertaken at 10:36 pm that recorded a result of 36 dBA. Note that for the determination of compliance, the NSW Industrial Noise Policy states in Section 11.1.3:

	A development will be deemed to be in non-compliance with noise consent or licence condition of the monitored noise level is more than 2dB above the statutory noise limit specified in the consent or licence condition.
Location	Monitoring location R6a (374 Cordeaux Road, Mt Kembla)
Cause of non-compliance	The cause of the exceedances was mine vehicles and operational activities on the surface.
Actions taken to mitigate adverse effects of non-compliance	No immediate actions taken as results required analysis.
Actions taken to prevent reoccurrence	Site personnel advised of results. Reinforcement of operational requirements under the Noise Management Plan.

Table 41: Regulatory action during the reporting period

Regulatory Action	Detail
Official Caution	None issued
Warning Letters	None issued
Penalty Notices	None issued
Prosecution Proceedings	None commenced

11.2. Site Compliance - Cordeaux

During the reporting period, Cordeaux Colliery was compliant with legislation and approvals as listed in Section 3.

12. ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

Dendrobium Mine

During the next reporting period, Dendrobium will continue longwall mining in Area 3B. Development will continue in Area 3B Main Gates, Wonga Mains and other associated mains development.

Construction Activities

The following projects will be progressed in the next reporting period:

- Electricity for Dendrobium Mine is currently supplied via a 33kV line originating from BlueScope Steel, Port Kembla. Dendrobium has completed planning to upgrade this surface electrical infrastructure to draw pit top power supply from the Endeavour Energy network. Construction is planned to commence early FY20.

- Preliminary planning work to upgrade the existing compressor on site is continuing. Possible locations for the upgrade include the existing compressor shed at Dendrobium Pit Top, Kemira Valley and also Ventilation Shaft 1.

- Completion of works to construct site entry control points to manage the risk of unauthorised entry to the Dendrobium sites and portals and effectively manage fatigue amongst the workforce. S32IMC estimate completion of construction activities to occur in October 2019.

- Repurposing of a building at Marley Place to include shower and bathroom facilities, office space and parking.

- Preliminary assessment of old kerosene mine workings to be scoped to rectify land stability issues.

- Completion of the sediment pond car park upgrade.

Environmental Management

Erosion and Sediment Control

Erosion and sediment control improvements planned to be undertaken during the next reporting period at the Dendrobium Pit Top include:

- Improvements and ongoing maintenance to drainage and greywater treatment systems; and
- Continued sealing of unsealed areas.
- Completion of repairs of erosion on the bank of American Creek near the bridge at the entrance of Dendrobium Pit top site.

Noise Management

Additional monitoring is planned during the next reporting period using handheld noise monitoring units to identify feasible noise reduction initiatives.

Dust Management

A new process for minimising dust emissions at the Dendrobium Pit Top will be implemented in the next reporting period. This will include the use of a Manitou with a sweeper head attachment. A Trigger Action Response Plan has been developed and will be implemented.

Bulk Diesel and Solcenic Management

It is planned to replace the bulk diesel tank and bulk solcenic tanks with self-bunded tanks.

Environmental Management System

Dendrobium Mine is planning to continue environmental management in accordance with ISO14001. Environmental Management Plans will be updated as needed during the next reporting period.

Rehabilitation

The following activities under the Legacy Sites and Rehabilitation Program are planned for FY20;

- Demolition and rehabilitation of three redundant switchyards including Summit Park – Mt Keira, O'Brien's Gap, and O'Brien's Drift.
- Demolition and rehabilitation of pumphouse at O'Brien's Gap.
- Demolition and rehabilitation of powerline circuits within residential areas including the BlueScope to Dendrobium circuit and the Figtree to Wongawilli circuit.
- Site investigations and planning for the rehabilitation of the O'Brien's Drift coal handling facility.
- Site investigations and planning for the rehabilitation of other redundant S32IMC powerline circuits located in National Parks and Wildlife Service and WaterNSW managed lands.

The Dendrobium Conceptual Closure Plan will be reviewed during the next reporting period.

The MOP is planned to be converted to a Rehabilitation Management Plan (RMP) in FY20, pending the release of the RMP Guideline by the Resources Regulator.

13. REFERENCES

13.1. Document References

Air Quality Management Plan

Bushfire Management Plan

Landscape Management Plan

Lighting Management Plan

Noise Management Plan

Waste Management Plan

Water Management Plan

Avon and Cordeaux Reservoir DSC Notification Area Management Plan

Rail Refuse Bin Demolition Management Plan

Environment Protection Licence 3241

Australian and New Zealand Guidelines for Fresh and Marine Water Quality- Volume 1, Chapter 3 (2000)

Cardno, Dendrobium Area 3B Subsidence Management Plan. Prepared for S32IMC.

Cardno, Swamp Impact, Monitoring, Management and Contingency Plan, Dendrobium Area 3B. Prepared for IC.

Cardno, Watercourse Impact Monitoring, Management and Contingency Plan, Dendrobium Area 3B.

S32IMC. Swamp Impact, Monitoring, Management and Contingency Plan.

Dendrobium 3B, Longwall 14 End of Panel Report

Biosis Research, Dendrobium Area 3B Longwalls 9-18: Heritage Impact Assessment

S32IMC - Remedial Action Plan - Corrimal No 3 Ventilation Shaft Picton Road, NSW (Rev 3) JBS&G

S32IMC- Corrimal No 3 Monitoring TARP_2018

13.2. Acronyms used in Annual Review

Table 42: Acronyms used in Annual Review

Acronym	Definition	Acronym	Definition
ACARP	Australian Coal Association Research Program	KVRL	Kemira Valley Rail Line
ARC	Australian Research Council	LDP	Licenced Discharge Point
CCL	Consolidated Coal Lease	LW	Longwall
CPI	Consumer Price Index	MOP	Mining Operations Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation	NATA	National Association of Testing Authorities
CV	Calorific Value	NEPM	National Environment Protection Measure
DCCC	Dendrobium Community Consultative Committee	NOW	NSW Office of Water
DCEC	Dendrobium Community Enhancement Committee	OEH	Office of Environment and Heritage (now Biodiversity Conservation Division)
DCEP	Dendrobium Community Enhancement Program	PEF	Processed engineered fuel
DCPP	Dendrobium Coal Preparation Plant	PM_{10}	Particulate matter 10 microns
DDG	Dust Deposition Gauge	RAP	Remedial Action Plan
DND	Dendrobium Next Domain Project	RMP	Rehabilitation Management Plan
DO	Dissolved Oxygen	RMS	Roads and Maritime Services
DPIE	Department of Planning, Industry and Environment[8]	ROM	Run of Mine
DSC	Dams Safety Committee	RNWG	Rail Noise Working Group
EC	Electrical conductivity	S32IMC	South32 Illawarra Metallurgical Coal
EIP	Environment Improvement Program	SBO	Strategic Biodiversity Offsets
EFT	S32 Environmental Field Team	SIMMCP	Swamp Impact, Monitoring, Management and Contingency Plan
EPL	Environment Protection Licence	SMP	Subsidence Management Plan
EP	Extraction Plan	TARP	Trigger Action Response Plan
EPA	Environment Protection Authority	TSP	Total Suspended Particulate
EPP	Environmental Protection Plan	TSS	Total Suspended Solid
FY	Financial Year	UoW	University of Wollongong
HVAS	High Volume Air Sampler	WIMMCP	Watercourse Impact, Monitoring, Management and Contingency Plan
KVCLF	Kemira Valley Coal Loading Facility		

[8] Previously Department of Planning and Environment, Department of Planning, Department of Urban Affairs and Planning

14. PLANS

Plan 1A - Location of Mining Domain

Plan 1B - LW Status as at end of Financial Year

Plan 2 – Dendrobium Mine Site

Plan 3 – Site Layout – Kemira Valley

Plan 4 – No. 1 Ventilation Shaft Site Layout

Plan 5 – No.2 and 3 Ventilation Shaft Site Layout

Plan 6 – Exploration Activities – Dendrobium Mine

Plan 7 – Air Quality Monitoring Locations

Plan 8A – Dendrobium Surface Water Quality Monitoring Locations

Plan 8B – Dendrobium LDP Locations

Plan 9 – Noise Monitoring Locations

Plan 10A – Rehabilitation Areas - Planned Rehabilitation – All other Areas

Plan 10B - Cordeaux Colliery – Corrimal No. 3 Shaft Remediation

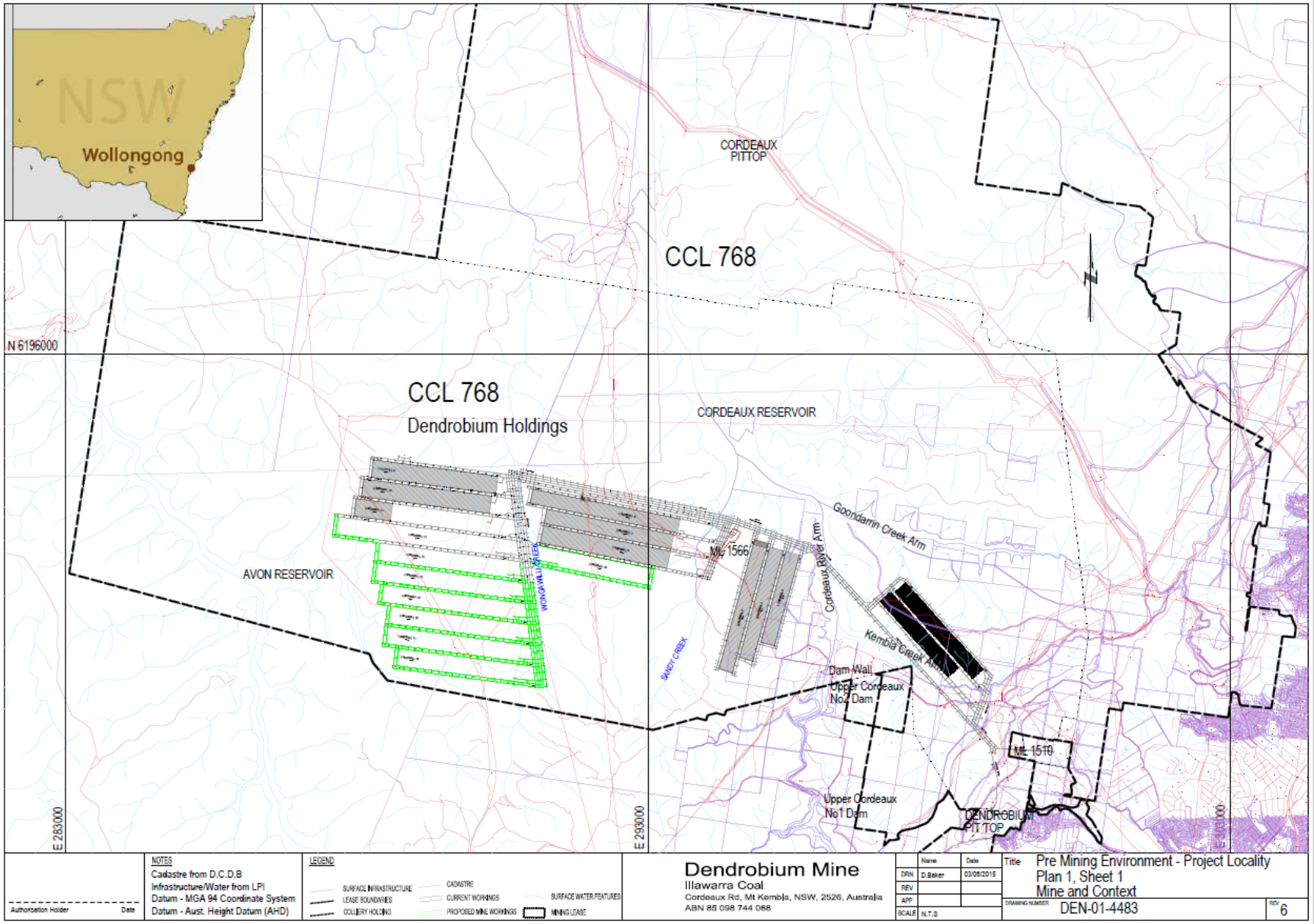
Plan 11 – Cordeaux Colliery Locality Plan

Plan 12 – Cordeaux Colliery Pit Top Infrastructure

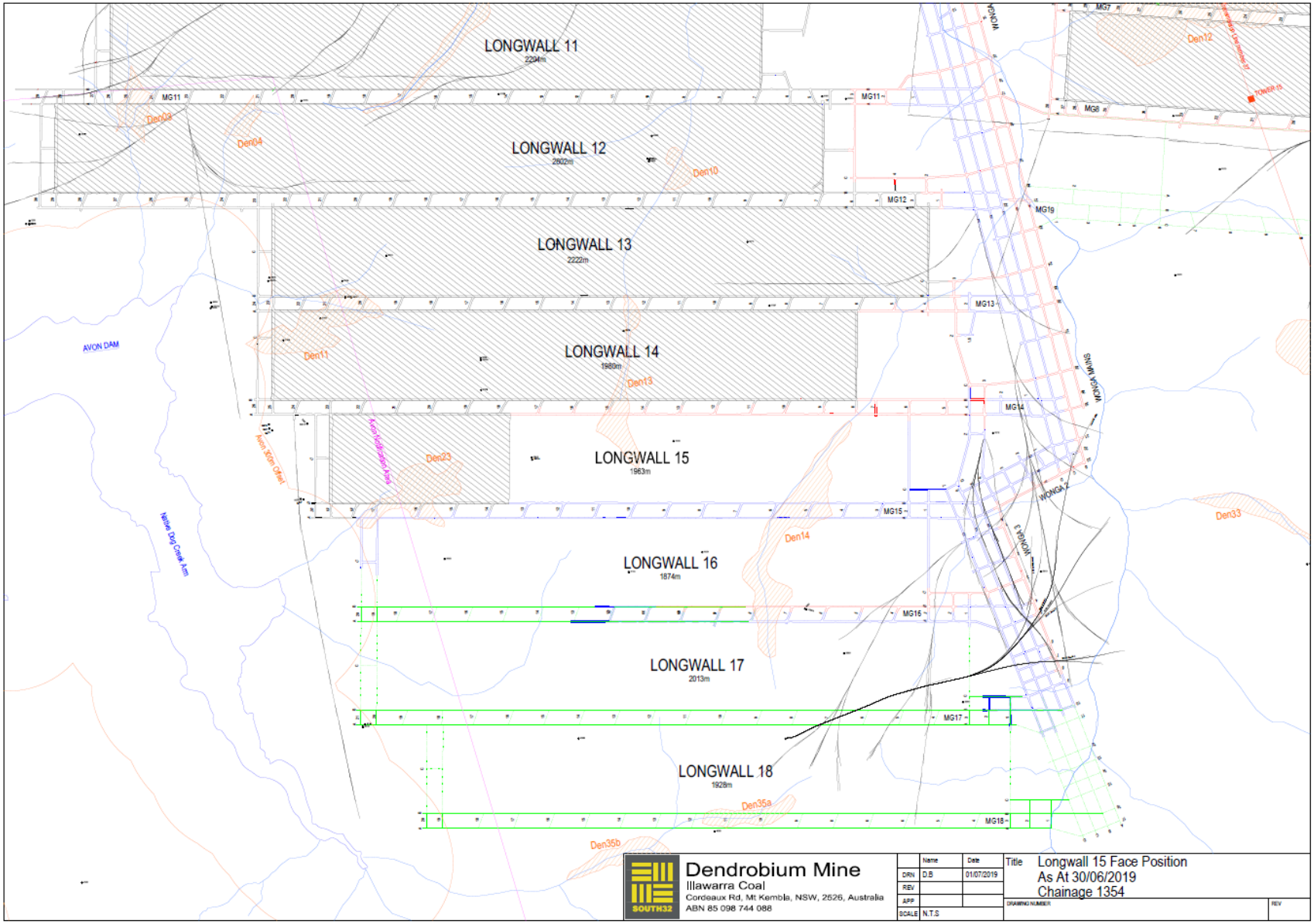
Plan 13 – Cordeaux Colliery Pit Top Surface Water Management

Plan 14 – Biodiversity Offset – Maddens Plains

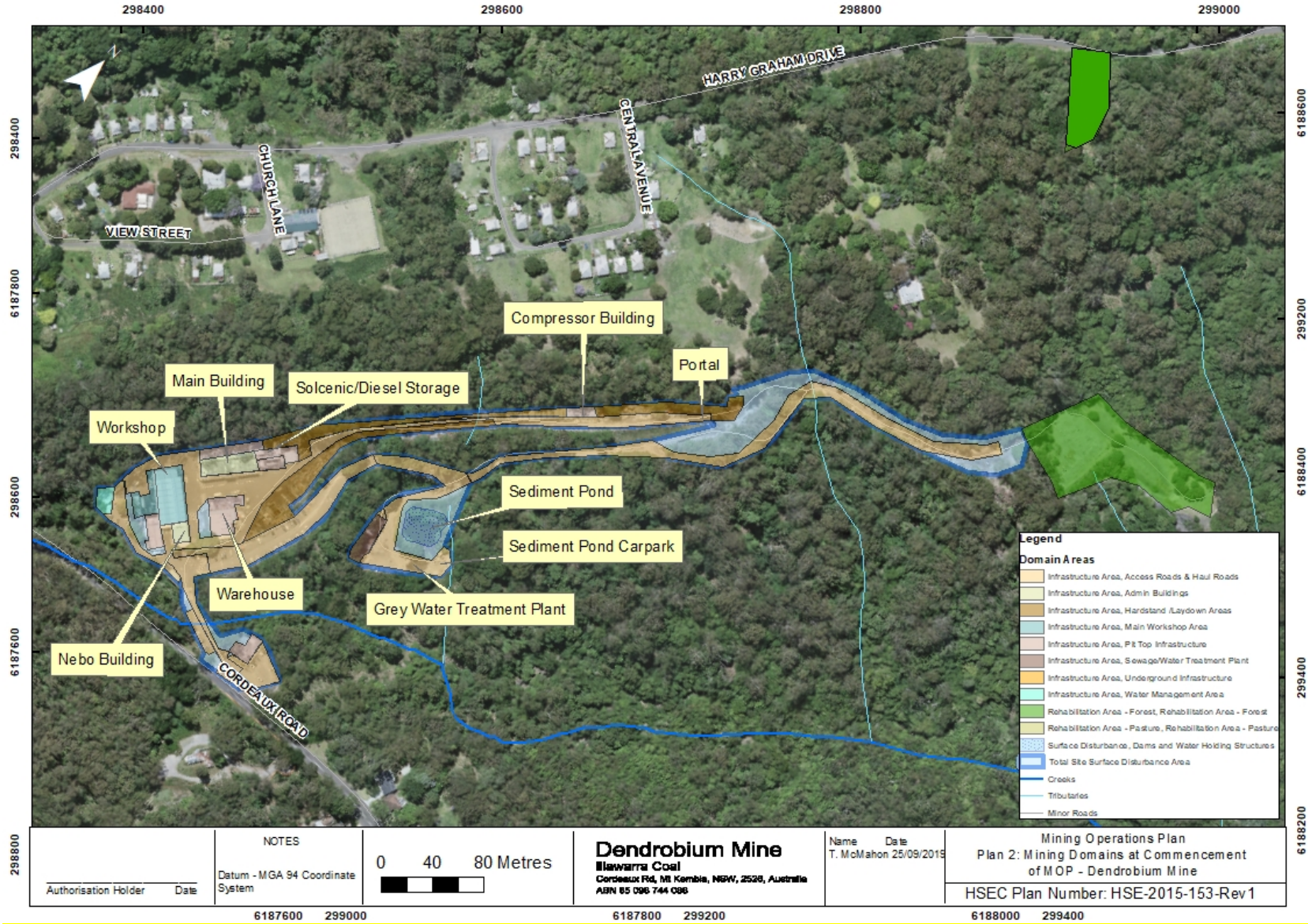
Plan 1A - Location of Mining Domain



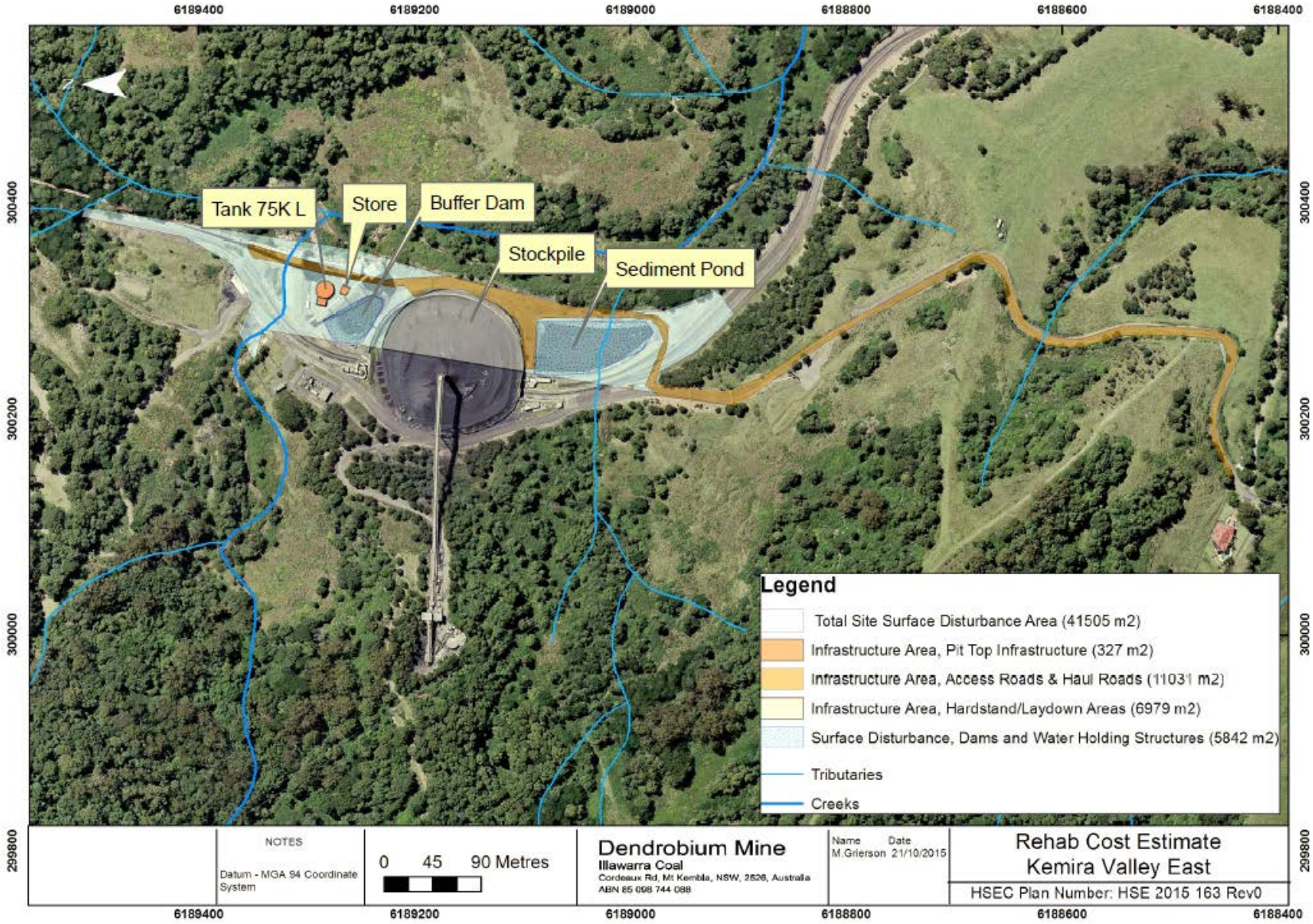
Plan 1B - LW Status as at end of Financial Year



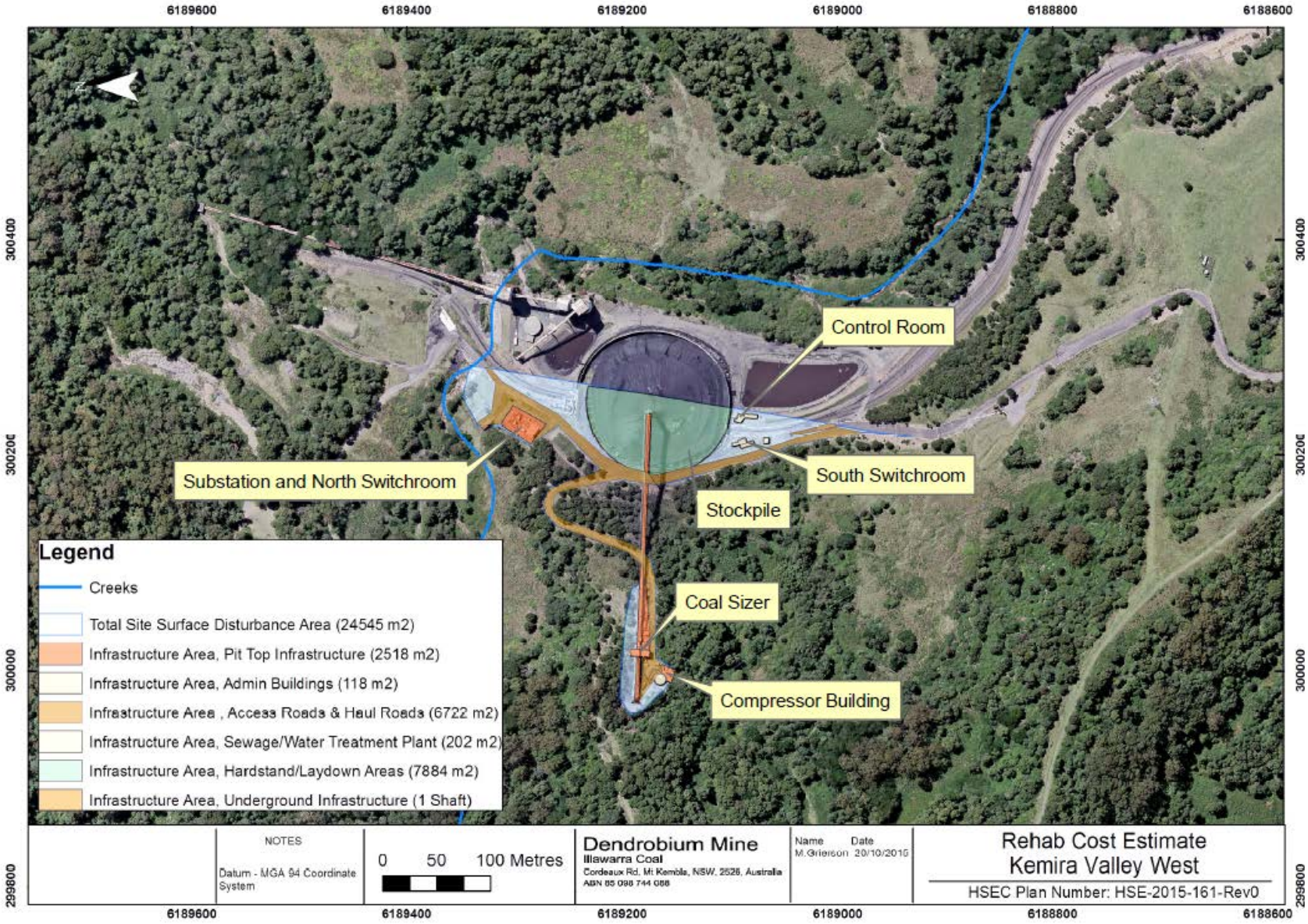
Plan 2 – Dendrobium Mine Site



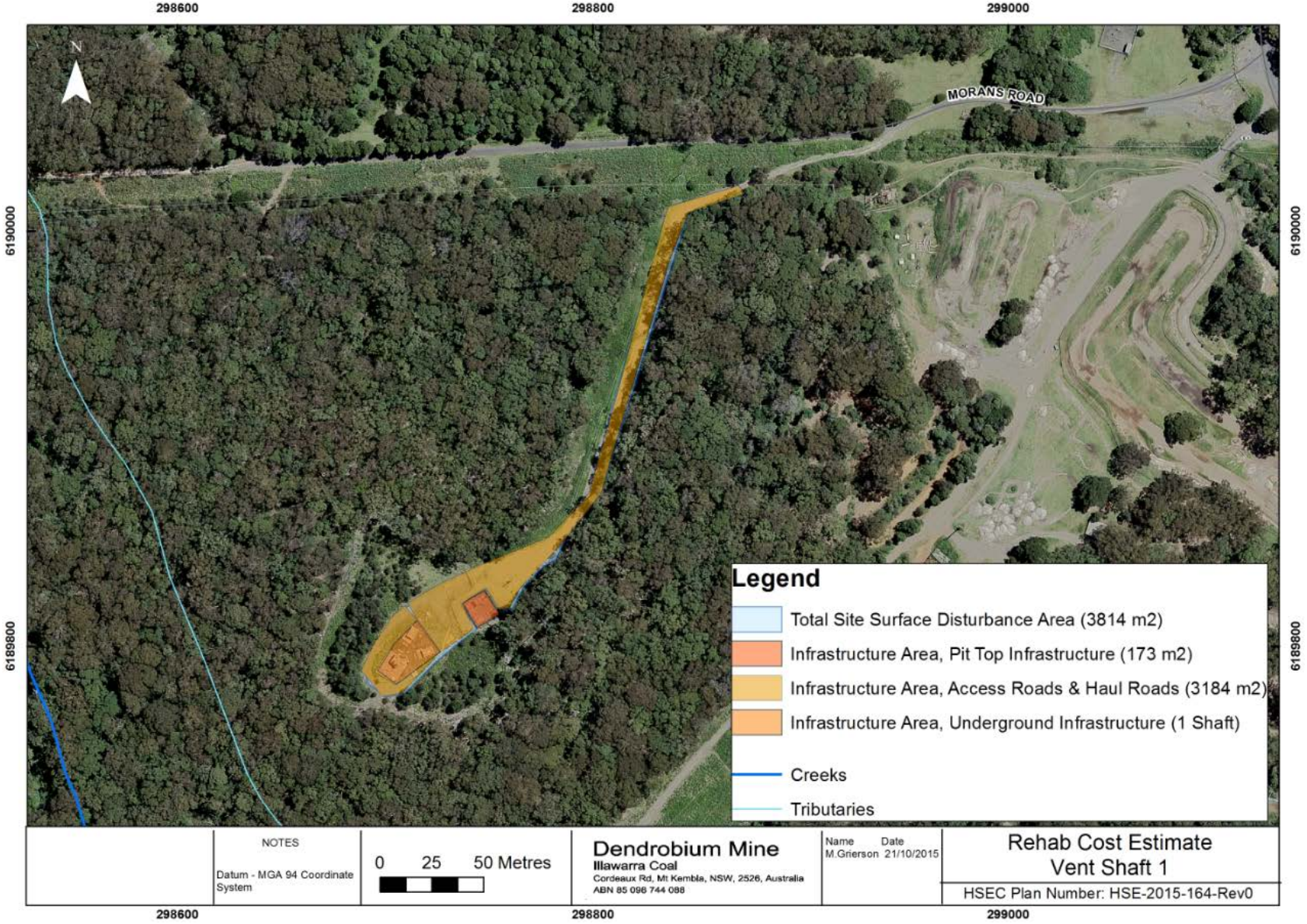
Plan 3A – Site Layout – Kemira Valley



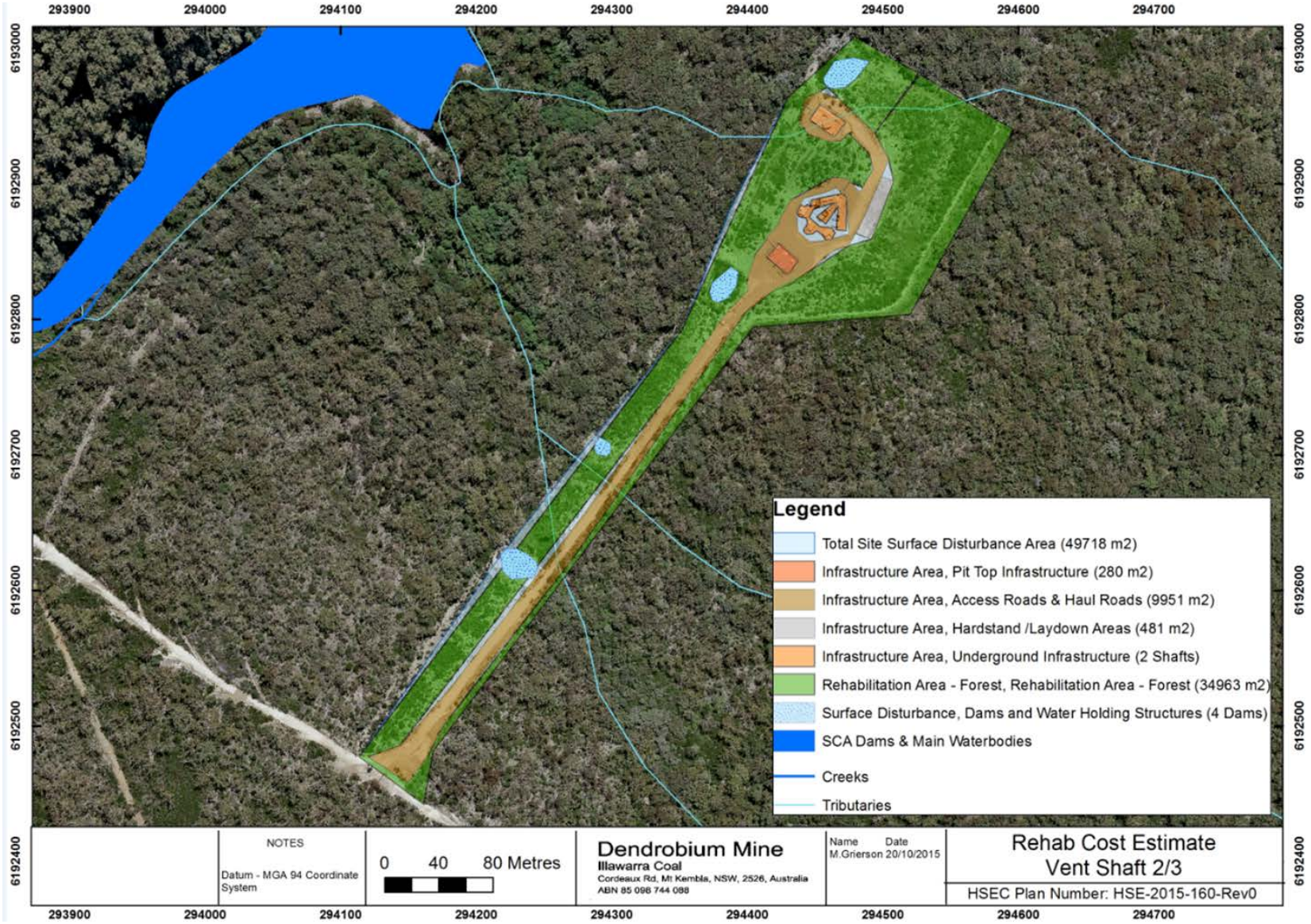
Plan 3B – Site Layout – Kemira Valley



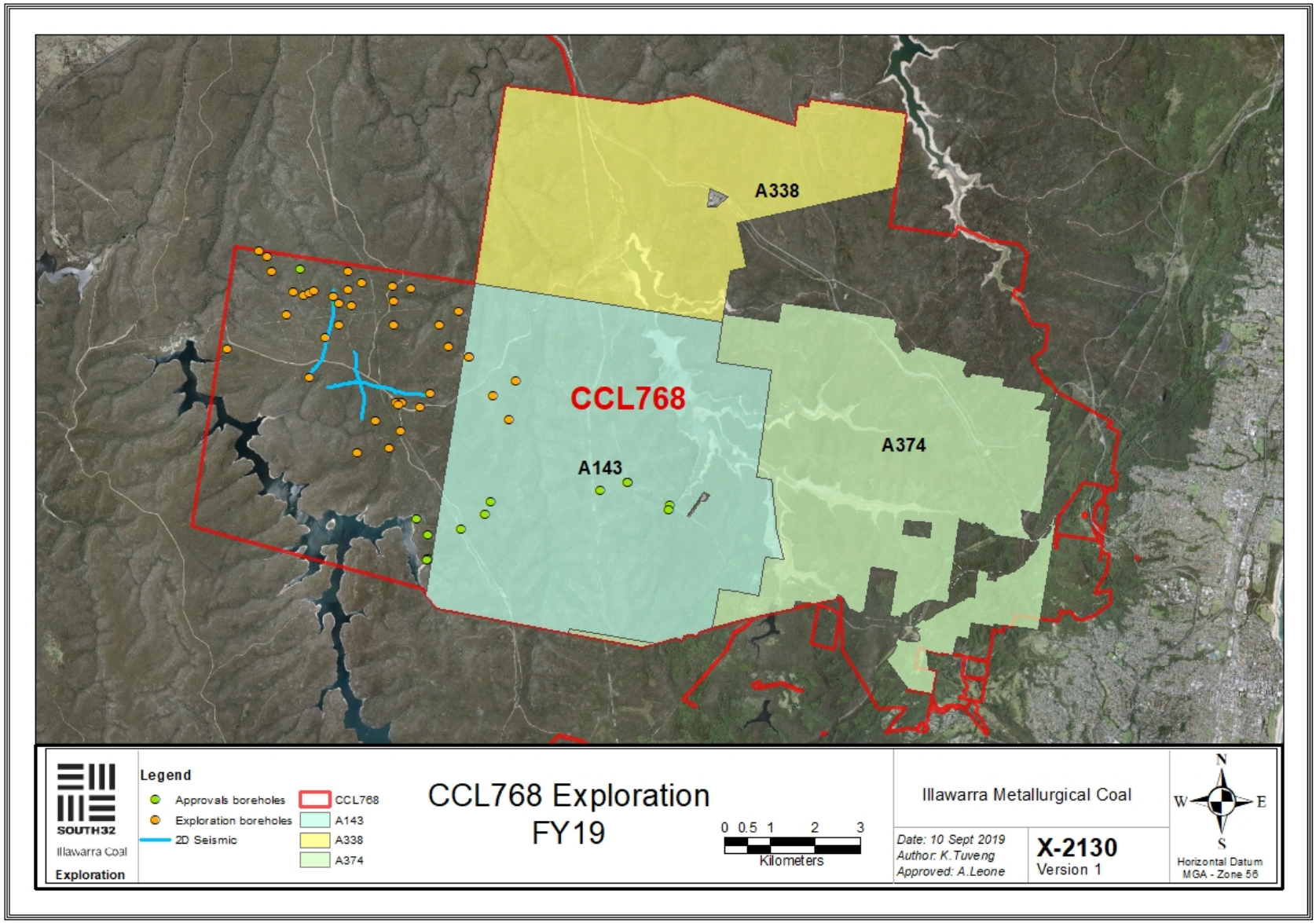
Plan 4 – No. 1 Ventilation Shaft Site Layout



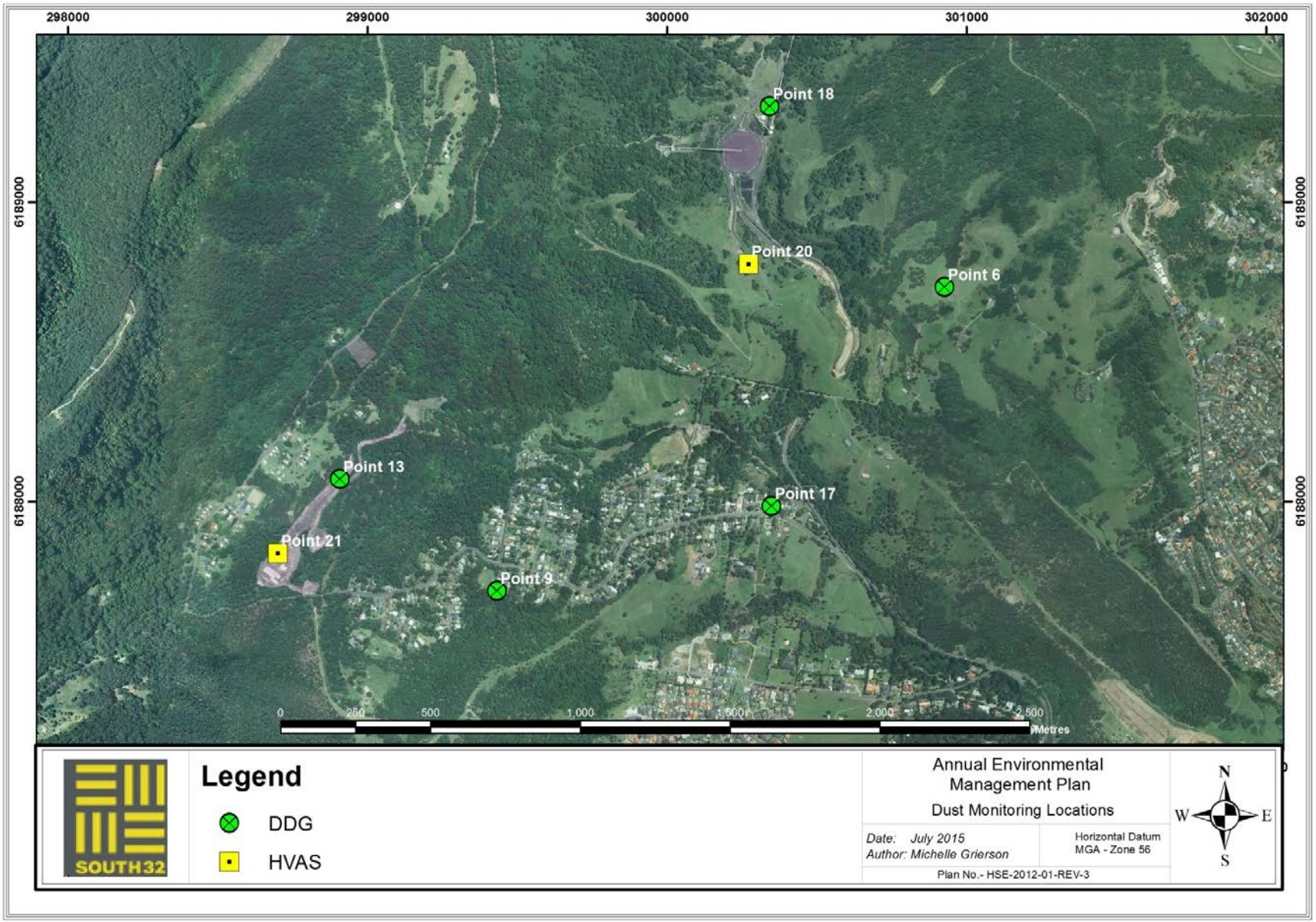
Plan 5 – No.2 and 3 Ventilation Shaft Site Layout



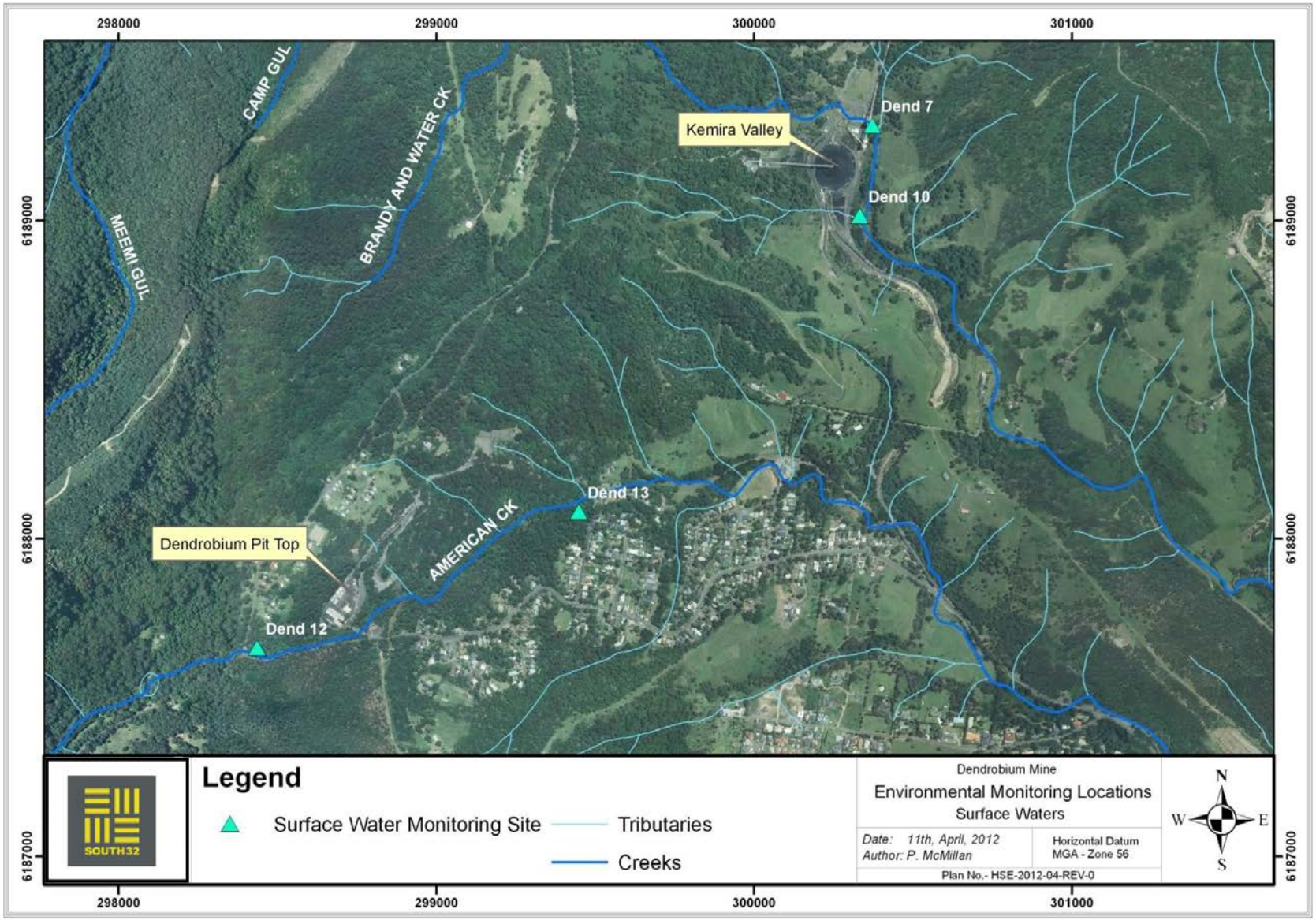
Plan 6 – Exploration Activities – Dendrobium Mine



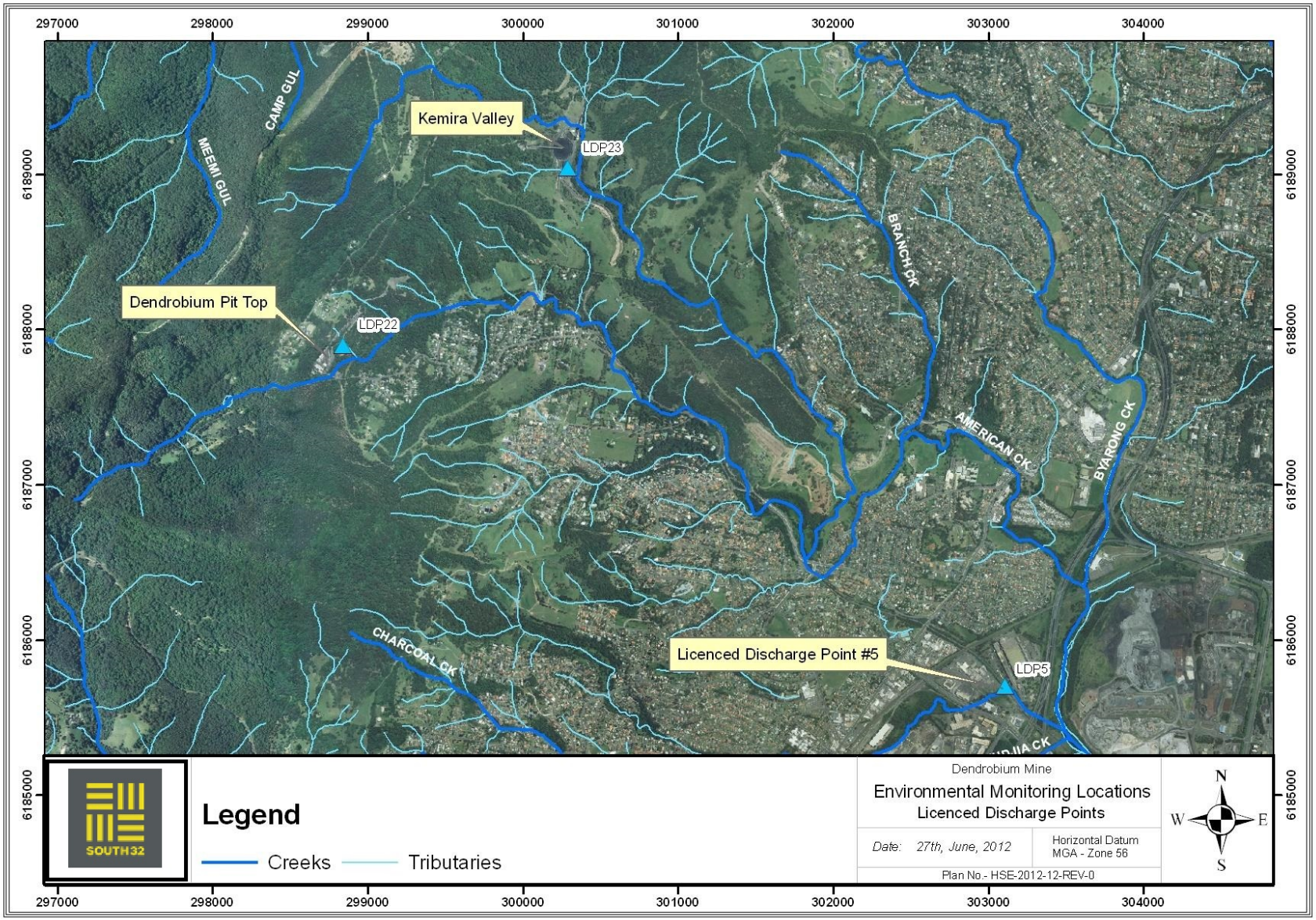
Plan 7 – Air Quality Monitoring Locations



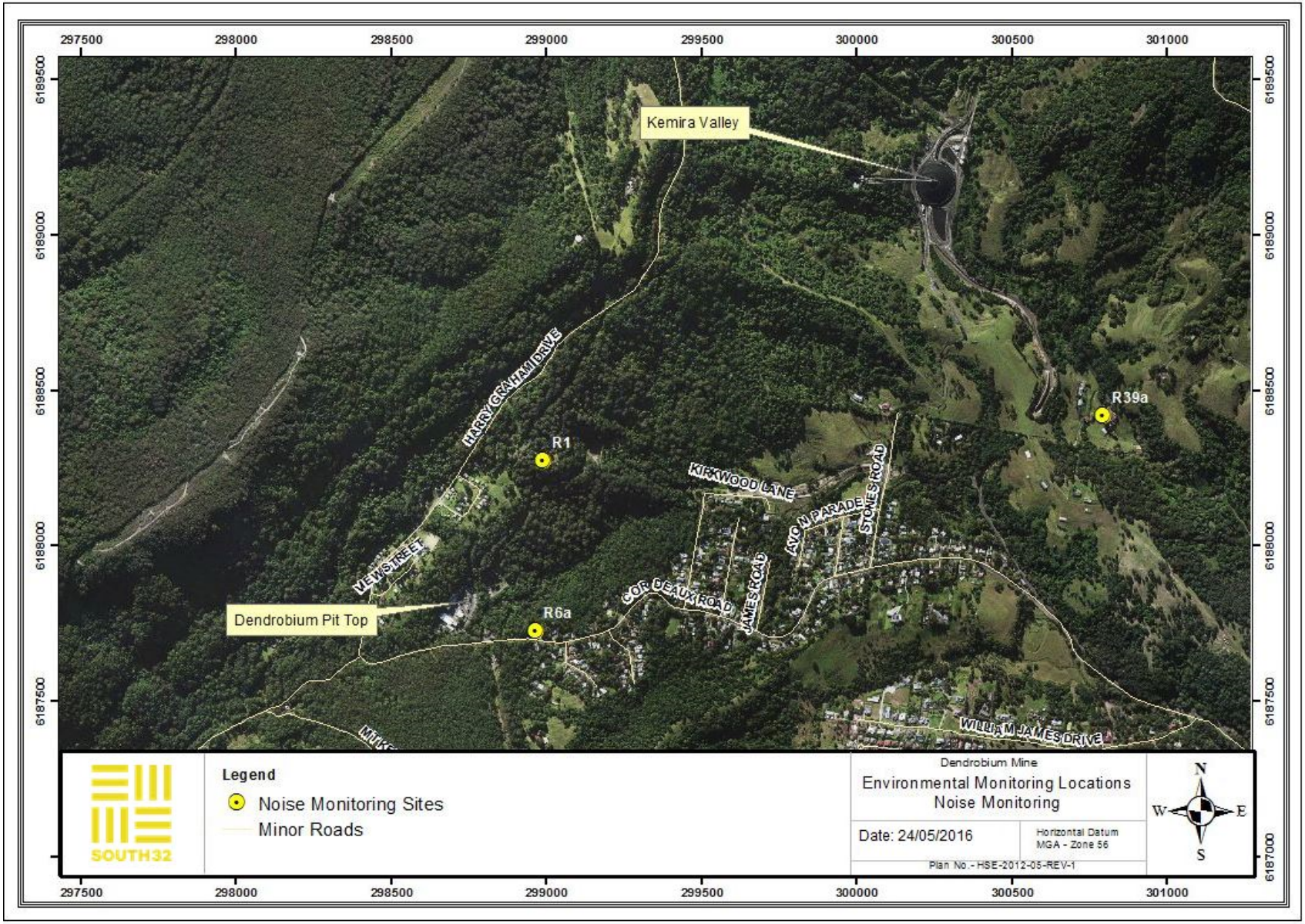
Plan 8A – Dendrobium Surface Water Quality Monitoring Locations



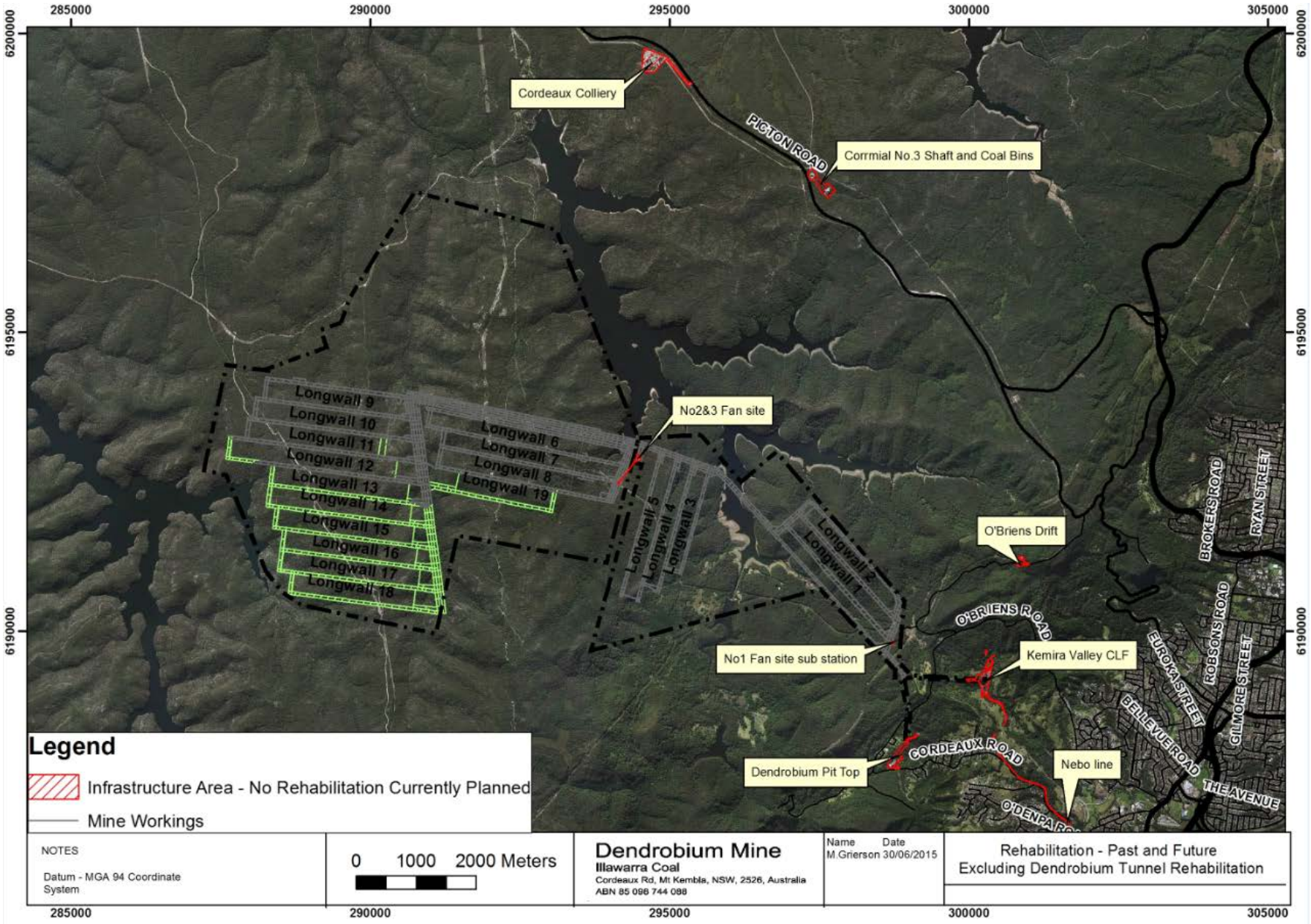
Plan 8B – Dendrobium LDP Locations



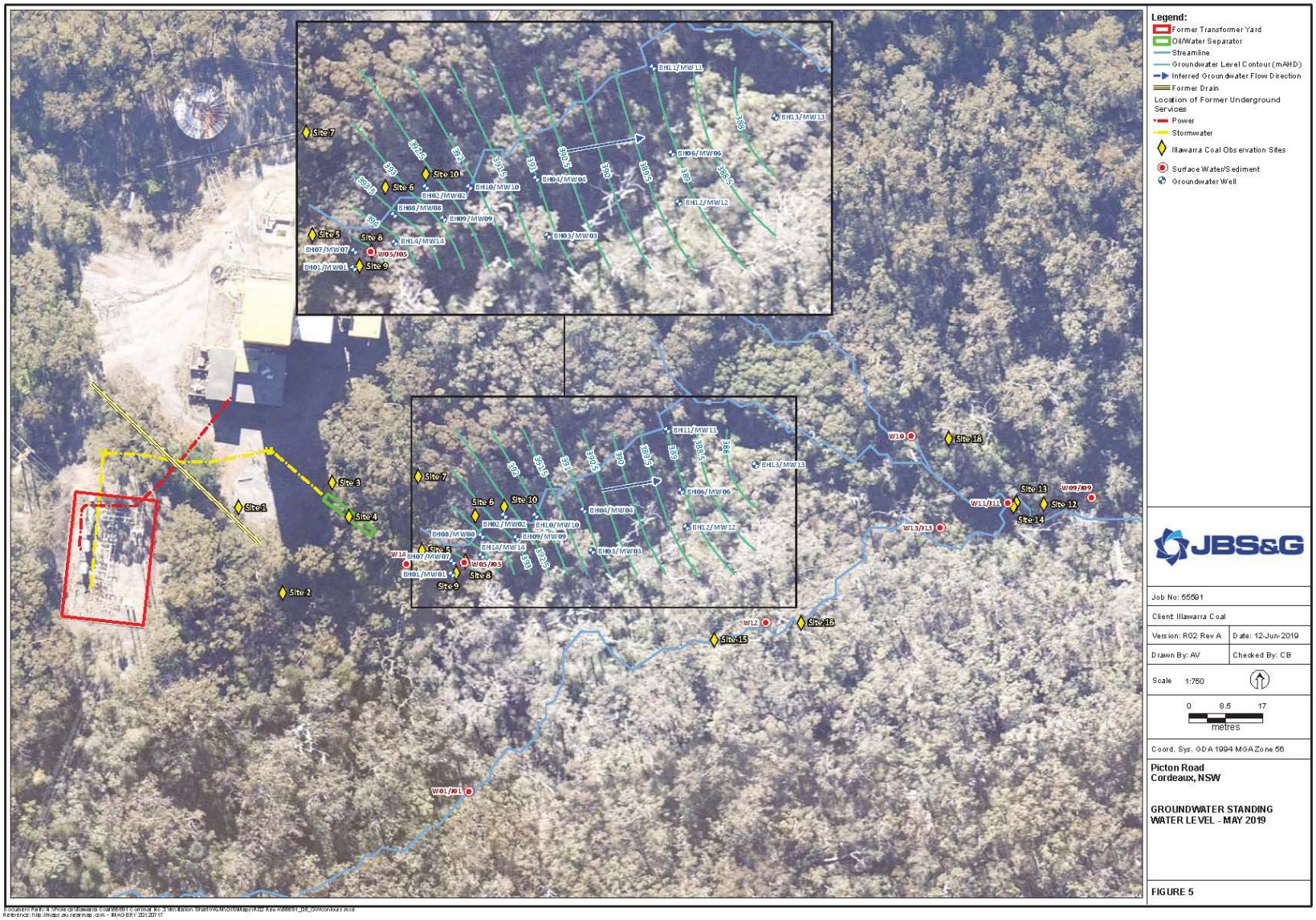
Plan 9 – Noise Monitoring Locations



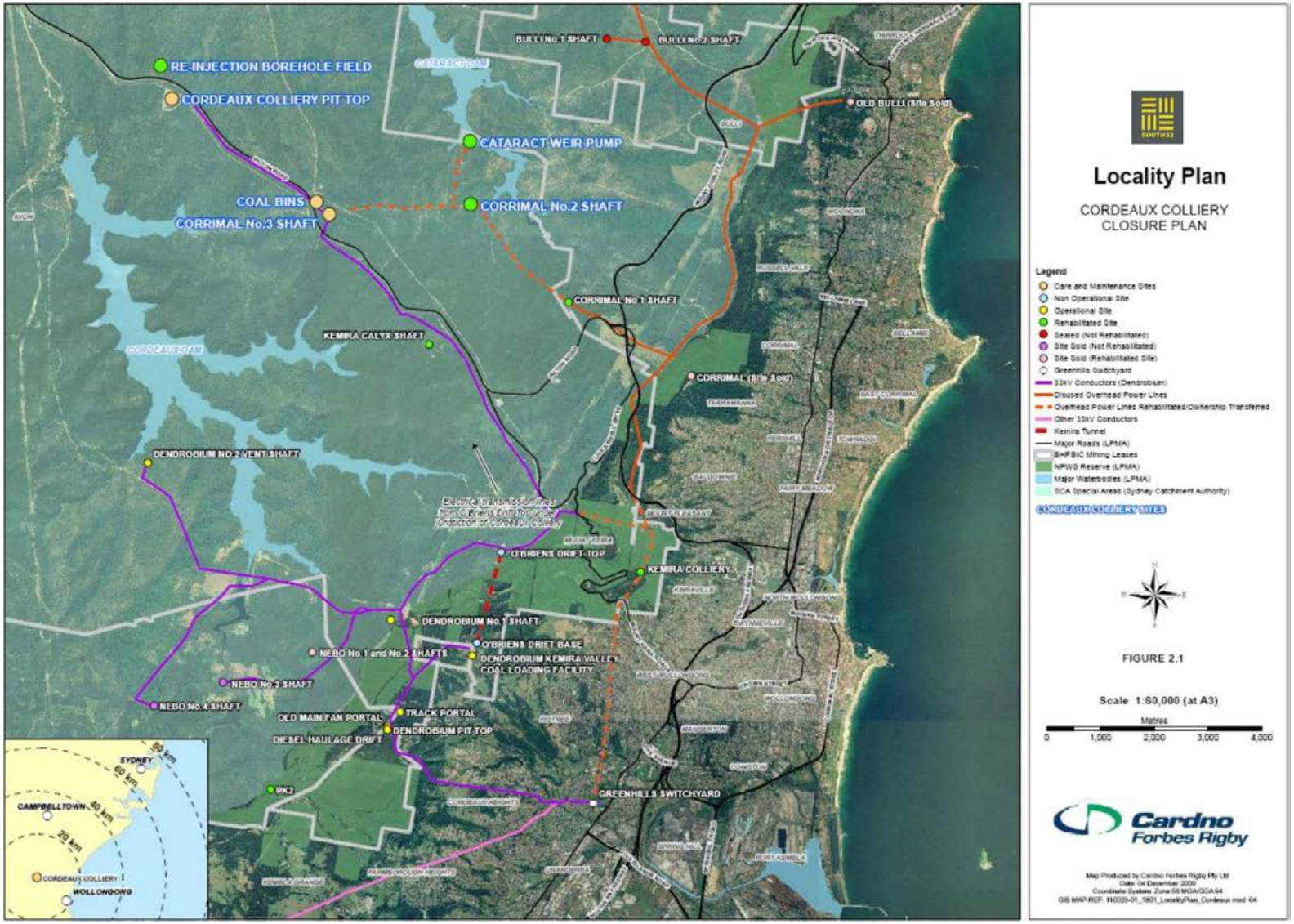
Plan 10A – Rehabilitation Areas - Planned Rehabilitation – All other Areas



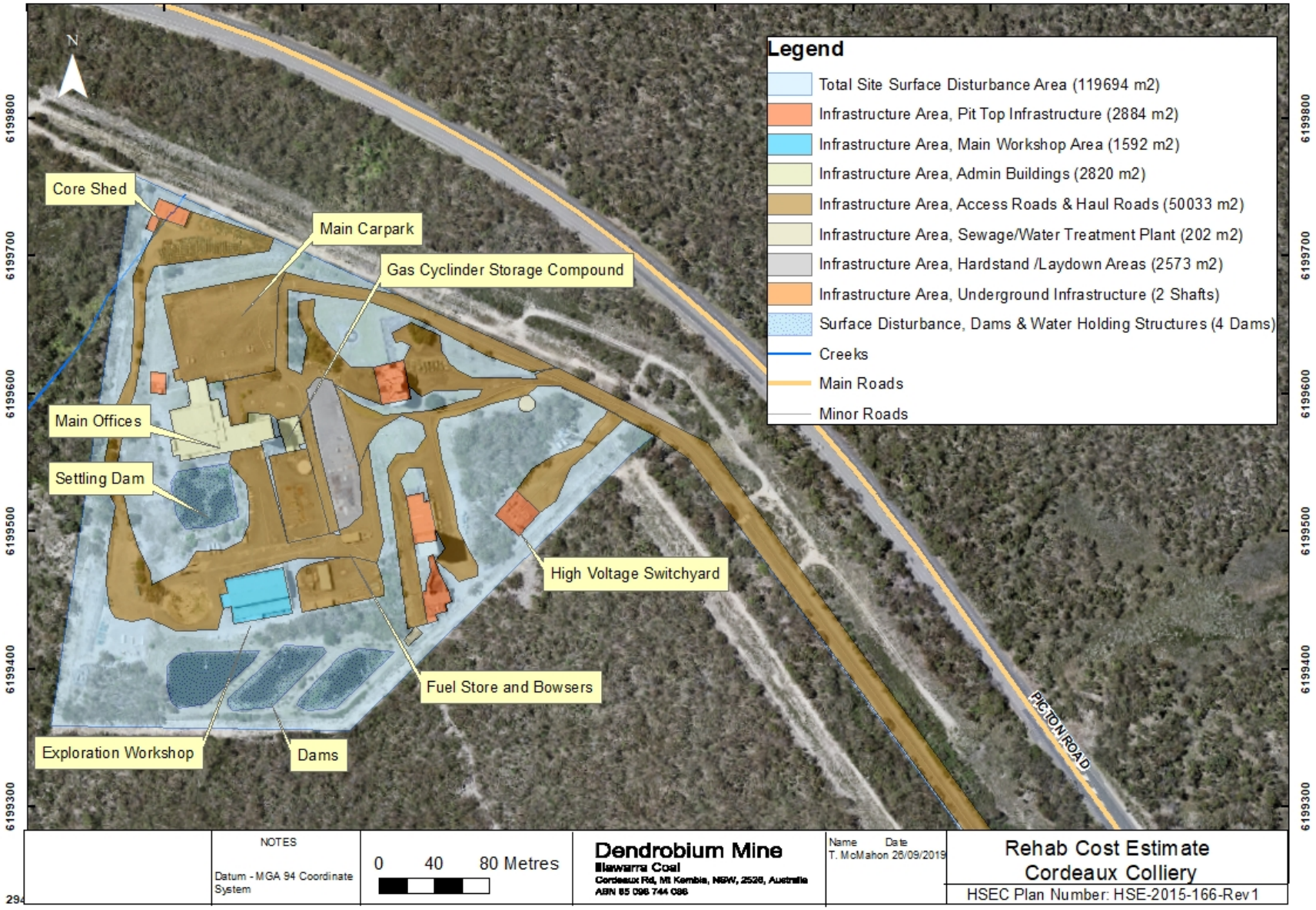
Plan 10B - Cordeaux Colliery – Corrimal No. 3 Shaft Remediation



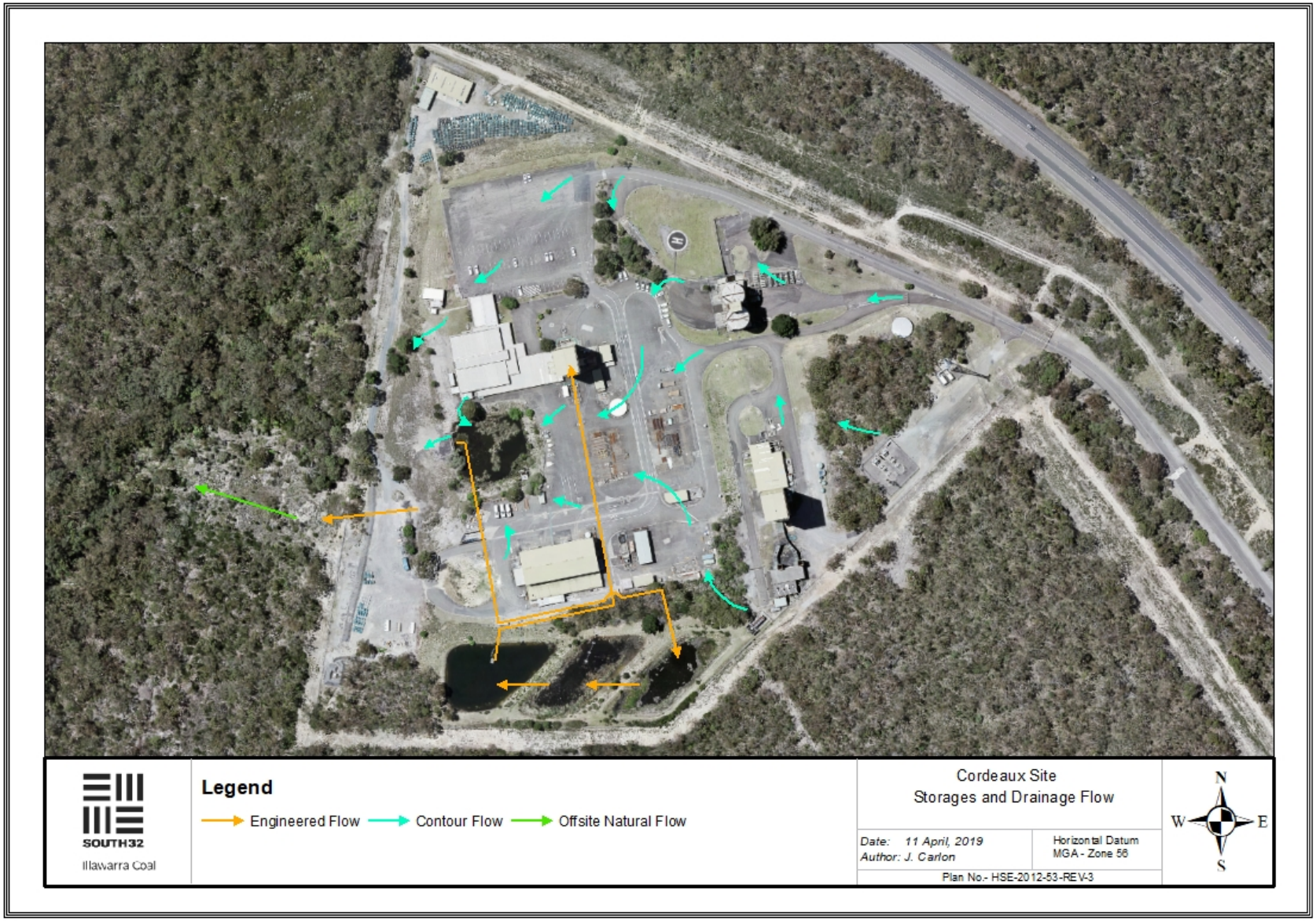
Plan 11 – Cordeaux Colliery Locality Plan



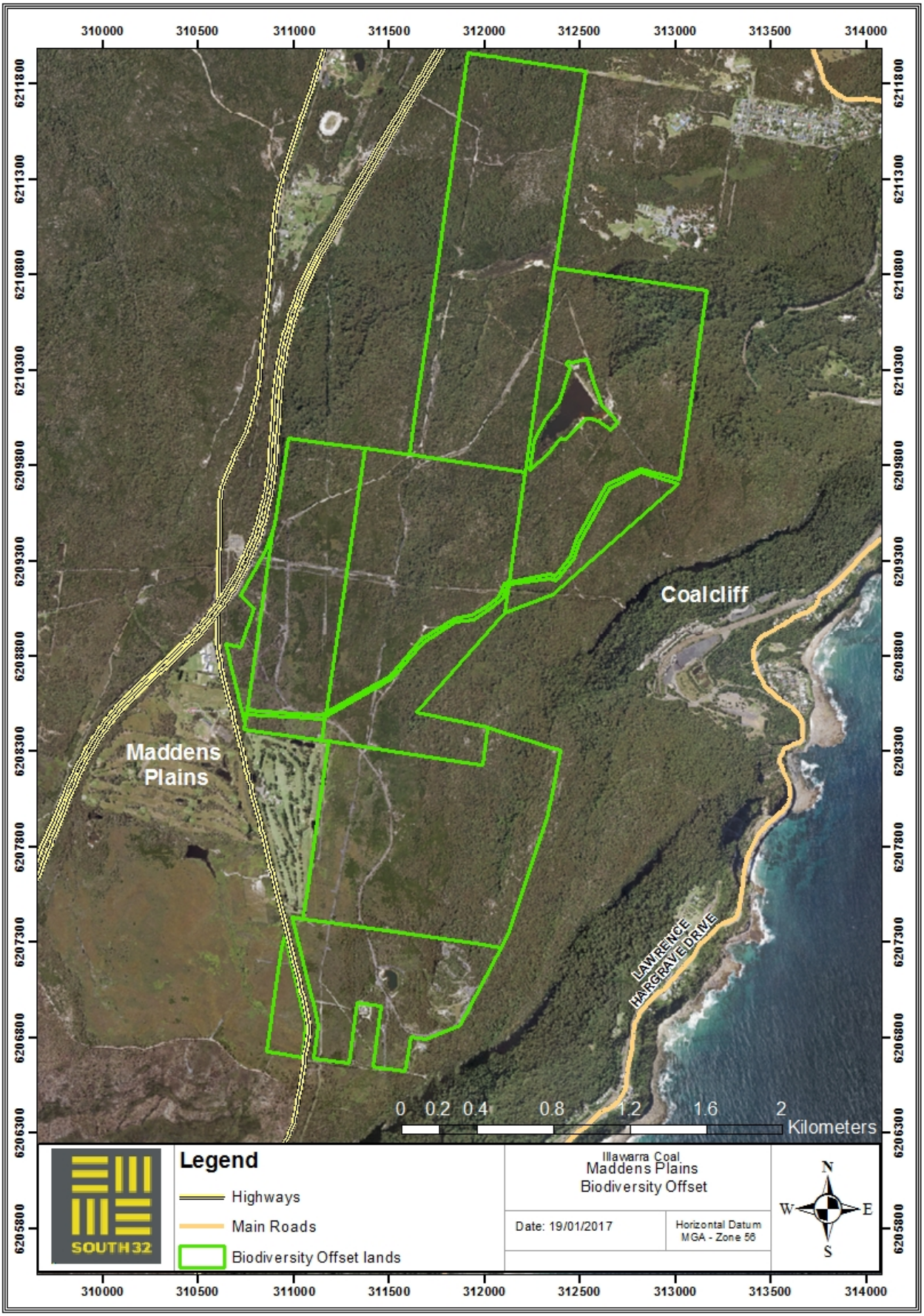
Plan 12 – Cordeaux Colliery Pit Top Infrastructure



Plan 13 – Cordeaux Colliery Pit Top Surface Water Management



Plan 14 – Biodiversity Offset – Maddens Plains



15. APPENDICES

APPENDIX A: EPA ANNUAL RETURN

Annual Return

DENDROBIUM COAL PTY LTD

Licence 3241

A. Statement of Compliance - Licence Details

ALL Licence holders must check that the Licence details in Section A are correct.

If there are changes to any of these details, **you must advise Environment Protection Authority (EPA) and apply as soon as possible for a variation to your Licence or for a Licence transfer.**

Licence variation and transfer application forms are available on the EPA website at: http://www.epa.nsw.gov.au/licensing-and-regulation/licensing or from regional offices of the EPA, or by contacting by telephone 02 9995 5700.

If you are applying to vary or transfer your Licence, you must still complete and submit this Annual Return.

A1. Licence holder

Licence number : 3241

Licence holder : DENDROBIUM COAL PTY LTD

Trading name *(if applicable)* :

ABN : 85 098 744 088

ACN :

Reporting period : From: 1-7-2018 To: 30-6-2019

A2. Premises to which Licence Applies (if applicable)

Common name (if any) : DENDROBIUM MINE

Premises : CORDEAUX ROAD MOUNT KEMBLA 2526 NSW

A3. Activities to which Licence Applies

Mining for coal

Coal works

A4. Other Activities (if applicable)

A5. Fee-Based Activity Classifications

Note that the fee based activity classification is used to calculate the administrative fee.

Fee-based activity	Activity scale	Unit of measure
Coal works	> 2,000,000.00 - 5,000,000.00	T annual handing capacity
Mining for coal	> 3,500,000.00 - 5,000,000.00	T annual production capacity

A6. Assessable Pollutants (if applicable)

Note that the identification of assessable pollutants is used to calculate the **load-based fee.**
The following assessable pollutants are identified for the fee-based activity classifications in the licence:

B. Monitoring and Complaints Summary

B1. Number of Pollution Complaints

Pollution Complaint Category	Complaints
Air	2
Water	0
Noise	36
Waste	0
Other	6
Total complaints recorded by the licensee during the reporting period	**44**

B2. Concentration Monitoring Summary

For each concentration monitoring point identified in your licence, details are displayed below. If concentration monitoring is not required by your licence, **no data** will appear below.
If data was provided from an uploaded file, the file name will be displayed below instead of any data.
Note that this does not exclude the need to conduct appropriate concentration monitoring of assessable pollutants as required by load-based licensing (if applicable).

Discharge Point 5

Stormwater and minewater discharge from Dendrobium mine. Brine discharge from Appin West mine. Discharge quality monitoring, Pipeline discharging to Allan's Creek labelled as "Discharge Point" on map titled "Dendrobium Mine Water Disposal Pipeline" dated 8 November 2002.

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Arsenic	milligrams per litre	12	13	0.009	0.011	0.014
Conductivity	microsiemens per centimetre	12	13	1800	2005	2400
Copper	milligrams per litre	12	13	<0.001	<0.001	<0.002
Nickel	milligrams per litre	12	13	0.011	0.014	0.021
Oil and Grease	milligrams per litre	12	13	<5	<5	<5
pH	pH	12	13	8.1	8.3	8.9

Total suspended solids	milligrams per litre	12	13	<5	6	11
Zinc	milligrams per litre	12	13	0.032	0.038	0.050

Monitoring Point 6

Dust Monitoring, Dust gauge located at Figtree Farm, O'Briens Road Figtree, labelled as "Point 6" in the map titled "Figure 1 - Air Quality Monitoring Sites" submitted to the EPA on 15/9/09.

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Ash	grams per square metre per month	12	12	0.1	0.8	3.6
Combustible solids	grams per square metre per month	12	12	<0.1	0.4	1.3
Insoluble solids	grams per square metre per month	12	12	0.2	1.2	4.9

Monitoring Point 9

Dust Monitoring, Dust gauge located at Mt Kembla Primary School labelled as "Point 9" in the map titled "Figure 1 - Air Quality Monitoring Sites" submitted to the EPA on 15/9/09.

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Ash	grams per square metre per month	12	12	0.2	0.5	1.0
Combustible solids	grams per square metre per month	12	12	0.1	0.5	1.2
Insoluble solids	grams per square metre per month	12	12	0.3	1.1	2.1

Monitoring Point 13

Dust Monitoring, Dust gauge located at Dendrobium Colliery Surface, labelled as "Point 13" in the map titled "Figure 1 - Air Quality Monitoring Sites" submitted to the EPA on 15/9/09.

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Ash	grams per square metre per month	12	12	0.4	1.1	1.8
Combustible solids	grams per square metre per month	12	12	0.4	0.7	1.2
Insoluble solids	grams per square metre per month	12	12	0.8	1.8	3

Monitoring Point 17

Dust Monitoring, Dust gauge located at 206 Cordeaux Road, Mt Kembla, labelled as "Point 17" in the map titled "Figure 1 - Air Quality Monitoring Sites" submitted to the EPA on 15/9/09.

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Ash	grams per square metre per month	12	12	0.1	0.7	1.7
Combustible solids	grams per square metre per month	12	12	0.1	0.5	0.9
Insoluble solids	grams per square metre per month	12	12	0.2	1.1	2.3

Monitoring Point 18

Dust Monitoring, Dust gauge located at Kemira Valley Coal Loading Facility at the bins, labelled as "Point 18" in the map titled "Figure 1 - Air Quality Monitoring Sites" submitted to the EPA on 15/9/09.

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Ash	grams per square metre per month	12	12	0.3	1.1	2.1
Combustible solids	grams per square metre per month	12	12	0.3	1.7	4.5

Insoluble solids	grams per square metre per month	12	12	0.6	2.8	6

Monitoring Point 20

Ambient Air Monitoring, Hi-Vol sampler located at Kemira Valley Coal Loading Facility labelled as "Point 20" in the map titled "Figure 1 - Air Quality Monitoring Sites" submitted to the EPA on 15/9/09.

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
PM10	micrograms per cubic metre	12	12	5.2	13.3	20.6
Total suspended particles	micrograms per cubic metre	12	12	6.6	22.3	51.0

Monitoring Point 21

Ambient Air Monitoring, Hi-Vol sampler located at Dendrobium Surface, labelled as "Point 21" in the map titled "Figure 1 - Air Quality Monitoring Sites" submitted to the EPA on 15/9/09.

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
PM10	micrograms per cubic metre	12	12	6.1	15.5	25.8
Total suspended particles	micrograms per cubic metre	12	12	15.6	36.1	74.4

B3. Volume or Mass Monitoring Summary

For each volume or mass monitoring point identified in your licence, details are displayed below. If volume or mass monitoring is not required by your licence, **no data** will appear below.
If data was provided from an uploaded file, the file name will be displayed below instead of any data.
Note that this does not exclude the need to conduct appropriate volume or mass monitoring of assessable pollutants are required by load-based licensing (if applicable).

Monitoring Point 24

Volume Monitoring, Pipeline dewatering underground water storage area.

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
megalitres per day	Continuous	Continuous	2.45	5.53	7.21

Monitoring Point 25

Volume Monitoring, Pipeline discharge for Kemira Valley sedimentation ponds.

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
megalitres per day	Continuous	Continuous	0.00	0.13	1.99

C. Statement of Compliance - Licence Conditions

C1. Compliance with Licence Conditions

Were all conditions of the licence complied with (including monitoring and reporting requirements)?	**Yes**

D. Statement of Compliance - Load Based Fee Calculation

If you are not required to monitor assessable pollutants by your licence, **no data** will appear below.

If assessable pollutants have been identified on your licence, the following worksheets for each assessable pollutant will determine your load based fee for the licence fee period to which this Annual Return relates.

Loads of assessable pollutants must be calculated using any of the methods provided in EPA's Load Calculation Protocol for the relevant activity. A Load Calculation Protocol would have been already sent to you with your licence. If you require additional copies, you can download the Protocol from the EPA's website or you can contact us on telephone 02 9995 5700.

You are required to keep all records used to calculate licence fees for four years after the licence fee was paid or became payable, whichever is the later date.

E. Statement of Compliance - Requirement to Prepare PIRMP

Have you prepared a Pollution Incident Response Management Plan (PIRMP) as required under section 153A of the Protection of the Environment Operations (POEO) Act 1997?	**Yes**
Is the PIRMP available at the premises?	**Yes**

Is the PIRMP available in a prominent position on a publicly accessible website?	**Yes**
Address of the web page where the PIRMP can be accessed ▼	
https://www.south32.net/what-we-do/places-we-work/illawarra-metallurgical-coal/documents	
Has the PIRMP been tested?	**Yes**
The PIRMP was last tested on	**3-7-2019**
Has the PIRMP been updated?	**Yes**
The PIRMP was last updated on	**5-7-2019**
Number of times the PIRMP was activated in this reporting period?	**0**
The PIRMP was activated on	**N/A**

F. Statement of Compliance - Requirement to Publish Pollution Monitoring Data

Are there any conditions attached to your licence that require pollution monitoring to be undertaken as required under section 66(6) of the Protection of the Environment Operations (POEO) Act 1997?	**Yes**

Do you operate a website?	**Yes**
Is the pollution monitoring data published on your website in accordance with the EPA's written requirements for publishing pollution monitoring data?	**Yes**
Address of the web page where the pollution monitoring data can be accessed ▼	
https://www.south32.net/what-we-do/places-we-work/illawarra-metallurgical-coal/documents	

G. Statement of Compliance - Environment Management System and Practices

Do you have an ISO 14001 certified Environmental Management System (EMS) OR any other system that EPA considers is equivalent to the accountability, procedures, documentation and record keeping requirements of an ISO 14001 certified EMS?	**Yes**

When was the last check (As per ISO 14001) of the EMS completed?	**3-6-2019**
Were there any non-conformances related to environmental issues identified in the last check of the EMS?	**Yes**
If there were non-conformances identified, were these non-conformances rectified?	**Yes**

H. Signature and Certification

This Annual Return may only be signed by person(s) with legal authority to sign it as set out in following categories: an Individual, a Company, a Public authority or a Local council.

It is an offence to supply any information in this form that is false or misleading in a material respect, or to certify a statement that is false or misleading in a material respect. There is a maximum penalty of $250,000 for a corporation and $120,000 for an individual.

I/We

- declare that the information in the Monitoring and Complaints Summary in Section B of this Annual Return application is correct and not false or misleading in a material respect, and
- certify that the information in the Statement and Compliance in sections A, C, D, E, F, G and H and any other pages attached to Section C is correct and not false or misleading in a material respect.

Signature	
Name	
Position	
Date	/ /
Declaration **I declare that the information in the Monitoring and Complaints Summary in section B of this Annual Return is correct and not false or misleading in a material respect, and** **I certify that the information in the Statement of Compliance in section A,C,D,E,F and G and any pages attached to Section C is correct and not false or misleading in a material respect.**	

Signature	
Name	
Position	
Date	/ /
Declaration **I declare that the information in the Monitoring and Complaints Summary in section B of this Annual Return is correct and not false or misleading in a material respect, and** **I certify that the information in the Statement of Compliance in section A,C,D,E,F and G and any pages attached to Section C is correct and not false or misleading in a material respect.**	

APPENDIX B: REHABILITATION SECURITY COST ESTIMATE - DEPARTMENT OF RESOURCES AND GEOSCIENCE ONLY

APPENDIX C: DENDROBIUM MINE CONSENT CONDITION COMPLIANCE

Dendrobium Mine Compliance Report

A report of compliance against the Development Consent 60-03-2001 (as modified)

1 July 2018 – 30 June 2019

CONDITION OF CONSENT	STATUS	COMMENTS
SCHEDULE 2: ADMINISTRATIVE CONDITIONS		
Obligation to Minimise Harm to the Environment		
1. The Applicant must implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.	Compliant	Implementation of and adherence to the Conditions of Consent will achieve this requirement.
Terms of Approval		
2. The Applicant must carry out the development generally in accordance with the: (a) Development Application (DA 60-03-2001), EIS and associated submissions to the Dendrobium Underground Coal Mine Project Commission of Inquiry, and in particular its: • Primary Submission (the Dendrobium Project, dated 30 July 2001); • Submission in Reply (the Dendrobium Project, undated); and • Environmental Effects of Subsidence Associated with the Dendrobium Project, prepared by National Environmental Consulting Services and dated August 2001; (b) Modification Application dated 12 February 2002 and supporting information dated 27 January 2002; (c) Modification Application and supporting information dated 24 May 2002 and additional supporting information dated 14 June 2002; (d) Modification Application and Statement of Environmental Effects for the Dendrobium Coal Sizer, prepared by Olsen Environmental Consulting and dated March 2005; (e) Application for Further Approval of West Cliff Emplacement Area Stage 3, Vol 2 (including Appendices), prepared by Cardno Forbes Rigby and dated July 2007, associated Response to Submissions dated 1 November 2007 and associated Statement of Commitments dated 28 November 2007 (see Appendix 3); (f) Modification Application – Modification of Area 3 Footprint and Review of Conditions of Consent dated 27 November 2007, EA and associated Statement of Commitments (see Appendix 4); (g) EA (MOD 7); and (h) EA (MOD 8)	Compliant	The listed documentation reflects changes to the development as a result of consultation with Authorities and the community. Management Plans and associated documentation reflect these changes and requirements.
2A. The Applicant must carry out the development in accordance with the conditions of this consent.	Not compliant	The Stones Road Maintenance Deed expired. It was reissued on 28 August 2019.
3. If there is any inconsistency between the above documents, the most recent document must prevail to the extent of the inconsistency. However, the conditions of this consent must prevail to the extent of any inconsistency.	Compliant	Document precedence is applied where required.

CONDITION OF CONSENT	STATUS	COMMENTS
4. The Applicant must comply with any reasonable and feasible requirement/s of the Secretary arising from the Department's assessment of: (a) any reports, strategies, plans, programs, reviews, audits or correspondence that are submitted in accordance with the conditions of this consent; (b) any reviews, reports or audits undertaken or commissioned by the Department regarding compliance with the conditions of this consent; and (c) the implementation of any actions or measures contained in these documents.	Compliant	Requirements have been complied with where reasonable and feasible.
Limits on Approval		
5. Mining operations may take place in the mining area until 31 December 2030. *Note: Under this consent, the Applicant is required to rehabilitate the site to the satisfaction of the Secretary and DRG. Consequently this consent will continue to apply in all other respects other than the right to conduct mining operations until the site has been rehabilitated to a satisfactory standard.*	Compliant	Recognised in Environmental Management Strategy.
6. The Applicant must not extract more than 5.2 million tonnes of ROM coal a year from the mining area.	Compliant	Less than 5.2 million tonnes are extracted per year. Mining plans and production forecasts are developed on this basis.
7. The Applicant must only transport coal from the surface facilities by rail.	Compliant	Coal extracted from Dendrobium Mine is only transported via the Kemira Valley rail line.
Staged Submission of Management Plans/Monitoring Programs		
8. With the approval of the Secretary, the Applicant may submit any management plan or monitoring program required by this consent on a progressive basis.	Compliant	Plans required under the consent are submitted as required.
9. The Applicant must ensure that monitoring programs, management plans and the Environmental Management Strategy, as in existence at the date of modification of consent in November 2008, continue to be implemented (to the satisfaction of the Secretary) until replaced by monitoring programs and management plans approved in accordance with the conditions of this consent.	Compliant	Environmental requirements under existing programs, plans and strategies continue to be implemented pending approval of updated documentation.
Structural Adequacy		
10. The Applicant must ensure that all new buildings and structures, and any alterations or additions to existing	Compliant	All work completed by licensed trades.

CONDITION OF CONSENT	STATUS	COMMENTS
buildings and structures, are constructed in accordance with the relevant requirements of the BCA. *Notes:* • *Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works.* • *Part 8 of the EP&A Regulation sets out the requirements for the certification of the development.*		
Demolition		
11. The Applicant must ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.	Compliant	Demolition work was undertaken at the Dendrobium Coal Preparation Pant during the reporting period in accordance with these requirements.
Operation of Plant and Equipment		
12. The Applicant must ensure that all plant and equipment used on site is: (a) maintained in a proper and efficient condition; and (b) operated in a proper and efficient manner.	Compliant	A maintenance management system is used to ensure that all plant and equipment used on site is maintained in a proper and efficient condition. Operators are trained and assessed as competent. The site entry process ensures that there is a maintenance strategy and operating procedure for equipment before going underground.
Community Enhancement		
13. The Applicant must contribute $0.03 per tonne of saleable coal production each financial year to fund the provision of significant present and future benefits to local communities directly affected by the development. These funds must be: (a) administered and expended in accordance with procedures which are to the satisfaction of WCC and the Secretary; (b) provided by 30 September each year over the life of the consent; (c) based on saleable coal production in the previous financial year; and (d) indexed in accordance with the CPI, with April 2005 used as the commencement date for indexation calculations. Any dispute over the operation of this fund must be referred to the Secretary for resolution.	Compliant	Payment was made for FY19 in accordance with requirements.

CONDITION OF CONSENT	STATUS	COMMENTS
Costs of Management Measures		
14. The Applicant must be responsible for the costs of all management measures (including measures to minimise, mitigate, offset or remediate impacts of the development which are not recoverable by a third party through the Coal Mine Subsidence Compensation Act 2017 or the Mining Act 1992) including but not limited to remediation of natural features, rehabilitation of ecological systems, the provision of supplementary waters and monitoring of the effectiveness of the works, as determined by the Secretary.	Compliant	Management measures will be undertaken as required and at the cost of Illawarra Coal where not recoverable by a third party.
Strategic Biodiversity Offsets		
15. If the Applicant is required to provide a biodiversity offset pursuant to this consent (including any biodiversity offset that is required under the conditions of a subordinate approval issued in accordance with this consent), the Secretary, in consultation with OEH, may 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. If the Secretary accepts such an offset under this condition, the Secretary must issue a written statement to the Applicant advising: (a) the details of the proposed offset land; (b) the offset requirements that are being met; (c) the conservation values that have been relied upon to meet the offsetting requirements; and (d) that in the opinion of the Secretary: (i) the land has offsetting values in addition to those that have been relied upon to meet the offsetting requirement in condition 15(b); or (ii) if the land has been subject to a previous statement from the Secretary under this condition, confirmation that the land continues to have conservation values in addition to those that have been relied upon to meet the previous offsetting requirement, or that there are no further conservation values available in respect of the land. If the Secretary has issued a statement under this condition, the Applicant can rely on that statement and the residual conservation values that the land subject to the statement may hold, to meet further offsetting requirement(s) that may be required under this consent or the project approval for the Bulli Seam Operations Project (08_0150). The Secretary's statement under this condition can be relied on a number of times in respect of the same land until all of the conservation values of the land the subject of the Secretary's statement have been relied upon to meet offsetting requirements under this consent or the approval for the Bulli Seam Operations Project (08_0150). The Applicant must make suitable arrangements to provide	Compliant	A biodiversity offset area has been established and approved by the Secretary.

CONDITION OF CONSENT	STATUS	COMMENTS
appropriate long-term security for the biodiversity offset area(s) accepted under this condition, within 2 years of the date of the Secretary's statement in respect of that land, unless otherwise agreed with the Secretary		
SCHEDULE 3: SPECIFIC ENVIRONMENTAL CONDITIONS – MINING AREA		
SUBSIDENCE *Note: These conditions should be read in conjunction with the Statement of Commitments.*		
Watercourse Impact Management		
1. The Applicant must ensure that, as a result of the development: (a) no rock fall occurs at Sandy Creek Waterfall or from its overhang; (b) the structural integrity of the waterfall, its overhang and its pool are not impacted; (c) cracking in Sandy Creek within 30 m of the waterfall is of negligible environmental and hydrological consequence; and (d) negligible diversion of water occurs from the lip of the waterfall to the satisfaction of the Secretary.	Compliant	A SMP for Area 3A was approved that meets these requirements.
2. The Applicant must ensure that underground mining operations do not cause subsidence impacts at Sandy Creek and Wongawilli Creek other than "minor impacts" (such as minor fracturing, gas release, iron staining and minor impacts on water flows, water levels and water quality) to the satisfaction of the Secretary. *Note: In this condition, "minor impacts" are those defined as minor triggers in Table 23.2 of the draft SMP submitted by the Applicant for Dendrobium Area 3A.*	Compliant	A SMP for Area 3A was approved that meets these requirements. The approved SMP for Area 3B also addresses potential impacts on Wongawilli Creek. Longwall panels are aligned, where possible, to minimise impacts to watercourses.
3. The Applicant must ensure the development does not result in reduction (other than negligible reduction) in the quality or quantity of surface water or groundwater inflows to Lake Cordeaux or Lake Avon or surface water inflow to the Cordeaux River at its confluence with Wongawilli Creek, to the satisfaction of the Secretary.	Compliant	Potential subsidence impacts are covered in the relevant SMP.
4. Prior to carrying out any underground mining operations that could cause subsidence in either Area 3A, Area 3B or Area 3C, the Applicant must prepare a Watercourse Impact Monitoring, Management and Contingency Plan to the satisfaction of the Secretary. Each such Plan must: (a) demonstrate how the subsidence impact limits in conditions 1 - 3 are to be met; (b) include a monitoring program and reporting mechanisms to enable close and ongoing review by the Department and DPI of the subsidence effects and impacts (individual and cumulative) on Wongawilli Creek, Sandy Creek and Sandy Creek Waterfall; (c) include a general monitoring and reporting program addressing	Compliant	The Watercourse Impact Monitoring, Management and Contingency Plan has been incorporated into the Area 3B SMP and is also available on the Dendrobium Mine website.

CONDITION OF CONSENT	STATUS	COMMENTS
surface water levels, water flows, water quality, surface slope and gradient, erodibility, aquatic flora and fauna (including Macquarie Perch, any other threatened aquatic species and their habitats) and ecosystem function; (d) include a management plan for avoiding, minimising, mitigating and remediating impacts on watercourses, which includes a tabular contingency plan (based on the Trigger Action Response Plan structure) focusing on measures for remediating both predicted and unpredicted impacts; (e) address third and higher order streams individually but address first and second order streams collectively; (f) be prepared in consultation with EPA, SCA and DPI; (g) incorporate means of updating the plan based on experience gained as mining progresses; (h) be approved prior to the carrying out of any underground mining operations that could cause subsidence impacts on watercourses in the relevant Area; and (i) be implemented to the satisfaction of the Secretary. *Notes:* • *Should review by the Department of reports by the Applicant under paragraph (b) indicate that subsidence impacts have exceeded or threaten to limits imposed in conditions 1-3, then under condition 4 of Schedule 2 the Secretary may instruct the Applicant to implement reasonable and feasible requirements, which may include to cease mining within the operative longwall, shorten the length of that longwall or shorten the length and/or width of future longwalls.* • *Requirements under paragraphs (a) and (b) in respect of Sandy Creek and Sandy Creek Waterfall relate only to the Watercourse Impact Monitoring, Management and Contingency Plan for Area 3A.*		
Swamp Impact Management		
5. The Applicant must ensure that subsidence does not cause erosion of the surface or changes in ecosystem functionality of Swamp 15a and that the structural integrity of its controlling rockbar is maintained or restored, to the satisfaction of the Secretary.	Compliant	Subsidence management measures for Swamp 15a are included in the SMP for Area 3A.
6. Prior to carrying out any underground mining operations that could cause subsidence in either Area 3A, Area 3B or Area 3C, the Applicant must prepare a Swamp Impact Monitoring, Management and Contingency Plan to the satisfaction of the Secretary. Each such Plan must: (a) demonstrate how the subsidence impact limits in condition 5 are to be met; (b) include a monitoring program and reporting mechanisms to enable close and ongoing review by the Department and DRG of the subsidence effects and impacts (individual and cumulative) of each Area 3A longwall on Swamp 15a; (c) include a general monitoring and reporting program addressing surface water levels, near surface groundwater levels, water quality, surface slope and gradient, erodibility, flora and ecosystem function; (d) include a management plan for avoiding, minimising, mitigating	Compliant	The Swamp Impact Monitoring, Management and Contingency Plan has been incorporated into the Area 3A and 3B SMPs. The Swamp Impact Monitoring, Management and Contingency Plan and the Watercourse Impact Monitoring, Management and Contingency Plan documents were revised to take into account the SMP Approval Conditions and

CONDITION OF CONSENT	STATUS	COMMENTS
and remediating impacts on swamps, which includes a tabular contingency plan (based on the Trigger Action Response Plan structure) focusing on measures for remediating both predicted and unpredicted impacts; (e) address headwater and valley infill swamps separately and address each swamp individually; (f) be prepared in consultation with OEH, Water NSW and DRG; (g) incorporate means of updating the plan based on experience gained as mining progresses; (h) be approved prior to the carrying out of any underground mining operations that could cause subsidence impacts on swamps in the relevant Area; and (i) be implemented to the satisfaction of the Secretary. *Notes:* • *Should review by the Department of reports by the Applicant under paragraph (b) indicate that subsidence impacts have exceeded or threaten to exceed limits imposed in condition 5, then under condition 4 of Schedule 2 the Secretary may instruct the Applicant to implement reasonable and feasible requirements, which may include to cease mining within the operative longwall, shorten the length of that longwall or shorten the length and/or width of future longwalls.* • *Requirements under paragraphs (a) and (b) relate only to the Swamp Impact Monitoring, Management and Contingency Plan for Area 3A.*		submissions from regulatory agencies.
Subsidence Management Plans		
7. Prior to carrying out any underground mining operations that could cause subsidence in either Area 3A, 3B or 3C, the Applicant must prepare a Subsidence Management Plan (SMP) to the satisfaction of the Secretary and the Secretary of DRG. Each such SMP must: (a) integrate ongoing management of Areas 1 and 2; (b) integrate the Watercourse and Swamp Impact Monitoring, Management and Contingency Plans required under conditions 4 and 6; (c) include monitoring of subsidence effects; (d) include a WaterNSW Assets Protection Plan; (e) include monitoring, management, and contingency plans for all other significant natural features and all significant man made features which may be impacted by subsidence, including: • landscape (including cliffs and steep slopes); • groundwater (see condition 13); • terrestrial flora and fauna and ecology (including all threatened species assessed as being likely to be significantly affected by the development and their habitats); • Aboriginal and other cultural heritage (see condition 12); and electrical, communications and other infrastructure; (f) be prepared in consultation with OEH, WaterNSW and DRG; (g) be approved prior to the carrying out of any underground mining operations that could cause subsidence in the relevant Area; and (h) be implemented to the satisfaction of the Secretary and the Secretary of DRG.	Compliant	SMPs that meet these requirements have been and will be submitted as required.

CONDITION OF CONSENT	STATUS	COMMENTS
Notes: • *The WaterNSW Assets Protection Plan required under this condition must also be prepared and implemented to the satisfaction of the WaterNSW.* • *The contingency plans required under paragraph (e) must address remediation (as appropriate) and be based on a TARP structure.*		
8. The SMPs prepared under condition 7 for Areas 3B and 3C must: (a) include a mine plan for the relevant Area; (b) include a detailed subsidence impact assessment, clearly setting out all predicted subsidence effects, subsidence impacts and environmental consequences; (c) include a minimum of 2 years of baseline data, collected at appropriate frequency and scale, for all significant natural features; (d) identify and assess the significance of all natural features located within 600 m of the edge of secondary extraction; (e) distinguish between, clearly describe and adequately quantify all subsidence effects, subsidence impacts and environmental consequences; (f) propose limits on subsidence impacts and environmental consequences to be applied within the relevant Area; (g) be otherwise prepared in accordance with any guidelines for SMPs developed by the Department and/or DRG; (h) be approved prior to the carrying out of any underground mining operations that could cause subsidence in the relevant Area; and (i) be implemented to the satisfaction of the Secretary and the Secretary of DRG. *Note: In approving an SMP, the Secretary may impose conditions containing subsidence impact limits (similar to conditions 1- 3 & 5), subsidence management mechanisms (similar to conditions 4 & 6) or other conditions.*	Compliant	The SMPs prepared are in line with this condition.
End of Panel Reporting		
9. Within 4 months of the completion of each longwall panel, or as otherwise permitted by the Secretary, the Applicant must: (a) prepare an end-of-panel report: • reporting all subsidence effects (both individual and cumulative) for the panel and comparing subsidence effects with predictions; • describing in detail all subsidence impacts (both individual and cumulative) for the panel; • discussing the environmental consequences for watercourses, swamps, water yield, water • quality, aquatic ecology, terrestrial ecology, groundwater, cliffs and steep slopes; and • comparing subsidence impacts and environmental consequences with predictions; and (b) submit the report to the Department, DPI, SCA, EPA, DWE and any other relevant agency to the satisfaction of the Secretary.	Compliant	End of Panel Reports for Longwalls 6, 7, 8, 9, 10, 11,12, 13 and 14 have been submitted in accordance with the timing of this condition.

CONDITION OF CONSENT	STATUS	COMMENTS
10. The Applicant must include a comprehensive summary, analysis and discussion of the results of monitoring of subsidence effects, subsidence impacts and environmental consequences in each Annual Review. *Note: Conditions 9 and 10 apply to Area 2, as well as to Areas 3A, 3B and 3C.*	Compliant	A summary of subsidence effects, impacts and environmental consequences is included in the Annual Review.
Subsidence Expert Assessments		
11. The Applicant must pay the reasonable costs of the Department in engaging independent experts to advise it when it assesses SMPs prepared under condition 7 for Areas 3B and 3C.	N/A	No such request has been received from the Department.
ABORIGINAL HERITAGE		
12. The SMPs prepared under condition 7 must include an Aboriginal Heritage Plan, which must include a: (a) description of known Aboriginal heritage sites; (b) protocol for the ongoing consultation and involvement of the Aboriginal community in the conservation and management of Aboriginal heritage; (c) description of the measures that would be implemented to protect Aboriginal sites generally, including measures that would be implemented to secure, analyse and record sites at risk of subsidence; (d) description of the measures that would be implemented to protect Aboriginal site 52-2-1646, including: • a full recording and assessment of the site's rock art; • a more detailed subsidence assessment for the site; • measures which seek to avoid any significant impact on the site and any necessary contingency plans to protect the site against collapse or substantial impact on its rock art; and (e) description of the measures that would be implemented if any new Aboriginal objects or skeletal remains are discovered during the development.	Compliant	The Aboriginal Heritage Plan has been incorporated into the Area 3A and 3B SMPs.
GROUNDWATER MONITORING PROGRAM		
13. The SMPs prepared under condition 7 must include a Groundwater Monitoring Program, which must include: (a) proposals to develop a detailed regional and local groundwater model, with special reference to flows to and from nearby water storages; (b) detailed baseline data to benchmark the natural variation in groundwater levels, yield and quality; (c) groundwater impact assessment criteria; (d) a program to monitor the impact of the development on: • groundwater levels, yield and quality (particularly any potential loss of flow to, or flow from, WaterNSW water storages); • coal seam aquifers and overlying aquifers; and	Compliant	The Groundwater Monitoring Program has been incorporated into the Area 3A and 3B SMPs. A Groundwater Monitoring and Modelling Plan is also in place.

CONDITION OF CONSENT	STATUS	COMMENTS
• groundwater springs and seeps; and (e) consideration of the requirements of the latest version (or subsequent replacement) of WaterNSW's *The Design of a Hydrological and Hydrogeological Monitoring Program to Access the Impacts of Longwall Mining in SCA Catchment*.		
ENVIRONMENTAL OFFSETS		
14. The Applicant must provide suitable offsets for loss of water quality or loss of water flows to WaterNSW storages, clearing and other ground disturbance (including cliff falls) caused by its mining operations and/or surface activities within the mining area, unless otherwise addressed by the conditions of this consent, to the satisfaction of the Secretary. These offsets must: (a) be submitted to the Secretary for approval by 30 April 2009; (b) be prepared in consultation with WaterNSW; (c) provide measures that result in a beneficial effect on water quality, water quantity, aquatic ecosystems and/or ecological integrity of WaterNSW's special areas or water catchments.	Compliant	This offset was accepted by WaterNSW on 10 February 2009.
SCHEDULE 4: SPECIFIC ENVIRONMENTAL CONDITIONS – SURFACE FACILITIES		
NOISE		
Noise Impact Assessment Criteria		
1. The Applicant must ensure that the noise generated at the surface facilities does not exceed the noise impact assessment criteria in Table 1 at any residence on privately-owned land, or on more than 25% of any privately-owned land. The applicable criteria for any residence not listed in Table 1 must be the criteria applying at the nearest listed residence.	Compliant (although exceedance of criteria recorded)	Noise monitoring is undertaken in accordance with the approved Noise Management Plan. A summary of results is provided via the Dendrobium Mine Annual Review. There were two exceedances of the LAeq, 15-minute noise criteria at monitoring location R6a during the reporting period[1].

[1] Note that for the determination of compliance, the NSW Industrial Noise Policy states in Section 11.1.3:

A development will be deemed to be in non-compliance with noise consent or licence condition of the monitored noise level is more than 2dB above the statutory noise limit specified in the consent or licence condition.

CONDITION OF CONSENT	STATUS	COMMENTS
Table 1: Noise impact assessment criteria dB(A) **Day** $L_{Aeq(15\ min)}$ / **Evening** $L_{Aeq(15\ min)}$ / **Night** $L_{Aeq(15\ min)}$ / **Night** $L_{A1(1\ min)}$ / **Residence** (as shown in the Noise Monitoring Program) 42 / 42 / 38 / 48 / R2 41 / 41 / 40 / 50 / R22 40 / 40 / 39 / 49 / R1, R9, R15a 40 / 40 / 37 / 47 / R3a, R5a, R6a&b 37 / 35 / 35 / 45 / R39a *Notes:* • *To determine compliance with the $L_{Aeq(15\ minute)}$ limit, noise from the development is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary. Where it can be demonstrated that direct measurement of noise from the development is impractical, DECC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.* • *To determine compliance with the $L_{A1(1\ minute)}$ limit, noise from the development is to be measured at 1 metre from the dwelling façade. Where it can be demonstrated that direct measurement of noise from the development is impractical, DECC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy).* • *The noise emission limits identified in the above table apply under meteorological conditions of:* o *wind speeds of up to 3 m/s at 10 metres above ground level ; or* o *up to 3°C/100 m temperature inversion strength for all receivers, plus a 2 m/s source-to-receiver component drainage flow wind at 10 metres above ground level for those receivers where applicable.* • *These limits do not apply if the Applicant has an agreement with the relevant owner/s of these residences to generate higher noise levels, and the Applicant has advised the Department and DECC in writing of the terms of this agreement.*		
Land Acquisition Criteria		
2. If the noise generated at the surface facilities exceeds the relevant criteria in Table 2 at any residence on privately-owned land or on more than 25% of any privately-owned land, the Applicant must, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 8 - 10 of schedule 4. The applicable criteria for any residence not listed in Table 2 must be the criteria applying at the nearest listed residence. *Table 2: Noise acquisition criteria dB(A)* **Day** $L_{Aeq(15\ min)}$ / **Evening** $L_{Aeq(15\ min)}$ / **Night** $L_{Aeq(15\ min)}$ / **Residence** (as shown in the Noise Monitoring Program) 47 / 47 / 43 / R2 46 / 46 / 45 / R22 45 / 45 / 44 / R1, R9, R15a 45 / 45 / 42 / R3a, R5a, R6a&b 42 / 40 / 40 / R39a *Note: Noise generated by the development is to be measured in accordance with the notes to Table 1.*	N/A	No written requests have been received from landholders for land acquisition due to noise in the reporting period.
Rail Haulage Impact Assessment Criteria		
3. The Applicant must ensure that noise generated by locomotives using the Kemira Valley rail line does not exceed the rail noise impact assessment criteria in Table 3.	Compliant	Rail noise monitoring is undertaken. A minor exceedance for the 315kHz frequency was recorded for idle operating conditions (as defined in the NSW EPA Industrial Noise Policy).[2] Overall noise (LA_{eq} and L_{eq}) were compliant.

[2] High frequency sounds are heavily attenuated by distance (Stokes Law). As the measurement distance was 15 metres away from the rail line and the train does not operate in idle within this distance of a receiver, the exceedance was considered to be non-material.

CONDITION OF CONSENT	STATUS	COMMENTS
Table 3: Rail noise impact assessment criteria **Operating Condition** / **Measurement Conditions** / **Criteria $L_{A1(1\ min)}$** Locomotive at idle, with compressor radiator fans and air conditioning operating at maximum load — Stationary 15 metre contour — 70 dB(A) All other throttle settings under self-load, with compressor radiator fans and air conditioning operating at maximum load — Stationary 15 metre contour — 87 dB(A); 95 dB(Lin) All service conditions — Up to 50 kilometres per hour, 15 metres from centreline of rail track — 87 dB(A); 95 dB(Lin); Must be non-tonal; Linear noise levels must not exceed A-weighted noise levels by more than 15 dB *Note: All measured noise levels must be assessed for tonality in accordance with the NSW Industrial Noise Policy, unless otherwise specified.*		
Continuous Improvement		
4. The Applicant must: (a) continue to investigate ways to reduce the noise generated by the development (including off-site road noise, noise and vibration impacts from the operation of the Kemira Valley rail line and maximum noise levels which may result in sleep disturbance); (b) continue to implement all reasonable and feasible best practice noise mitigation measures; and (c) report on these investigations and the implementation and effectiveness of these measures in the Annual Review, to the satisfaction of the Secretary.	Compliant	Details of noise investigations undertaken and mitigation improvements implemented are noted in the Annual Review.
5. The Applicant must use its best endeavours to minimise wheel squeal, brake squeal and locomotive wheel slippage arising from rail haulage on the Kemira Valley rail line.	Compliant	Details regarding noise investigations undertaken and mitigation improvements implemented are detailed in the Annual Review.
Additional Noise Mitigation Measures		
6. Upon receiving a written request from the owner of any residence where subsequent noise monitoring shows the noise generated by the development is 3 dB(A) greater than the noise impact assessment criteria in Table 1 (except where a negotiated noise agreement is in place) the Applicant must implement reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at any residence on the land in consultation with the landowner. If within 3 months of receiving this request from the landowner, the Applicant 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.	Compliant	A request for noise mitigation was received from a resident during the reporting period. Discussions are being held with the resident. Quarterly noise monitoring has not recorded any exceedances of the impact assessment criteria greater than 2 dB(A).
Monitoring		
7. The Applicant must prepare a Noise Monitoring Program for the development to the satisfaction of the Secretary. This program	Compliant	An approved Noise Management Plan is in

<table>
<tr><th>CONDITION OF CONSENT</th><th>STATUS</th><th>COMMENTS</th></tr>
<tr><td>must:
(a) be submitted to the Secretary for approval by 30 April 2009;
(b) be prepared in consultation with EPA;
(c) provide for quarterly attended noise monitoring and real-time noise monitoring (where appropriate)
to monitor the performance of the development, especially in residential areas close to the surface facilities; and
(d) include a noise monitoring protocol for evaluating compliance with the noise impact and land acquisition criteria in this consent.

The Applicant must implement the Noise Monitoring Program as approved by the Secretary.

Note: This program must expressly monitor the modifying factors referred to in the NSW Industrial Noise Policy (such as intermittency, tonality and low frequency)</td><td></td><td>place.</td></tr>
<tr><td colspan="3">BLASTING AND VIBRATION</td></tr>
<tr><td>8. The Applicant is not permitted to undertake blasting operations at the surface facilities except with the prior written approval of EPA and subject to any conditions which EPA may impose.</td><td>Compliant</td><td>No blasting activities were undertaken.</td></tr>
<tr><td colspan="3">AIR QUALITY</td></tr>
<tr><td colspan="3">Impact Assessment Criteria</td></tr>
<tr><td>9. The Applicant must ensure that dust generated by the development does not cause additional exceedances of the criteria listed in Tables 4 to 6 at any residence on privately-owned land, or on more than 25 percent of any privately-owned land.

Table 4: Long term impact assessment criteria for particulate matter
<table><tr><th>Pollutant</th><th>Averaging period</th><th>Criterion</th></tr><tr><td>Total suspended particulate (TSP) matter</td><td>Annual</td><td>90 µg/m^3</td></tr><tr><td>Particulate matter < 10 µm (PM_{10})</td><td>Annual</td><td>30 µg/m^3</td></tr></table>
Table 5: Short term impact assessment criteria for particulate matter
<table><tr><th>Pollutant</th><th>Averaging period</th><th>Criterion</th></tr><tr><td>Particulate matter < 10 µm (PM_{10})</td><td>24 hour</td><td>50 µg/m^3</td></tr></table>
Table 6: Long term impact assessment criteria for deposited dust
<table><tr><th>Pollutant</th><th>Averaging period</th><th>Maximum increase in deposited dust level</th><th>Maximum total deposited dust level</th></tr><tr><td>Deposited dust</td><td>Annual</td><td>2 g/m^2/month</td><td>4 g/m^2/month</td></tr></table>
Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 1991, AS/NZS 3580.10.1-2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.</td><td>Compliant</td><td>Air quality monitoring is undertaken in accordance with the Air Quality Management Plan. Results are provided in the Annual Review. No exceedances of criteria recorded for this reporting period.</td></tr>
<tr><td colspan="3">Monitoring</td></tr>
<tr><td>10. The Applicant must prepare and implement an Air Quality Monitoring Program for the surface facilities (excepting those surface facilities within the mining area) to the satisfaction of the Secretary. This program must:
(a) be submitted to the Secretary for approval by 30 April 2009;
(a) be prepared in consultation with EPA;
(b) use a combination of high volume samplers and dust deposition gauges to monitor the performance</td><td>Compliant</td><td>An approved Air Quality Management Plan (Monitoring Program) is in place.</td></tr>
</table>

CONDITION OF CONSENT	STATUS	COMMENTS
of the development; and (c) include an air quality monitoring protocol for evaluating compliance with the air quality impact assessment criteria in this consent.		
METEOROLOGICAL MONITORING		
11. During the development, the Applicant must ensure that it has a suitable meteorological station in the vicinity of the site that is generally in accordance with the requirements in the guideline *Approved Methods for Sampling of Air Pollutants in New South Wales*.	Compliant	A meteorological station is situated at the Kemira Valley Coal Loading Facility, Dendrobium Area 3B and Ventilation Shaft 2/3 site.
WATER MANAGEMENT		
Discharges		
12. The Applicant must ensure all surface water discharges from the surface facilities: (a) meet the relevant ANZECC water quality objectives for the protection of aquatic ecosystems and water quality of existing receiving waters; and (b) comply with the discharge limits (both volume and quality) set for the development in any EPL.	Compliant	Water quality monitoring is undertaken as per the Water Management Plan. Water quality was within EPL limits during the reporting period.
Water Management Plan		
13. The Applicant must prepare a Water Management Plan for the surface facilities to the satisfaction of the Secretary. This plan must: (a) be submitted to the Secretary for approval by 30 April 2009; (b) be prepared in consultation with EPA, WaterNSW and DoI by suitably qualified expert/s whose appointment/s have been approved by the Secretary; and (c) include a: • Site Water Balance; • Erosion and Sediment Control Plan; • Surface Water Monitoring Program; and • Surface and Ground Water Response Plan. The Applicant must implement the Water Management Plan as approved by the Secretary.	Compliant	An approved Water Management Plan is in place.
Site Water Balance		
14. The Site Water Balance must: (a) include details of: • sources and security of water supply; • water use on site; • water intercepted by mining operations; • water management on site; • off-site water transfers and water stored or disposed of underground;	Compliant	The Site Water Balance has been incorporated in the Water Management Plan to meet these requirements.

CONDITION OF CONSENT	STATUS	COMMENTS
• reporting procedures; and (b) describe measures to minimise water use by the development.		
Erosion and Sediment Control		
15. The Erosion and Sediment Control Plan must: (a) be consistent with the requirements of the *Managing Urban Stormwater: Soils and Construction Manual* (Landcom 2004, or its latest version); (b) identify activities that could cause soil erosion and generate sediment; (c) describe measures to minimise soil erosion and the potential for transport of sediment to downstream waters; (d) describe the location, function, and capacity of erosion and sediment control structures; and (e) describe what measures would be implemented to monitor and maintain the structures over time.	Compliant	The Erosion and Sediment Control Plan has been incorporated in the Water Management Plan (refer to Element II) to meet these requirements.
Surface Water Monitoring Program		
16. The Surface Water Monitoring Plan must include: (a) baseline data on surface water flows and quality in streams and other waterbodies that have been or could be affected by the surface facilities; (b) surface water quality and stream health assessment criteria, including trigger levels for investigating any potentially adverse surface water impacts; (c) a program to monitor the impact of the surface facilities on surface water flows and quality, stream health and channel stability; and (d) procedures for reporting the results of this monitoring.	Compliant	The Surface Water Monitoring Plan has been incorporated in the Water Management Plan to meet these requirements. A summary of the results from the monitoring program is provided in the Dendrobium Mine Annual Review.
Surface and Ground Water Response Plan		
17. The Surface and Ground Water Response Plan must describe what measures and/or procedures would be implemented to: (a) respond to any exceedances of the surface water, stream health, and groundwater assessment criteria; and (b) mitigate and/or offset any adverse impacts on groundwater dependent ecosystems, aquatic ecosystems or riparian vegetation.	Compliant	The Surface and Ground Water Response Plan has been incorporated in the Water Management Plan to meet these requirements.
LANDSCAPE MANAGEMENT		
Rehabilitation		
18. The Applicant must rehabilitate the surface facilities sites to the satisfaction of DRG. For rehabilitation works within the Metropolitan Special Area, the Applicant must also ensure that these works are carried out to the satisfaction of WaterNSW.	Compliant	A Conceptual Site Closure Plan has been developed. Closure and/or rehabilitation activities, when undertaken, will meet the requirements of the relevant regulatory agencies. Rehabilitation

CONDITION OF CONSENT	STATUS	COMMENTS
		undertaken during each financial year is reported annually in the Annual Review.
Landscape Management Plan		
19. The Applicant must prepare and implement a Landscape Management Plan for the surface facilities to the satisfaction of the Secretary and the Secretary of DRG. This plan must: (a) be submitted for approval by 30 April 2009; (b) be prepared by suitably qualified expert/s whose appointment/s have been endorsed by the Secretary; (c) be prepared in consultation with OEH and WaterNSW; and (d) include a: • Rehabilitation Management Plan; and • Mine Closure Plan. The Applicant must implement the Landscape Management Plan as approved by the Secretary. *Note: The Mine Closure Plan may be submitted at a date agreed by the Secretary, provided that this date is at least 2 years prior to the planned cessation of mining at the site.*	Compliant	An approved Landscape Management Plan is in place.
Rehabilitation Management Plan		
20. The Rehabilitation Management Plan must include: (a) the rehabilitation objectives for the surface facilities sites; (b) a general description of the short, medium and long term measures that would be implemented to rehabilitate these sites; (c) performance and completion criteria for the rehabilitation of these sites; (d) a description of how the performance of the rehabilitation works would be monitored over time to achieve the stated objectives and against the relevant performance and completion criteria; (e) any measures necessary to ensure that abandoned mine workings do not impact on stored waters or dams; and (f) details of who is responsible for monitoring, reviewing and implementing the plan.	Compliant	The Rehabilitation Management Plan has been incorporated in the Landscape Management Plan.
Mine Closure Plan		
21. The Mine Closure Plan must: (a) be prepared in consultation with the affected councils and CCC; (b) define the objectives and criteria for mine closure; (c) investigate options for the future use of the surface facilities sites; (d) include the proposed management and use of any heritage-listed buildings; (e) investigate ways to minimise the adverse socio-economic effects associated with mine closure, including reduction in local	Compliant	A summary of the Conceptual Mine Closure Plan is provided in the Landscape Management Plan. A Conceptual Site Closure Plan (as a separate document) has been developed that

CONDITION OF CONSENT	STATUS	COMMENTS
and regional employment; (f) describe the measures that would be implemented to minimise or manage the on-going environmental effects of the development; and (g) describe how the performance of these measures would be monitored over time.		generally meets these requirements and all requirements will be met closer to mine closure. Site Closure is not planned within the next two years.
Bushfire Management Plan		
22. The Applicant must prepare and implement a Bushfire Management Plan for the site, with particular reference to the mining area, in consultation with WaterNSW and to the satisfaction of the Rural Fire Service.	Compliant	An approved Bushfire Management Plan is in place.
Photographic Archival Recording		
22A. The Applicant must undertake photographic archival recording of significant built and landscape elements affected by Modification 8 prior to the commencement, during the works and after the completion of works, in accordance with the NSW Heritage Division publications 'How to prepare archival records of heritage items and Photographic Recording of Heritage Items using Film or Digital Capture'. A copy of these archival recordings must be provided to the Heritage Council of NSW and WCC.	Compliant	Archival recording has been undertaken and is documented in the 33kv Substation Dendrobium Colliery report dated June 2018.
Unexpected Historical Archaeological Relics		
22B. In the event that unexpected archaeological artefacts are uncovered during ground disturbing works, the Applicant must ensure work ceases in the subject area and a suitably trained archaeologist should attend the site to inspect the find. Should archaeological material be identified as having heritage significance, the Applicant must obtain any necessary further approvals before works can proceed.	N/A	The works were not commenced in the reporting period.
TRANSPORT		
Rail Transport of Coal		
23. The Applicant must ensure that trains do not travel on the Kemira Valley rail line: (a) between 12 midnight and 6 am, until 29 April 2010; and (b) between 11 pm and 6 am, from 30 April 2010 unless written approval is obtained from EPA for emergency use of the rail line.	Compliant	The rail curfew is adhered to. No emergency use required during the reporting period.
24. The Applicant must record the: (a) date and time of each train movement on the Kemira Valley rail line; and (b) amount of coal transported from the KVCLF each year and include a comprehensive summary and discussion of the results of this monitoring in each Annual Review.	Compliant	This data is recorded via the Logistics KPI Report and also on Pacific National Run Sheets. The data is summarised and reported in the Annual Review.

CONDITION OF CONSENT	STATUS	COMMENTS
Road Transport		
25. The Applicant must prepare a Traffic Management Plan for the development to the satisfaction of the Secretary. This plan must: (a) be submitted to the Secretary for approval by 30 April 2009; (b) be prepared in consultation with the WCC, Mt Kembla Primary School and the CCC; (c) include traffic control measures for truck movements through residential areas, including Stones Road and its intersection with Cordeaux Road; (d) provide that mine shift changeover times and deliveries by heavy vehicle to the pit top facilities and KVCLF do not conflict with pick-up and drop-off times for Mt Kembla Primary School students; (e) provide heavy vehicle speed limits; (f) include a Driver's Code of Conduct to be applied to the applicant's employees and contractors working at the development and measures for the enforcement of this code; and (g) include procedures for regular monitoring of compliance with this plan. The Applicant must implement the Traffic Management Plan as approved by the Secretary.	Compliant	An approved Traffic Management Plan is in place
Road Maintenance		
26. The Applicant must enter into an agreement with WaterNSW, to the satisfaction of the Secretary, to share the reasonable costs of maintenance of all access roads, bridges and creek crossings located on land controlled by WaterNSW and used by the Applicant.	Compliant	An agreement has been developed with WaterNSW.
27. The Applicant must establish an agreement with WCC to share the reasonable costs of maintenance of Stones Road for the life of the development. Prior to decommissioning of the mine, Stones Road must be inspected, to the satisfaction of WCC, and the road restored by the Applicant to a standard not less than its condition prior to the development's approval. If roadworks are not carried out by the Applicant within one month of being informed by WCC that these works are required under the maintenance agreement, WCC must be entitled to carry out such maintenance work at the Applicant's cost. Any dispute over implementation of this condition is to be referred to the Secretary for resolution.	Non-Compliant	A Maintenance Agreement for Stones Road was established however the Deed lapsed on 18 May 2018. The deed was renegotiated and signed on 28 August 2019.
VISUAL		
Visual Amenity		
28. The Applicant must minimise the visual impacts of the surface facilities to the satisfaction of the Secretary.	Compliant	A vegetative screen is maintained around the operation. There have been no complaints in the reporting period

CONDITION OF CONSENT	STATUS	COMMENTS
		received regarding visual amenity.
Lighting Emissions		
29. The Applicant must: (a) ensure that all external lighting associated with the surface facilities complies with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*; (b) take all practicable measures to mitigate off-site lighting impacts from the surface facilities; (c) ensure that light emitted from headlights of locomotives operating on the Kemira Valley rail line are screened from residences; and (d) report on the effectiveness of lighting emission controls in the Annual Review to the satisfaction of the Secretary.	Compliant	An approved Lighting Management Plan is in place. Lighting associated with the sediment pond car park is being reviewed to minimise perceived visual impacts.
WASTE		
30. The Applicant must: (a) monitor the amount of waste generated by the development; (b) investigate ways to reuse, recycle, or minimise this waste; (c) implement reasonable and feasible measures to minimise this waste; and (d) report on waste management and minimisation in the Annual Review to the satisfaction of the Secretary.	Compliant	A summary of waste management activities associated with Dendrobium Mine is reported via the Annual Review.
SCHEDULE 5: SPECIFIC ENVIRONMENTAL CONDITIONS - OTHER SITE COMPONENTS		
COAL WASHERY		
Hot Gas Exhaust Stack Discharges		
1. The Applicant must: (a) ensure that the concentration of pollutants discharged from the coal dryer hot gas exhaust complies with discharge limits set for the development in any EPL; (b) regularly monitor the concentration of pollutants discharged from the coal dryer hot gas exhaust; and (c) report on waste management and minimisation in the Annual Review to the satisfaction of the Secretary.	N/A	The Coal Dryer is not in operation.
Fuel Source		
2. The Applicant must ensure the coal drying plant only uses blast furnace offgas or natural gas as fuel for the drier.	N/A	The Coal Dryer is not in operation.
WEST CLIFF COAL WASH EMPLACEMENT		
Coal Washery Reject		
3. The Applicant must: (a) monitor the amount of coal washery reject emplaced in the West Cliff Coal Wash Emplacement; (b) investigate ways to reduce emplacement of coal washery	N/A	Project Approval 08_0150 for the Bulli Seam Operations Project has been

CONDITION OF CONSENT	STATUS	COMMENTS
reject at West Cliff, including beneficial use or improved disposal options; and (c) report on these matters in the West Cliff AEMR to the satisfaction of the Secretary.		granted and as such takes precedence. Refer to Schedule 5: Condition 8. *These requirements are reported in the BSO Annual Review.*
Pollution Reduction Program		
4. The Applicant must develop with EPA a new Pollution Reduction Program (PRP) to be incorporated into the West Cliff Colliery's EPL. Subject to the satisfaction of EPA, the PRP must: (a) include investigation, trial and implementation of appropriate strategies, technologies or works to achieve agreed water quality discharge criteria for licensed discharges from the West Cliff Colliery site with particular reference to salinity; and (b) cover a period of not less than five years.	N/A	Project Approval 08_0150 has been granted and as such takes precedence. Refer to Schedule 5: Condition 8 *An Environment Improvement Program to meet agreed water quality criteria has been developed and has been incorporated into EPL 2504.*
Water Quality Monitoring Program		
5. The Applicant must review its water quality monitoring program for the West Cliff Mine in consultation with EPA and DWE and to the satisfaction of the Secretary.	N/A	Project Approval 08_0150 has been granted and as such takes precedence. Refer to Schedule 5: Condition 8. *A Surface Water Management Plan is in place for the Bulli Seam Operations.*
Brennans Creek Diversion Bypass Rehabilitation Plan		
6. The Applicant must, by 30 June 2009, develop a Brennans Creek Diversion Bypass Rehabilitation Plan in consultation with OEH, DoI and DRG and to the satisfaction of the Secretary.	Compliant	Project Approval 08_0150 has been granted and as such takes precedence. Refer to Schedule 5: Condition 8. *Brennans Creek Diversion Bypass Rehabilitation Plan was submitted to DoP in December 2008. Plan was approved on 9 September 2009.*

CONDITION OF CONSENT	STATUS	COMMENTS
General Management of the Emplacement		
7. Subject to condition 2 of schedule 2 and conditions 3- 6 above, the Applicant must monitor and manage the West Cliff Coal Wash Emplacement as part of the Environmental Management Plan for the West Cliff Mine. Monitoring and management of the Emplacement must be reported within the West Cliff AEMR, rather than the Annual Review for this development.	Compliant	Project Approval 08_0150 has been granted and as such takes precedence. Refer to Schedule 5: Condition 8. *Emplacement operations are managed in accordance with the West Cliff Coal Wash Emplacement Area Management Plan. Details of the emplacement operations, including the rehabilitation aspects, are included in the BSO Annual Review.*
8. All references in this consent (including conditions 3 – 7 of this schedule and Appendix 3) that have direct application to the West Cliff Coal Wash Emplacement must cease to have force and effect subsequent to the grant of any project approval under Part 3A of the Environmental Planning & Assessment Act 1979 which includes the West Cliff Colliery and the West Cliff Coal Wash Emplacement Area.	Compliant	Project Approval 08_0150 has been granted.
SCHEDULE 6: SPECIFIC ENVIRONMENTAL CONDITIONS – EXTENDED SITE		
GREENHOUSE GASES & ENERGY EFFICIENCY		
1. The Applicant must prepare a Greenhouse and Energy Efficiency Plan for the development. This plan must: (a) be prepared in consultation with EPA and generally in accordance with the Guidelines for Energy Savings Action Plans (DEUS 2005, or its latest version); (b) be submitted to the Secretary by 30 April 2009 for approval; (c) include a program to monitor greenhouse gas emissions and energy use generated by the development; (d) include a framework for investigating and implementing measures to reduce greenhouse gas emissions and energy use at the development; (e) include a research program to inform the continuous improvement of the greenhouse gas minimisation measures at the development; (f) describe how the performance of these measures would be monitored over time; and (g) report on the development's greenhouse gas emissions and minimisation measures in the AEMR to the satisfaction of the Secretary. *Note: The Applicant may consider the Dendrobium Mine's greenhouse gas minimisation measures within its overall*	Compliant	The following documents were originally submitted to the DoP by 30 April 2009 to meet these requirements and approved in December 2009: • Illawarra Coal Greenhouse Gas and Energy Management Plan • Dendrobium Mine GHG and Energy Efficiency Plan • Dendrobium Coal Preparation Plant GHG and Energy Efficiency Plan • West Cliff Coal Wash Emplacement

CONDITION OF CONSENT	STATUS	COMMENTS
greenhouse gas minimisation measures across its Southern Coalfield mines and related operations. The Applicant must implement the Greenhouse and Energy Efficiency Plan as approved by the Secretary.		GHG and Energy Efficiency Plan
2. The Applicant must implement all reasonable and feasible measures to minimise the greenhouse gas emissions from the development to the satisfaction of the Secretary.	Compliant	Measures being undertaken are reported in the Annual Review.
SCHEDULE 7: ADDITIONAL PROCEDURES FOR AIR QUALITY AND NOISE MANAGEMENT		
NOTIFICATION OF LANDOWNERS		
1. If the results of monitoring required in Schedule 4 identify that the impacts generated by the development are greater than the relevant impact assessment criteria in Schedule 4, except where this is predicted in the documents listed in condition 2 of schedule 2 or where a negotiated agreement has been entered into in relation to that impact, then the Applicant must notify the Secretary and the affected landowners and/or existing or future tenants (including tenants of mine-owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the development is complying with the criteria in Schedule 4.	Compliant	Results are reported in the Annual Review which is publicly available on the web site. Monitoring results are provided on the South32 website. Exceedances of noise impact assessment criteria recorded during the reporting period have been reported to an adjacent landowner. It is noted that there was no non-compliance recorded.
INDEPENDENT REVIEW		
2. If a landowner considers the development to be exceeding the impact assessment criteria in schedule 4, except where this is predicted in the EA, then he/she may ask the Secretary in writing for an independent review of the impacts of the development on his/her land. If the Secretary is satisfied that an independent review is warranted, the Applicant must within 2 months of the Secretary's decision: (a) consult with the landowner to determine his/her concerns; (b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to conduct monitoring on the land, to: • determine whether the development is complying with the relevant impact assessment criteria in schedule 4; and • identify the source(s) and scale of any impact on the land, and the development's contribution to this impact; and (c) give the Secretary and landowner a copy of the independent review.	Compliant	South32 Illawarra Metallurgical Coal (S32IMC) have been advised that a request for an independent review was submitted to the Department of Planning, Industry and Environment during the reporting period. It is understood that the request is still being considered by the Department and no formal correspondence has been received by S32IMC.

CONDITION OF CONSENT	STATUS	COMMENTS
3. If the independent review determines that the development is complying with the relevant impact assessment criteria in schedule 4, then the Applicant may discontinue the independent review with the approval of the Secretary. If the landowner disputes the results of the independent review then either the Applicant or the landowner may refer the matter to the Secretary for resolution. Where matters referred to the Secretary under this condition cannot be resolved by the Director- General within 28 days, the Secretary must refer the matter to an Independent Dispute Resolution Process.	N/A	No independent review has been undertaken.
4. If the independent review determines that the development is not complying with the relevant impact assessment criteria in Schedule 4, and that the development is primarily responsible for this non compliance, then the Applicant must: (a) take all reasonable and feasible measures, in consultation with the landowner, to ensure that the development complies with the relevant criteria and conduct further monitoring to determine whether these measures ensure compliance; or (b) secure a written agreement with the landowner to allow exceedances of the relevant criteria; or (c) offer to acquire all or part of the landowner's land in accordance with the procedures in conditions 6-8 below to the satisfaction of the Secretary.	N/A	No independent review has been undertaken.
5. If further monitoring under condition 4(a) determines that the development is complying with the relevant impact assessment criteria, then the Applicant may discontinue the independent review with the approval of the Secretary. If further monitoring under condition 4(a) determines that measures implemented under that condition have not achieved compliance with the impact assessment criteria in schedule 4, and the Applicant cannot secure a written agreement with the landowner under condition 4(b) to allow these exceedances, then the Applicant must, upon receiving a written request from the landowner, acquire all or part of the landowner's land in accordance with the procedures in conditions 6-8 below.	N/A	No independent review has been undertaken.
LAND ACQUISITION		
6. Within 3 months of receiving a written request from a landowner with acquisition rights, the Applicant must make a binding written offer to the landowner based on: (a) the current market value of the landowner's interest in the property at the date of this written request, as if the property was unaffected by the development the subject of the development application, having regard to the: • existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and • presence of improvements on the property and/or any approved building or structure which has been physically	N/A	No written requests have been received by landowners for acquisition.

CONDITION OF CONSENT	STATUS	COMMENTS
commenced at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of the 'additional noise mitigation measures' in condition 6 of schedule 4; (b) the reasonable costs associated with: • relocating within the local government areas of the affected Councils, or to any other local government area determined by the Secretary; • obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is required; and (c) reasonable compensation for any disturbance caused by the land acquisition process. If, within 28 days of the Applicant making this offer, the Applicant and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired, then either party may refer the matter to the Secretary for resolution. Upon receiving such a referral, the Secretary must request the President of the NSW Division of the Australian Property Institute (the API) to appoint a qualified independent valuer to: • consider submissions from both parties; • establish a fair market valuation for the land and determine reasonable costs and compensation for the acquisition, in accordance with paragraphs (a)-(c) above and any guidance or guidelines that the Secretary may prepare relating to this condition; and • propose any appropriate fair and reasonable terms of acquisition. The appointed valuer is to provide a full report and explanation of their valuation, determinations and proposed terms of acquisition to the Secretary, the Applicant and the landowner. The Secretary must consider the report and decide whether the valuation, determinations and any proposed terms of acquisition are fair and reasonable and advise the parties accordingly. Within 14 days of receiving the Secretary's decision that the independent valuer's report is fair and reasonable, the Applicant must make a written offer to purchase the land at a price and according to terms not less than set out in the independent valuer's report. If the Secretary is of the opinion that the valuation and/or determination is not fair and/or reasonable, they must give notice to the parties that a further independent valuation and determination will be undertaken in accordance with this condition and duly request a further appointment by the API. If the landowner refuses to accept within 6 months a written offer duly made by the Applicant under this condition, then the Applicant's obligations to acquire the land must cease, unless otherwise agreed by the Secretary.		
7. The Applicant must bear the full costs of any independent valuer's valuation, determination and report.	N/A	No written requests have been received by landowners for acquisition.

CONDITION OF CONSENT	STATUS	COMMENTS
8. If the Applicant and landowner agree that only part of the land must be acquired, then the Applicant must pay all reasonable costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of the plan at the Office of the Registrar-General.	N/A	No written requests have been received by landowners for acquisition.
SCHEDULE 8: ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING AND REPORTING		
ENVIRONMENTAL MANAGEMENT STRATEGY		
1. The Applicant must prepare and implement an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must be submitted to the Secretary for approval by 30 April 2009, and: (a) provide the strategic framework for environmental management of the development; (b) identify the statutory requirements that apply to the development; (c) describe in general how the environmental performance of the development would be monitored and managed for the: • mining area; • surface facilities; • other site components; and • extended site; (d) describe the procedures that would be implemented to: • keep the local community and relevant agencies informed about the operation and environmental performance of the development; • receive, handle, respond to, and record complaints; • resolve any disputes that may arise during the course of the development; • respond to any non-compliance; • manage cumulative impacts; and • respond to emergencies; and (e) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development; and (f) include: • references to any strategies, plans and programs approved under the conditions of this consent; and • a clear plan depicting all the monitoring to be carried out under the conditions of this consent. The Environmental Management Strategy approved by the Secretary must be implemented.	Compliant	An approved Environmental Management Strategy is in place.
MANAGEMENT PLAN REQUIREMENTS		
2. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:	Compliant	Management Plans were submitted to the

CONDITION OF CONSENT	STATUS	COMMENTS
(a) a summary of relevant background or baseline data; (b) details of: (i) the relevant statutory requirements (including any relevant approval, licence or lease conditions); (ii) any relevant limits or performance measures and criteria; and (iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; (c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria; (d) a program to monitor and report on the: (i) impacts and environmental performance of the development; and (ii) effectiveness of the management measures set out pursuant to condition 2(c); (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (f) a program to investigate and implement ways to improve the environmental performance of the development over time; (g) a protocol for managing and reporting any: (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria); (ii) complaint; (iii) failure to comply with statutory requirements; and (h) a protocol for periodic review of the plan. Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.		Department of Planning by 30 April 2009 to meet these requirements. The Environmental Monitoring Program was approved in December 2009. Management plans were again submitted and approved during FY19.
2A. Within three months of the: (a) submission of an incident report under condition 4 of Schedule 8; (b) submission of an Annual Review under condition 5 of Schedule 8; (c) submission of an Independent Environmental Audit under condition 6 of Schedule 8; or (d) approval of any modification of the conditions of this consent, the suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant. If necessary, to either improve the environmental performance of the development or cater for a modification, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Secretary and submitted to the Secretary for approval within six weeks of the review. *Note: This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.*	Compliant	Management Plans have been reviewed as required. Revised Management Plans were submitted to the Department on 17 July 2018 and resubmitted on 30 August 2018. All plans, with the exception of the Water Management Plan, were approved on 31 August 2018. The Water Management Plan was resubmitted on 3 September 2018 and approved on 3 September 2018.

CONDITION OF CONSENT	STATUS	COMMENTS
REPORTING		
Incident Reporting		
3. Within 24 hours of detecting the occurrence of an incident that causes (or may cause) material harm to the environment, the Applicant must notify the Department and other relevant agencies of the incident.	Compliant	No incidents causing or with the potential to cause material environmental harm have occurred during the reporting period and therefore no incident reports as required by this condition have been submitted to the Department.
4. Within 7 days of notifying the Department and other relevant agencies of such an incident, the Applicant must provide the Department and these agencies with a written report that: (a) describes the date, time, and nature of the incident; (b) identifies the cause (or likely cause) of the incident; (c) describes what action has been taken to date; and (d) describes the proposed measures to address the incident.	Compliant	No written reports were provided as no incidents causing or with the potential to cause material environmental harm have occurred during the reporting period.
Annual Review		
5. By the end of September each year (or other such timing as may be agreed by the Secretary), and for at least 3 years following the cessation of mining at the development, the Applicant must submit an Annual Review to the Secretary, CCC and all relevant agencies reviewing the environmental performance of the development to the satisfaction of the Secretary. This report must relate to the previous financial year and: (a) identify the standards and performance measures that apply to the development; (b) describe the development (including any rehabilitation) that was carried out in the previous financial year; (c) describe the development (including any rehabilitation) that is proposed to be carried out over the current financial year; (d) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years; (e) include a summary of the monitoring results for the development during the past year; (f) a comprehensive review of the monitoring results and complaints records of the development over the previous financial year, including a comparison of these results against the: (i) relevant statutory requirements, limits or performance measures/criteria; (ii) requirements of any plan or program required under this consent; (iii) monitoring results of previous years; and (iv) relevant predictions in the documents listed in condition 2 of Schedule 2. (g) identify any non-compliance or incident which occurred in the	Compliant	The Annual Review is submitted to the relevant stakeholders annually as per the requirements. The Annual Review is made available on the South32 website

CONDITION OF CONSENT	STATUS	COMMENTS
previous financial year, and describe what actions were (or are being) taken to rectify the non-compliance and avoid reoccurrence; (h) evaluate and report on: (i) the effectiveness of the noise and air quality management systems; and (ii) compliance with the performance measures, criteria and operating conditions in this consent; (i) identify any trends in the monitoring data over the life of the development; (j) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and (k) describe what measures will be implemented over the next financial year to improve the environmental performance of the development. Copies of the Annual Review must be submitted to the affected Councils and made available to the CCC and any interested person upon request.		
6. By 31 December 2011, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. This audit must: (a) be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary; (b) include consultation with the relevant agencies and the CCC; (c) assess the environmental performance of the development and assess whether it is complying with the relevant requirements in this consent and any relevant EPL or mining lease (including any strategy, plan or program required under these approvals); (d) review the adequacy of strategies, plans or programs required under these approvals; (e) recommend measures or actions to improve the environmental performance of the development, and/or any strategy, plan or program required under these approvals; and (f) be conducted and reported to the satisfaction of the Secretary. *Note: This audit team must be led by a suitably qualified auditor and include experts in the fields of a) mine subsidence impacts and remediation and b) stream hydrology and water quality.*	Compliant	The last Independent Environmental Audit was undertaken by ERM Pty Ltd in FY18.
7. Within three months of commencing an Independent Environmental Audit, or within another timeframe agreed by the Secretary, the Applicant must submit a copy of the audit report to the Secretary, and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations. The recommendations must be implemented to the satisfaction of the Secretary. Note: The audit team must be led by a suitably qualified auditor	N/A	An administrative non-compliance was reported in FY18 (does not apply in this reporting period). The IEA report was not submitted within the 6 weeks of completing the audit. The Department was informed of the delay of delivery of the

CONDITION OF CONSENT	STATUS	COMMENTS
and include experts in any fields specified by the Secretary.		report and considered it to be an administrative non-compliance and no further actions were undertaken. This was reported in the FY18 Annual Review.
Monitoring and Environmental Audits		
8. Any condition of this consent that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of Part 9 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification, compliance report and independent audit. Note: For the purposes of this condition, as set out in the EP&A Act, "monitoring" is monitoring of the development to provide data on compliance with the consent or on the environmental impact of the development, and an "environmental audit" is a periodic or particular documented evaluation of the development to provide information on compliance with the consent or the environmental management or impact of the development.	Compliant	Strategies, Plans and Programs will be revised where required and resubmitted.
COMMUNITY CONSULTATIVE COMMITTEE		
9. The Applicant must maintain a Community Consultative Committee (CCC) for the development to the satisfaction of the Secretary. This CCC must be operated in general accordance with the Department's Community Consultative Committee Guidelines: State Significant Projects (2016) to the satisfaction of the Secretary. *Notes:* *• The CCC is an advisory committee only.* *• In accordance with the guidelines, the committee should comprise an independent chair and appropriate representation from the Applicant, Council and the local community.*	Compliant	The Dendrobium Community Consultative Committee is in place. Meetings are held every two months.
10. If required by the CCC, the Applicant must establish and maintain a trust fund, or other funding arrangement that may be agreed between the Applicant and the CCC. This fund must be: (a) managed by the Chair of the CCC to facilitate the functioning of the CCC; (b) used only if required for the engagement of consultants to interpret technical information and the like; (c) provided with $8,000 per annum (indexed according to the CPI) by the Applicant for the duration of mining operations and other activities under the consent, or as otherwise directed by the Secretary; (d) managed so that any monies unspent during each year are returned to the Applicant; (e) managed so that the Chair of the CCC causes a record of the finances of the fund to be kept and provided to the Applicant and the Secretary at the end of each year the fund is used.	Compliant	Funds are released as required when requested by the CCC.

CONDITION OF CONSENT	STATUS	COMMENTS
ACCESS TO INFORMATION		
11. Before the commencement of Modification 8 until the completion of all rehabilitation required under this consent, the Applicant must: (a) make the following information and documents (as they are obtained, approved or as otherwise stipulated within the conditions of this consent) publicly available on its website: (i) the documents referred to in condition 2 of Schedule 2 of this consent; (ii) all current statutory approvals for the development; (iii) all approved strategies, plans and programs required under the conditions of this consent; (iv) minutes of CCC meetings; (v) regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent; (vi) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs; (vii) a summary of the current stage and progress of the development; (viii) contact details to enquire about the development or to make a complaint; (ix) a complaints register, updated monthly; (x) the Annual Reviews of the development; (xi) audit reports prepared as part of any Independent Environmental Audit of the development and the Applicant's response to the recommendations in any audit report; (xii) any other matter required by the Secretary; and (b) keep such information up to date, to the satisfaction of the Secretary.	Compliant	Strategies, plans and programs are updated on the web site as they become available.

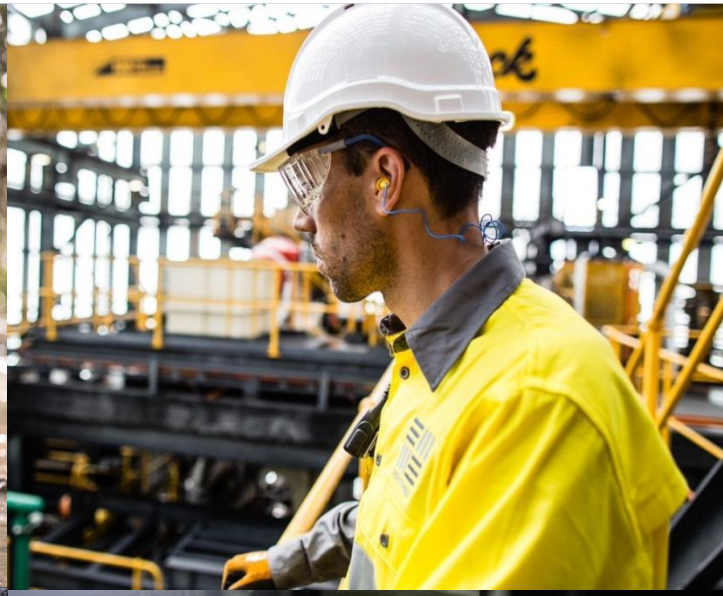
APPENDIX D: COMMUNITY COMPLAINTS REPORT

COMPLAINTS REPORT

June 2019

DENDROBIUM OPERATIONS






Dendrobium Mine - Community Complaints Report

Operation/Project	Month	Date	Nature of Complaint	Actions / Follow Up
Logistics	June	28/06/2019	Resident called the Community Officer directly on 28 June 2019 at 11.50am to notify of rail squeal from the last two wagons on the train. The resident was walking on the pathway - it was unclear where on the pathway.	The Community Officer forwarded the complaint to the logistics team on the same day. Logistics completed an inspection of the wagons the same day with no anomalies found. Investigations are continuing to mitigate the rail squeal at the corner.
Dendrobium Mine Pit Top	June	21/06/2019	Resident called the Community Call Line on 21 June 2019 at 3.38am to report compressor noise. The resident noted no communication about a compressor operating was provided in advance which is normal procedure.	The Dendrobium Team was notified of the concern on the same day and completed an investigation. The noise source was found to be a rattle from the sediment pond pump. The pump load was reduced immediately to minimise the rattle during the day, and another style of pump will be used at night to minimise noise. A replacement pump that will not rattle against the concrete has been ordered and will be installed as soon as it arrives. There were no new compressors operating at the site.
Logistics	June	17/06/2019	Resident called the Community Call Line at 9.30am concerned about a wide load travelling a tight corner on Cordeaux Road. It was not escorted and caused the resident to take evasive action.	The supply team was notified immediately and commenced an investigation. It was confirmed a Dendrobium Mine transport provider was moving a 2.5 metre load at the reported time. The drivers were requested to slow well below normal speed limit on all tight sections of Cordeaux Road. It was noted wide loads greater than 3.5 metres require an escort. The resident was provided this feedback 21 June 2019 and was satisfied with the result.
Logistics	June	15/06/2019	Resident emailed the community officer directly on 15 June 2019 at 5.15pm. The email noted rail squeal from a train travelling west.	The community officer advised the logistics team of the reported squeal the following business day (17 June 2019), and advised the resident the noise squeal had been logged. Investigations are continuing to mitigate the rail squeal at the corner.

Logistics	June	13/06/2019	Resident mails the community officer directly on 13 June 2019 at 6.31am. The email noted a rail squeal event on Sunday 9 June 2019 at 2.20pm.	The community officer advised the logistics team of the reported squeal. The resident's concern was acknowledged by return email and included further detail on activities and investigations underway to mitigate the rail squeal at the curve in the track.
Logistics	May	19/05/2019	Resident emailed the community directly on 19 May 2019 at 10:51am regarding rail squeal heard at 10:45am	The community officer advised the logistics team of the reported squeal at 2pm on 20 May 2019 - the next business day. They also advised the resident the concern was noted on 20 May 2019 at 2:50pm. The resident is aware of the mitigation measures currently in trial to reduce the rail squeal in the area of concern.
Logistics	May	18/05/2019	Resident emailed the community officer directly on 19 May 2019 at 10:51am regarding rail squeal noise heard on 18 May 2019 at 7:55am. The train was travelling west toward the mine.	The community officer advised the logistics team of the reported squeal at 2pm on 20 May 2019 - the next business day. The resident was advised the concern was received 20 May 2019 at 2:50pm. The resident is aware of the mitigation measures currently in trial to reduce the rail squeal in the area of concern.
Logistics	May	15/05/2019	Resident emailed the community officer directly on 15 May 2019 at 6:12am noting rail squeal at 6.10am.	The community officer replied to the complainant noting the concern was received at 3:47pm on 17 May 2019. The concern was shared with the logistics department to be included in its investigations. The resident was advised the trains speed would be reduced through the area for a longer trial period commencing 22 May 2019. Work was also planned 12 and 13 June realign the rail tracks.

Logistics	May	14/05/2019	Resident emailed the community officer on 14 May 2019 noting rail squeal at 6.11am and 8:13pm. The resident was also concerned about the accuracy of the noise monitoring for the rail noise.	The community officer shared the concern with the logistics team immediately. By return email to the resident it was clarified the noise monitor is being used to understand the effectiveness of the noise mitigation methods being implemented rather than a compliance tool (including the slowing of the trains and the change to track width).
Logistics	May	13/05/2019	Resident called the Community Call Line at 7.55pm to report a loud rail squeal. Requested a call back on the 14 May.	Community Lead left a voice message on 14 May 2019. The resident text to request a suitable time to call. Subsequent attempts to call the resident were unsuccessful.
Logistics	May	12/05/2019	Resident emailed the community officer to advise of rail squeal noise from train travelling west at 10.10am and 10.04pm. The resident requested the noise management plan, noise monitor calibration certificate and minutes from the community information sessions. Dozers working at the Kemira Valley stockpile were also noted to be audible.	The community officer shared the concern with the logistics team immediately and provided feedback to the resident the next business day. The rail squeal event was noted, and the resident was provided with a link to the noise management plan on the South32 website. A further update on the progress to limit wheel squeal was provided. The noise calibration certificate was not provided to the resident. There were no minutes taken at the community information sessions given the format was casual, so residents could 'drop in for a chat'. The contact details to discuss the Dendrobium Mine Plan for the Future was provided to the resident.

Dendrobium Mine Pit Top	May	8/05/2019	Resident contacted the Community Call Line at 9.15am regarding ongoing noise from the Dendrobium Pit Top. Wished for a call back.	Community Officer contacted the resident at 10.20am understood the concern to be consistent construction-type noise from 7am-6pm. The upgrade/construction to a carpark at site was the cause of the noise. The resident's request to visit site and understand the activities was fulfilled, and it was agreed proactive notification of activities at the site would be provided.
Logistics	May	8/05/2019	Resident emailed the community officer directly at 6.06am noting rail squeal. The squeal was coming from an area near William James Drive and further west on the track.	The complaint was shared with the logistics team immediately. The landholder was provided an update by return email on the same day noting investigations were underway to try and limit the rail squeal in the area, with train speeds reduced for the last week. Track adjustments would be implemented in a staged approach commencing 8 May. Noise monitoring was continuing.
Dendrobium Mine Pit Top	May	5/05/2019	Resident contacted the Community Call Line at 1.30pm advising of horn noise at the Dendrobium Mine Pit Top.	The complaint was lodged with Dendrobium Control at 3.08pm on the same day for investigation. The horns were being used frequently during the movement of a large piece of equipment as radios were not clear during heavy rain, however horn use continued after the rain stopped. Use of the horn ceased after the complaint was investigated and an incident report was generated for management. The resident was advised of the outcome at 3.30pm the same day and noted the horn noise had been heard a few weeks ago. The resident was satisfied with the prompt response to the issue.

Dendrobium Mine Pit Top	May	5/05/2019	Resident contacted the Community Call Line at 1.24pm advising of horn noise at the Dendrobium Mine Pit Top.	The complaint was lodged with Dendrobium Control at 3.08pm on the same day for investigation. The horns were being used frequently during the movement of a large piece of equipment as radios were not clear during heavy rain, however horn use continued after the rain stopped. Use of the horn ceased after the complaint was investigated and an incident report was generated for management. The resident did not wish for a call back.
Logistics	May	2/05/2019	Resident emailed the community officer directly to advise of rail squeal from trains travelling west at 6.10am. The resident requested drawings of the rail line showing where the curve locations of the track were.	The resident was advised the complaint would be logged in the register. A comprehensive written summary of the discussion which took place the day prior was provided, and the map requested included.
Logistics	May	1/05/2019	Resident emailed the community officer directly to advise of rail squeal from trains travelling west at 6.10am and 9.29pm.	The resident was advised the complaints would be logged in the register. A meeting with the resident was held the same day where plans to alter the track and trial decreasing train speeds was shared. The resident shared further concerns of graffiti, residual dust from tracks, and rail operating times at the meeting. Action was taken to investigate the further concerns and report back to the resident.
Processing and Logistics	April	29/04/2019	Resident emailed community officer directly regarding rail squeal noise from train travelling west.	The resident was advised the complaint would be noted. The email is a result of the discussion had 26 April where notification of rail squeal noise was requested by the community officer. The email was forwarded to the logistics team. A meeting with the resident is scheduled 1 May.

Processing and Logistics	April	28/04/2019	Resident emailed community officer directly at 6.57am noting rail squeal from trains travelling west.	The email is a result of the discussion had 26 April where notification of rail squeal noise was requested by the community officer. The email was forwarded to the logistics team. A meeting with the resident is scheduled 1 May.
Processing and Logistics	April	27/04/2019	Resident emailed community officer directly at 11.32am, 1.20pm, 4.42pm and 9.27pm noting rail squeal from trains travelling west.	The emails are a result of the discussion had 26 April where notification of rail squeal noise was requested by the community officer. The emails were forwarded to the logistics team. A meeting with the resident is scheduled Wednesday 1 May.
Processing and Logistics	April	25/04/2019	Resident emailed community officer directly at 9.44am disappointed the rail movements occurred on Anzac Day. Requested the complaint be logged in the register.	The concern regarding rail movements on Anzac Day was shared with logistics the same day. The resident was contacted the following business day by phone and advised short- and long-term investigations to limit the rail squeal were underway as previously shared. The resident noted these and was keen to see result - the resident was encouraged to continue to advise when rail squeal was heard. An email detailing the discussion was shared with the resident. A meeting with the resident is scheduled for Wednesday 1 May.
Processing and Logistics	April	21/04/2019	Resident emailed the community officer concerned about rail squeal noise of train travelling west at 9.45am. The same resident called the community call line at 7.00am on the same day also concerned about rail squeal noise of train travelling west.	The call to the community call line was investigated the same day - the greasing pot was checked and trains listened to with nothing out of the ordinary found. The community officer left a voice message with the resident the next business day advising of the outcome, noting the short and long term investigations underway to limit rail squeal on trains travelling west. The same information was shared by

Processing and Logistics	April	19/04/2019	Resident emailed the community officer directly concerned about rail squeal noise of train travelling west at 10am. The same resident emailed the community officer directly at 9.25pm concerned about rail squeal noise of a train travelling west.	The community officer left a voice message with the resident the next business day advising of the outcome, noting the short- and long-term investigations underway to limit rail squeal on trains travelling west. The same information was shared by email on 23 April and a meeting with the resident also offered.
Processing and Logistics	April	16/04/2019	A resident contacted the community call line at 9.10am advising they have heard rail squeal every day over the last week near the first bridge on Cordeaux Road.	The grease pot was inspected the day the call was received, and trains travelling west were monitored for squeal that was out of the ordinary - all operating conditions were normal. The resident did not request feedback.
Processing and Logistics	April	16/04/2019	Resident emailed the community officer directly concerned about rail squeal noise of trains travelling west at 9.40pm and graffiti on carriages. They requested operating times for the rail.	The community officer responded the following business day by email and shared the operating times for the rail. It was noted short- and long-term investigations continuing into rail squeal noise. A meeting with the resident was offered.
Processing and Logistics	April	14/04/2019	Resident emailed the community officer directly concerned about rail squeal noise of trains travelling west at 6.54am. The resident requested details on the rail operation times.	The community officer shared the complaint with the logistics team which advised its investigations were continuing. The resident was provided a response by email 17 April which included the rail operating times.
Processing and Logistics	April	11/04/2019	Resident emailed the community officer directly concerned about rail squeal noise of trains travelling west at 6.30pm. The resident requested detail about mine expansion and the EIS.	Community officer responded the following business day by email. Details regarding the EIS and the upcoming community information forums was shared.

Processing and Logistics	April	10/04/2019	Resident emailed the community officer directly concerned about rail squeal noise of trains travelling west at 6.30pm.	Community officer responded to the resident on 11 April advising the complaint had been noted. The investigations previously described to the resident were continuing.
Processing and Logistics	April	9/04/2019	Resident contacted the Community Call Line at 7.20am and advised blue smoke was coming from the train at 7.12am travelling toward the mine. Requested a call back with details.	The complaint was shared with the logistics team at 7.50am 9 April. It was determined the blue smoke was caused by a build-up of particulates in the diesel engine after a period of the trains not moving frequently. A message was left with the resident at 8.47am.
Processing and Logistics	April	8/04/2019	Resident emailed the community officer directly on 8 April at 6.54am to advise of rail squeal noise heard at 6.48am. The train was travelling uphill. The resident requested detail on what South32 was doing to reduce the noise.	The community officer shared the concern with the logistics team the following business day (8 April) and an investigation commenced. Given railing movements had been limited for the last 4 weeks, surface rust is likely to have formed on the tracks which can lead to additional wheel squeal. The noise will reduce when consistent rail movements are restored over the next week. The automatic lubrication stations were checked and confirmed to be operating effectively. The resident was provided the outcome by return email at 1.33pm 8 April; no further correspondence was received by 9 April.

Processing and Logistics	April	7/04/2019	Resident emailed the community officer directly on 8 April at 6.54am to advise of rail squeal noise heard at 9am on 7 April. The train was travelling uphill. The resident requested detail on what South32 was doing to reduce the noise.	The community officer shared the concern with the logistics team the following business day (8 April) and an investigation commenced. Given railing movements had been limited for the last 4 weeks, surface rust is likely to have formed on the tracks which can lead to additional wheel squeal. The noise will reduce when consistent rail movements are restored over the next week. The automatic lubrication stations were checked and confirmed to be operating effectively. The resident was provided the outcome by return email at 1.33pm 8 April; no further correspondence was received by 9 April.
Processing and Logistics	April	6/04/2019	Resident emailed the community officer directly at 8.43am regarding rail squeal heard at 8.35am. The train was travelling uphill toward the mine.	The community officer shared the concern with the logistics team the following business day (8 April) and an investigation commenced. Given railing movements had been limited for the last 4 weeks, surface rust is likely to have formed on the tracks which can lead to additional wheel squeal. The noise will reduce when consistent rail movements are restored over the next week. The automatic lubrication stations were checked and confirmed to be operating effectively. The resident was provided the outcome by return email at 1.33pm 8 April; no further correspondence was received by 9 April.
Processing and Logistics	March	26/03/2019	Resident emailed the community officer noting a rail squeal event. (Note the community officer was on leave, returning 1 April.)	The logistics team investigated the rail squeal when notified on 1 April, identifying the noise event occurred during a planned rail outage. A track maintenance vehicle caused the squeal noise. Two voice messages were left with the complainant advising of the investigation outcome.

Processing and Logistics	March	16/03/2019	Resident contacted the Community Call Line at 9.15am to report a flat wheel on a train travelling eastbound – wagon #43060. It was making a loud noise as it travelled.	The logistics team investigated the incident immediately, inspecting the train at low and high speed over the weekend. A flat wheel was changed out in the week on a wagon different to that noted by the resident. The resident did not wish for feedback on the matter.
Processing and Logistics	March	08/03/2019	Resident contacted the Community Call Line at 2.30pm advising trucks were speeding and using exhaust brakes unnecessarily near Boorea Avenue, Cordeaux Road.	The resident was contacted the same day for further information to enable a detailed investigation. The trucking company investigated vehicle movements determining speed to not be an issue, and it advised drivers to refrain from using exhaust brakes in the area. The resident was satisfied with the outcome.
Dendrobium Pit Top	February	11/02/2019	Resident contacted the Community Call Line at 6.19pm regarding diesel compressor noise at the Dendrobium Mine Pit Top. The resident was not notified prior to the compressor being operational as per usual processes and requested details of its operational period.	Community relations followed up with site the same evening to understand details about compressor use. It was relayed to the resident at 7.25pm that the diesel compressor would be operating 6am – 10pm until 20 February, and the operation had failed to notify the community team of its use, A letter was proactively sent the next day to other residents in the area detailing the potential noise impact.
External Affairs	February	06/02/2019	Resident contacted the Community Call Line at 3.30pm to request details about why they received the Dendrobium Community Newsletter.	Community relations followed up with the resident by phone 7 February 2019 at 11am. The newsletters are sent as part of our community engagement program. The resident appreciated the information but was unhappy they were receiving something that created waste.

Processing and Logistics	January	22/01/2019	Resident contacted the Community Call Line at 10.40am to advise of excessive rail noise, particularly the wheel squeal on trains travelling toward the Dendrobium Mine. The resident noted the noise has been loud for a while but was particularly noticeable over the Christmas period.	Illawarra Coal logistics and environmental teams commenced investigation within an hour of receiving the complaint. This included a review of the static noise monitor data since October 2018, assessment of the rail maintenance and listening to the rail noise between the resident's property and the rail line over a week. The investigation identified a flat wheel which was changed out immediately. Nothing further out of the ordinary was noted. The resident was provided this feedback on 31 January and was not satisfied with the outcome. A meeting with the resident was scheduled for 1 February.
Processing and Logistics	December	7/12/2018	Resident emailed Illawarra Coal Community Officer at 10.28am to advise of low overhanging branches on Cordeaux Road. The resident advised that they had seen a vehicle travelling to and from the mine pit top crossing over double white lines presumably to avoid the obstruction.	Illawarra Coal identified the trees to be on Wollongong City Council property and contacted the Council to trim the branches. Wollongong City Council trimmed the branches 17 December. The resident was notified of the outcome on 17 December by return email.
	November		No complaints recorded for the month.	

Processing and Logistics	October	22/10/2018	Resident emailed IC Enquiries on 22 October at 8.50am regarding noise from trains being more audible from Cordeaux Road. The resident requested information about train noise.	The logistics team conducted an initial investigation on 22 October using noise files from the noise monitor and did not find anything of note. Nothing operationally had changed over the last few weeks. This feedback was provided to the resident by return email 22 October at 12.41pm, with a request for more information regarding particular times the trains are noisy. The resident responded the following day by email noting it was an enquiry into rail noise generally rather than pinpointing a specific time. The resident was advised Illawarra Coal would conduct another review of the data extending back into September and be in touch with the results of the investigation. The complainant was satisfied with this action and response.
Processing and Logistics	September	13/9/2018	Resident contacted the call line to report a hole in the fence between their property and the rail corridor. They have concerns regarding safety if the rail corridor is access via the hole.	The logistics team will address the issue during the track isolation planned for 2 – 3 October. This timeframe was shared with the resident and they were satisfied.

Processing and Logistics	August 2018	24/8/2018	Resident phoned the Community Line at 2.18pm in regard to a crane travelling on Cordeaux Road at 2pm. The crane registration details were noted and the fact it was a left-hand drive vehicle. The caller had safety concerns due to the width of the road and visibility.	The Community Team responded to the complaint by returning the call at 2.30pm to advise an investigation was underway. The processing and logistics team investigated the complaint and determined the crane was travelling to Dendrobium Pit Top. The crane had all required permits for travelling the road. Cranes travel the road about once per month for special work. A return phone call was made Monday 27 August at 3.30pm with this outcome. The complainant appreciated the information and confirmation all permits were in place but remained concerned with the activity proceeding.
Processing and Logistics	July 2018	19/7/2018	Resident phoned the Community Call Line at 1pm to advise of excessive noise from one of the Kemira Valley trains heading to BlueScope	The Community team responded to the complaint by returning the residents call at 3pm. The processing and logistics team investigated the complaint and found two contributing factors - the driver had released the brake earlier than required and therefore had to apply the brake earlier in the noise sensitive area; and the brakes on the second last wagon were intermittently staying on. Action taken included a communication out to all train crews on braking on noise sensitive areas and the identified wagon removed for repair. The complainant received a full report of the investigation the following day and was satisfied with the outcome.

Processing and Logistics	July 2018	5/07/2018	Resident phoned Dendrobium Mine at 1:45pm to complain about dust from the Kemira Valley stockpile.	The Community team responded to the complaint by returning the residents call at 2pm. The site environment team were notified of the complaint and immediately checked and confirmed all dust suppression systems were working correctly. The team also held a joint investigation with the EPA on 9 July to review all dust mitigation systems at Kemira Valley Loading Facility. The investigation determined the site was compliant with all activities. A community specialist phoned the resident on 9 July to report the outcomes of the investigation and offer to install a dust gauge on their property which the resident accepted. The complainant was satisfied with the outcome of the investigation.
	June 2018		No complaints recorded for the month.	
	May 2018		No complaints recorded for the month.	
Processing and Logistics	April 2018	19/04/2018	Resident called Dendrobium Mine Environmental Specialist at 10am on 19 April regarding the rail crossing on Central Road, Unanderra, with concerns about the roads condition. The resident was phoned back by Illawarra Coal's Community team the same day to seek further details regarding the complaint.	The Community team responded to the complaint by notifying Illawarra Coal's Processing and Logistics team of the issue. The team advised they were aware of the location and had previously arranged for the area to be rehabilitated the following day (April 19). A Community Specialist notified the complainant of planned work and they were pleased with this outcome.

Dendrobium Pit Top	April 2018	10/04/2018	A noise complaint was received via the community call line at 2am in relation to noise generated from surface activities at Dendrobium Pit Top. The caller did not request a call back.	The Community team responded to complaint by informing site on 10 April at 7am of the notification. An investigation into the noise complaint found a machine was being used at the time at the pit top to move material. Video security footage showed at 2.18am the driver made a sudden stop which is likely the reason for the noise. The driver was informed that a complaint had been received the same day and was provided with the noise curfew standards. The outcome of the investigation was provided to the complainant by the Community team on 12 April who indicated they were satisfied with the outcome.
Dendrobium Pit Top	March 2018	26/03/2018	A noise complaint was received via the community call line in relation to noise generated from the compressor in use at Dendrobium Pit Top. The complainant noted hearing a low frequency hum sound at their property.	The Community team responded to the call to acknowledged it had been received on 26 March. The complaint was immediately reported to site for investigation. The investigation confirmed the noise source was a compressor being used at the site to support additional compressed air requirements underground. The site indicated the compressor will be in use until 13 April 2018. To mitigate the noise, the site has organised three noise walls to be delivered to the site on Wednesday 28 March. Noise monitoring will also be conducted. The complainant was advised of the outcomes of the investigation, mitigation controls and expected removal of equipment, and were satisfied with the update and quick response taken from the Company.

Dendrobium Pit Top	March 2018	26/03/2018	Noise complaint was received via the community call line in relation to noise generated from a compressor in use at Dendrobium Pit Top. The complainant noted hearing a low frequency hum sound at their property.	The Community team responded to the call to acknowledged it had been received on 26 March. The complaint was immediately reported to site for investigation. The investigation confirmed the noise source was a compressor being used at the site to support additional compressed air requirements underground. The site indicated the compressor will be in use until 13 April 2018. To mitigate the noise, the site has organised three noise walls to be delivered to the site on Wednesday 28 March. Noise monitoring will also be conducted. The complainant was advised of the outcomes of the investigation, mitigation controls and expected removal of equipment, and were satisfied with the update and quick response taken from the Company.
Dendrobium Pit Top	March 2018	25/03/2018	Noise complaint received via email to the Community team regarding details of loud banging noises being heard at Dendrobium Pit Top at 6.20am on 25 March.	The Community team responded to the email to acknowledged it had been received on 25 March. The complaint was immediately reported to the site for investigation (Control Officer). The outcomes of the investigation identified the noise was a result of the shift change (resulting in additional movements of machinery on-site). The noise is compliant with the Dendrobium Noise Management Plan which states that noise may be evident and potentially increased during shift change. The timing of the complaint confirms the noise was heard during the day shift, shift change. The site will take all steps to minimise shift change noise, where possible. The complainant was advised of the detail from the investigation on 27 March (including noise management plan) and was satisfied with the prompt investigation and response.

Dendrobium Pit Top	March 2018	19/3/2018	Noise complaint received by the community call line at 11pm. Illawarra Coal followed up with the complainant the following morning and further determined there was noise coming from the pit top at 11pm which included bangs, clangs and vehicles. The complainant understood there was a noise curfew in place and requested more details on this to better understand what noise is acceptable.	The complaint was investigated the day after it was received. The noise was caused by an employee loading supplies for projects underground. It was also noted there is a shift change at 10pm which does result in vehicle noise between 10-11pm. The site has been reminded of the noise management plan which states that unnecessary movements would be limited from 10pm - 6.15am. The complainant was advised of this finding and provided a copy of the noise management plan as requested. A meeting to go through the plan and discuss pit top movements was also offered.
Processing and Logistics	March 2018	12/03/2018	A resident reported a complaint via the Illawarra Coal enquires email. The complainant advised on 12th March at 7.30am a truck with a semi-trailer was driving south on Harry Graham Drive towards the Dendrobium Mine. The Truck drove through the partially closed section of the road and forced the complainant to swerve to avoid hitting the truck. This route is against the Dendrobium Drivers Code of Conduct and it is illegal to drive a large truck on that section of the road.	The processing and Logistics team were notified of the event and an investigation was conducted. Illawarra Coal determined the delivery company that was responsible for this incident from the time/date provided by the complainant. The incident was referred to the trucking company and reported the fault of the travel route on Harry Graham Drive to Dendrobium Mine. Communication is sent to all subcontractors regarding prescribed travel routes, Dendrobium Drivers Code of Code and Wollondilly Shire Council road rules for travelling to and from Dendrobium site. Further correction action will be taken with the trucking Company and its parent operator at the close out of the investigation. The complainant was advised of the investigation via return email.

Processing and Logistics	January 2018	4/01/2018	Resident contacted Dendrobium Mine concerned about over grown grass between their property and the rail line.	The resident was immediately contacted for more information. The grass was sprayed by Illawarra Coal 30 October 2017 but it has grown denser since. A site inspection was conducted 9 January (rail outage is required to access the area) and cut and spray will occur on 22/23 January during another rail outage. The resident was advised of the action by phone.
	December 2017		No complaints recorded for the month	
Dendrobium pit top	November 2017	17/11/2017	Community complaint received regarding notice of speeding trucks travelling to and from the Mine between Araluen Avenue and the pit top (expected to be travelling 60km/hr in a 40km.hr zone).	The complainant was contacted immediately to obtain further follow-up information regarding the complaint. Once further information was provided, the complaint was them passed onto the Warehouse division for investigation. A recommendation was made to review all contractor delivery trucks that travelled to and from the mine at the approximate time of the event notification and inform them of the complaint/issue a notice (if applicable).
Dendrobium pit top	November 2017	13/11/2017	A complaint was received by a resident via an email. The complaint was in relation to a truck traveling from the Dendrobium Mine along Cordeaux Road that overtook another truck and crossed over double lines.	The incident was referred to the contracting company who had followed up the with the driver. The driver confirmed the incident and ensured more care would be taken on the road in the future. The complainant was advised of the action and was satisfied with the outcome.

Processing and Logistics	November 2017	13/11/2017	Complaint received via the Dendrobium Control regarding train horn noise being longer and louder than usual.	The complaint was forwarded to the Processing and Logistics team. All trains are instructed to use the City horn in the area as it is quieter than the Country horn - there has been no change in practice. All drivers were reminded on the use of horns. The resident was advised of the outcome and noted a change in the horn noise since lodging the complaint.
Processing and Logistics	October 2017	15/10/2017	Complaint received via an email from local resident regarding noise from trains traveling both uphill and downhill.	The complaint was forwarded to Processing and Logistics team who have installed noise monitors on some trains and changed out other trains for maintenance. They are monitoring the trains to identify if any have emitted noise. They identified a number of flat spots on the wheels, which were changed out. this has reduced the noise. This was advised back to the resident via email.
Dendrobium Mine Surface Infrastructure	October 2017	13/10/2017	Complaint received from local resident regarding graffiti on the Mount Keira Sub Station (this equipment forms part of Illawarra Coal's surface infrastructure)	All of Illawarra Coal's redundant infrastructure is being reviewed and will be given a priority of rehabilitation. The resident was advised that this is not currently being rehabilitated and we will inform them once the Company has a schedule

Processing and Logistics	October 2017	11/10/2017	Complaint received via the South32 website. Issue with contractors that clean the trees from under Illawarra Coal's 6.6kV supply has created a fire hazard for the resident. The contractors also allegedly damaged the fence while gaining access to the property.	Site visit with the contractors and complainant was conducted in late October. An action was taken by the contractor to determine options to remove the larger tree branches. The fence damage could not be linked to the contractors however South32 will investigate actions to stabilise the fence. Further update provided to complainant on 16 November - the remnant vegetation will be removed where it is safe to do so, however the alleged damage to the fence will not be fixed. The expert that assessed the fence noted its very poor condition, insect damage and rot, which would have attributed to its deterioration. The complainant was advised of the action and decisions regarding the investigation. The loose vegetation was removed on 20 December 2017.
Dendrobium Pit Top	October 2017	5/10/2017	Complaint received regarding trucks travelling up Stones Road outside of the Dendrobium Drivers Code of Conduct allowable travel times.	The complaint was immediately reported to the site. Action included issuing a reminder to all contractor delivery companies regarding the allowable travel times as per Dendrobium Mine Drivers Code of Conduct. The complainant advised they did not require a call back.
Processing and Logistics	September 2017	8/09/2017	Received a call via the community call line regarding a noisy wagon (identified as having a flat spot on the wheel) travelling along Kemira Valley Rail Line.	Complaint was reported to Process and Logistics team for investigation. The flat wheel was identified from audio testing and has been removed from the wagon fleet. The complainant was happy with the investigation and quick response.
	August 2017		No complaints recorded for the month	

Dendrobium Pit Top	July 2017	9/07/2017	Noise complaint received via the IC Enquiries email address in relation to compressor in use at Dendrobium Pit Top, after curfew hours.	The complaint was immediately reported to site and mitigation included organising a timer to automatically switch the compressor off at 9pm (an hour before curfew – to avoid it running overtime). The site has also hired an alternative set up noise walls to further insulate the noise to be contained to the pit top area. Both actions were implemented by the site by 10 July 2017. A full account was reported to the landholder who was satisfied with the actions and the quick action from the site.
Process and Logistics	July 2017	3/07/2017	Received a call via the community call line regarding a screeching wheel when coming down the Kemira Valley Rail Line.	Complaint was reported to Process and Logistics for investigation. The screeching wheel was identified and taken out of service. The complainant was happy with the investigation.
Dendrobium Pit Top	June 2017	30/06/2017	Noise complaint received via the IC Enquiries email address in relation to compressor in use at Dendrobium Pit Top. The complaint was reported the Dendrobium site operations for investigation.	Representatives from Dendrobium met with the community and environment team to identify better noise attenuation for the compressors located at the pit top. This included, organising a timer to automatically switch the compressor off at 9pm (an hour before curfew – to avoid it running overtime); hiring an alternative set up noise walls to further insulate the noise to be contained to the pit top area. Both actions were implemented by the site by 10 July 2017. A full account was reported to the landholder who was satisfied with the actions and notified the community team that he had not experienced hearing the compressors since the additional controls had been put in place.

Dendrobium Pit Top	June 2017	26/06/2017	Noise complaint received via the IC Enquiries email address in relation to compressor in use at Dendrobium Pit Top, after curfew hours.	Complaint reported to site for investigation. It was determined the compressor was in use after 10pm (the allowable time of use is from 6am - 10pm). Immediate action was taken to notify all responsible personnel at the site on afternoon and night shift of the allowable timeframe for the compressor.
Dendrobium Pit Top	June 2017	15/06/2017	Noise complaint received via the Community Call Line in relation to compressor in use at Dendrobium Pit Top	Complaint reported to site for investigation. It was determined the installation of the noise walls (in attempt to reduce the noise) had caused it to be redirected. Immediate action was taken to relocate the noise walls and ensure they were in the correct position to reduce the potential for noise emissions. The site is in the process of acquiring an electric compressor which will greatly reduce any noise emissions heard from neighbouring properties.
Process and Logistics	June 2017	8/06/2017	Received a call via the community call line regarding a screeching wheel when coming down the Kemira Valley Rail Line.	Complaint was reported to Process and Logistics for investigation. The screeching wheel was identified and taken out of service. The complainant was happy with the investigation.
Dendrobium Pit Top	May 2017	31/05/2017	Noise from compressor at Dendrobium Pit Top	Complaint reported for investigation. Noise walls to be placed around the compressor. The compressor will be on site up until 16 June 2017. the complainant was satisfied with the outcomes.
Dendrobium Pit Top	May 2017	25-May-17	Wheel/break Squeal from train travelling on Kemira Valley Rail Line (call)	Project is underway to address rail noise on the rail line.

Dendrobium Pit Top	May 2017	22-May	Noise from compressor at Dendrobium Pit Top	Complaint reported to site for investigation. The compressor will be required for a further three weeks. The site is in the process of acquiring an electric compressor which will greatly reduce any noise emissions heard from neighbouring properties. As an interim noise attenuation measure, the site is seeking to erect noise walls around the compressor to reduce the noise. The complainant was satisfied with this outcome.
Processing and logistics	May 2017	17/05/2017	Wheel/break Squeal from train travelling on Kemira Valley Rail Line (Community Meeting)	Notice of the time of the event was reported to the Processing and Logistics team for investigation and the train identified. A project is currently underway to address rail noise on the rail line. The complainant will be provided with an update on the outcomes of the project at future Dendrobium CCC meetings.
Dendrobium Pit Top	May 2017	11-May-17	Dendrobium surface power supply infrastructure (condition of power pole)	Complaint reported to the Engineering function for investigation and VP operations. In consultation with the nearby residents, a structural inspection and maintenance work has been carried out on a power pole. A review of Dendrobium Mine's surface power requirements and associated infrastructure (including redundant infrastructure) is underway.
Dendrobium Pit Top	May 2017	8-May-17	Dendrobium surface power supply infrastructure (condition of power pole)	Complaint reported to the Engineering function for investigation and VP operations. In consultation with the nearby residents, a structural inspection and maintenance work has been carried out on a power pole. A review of Dendrobium Mine's surface power requirements and associated infrastructure (including redundant infrastructure) is underway.

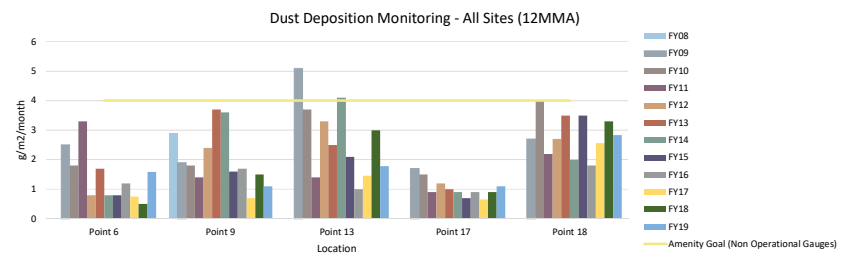
Processing and logistics	April 2017	30/04/2017	Wheel/break Squeal from train travelling on Kemira Valley Rail Line (email)	Project is underway to address rail noise on the rail line.
Processing and logistics	April 2017	26/04/2017	Excess smoke coming from a National Pacific Loco traveling on Kemira Valley Rail Line (call)	Train has been identified and problem rectified
Processing and logistics	April 2017	8/04/2017	Wheel/break Squeal from train travelling on Kemira Valley Rail Line (call)	Project is underway to address rail noise on the rail line.
Processing and logistics	March 2017	28/03/2017	Vehicle driving outside curfew hours	The General Manager was advised of the complaint and a followed up with the truck company, who discussed with the driver.
Processing and logistics	March 2017	24/03/2017	Poor driver behaviour - vehicle leaving the mine went fast down the hill	The General Manager was advised of the complaint and a followed up with the truck company, who discussed with the driver.
Processing and logistics	March 2017	22/03/2017	Wheel/brake Squeal from train travelling on Kemira Valley Rail Line (call) and dust from mine	Project is underway to address rail noise on the rail line. Investigation of dust in ongoing
Processing and logistics	March 2017	20/03/2017	Wheel/break Squeal from train travelling on Kemira Valley Rail Line (call)	Project is underway to address rail noise on the rail line
Processing and logistics	February 2017	21/02/2017	Poor driver behaviour - several vehicles leaving the mine overtook a wide load on double white lines	GM was advised of the complaint. A note was included in the next shift briefing to drive within law
Dendrobium Pit Top	January 2017	21/01/2017	Noise from a generator at the Dendrobium mine.	Generator was switched off after receiving the complaint

Dendrobium Pit Top	January 2017	19/01/2017	Noise from a generator at the Dendrobium mine.	Generator was switched off after receiving the complaint
Dendrobium Pit Top	January 2017	19/01/2017	Dust from stockpile.	spoke to complainant who did not want an inspection
Dendrobium Pit Top	January 2017	5/01/2017	Noise from a generator at the Dendrobium mine.	Generator was switched off after receiving the complaint

APPENDIX E: DENDROBIUM MONITORING DATA

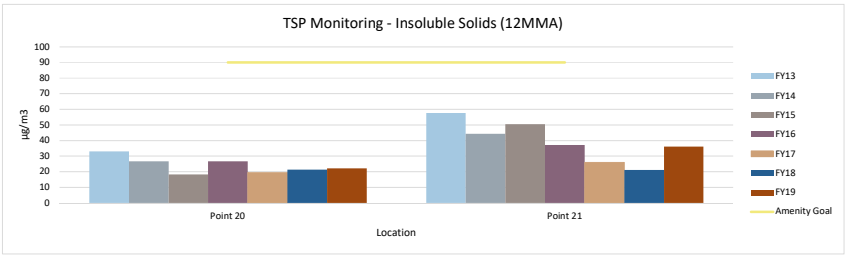
Dust Deposition Results - 12MMA

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal (Non Operational Gauges)
Point 6		2.5	1.8	3.3	0.8	1.7	0.8	0.8	1.2	0.75	0.5	1.58	4
Point 9	2.9	1.9	1.8	1.4	2.4	3.7	3.6	1.6	1.7	0.7	1.5	1.1	4
Point 13		5.1	3.7	1.4	3.3	2.5	4.1	2.1	1	1.46	3	1.78	4
Point 17		1.7	1.5	0.9	1.2	1	0.9	0.7	0.9	0.65	0.9	1.1	4
Point 18		2.7	4	2.2	2.7	3.5	2	3.5	1.8	2.56	3.3	2.83	4



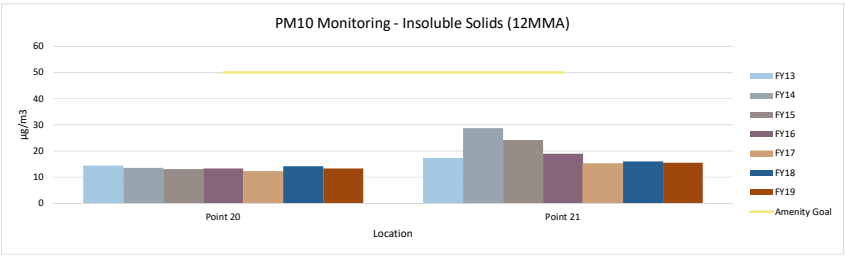
HVAS - TSP - 12MMA

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Point 20						33	26.7	18.3	26.8	19.51	21.4	22.3	90
Point 21						57.7	44.3	50.5	37.3	26	21.1	36.1	90



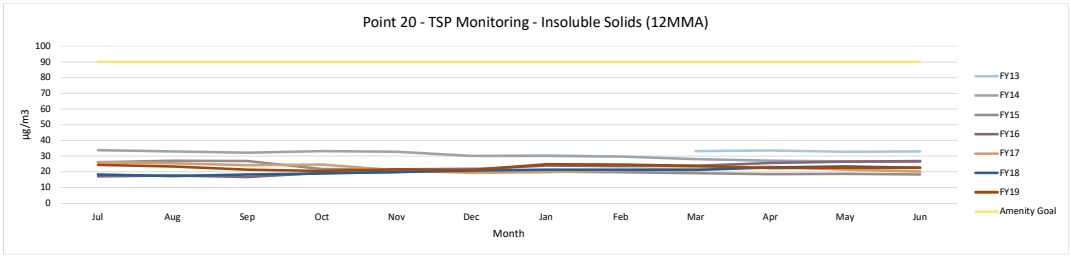
HVAS - PM10 - 12MMA

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Point 20						14.5	13.6	13.1	13.3	12.2	14.2	13.3	50
Point 21						17.4	28.7	24.2	18.9	15.1	16	15.5	50



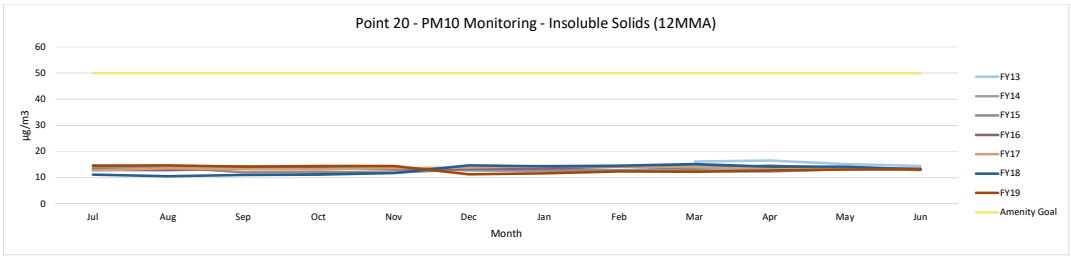
HVAS Point 20 - TSP - 12MMA

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Jul							33.8	26.1	17.2	26.2	18.4	24.5	90
Aug							32.9	27.1	17.7	25.5	17.3	23.4	90
Sep							32.3	26.9	16.7	24.3	18.4	21.3	90
Oct							33.2	21.9	19.4	24.6	19.0	20.6	90
Nov							32.7	21.6	19.9	21.0	20.0	21.7	90
Dec							30.1	22.0	21.7	19.3	20.8	21.2	90
Jan							30.3	20.1	24.1	19.8	21.4	24.8	90
Feb							29.7	19.8	23.7	21.0	21.4	24.7	90
Mar						33.1	28.1	19.2	23.8	22.4	21.2	23.8	90
Apr						33.7	27.2	18.5	25.6	23.2	22.9	22.4	90
May						32.8	26.7	18.7	26.5	21.4	23.3	22.7	90
Jun						33.0	26.7	18.3	26.8	20.3	22.5	22.6	90



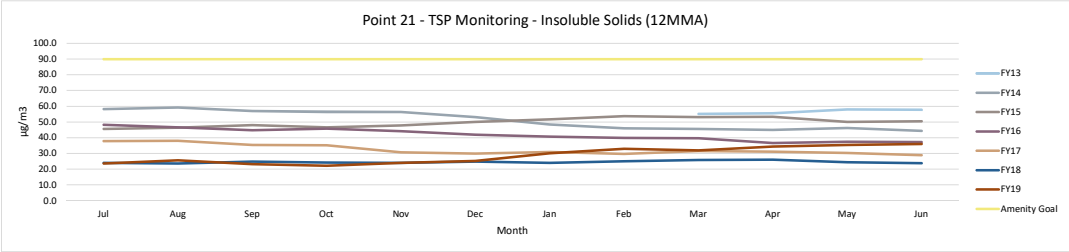
HVAS Point 20 - PM10 - 12MMAS

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Jul							14.6	13.7	13.0	12.8	11.2	14.6	50
Aug							14.2	14.1	12.9	13.7	10.6	14.8	50
Sep							14.4	12.0	13.5	13.3	11.1	14.3	50
Oct							13.5	12.3	13.7	13.3	11.2	14.5	50
Nov							13.9	12.0	13.1	13.6	11.8	14.5	50
Dec							12.8	13.2	13.4	13.8	14.7	11.3	50
Jan							12.5	12.9	13.5	14.5	14.4	11.7	50
Feb							12.9	13.0	14.2	14.4	14.6	12.4	50
Mar						16.2	13.2	12.5	13.7	14.1	15.2	12.3	50
Apr						16.6	13.0	12.5	14.6	13.6	14.3	12.7	50
May						15.3	13.4	13.3	13.7	13.7	14.3	13.1	50
Jun						14.5	13.6	13.1	13.3	12.9	13.2	13.3	50



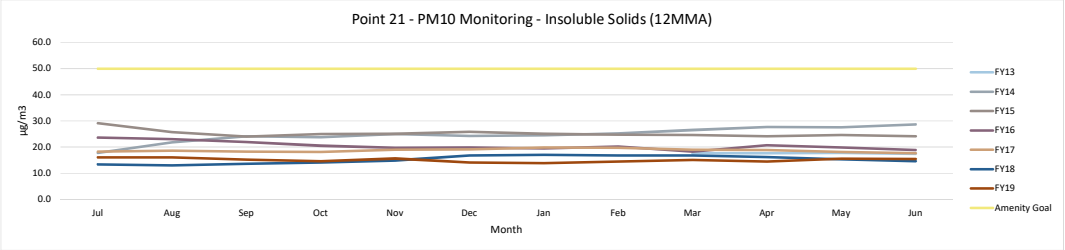
HVAS Point 21 - TSP - 12MMAS

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Jul							58.2	45.6	48.3	37.9	24.1	23.7	90
Aug							59.2	46.4	46.7	38.0	23.5	25.7	90
Sep							57.0	48.1	44.8	35.4	24.9	23.2	90
Oct							56.5	46.6	45.8	35.3	24.3	22.2	90
Nov							56.4	47.8	44.1	30.7	24.1	24.0	90
Dec							53.1	50.1	42.0	29.9	24.8	25.3	90
Jan							48.4	51.8	40.7	30.9	24.1	30.1	90
Feb							46.1	53.8	39.9	29.7	25.1	33.1	90
Mar						55.2	45.6	53.1	39.7	31.6	25.7	32.0	90
Apr						55.6	45.0	53.3	36.6	31.1	26.0	34.3	90
May						58.1	46.2	50.0	37.5	30.4	24.5	35.5	90
Jun						57.7	44.3	50.5	37.3	28.9	23.8	36.1	90



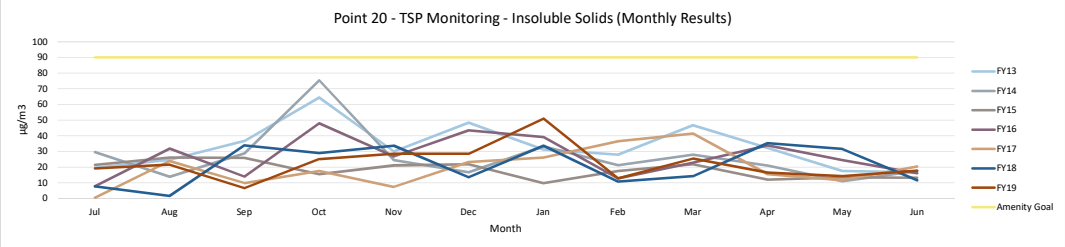
HVAS Point 21 - PM10 - 12MMAS

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Jul							17.8	29.1	23.7	18.2	13.4	16.1	50
Aug							21.8	25.7	23.0	18.6	13.0	16.1	50
Sep							24.2	24.1	21.9	18.4	13.7	15.2	50
Oct							23.8	25.0	20.6	18.2	14.2	14.6	50
Nov							25.0	25.1	19.7	19.0	14.9	15.7	50
Dec							24.2	25.9	19.9	19.1	16.8	14.2	50
Jan							24.5	25.1	19.5	19.9	17.0	13.8	50
Feb							25.3	24.7	20.3	19.7	16.9	14.5	50
Mar						17.7	26.6	24.6	18.3	19.0	16.8	15.2	50
Apr						17.7	27.7	24.1	20.7	18.9	16.2	14.4	50
May						17.8	27.5	24.7	19.9	18.2	15.3	15.6	50
Jun						17.4	28.7	24.2	18.9	17.6	14.7	15.5	50



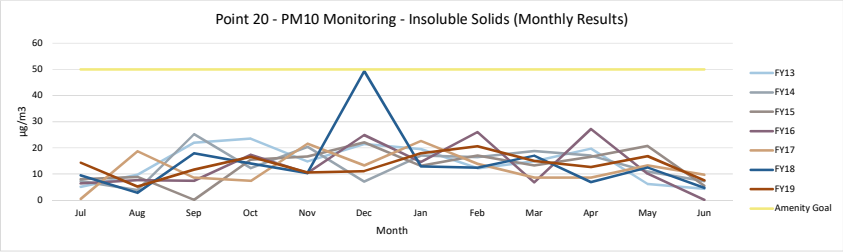
HVAS Point 20 - TSP - Monthly Results

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Jul						19.5	29.6	21.5	7.9	0.5	7.7	19.2	90
Aug						24.7	13.9	26.2	31.8	23.9	1.7	21.6	90
Sep						36.7	28.8	25.9	14.0	9.9	33.9	6.6	90
Oct						64.4	75.4	15.6	48.0	17.5	29.0	25.2	90
Nov						30	24.5	21.1	26.8	7.4	33.7	28.5	90
Dec						48.3	16.7	21.8	43.4	23.3	13.6	28.5	90
Jan						31.2	33.2	9.8	39.2	26.0	33.7	51	90
Feb						28	21.2	17.5	12.8	36.6	10.8	12.8	90
Mar						46.8	27.9	21.8	22.9	41.5	14.2	25.4	90
Apr					25.7	32.2	21.0	12.1	33.9	15.5	35.3	16.5	90
May					27.6	17.5	11.1	13.5	24.5	11.7	31.6	14.4	90
Jun					14.7	16.7	17.6	13.2	16.1	20.4	11.6	17.7	90



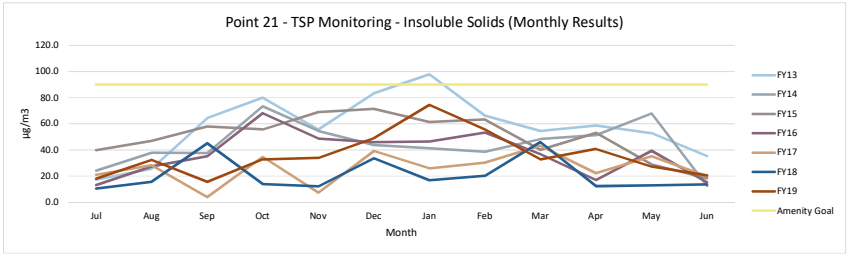
HVAS Point 20 - PM10 - Monthly Results

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Jul						5.1	7.3	8.0	6.4	0.5	9.5	14.3	50
Aug						9.7	3.9	8.9	7.7	18.7	2.8	5.2	50
Sep						22	25.2	0.1	7.4	8.6	17.9	11.7	50
Oct						23.5	12.2	15.5	17.4	7.4	14.0	16.6	50
Nov						14.8	20.4	16.7	10.4	21.6	10.4	10.6	50
Dec						21.4	7.1	22.1	24.9	13.3	49.3	11.1	50
Jan						19.5	17.0	13.1	14.6	22.6	12.9	17.9	50
Feb						12.2	16.5	17.1	26.0	13.9	12.4	20.6	50
Mar						14.9	18.8	13.3	6.8	8.6	17.0	15.0	50
Apr					15.8	19.7	17.0	16.6	27.2	8.6	6.9	12.7	50
May					21.7	6.2	10.9	20.7	10.1	13.3	12.5	16.8	50
Jun					14.3	4.4	7.3	5.5	0.1	9.7	4.7	7.6	50



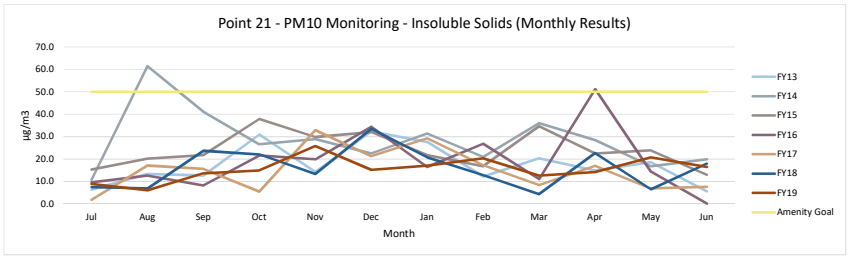
HVAS Point 21 - TSP - Monthly Results

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Jul						17.4	24.2	39.9	13.2	21.1	10.5	18	90
Aug						25.6	37.9	47.0	27.4	28.3	15.7	32.4	90
Sep						64.4	37.7	58.0	35.2	4.0	45.2	15.6	90
Oct						80.0	73.4	55.7	68.1	34.7	14.0	32.9	90
Nov						55.7	54.6	68.9	48.7	7.4	12.1	33.9	90
Dec						83.3	43.8	71.4	46.0	39.3	33.6	49	90
Jan						97.8	41.4	61.4	46.4	26.0	16.9	74.4	90
Feb						66.2	38.6	63.2	53.4	30.3	20.2	55.7	90
Mar						54.5	48.3	40.1	36.8	43.2	46.0	32.9	90
Apr					53.5	58.6	51.4	53.2	17.1	22.2	12.3	40.7	90
May					23.2	52.9	67.9	29.0	39.4	35.3	13.0	27.3	90
Jun					40.4	35.4	12.5	18.4	15.4	19.8	13.6	20.5	90



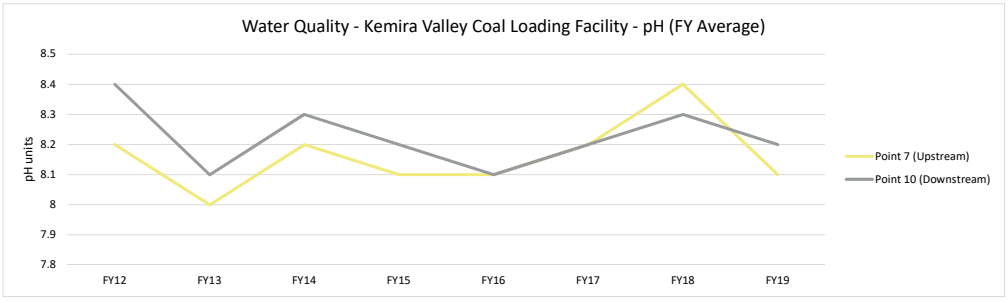
HVAS Point 21 - PM10 - Monthly Results

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Jul						6.4	10.7	15.3	9.6	1.8	7.4	8.9	50
Aug						13.4	61.4	20.2	12.6	17.1	6.9	6.1	50
Sep						12.7	41.1	21.8	8.2	15.6	23.7	13.7	50
Oct						30.9	26.6	37.9	21.6	5.5	22.1	15	50
Nov						14.3	28.9	29.8	19.9	32.9	13.3	25.8	50
Dec						32.3	22.5	32.1	34.4	21.3	33.5	15.2	50
Jan						27.7	31.4	21.8	16.5	29.3	20.8	17	50
Feb						12.2	21.0	16.8	26.8	17.3	12.8	20.3	50
Mar						20.3	36.0	34.7	11.1	8.4	4.4	12.6	50
Apr					14.8	14.9	28.5	22.5	51.2	17.0	22.7	14.2	50
May					17.2	18.6	16.8	23.9	14.4	6.9	6.5	20.8	50
Jun					9.6	5.6	19.9	13.0	0.1	7.6	18.0	16.5	50



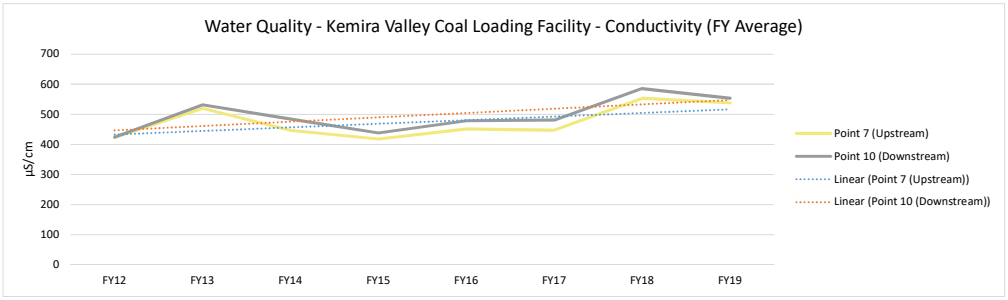
Kemira Valley Coal Loading Facility - pH

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Point 7 (Upstream)					8.2	8	8.2	8.1	8.1	8.2	8.4	8.1	
Point 10 (Downstream)					8.4	8.1	8.3	8.2	8.1	8.2	8.3	8.2	



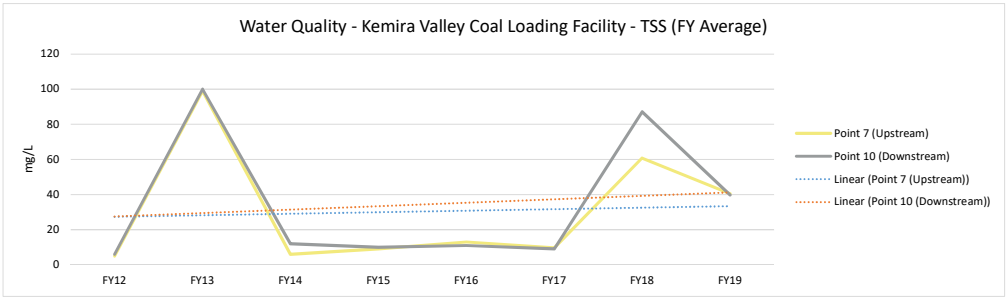
Kemira Valley Coal Loading Facility - Conductivity

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Point 7 (Upstream)					423	520	447	418	451	447	553	538	
Point 10 (Downstream)					424	532	484	438	479	481	586	554	



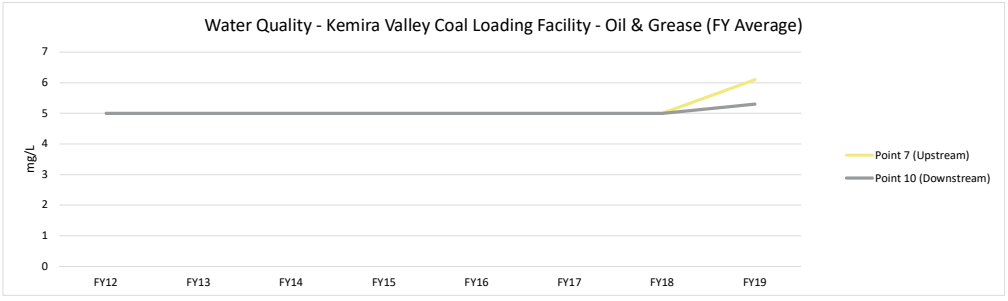
Kemira Valley Coal Loading Facility - TSS

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Point 7 (Upstream)					5	99	6	9	13	10	61	41	
Point 10 (Downstream)					6	100	12	10	11	9	87.16	39.8	



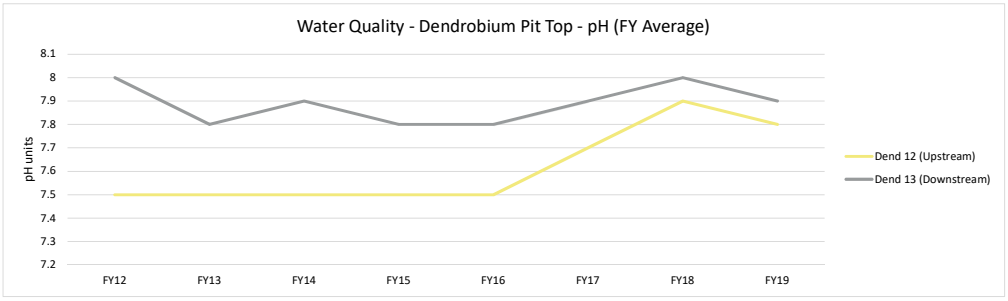
Kemira Valley Coal Loading Facility - Oil & Grease

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Point 7 (Upstream)					5	5	5	5	5	5	5	6.1	
Point 10 (Downstream)					5	5	5	5	5	5	5	5.3	



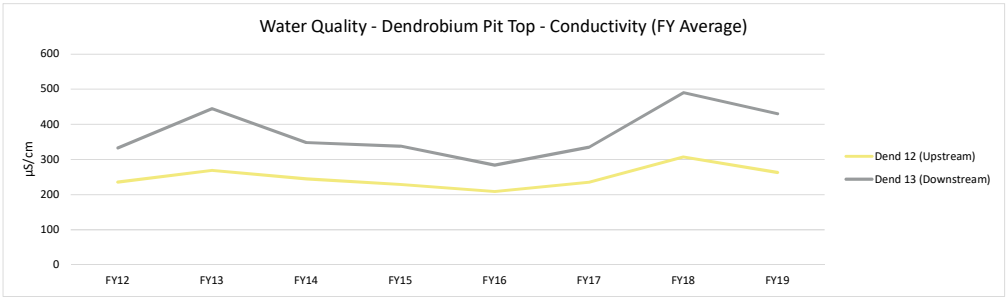
Dendrobium Pit Top - pH

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Dend 12 (Upstream)					7.5	7.5	7.5	7.5	7.5	7.7	7.9	7.8	
Dend 13 (Downstream)					8	7.8	7.9	7.8	7.8	7.9	8	7.9	



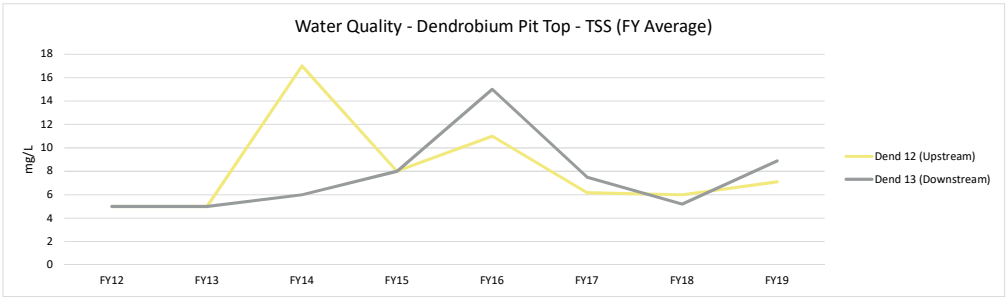
Dendrobium Pit Top - Conductivity

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Dend 12 (Upstream)					236	269	245	229	209	235	307	263	
Dend 13 (Downstream)					333	445	348	338	284	335	490	431	



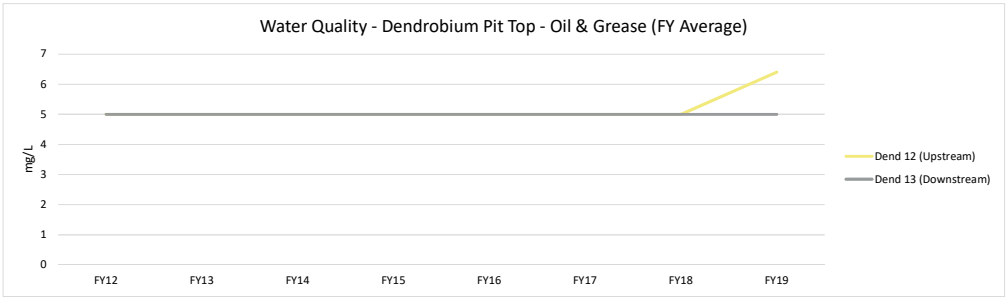
Dendrobium Pit Top - TSS

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Dend 12 (Upstream)					5	5	17	8	11	6	6	7	
Dend 13 (Downstream)					5	5	6	8	15	8	5	9	



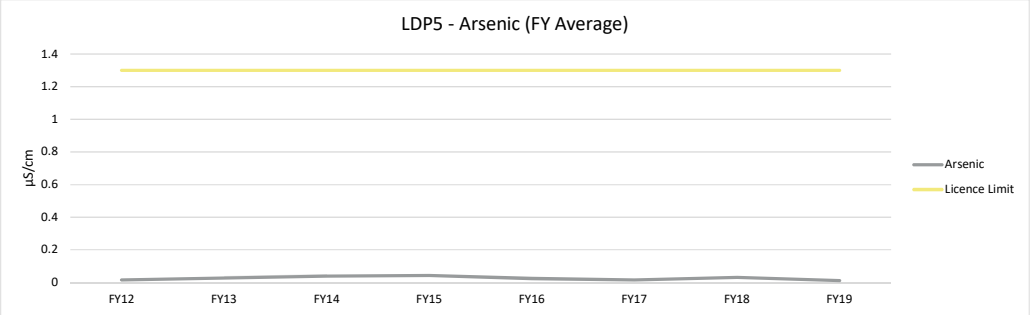
Dendrobium Pit Top - Oil & Grease

	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Amenity Goal
Dend 12 (Upstream)					5	5	5	5	5	5	5	6.4	
Dend 13 (Downstream)					5	5	5	5	5	5	5	5	

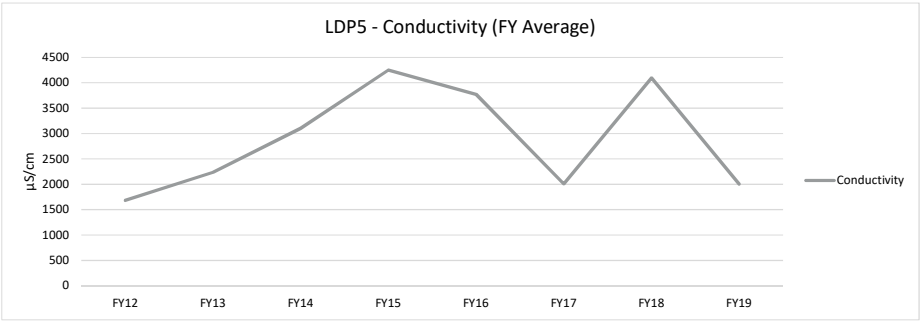


LDP5

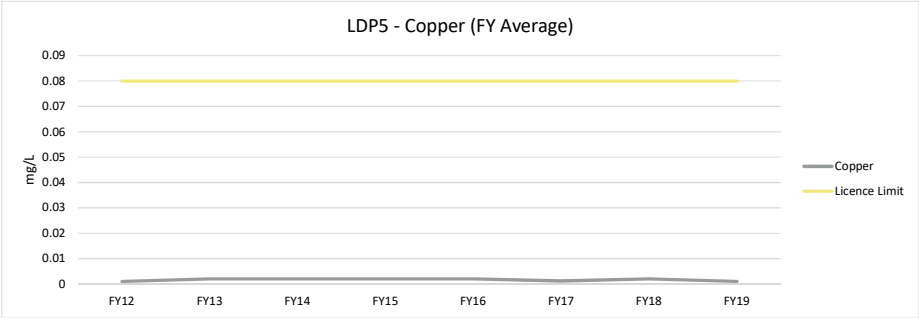
	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Arsenic					0.016	0.028	0.038	0.043	0.024	0.015	0.031	0.011
Licence Limit					1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3



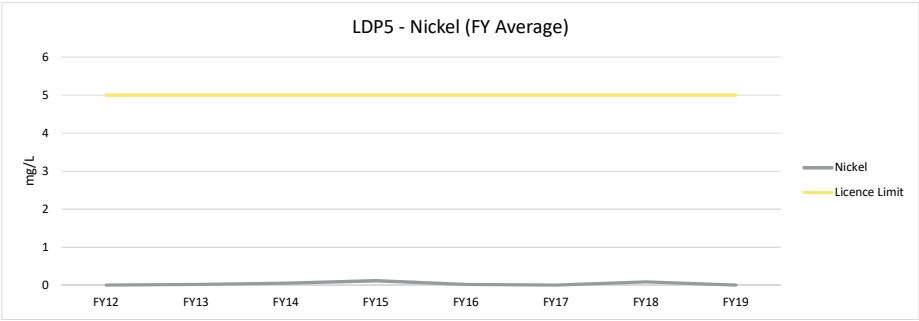
	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Conductivity					1683	2235	3104	4250	3773	2011	4096	2005



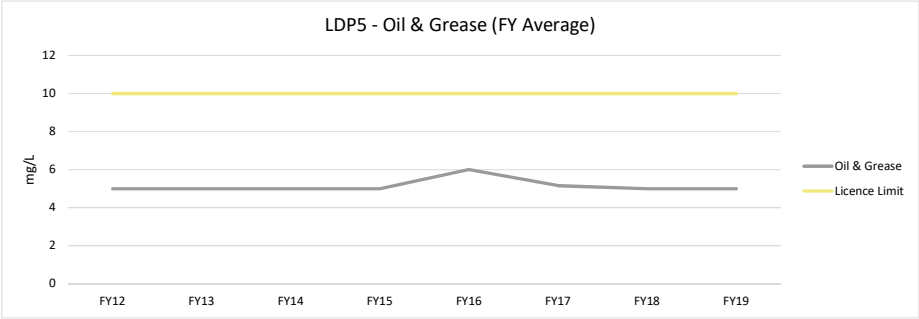
	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Copper					0.001	0.002	0.002	0.002	0.002	0.001	0.002	0.001
Licence Li	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08



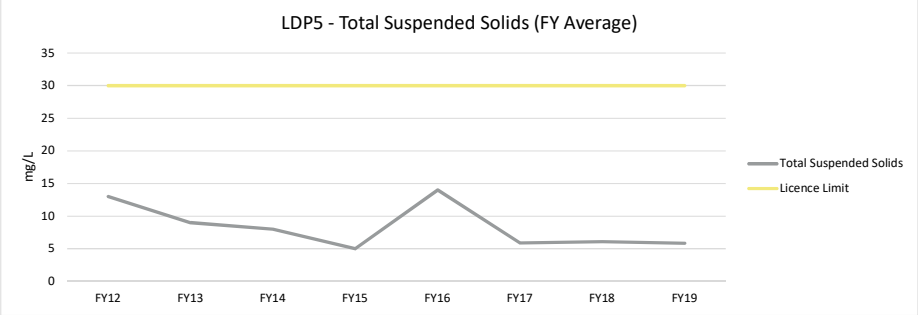
	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Nickel					0.01	0.025	0.057	0.122	0.026	0.009	0.091	0.014
Licence Li	5	5	5	5	5	5	5	5	5	5	5	5



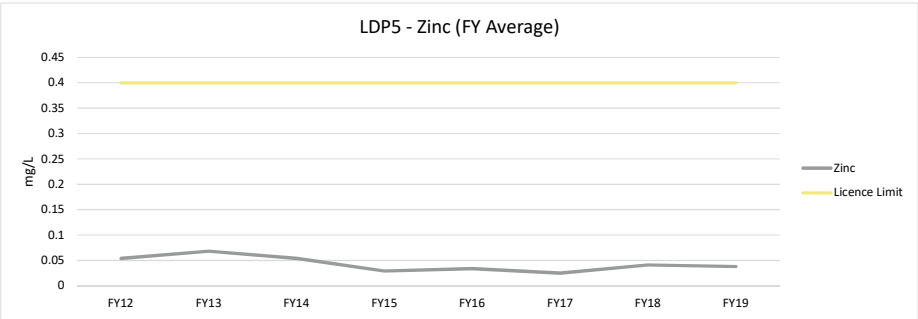
	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Oil & Grease					5	5	5	5	6	5.16	5	5
Licence Li	10	10	10	10	10	10	10	10	10	10	10	10



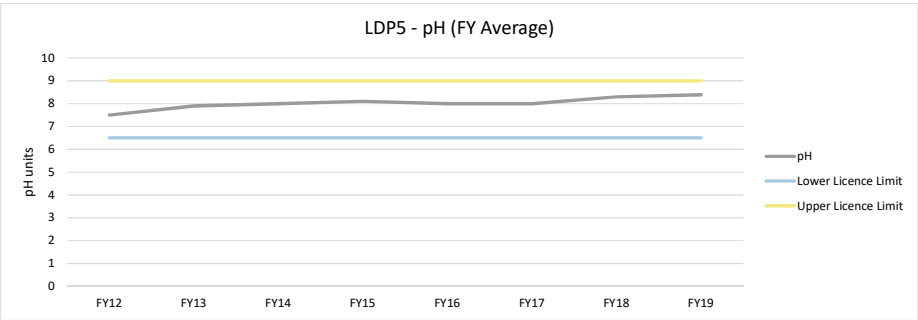
	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Total Suspended Solids					13	9	8	5	14	6	6.1	5.8
Licence Li	30	30	30	30	30	30	30	30	30	30	30	30



	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
Zinc					0.054	0.068	0.054	0.029	0.034	0.025	0.041	0.038
Licence Li	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

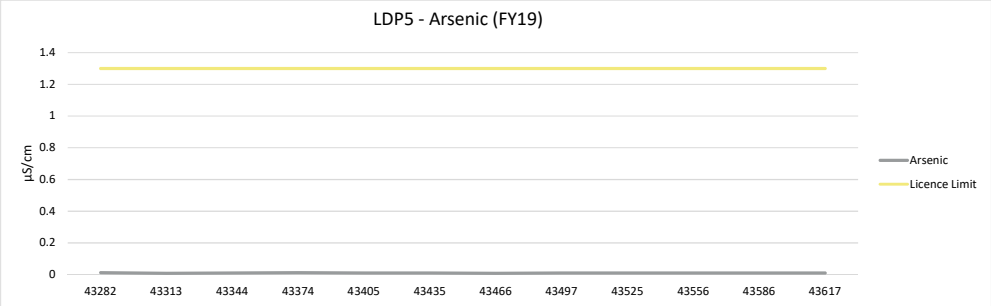


	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
pH					7.5	7.9	8	8.1	8	8	8.3	8.4
Lower Lic	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Upper Lic	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0

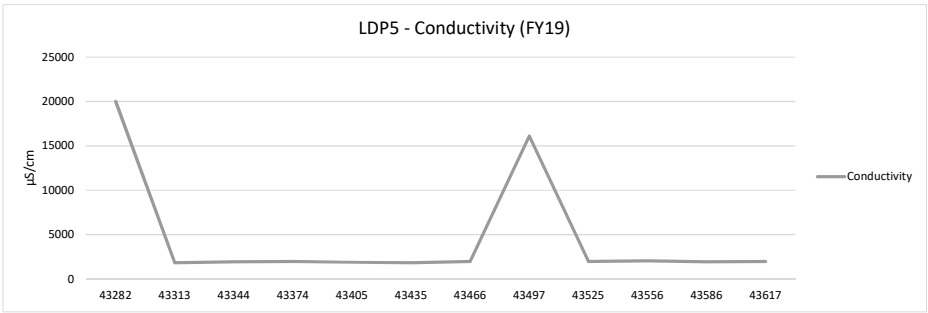


LDP5 FY19

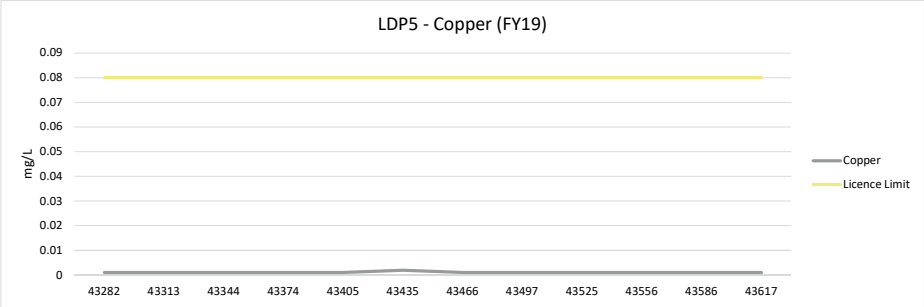
	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Arsenic	0.013	0.009	0.011	0.012	0.010	0.010	0.009	0.011	0.011	0.010	0.010	0.010
Licence Limit	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3



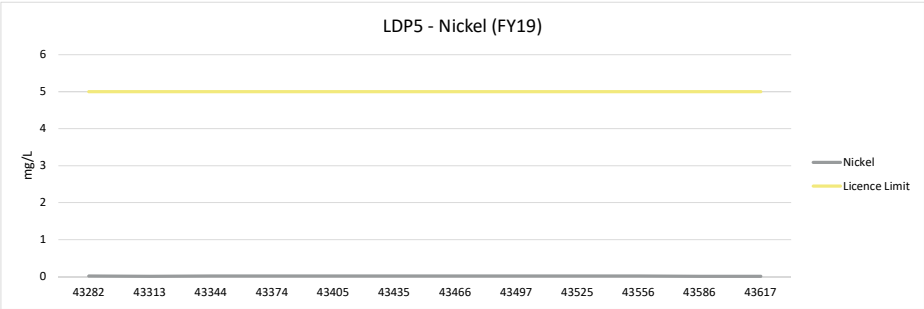
	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Conductivity	20000	1840	1940	1960	1890	1850	1970	16100	1990	2050	1940	1960



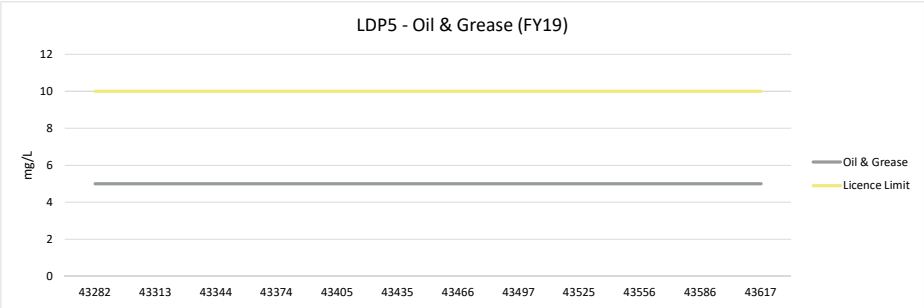
	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Copper	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Licence Limit	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08



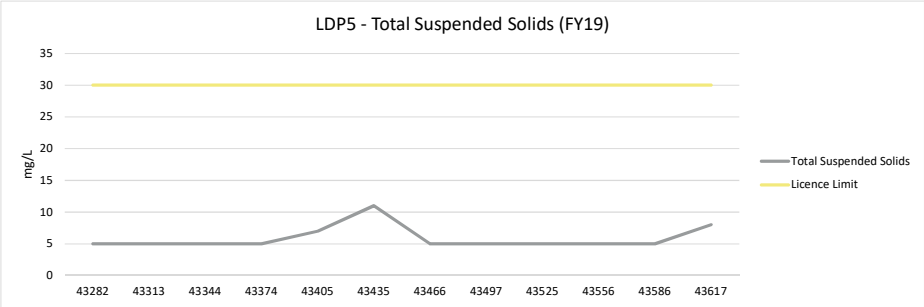
	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Nickel	0.013	0.011	0.021	0.014	0.013	0.014	0.019	0.021	0.013	0.014	0.011	0.011
Licence Limit	5	5	5	5	5	5	5	5	5	5	5	5



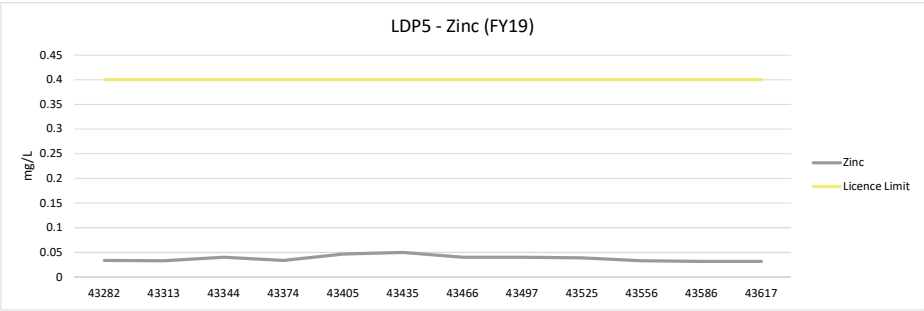
	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Oil & Grease	5	5	5	5	5	5	5	5	5	5	5	5
Licence Limit	10	10	10	10	10	10	10	10	10	10	10	10



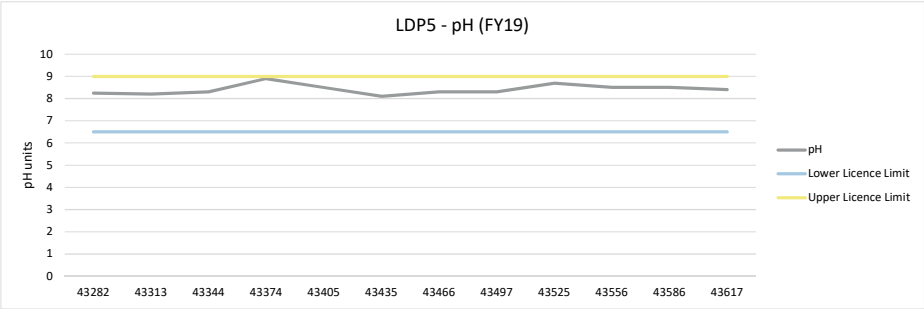
	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Total Suspende	5	5	5	5	7	11	5	5	5	5	5	8.0
Licence Limit	30	30	30	30	30	30	30	30	30	30	30	30



	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Zinc	0.034	0.033	0.04	0.034	0.047	0.05	0.04	0.04	0.039	0.033	0.032	0.032
Licence Limit	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4



	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
pH	8.25	8.2	8.3	8.9	8.5	8.1	8.3	8.3	8.7	8.5	8.5	8.4
Lower Licence	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Upper Licence	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0



APPENDIX F: PROGRESS AGAINST ACTIONS IDENTIFIED IN THE 2017/2018 INDEPENDENT ENVIRONMENTAL AUDIT AT DENDROBIUM MINE

Appendix F: Progress against actions identified in the 2017/2018 Independent Environmental Audit at Dendrobium Mine

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
Sch.2, Con 1	The Applicant shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.	Some exceedances of monitoring criteria for noise and water quality have been reported during the audit period, but are not considered by the auditor to be as a result of any systematic inadequacy of measures or effort. Stakeholders are claiming Area 3B longwalls may causing significant biodiversity impact to swamps, creeks and catchment yield losses from Special Areas due to inadequacy of the approved TARPs. The suitability of offsets secured by the mine is also being questioned. Refer Subsidence Impact Management.	O	Review of Environmental TARPs in full consultation with WaterNSW and DP&E. CMA - Layout for LW13 - 19 may need to be reviewed after TARP review if necessary.	In its advice to the Department of Planning and Environment, the Independent Expert Panel for Mining in the Catchment (27 April 2018) made the following conclusions: - The Panel does not have any evidence relating to loss of water that constitutes an exceedance of approval conditions - Modelling of water flows for Longwalls 16 - 18 do not provide strong evidence that there would be a breach of approval conditions Conditions 11 and 12 of the Longwall 16 SMP Approval requires the Swamp and Watercourse Management Plans be revised prior to the extraction of Longwall 15, including updating the TARPs taking into account advice from the Independent Expert Panel.	The Swamp and Watercourse Management Plans have been revised and approved. Closed
Sch.2, Con 9	The Applicant shall ensure that monitoring programs, management plans and the Environmental Management Strategy, as in existence at the date of modification of consent in November 2008, continue to be implemented (to the satisfaction of the Secretary) until replaced by monitoring programs and management plans approved in accordance with the conditions of this consent.	Monitoring programs, management plans and the Environmental Management Strategy were reviewed following the 2014 IEA and updated as required and continue to be implemented as further discussed against relevant conditions of this approval. However, some areas for review have been suggested in relation to the adequacy of monitoring programs and management plans have been raised by the auditor particularly in relation to Subsidence Management.	O	Refer to ANCs and observations provided against several conditions below.	Noted	Closed

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
Sch.3, Con 3	The Applicant shall ensure the development does not result in reduction (other than negligible reduction) in the quality or quantity of surface water or groundwater inflows to Lake Cordeaux or Lake Avon or surface water inflow to the Cordeaux River at its confluence with Wongawilli Creek, to the satisfaction of the Secretary.	FY17: Flow and catchment yield modelling assessment indicates that the headwater catchments at sites within DC13, Donald Castle Creek and WC21 have been affected by under-mining. Effects are not clearly observed in downstream catchments of both Donald Castle Creek and Wongawilli Creek. The FY17 AR reports a discernible loss of flows along the watercourse LA4, which is a tributary of Lake Avon. The previously determined TARPs have not been triggered, however flow behaviour during Longwall 12 was anomalous, including the occurrence of cease-to-flow conditions, indicative of a mining effect.	O	Review level of impacts to receiving watercourses from impacts to headwater catchments and any need for corrective actions. CMA - review of modelled groundwater leakage losses from Avon & Cordeaux Dams (refer to WaterNSW letter dated 11/9/17) based on time lag analysis between underground water make and rainfall + GW chemistry/age & source analysis to resolve this. CMA Layout for LW13 & 19 may need to be reviewed after TARP review if necessary.	Dendrobium Mine has a mature, peer reviewed regional-scale numerical groundwater flow model. Modelled maximum annualised take from Wongawilli Creek is 0.03 ML/d and 0.01 ML/d from Donalds Castle Creek. These are relatively small takes; partly this is due to the distance to Donalds Castle Creek (to the north, beyond Longwall 15) and because of the longwall being set-back from Wongawilli Creek to the east. Incremental surface water take due to conditions or performance criteria in the consent or SMP approval. The vast majority of impacts align with predictions and were expected when mining was approved. For the limited number of impacts that were greater than predicted, DPE has determined it does not consider these to have breached the development consent or SMP conditions. For these impacts, DPE has directed South32 to undertake remediation in accordance with plans approved in consultation with agencies. South32 has committed to doing so, and a Rehabilitation Plan for WC21 and Donalds Castle Creek has been submitted to DPE.	Closed
Sch.3, Con 4	Prior to carrying out any underground mining operations that could cause subsidence in either Area 3A, Area 3B or Area 3C, the Applicant shall prepare a Watercourse Impact Monitoring, Management and Contingency Plan to the satisfaction of the Secretary. Each such Plan must: a) demonstrate how the subsidence impact limits in conditions 1 - 3 are to be met; b) include a monitoring program and reporting mechanisms to enable close and ongoing review by the Department and DRE DPI of the subsidence effects and impacts (individual and cumulative) on Wongawilli Creek, Sandy Creek and Sandy Creek Waterfall; c) include a general monitoring and reporting program addressing	The current approved WIMMCP addresses the requirements of this condition and is applicable to the mining activities undertaken during the reporting period for Longwalls 11 - 13. The results of the Watercourse Impact Monitoring program are reported in detail in the End of Panel Reports and summarised in the Annual Environmental Monitoring Report. The Audit team observed examples of subsidence monitoring locations in the field. The Auditor is satisfied that DMD is implementing the approved WIMMCP. Several Corrective Management Actions (CMAs) were triggered during the current audit period by the Dendrobium WIMMCP and TARP which required back filling of surface cracks across fire trails and review	O	CMA – Consider revision of SIMMCP and WIMMCP TARPs with reference to WaterNSW requests (letter to ERM dated 11/09/17) and review against Performance Measures (PM) for Swamps, Watercourses & Water Storages. CMA - Layout for LW13 & 19 may need to be reviewed after TARP review if necessary.	In its advice to the Department of Planning and Environment, the Independent Expert Panel for Mining in the Catchment (27 April 2018) made the following conclusions: - The Panel does not have any evidence relating to loss of water that constitutes an exceedance of approval conditions - Modelling of water flows for Longwalls 16 - 18 do not provide strong evidence that there would be a breach of approval conditions Conditions 11 and 12 of the Longwall 16 SMP Approval requires the Swamp and Watercourse Management Plans be revised prior to the extraction of Longwall 15, including updating the TARPs taking into account advice from the Independent Expert Panel.	The Swamp and Watercourse Management Plans have been revised and approved. Closed

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
	surface water levels, water flows, water quality, surface slope and gradient, erodibility, aquatic flora and fauna (including Macquarie Perch, any other threatened aquatic species and their habitats) and ecosystem function; d) include a management plan for avoiding, minimising, mitigating and remediating impacts on watercourses, which includes a tabular contingency plan (based on the Trigger Action Response Plan structure) focusing on measures for remediating both predicted and unpredicted impacts; e) address third and higher order streams individually but address first and second order streams collectively; f) be prepared in consultation with OEH DECC, SCA and DRE DPI; g) incorporate means of updating the plan	of surface water groundwater impacts associated with rock bar cracking, flow path diversion and water quality and storage loss impacts to Avon reservoir and its feeder tributaries. Overall, the approved SMP/SIMMCP/WIMMCPs do not appear to be performing reasonably well in regard to the predicted subsidence and management of impacts. The auditor notes that although the proposed Swamp Research and Rehabilitation Plan (SRRP) and on-going monitoring of impacted features is occurring, it would appear that the approved Swamp and Watercourse TARPS are likely too aggressive to allow a reasonable assessment of actual impacts that allow appropriate responses to occur in a timely manner.				
Sch.3, Con 6	Prior to carrying out any underground mining operations that could cause subsidence in either Area 3A, Area 3B or Area 3C, the Applicant shall prepare a Swamp Impact Monitoring, Management and Contingency Plan to the satisfaction of the Secretary. Each such Plan must: a) demonstrate how the subsidence impact limits in condition 5 are to be met; b) include a monitoring program and reporting mechanisms to enable close and ongoing review by the Department and DRE DPI of the subsidence effects and impacts (individual and cumulative) of each Area 3A longwall on Swamp 15a; c) include a general monitoring and reporting program addressing surface water levels, near- surface groundwater levels, water quality, surface slope and gradient, erodibility, flora and ecosystem function;	Refer to Watercourse Impact Management - Condition 4 Subsidence Impact Management Compliance Assessment in Annex B.	O	Refer to Watercourse Impact Management - Condition 4 Recommendations above.	As above	Closed

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
	d) include a management plan for avoiding, minimising, mitigating and remediating impacts on swamps, which includes a tabular contingency plan (based on the Trigger Action Response Plan structure) focusing on measures for remediating both predicted and unpredicted impacts; e) address headwater and valley infill swamps separately and address each swamp individually; f) be prepared in consultation with OEH DECC, SCA and DRE DPI; g) incorporate means of updating the plan based on experience gained as mining progresses; h) be approved prior to the carrying out of any underground mining operations that could cause subsidence impacts on swamps in the relevant Area; and i) be implemented to the satisfaction of the Secretary.					
Sch.3, Con 8	The SMPs prepared under condition 7 for Areas 3B and 3C must: a) include a mine plan for the relevant Area; b) include a detailed subsidence impact assessment, clearly setting out all predicted subsidence effects, subsidence impacts and environmental consequences; c) include a minimum of 2 years of baseline data, collected at appropriate frequency and scale, for all significant natural features; d) identify and assess the significance of all natural features located within 600 m of the edge of secondary extraction; e) distinguish between, clearly describe and adequately quantify all subsidence effects, subsidence impacts and environmental consequences; f) propose limits on subsidence impacts and environmental consequences to be applied within	As discussed in the main body of this IEA report, WaterNSW provided some very detailed and specific feedback to the audit process with regard to aspects of SMP and adequacy of TARPs. These were provided to South32 for consideration and considered further in review of relevant compliance conditions.	O	Consider WaterNSW feedback and preparation of a response. Make any necessary changes to current and future SMP and TARPs where deemed appropriate.	Conditions 11 and 12 of the Longwall 16 SMP Approval requires the Swamp and Watercourse Management Plans be revised prior to the extraction of Longwall 15, including updating the TARPs taking into account advice from the Independent Expert Panel. WaterNSW feedback will be considered in the revisions of the SMP and TARPs.	The Swamp and Watercourse Management Plans have been revised and approved Closed

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
	the relevant Area; g) be otherwise prepared in accordance with any guidelines for SMPs developed by the Department and/or DPI DRE; h) be approved prior to the carrying out of any underground mining operations that could cause subsidence in the relevant Area; and i) be implemented to the satisfaction of the Secretary and the DRE Director-General of DPI.					
Sch.3, Con 10	The Applicant shall include a comprehensive summary, analysis and discussion of the results of monitoring of subsidence effects, subsidence impacts and environmental consequences in each AEMR.	During the document review, it became apparent that that current status of proposed CMAs and SSRP for the Swamps was not clearly described in the AEMR/AR.	O	Include a section in the AEMR/AR providing the status of subsidence impact CMAs (complete or proposed), noting this could be tabulated. A remediation and CMA works register on the website would also assist future auditors.	Noted-In future the AR will include CMA in the subsidence section. Annual Reviews are available on the website.	Included in Annual Reviews Closed
Sch.4, Con 1	The Applicant shall ensure that the noise generated at the surface facilities does not exceed the noise impact assessment criteria in Table 1 at any residence on privately-owned land, or on more than 25% of any privately-owned land. The applicable criteria for any residence not listed in Table 1 shall be the criteria applying at the nearest listed residence.	FY15: Four exceedances of the LAeq, 15 minute noise criteria during this period at R39a (two during the day and two during the evening). The source of the exceedances were due to rail movements within KVCLF (train idling) and vehicles working on the stockpile. FY16: There were two exceedances of the LAeq, 15 minute noise criteria during the reporting period at R39a, however the mine noise level remained below the dominant noise (insects, birds and bats).	NC	Continue to implement all reasonable and feasible noise mitigation measures with a view to ongoing improvement.	Noted noise mitigation measures will continue to be implemented and reviewed.	100% compliance against criteria was achieved in FY18. Two exceedances of criteria reported in FY19.

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
Sch.4, Con 12	The Applicant shall ensure all surface water discharges from the surface facilities: a) meet the relevant ANZECC water quality objectives for the protection of aquatic ecosystems and water quality of existing receiving waters; and b) comply with the discharge limits (both volume and quality) set for the development in any EPL.	An Oil & Grease exceedance of EPL Water Quality Criteria was appropriately reported during the audit period. The source of the recorded levels was not able to be identified.	NC	No further action required.	Noted	Closed
Sch.4, Con13	The Applicant shall prepare and implement a Water Management Plan for the surface facilities to the satisfaction of the Secretary. This plan must: a) be submitted to the Secretary for approval by 30 April 2009; b) be prepared in consultation with EPA DECC, SCA and NOW DWE by suitably qualified expert/s whose appointment/s have been approved by the Secretary; and c) include a: Site Water Balance; Erosion and Sediment Control Plan; Surface Water Monitoring Program; and Surface and Ground Water Response Plan.	Inspection of the Dendrobium Pit Top Site identified instances where oil cans / waste oil cans were not being stored in bunded areas. Surface staining was observed in numerous locations on the concrete apron, noting the significant amount of cracking of the apron providing a potential pathway for contamination of underlying soils.	NC	Ensure all oils and chemicals are appropriately stored in contained and covered areas in accordance with the WMP.	Noted – oils to only be stored in designated oily areas. Damaged concrete areas are progressively being resealed.	Issue requiring ongoing management. Closed
Sch.4, Con 14	The Site Water Balance must: (a) include details of: sources and security of water supply; water use on site; water intercepted by mining operations; water management on site; off-site water transfers and water stored or disposed of underground; reporting procedures; and (b) describe measures to minimise water use by the development.	WaterNSW provided some very detailed and specific feedback to the audit process with regard to the site water balance and associated modelling. This feedback was provided to South32 for consideration.	O	Consider the WaterNSW feedback and preparation of a response. Make any necessary changes to current and future site water balance modelling if deemed necessary.	Dendrobium Mine has a mature, peer reviewed regional-scale numerical groundwater flow model and Total Mine Water Budget. Condition 13 of the Longwall 16 SMP Approval requires the Dendrobium Regional Groundwater Model be revised prior to the extraction of Longwall 15, taking into account advice from the Independent Expert Panel. WaterNSW feedback will be considered in the revisions of the Dendrobium Regional Groundwater Model.	A review of the Groundwater Model was done for the LW16 SMP. Closed

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
Sch.4, Con 15	The Erosion and Sediment Control Plan must: (a) be consistent with the requirements of the Managing Urban Stormwater: Soils and Construction Manual (Landcom 2004, or its latest version); (b) identify activities that could cause soil erosion and generate sediment; (c) describe measures to minimise soil erosion and the potential for transport of sediment to downstream waters; (d) describe the location, function, and capacity of erosion and sediment control structures; and (e) describe what measures would be implemented to monitor and maintain the structures over time.	The Erosion and Sediment Control Plan (ESCP) is generally consistent with Landcom 2004 and meets the other requirements of this condition. The ESCP contained in the WMP does not specifically reference or direct requirements for ERSED controls to be in accordance with Landcom, 2004.	O	Ensure any updated ESCP specifically directs that controls are to be designed in accordance with the requirements of Landcom, 2004, or its latest version.	Specific reference to the Urban Stormwater Soils and Construction Manual has been included in the management plan to be resubmitted in July 2018.	Closed
Sch.4, Con 17	The Surface and Ground Water Response Plan must describe what measures and/or procedures would be implemented to: (a) respond to any exceedances of the surface water, stream health, and groundwater assessment criteria; and (b) mitigate and/or offset any adverse impacts on groundwater dependent ecosystems, aquatic ecosystems or riparian vegetation.	Trigger Action Response Plans (TARP) updated in Watercourse Impact Monitoring management and Contingency Plan (May 2015); Swamp Remediation and Research Program for Area 3A and 3B still pending approval. The SRRP was updated in August 2016 based on DP&E feedback (dated 29- June 16) and further discussion.	O	Confirm status of SRRP Approval.	To address the Longwall 14-15 SMP Conditions, Revision 1.6 of the Swamp Impact Monitoring Management and Contingency Plan was submitted to the Department of Planning and Environment (DPE) as part of the Longwall 16 SMP in October 2017. To address the Longwall 14-15 SMP Conditions, Revision 1.6 of the Watercourse Impact Monitoring Management and Contingency Plan was submitted to DPE as part of the Longwall 16 SMP in October 2017. The Dendrobium Swamp Rehabilitation Research Program (SRRP) was submitted to DPE in July 2015. The DPE wrote to Illawarra Coal June 2016 indicating that the SRRP generally satisfies condition 15 of the SMP approval. A revised SRRP was submitted to DPE August 2016.	Closed

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
Environmental Protection Licence 3241						
L2.1	For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.	Exceedance at Point 5, FY16 AER, oil and grease result over EPL 100 percentile limit. 23 July 2015 – oil and grease of 12mg/L reported through annual return to the EPL and also via the 14 day monitoring report. DRM reported as an unknown source of high reading, no further action required.	NC	No further action required	Noted	Closed
L2.4	Water and/or Land Concentration Limits [Table]	Exceedance reported at Point 5, FY16 AER as discussed at L2.1 above.	NC	No further action required	Noted	Closed
O1.1	Licensed activities must be carried out in a competent manner. This includes: a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.	The auditor observed an area for improvement in relation to housekeeping and storage of waste hydrocarbons at the Dendrobium Mine Pit Top yard and laydown. One example included a skip with oil drums not provided with secondary containment and observed staining in this area. Other oil cans were also seen discarded in an uncontrolled manner. Monitoring reports reviewed reference the relevant conditions.	NC	The auditor observed an area for improvement in relation to housekeeping and storage of waste hydrocarbons at the Dendrobium Mine Pit Top yard and laydown. One example included a skip with oil drums not provided with secondary containment and observed staining in this area. Other oil cans were also seen discarded in an uncontrolled manner.	A project is currently underway to review Dendrobiums storage and laydown areas, this includes removing materials that are non-longer required or could be stored at a more appropriate location (this includes hydrocarbons). A secondary Skip for waste oil cans has been provided adjacent to the workshop (located in an area that drains to an oil separator).	Off site storage facility has been established. Closed.

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
O4.1	All liquid and non-liquid wastes resulting from activities and processes at the Dendrobium Coal Mine must be assessed, classified and managed in accordance with the EPA's Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (2008), or any other EPA document superseding this guideline.	Refer finding and recommendation for improvement at condition O1.1.	NC	As above	As above	Closed
M2.1	For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified in the other columns:	Non-compliance in AR FY16, monthly sampling of point 6 and point 18 required 12 sampling events, but only 11 samples collected for the year. Missed one monthly sample at each point due to faulty equipment.	NC	No further action required, noting the mine self-reported this as an NC.	Noted	Closed
M6.1	For each discharge point or utilisation area specified below, the licensee must monitor: a) the volume of liquids discharged to water or applied to the area; b) the mass of solids applied to the area; c) the mass of pollutants emitted to the air; at the frequency and using the method and units of measure, specified below.	Continuous monitoring of the volume of liquids discharged was undertaken throughout the audit period. The only exception was during some periods of flow monitoring equipment failure.	ANC	No further action is required.	Noted	Closed

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
SMP Approval Compliance Table (Area 3B 2013)						
C6	The Applicant shall prepare and implement a Biodiversity Offset Strategy to the satisfaction of the Director- General. Initially, the Strategy must compensate for the impacts of Longwalls 9 to 13 on upland swamps and must: (e) propose a process whereby the actual impacts of the development on upland swamps are regularly reviewed (at least every 2 years) against predicted impacts and reported on to all affected agencies, including detailed consideration of the: predictions in the SMP; performance measures in Table 1; monitoring results; application, success and predicted success of measures to mitigate or remediate subsidence impacts	No reporting is evident that describes how the remedial actions (CMAs) from the TARP in the previous year are being measured and are the actions succeeding in mitigating the impacts predicted (refer FY16 AR stating that monitoring indicated TARP actions were required, but no mention in AR FY17 of how those actions performed).	O	Consider reporting on the performance of CMA in the Annual Reviews.	Noted CMAs will be reported in the AR.	CMAs have been reported in the Annual Reviews Closed
C9	The Applicant shall ensure that the development does not cause any exceedance of the performance measures in Table 1, to the satisfaction of the Director-General. Table 1: Subsidence Impact Performance Measures	Letter from DP&E to South32 Illawarra Coal (ref: 16/08860; dated: 16/12/2016) states that the DP&E considers the Strategic Biodiversity Offset document fulfils the requirements of this condition and Condition 6 above. Review of detailed monitoring results has focussed on the End of Panel Reports for Longwalls 11 and 12. Letter from WaterNSW to ERM (11/9/17) notes previous correspondence to DP&E that several Performance Measures for Swamps, Watercourses and Water Storage losses have probably been exceeded in Area 3B regardless of TARP triggers indicated in End of Panel Reports and Annual Reviews. Conclusions based on independent expert reviews of available data. Reported impacts summarised below: Swamps Dendrobium Area 3B Longwall 12 End of Panel Report (May 2017) (South32) states that terrestrial ecology	O	CMA – review and where necessary consider any necessary revision of SIMMCP and WIMMCP TARPs with reference to WaterNSW requests (letter to ERM dated 11/09/17) and review against PM for Swamps, Watercourses & Water Storages. CMA - Layout for LW13 & 19 may need to be reviewed pending above plan reviews	As above.	Closed

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
		monitoring is undertaken at swamps 1, 15B, 15A, 1A, 1B and 5. It reports on page 35 that swamps 1A and 5 have observed a decline of a vegetation community type greater than the comparative data, which the report states is a Level 2 TARP observation. These impacts are reported similarly in the preceding Longwall 11 End of Panel report (page 33) and LW12 where Non-executive Level 3 TARP triggered for Swamps 1a,3,5,10. (Eco-system impact indicator only and not a breach of any Performance Measure). It is noted however, that the approved TARPs allow four consecutive monitoring periods (i.e. years after mining) of decline in swamp size & biodiversity against control swamps before the impact is considered to be > Minor. Watercourses Surface water quality was reported as meeting the approved TARP values for both Donalds Castle and Wongawilli Creeks (End of Panel Report-Longwall 12, page 43) (level 2 and level 1 TARP respectively).End of Panel Reports for longwalls 11 and 12 also report no surface impacts to Donalds Castle or Wongawilli Creeks. Sections of Donalds Castle Creek tributaries and WC21 have dried out since undermining. Claiming no impact on downstream creek therefore debatable and require CMA on whether the current approved TARPs adequate for Performance Measure (PM) exceedance assessment. Water storages The End of Panel Report-Longwall 12, page 44) discusses sub catchment approved TARP levels being met however no whole-of-creek magnitude TARPs being reached (when considering the 'overall catchment' of Donalds Castle and Wongawilli Creeks). It also states that flows into				

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
		the Avon Reservoir are below significant levels (page 33). Estimates of storage losses being negligible in light of independent expert review of groundwater flows to the mine require modelling and impacts to be reviewed. Shallow VWP are considered to be not recording surface water table levels correctly and require verification around Dams.				
C10	Rehabilitation If the Applicant does not meet the performance measures in Table 1, then following consultation with OEH, SCA and DRE, the Director-General may issue the Applicant with a direction in writing to undertake actions or measures to mitigate or remediate subsidence impacts and/or associated environmental consequences. The Applicant must implement the direction in accordance with its terms and requirements, in consultation with the Director-General and affected agencies.	Two instances of Impact Performance Measure exceedances are identified in the audit against condition 9 (above) in relation to Swamp 5 and Surface water quality for both Donalds Castle and Wongawilli Creeks. However, in interview the Environment Superintendent it was identified there to have not been any exceedences of the performance criteria. Hence, it is the auditors understanding that these exceedances have not been acted upon.	O	As above	As above	Closed
C15	The Applicant shall prepare and implement a Swamp Rehabilitation Research Program to the satisfaction of the Director-General. This program must: be prepared in consultation with OEH, SCA and ORE; be submitted by 31 October 2013 to the Director- General for approval; investigate methods to rehabilitate swamps subject to subsidence impacts and environmental consequences within Areas 3A and 3B, with the aim of restoring groundwater levels and groundwater recharge response behaviour to pre- mining levels; 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; provide for the expenditure of at least $3.5 million over this period; and include a schedule for subsequent trials, development of work plans and ongoing	The Manager Approvals indicated that the DP&E have not yet approved the Swamp Rehabilitation Research Program – Dendrobium Area 3B (August 2016) (SRRP). section 3 of the SRRP describes consultation with NSW Government agencies. page 2 and section 3 state that a draft report was submitted to DP&E, WaterNSW, OEH and T&I. the SRRP contains description of such research activities (section 5). SRRP sections 5.8-5.11. Dollar ($) values are quoted as per campaign or per day however a sum total is not expressed. section 5.8 only contains a statement referencing that subsequent trials may be required with no schedule outlined.	ANC	Consideration should be given to identifying what is actual expenditure in keeping with the assumed intent of this condition. Establish and document a schedule for subsequent trials, development of work plans and ongoing reporting.	Costs to April 2018: • Longwall 9 height of fracture research applicable to swamp rehabilitation $736k • Piezometer and soil moisture data collection and maintenance $132k ($4,000 per month July 2015 – April 2018) • Electrical resistivity studies (Swamp 13) $40k • Swamp 14 paired monitoring holes $86k • Swamp 11 paired monitoring holes $86k • Swamp Rehabilitation Research Trial Swamp 1b: 3 characterisation holes completed to date $150k Forecast costs next 12 months: • Electrical resistivity studies (Swamps 14 and 1b) $100k • Giant dragonfly study Illawarra Coal has commenced research into a regional understanding of the context and cumulative impact of the Dendrobium Mine on populations of Littlejohns tree frog and Giant	Programs either undertaken, ongoing or yet to be commenced. Progress of projects listed is tracked. Closed.

Item No	Assessment Requirement	Comment	Type	Response/Action	Illawarra Coal Response/Time Frame	Status
	reporting.				Dragonfly. A program of electrical resistivity testing was provided to DPE January 2018. The surveys have commenced and will be undertaken in Swamps 1b, 13 and 14 at Dendrobium Mine. The aim of the survey is to detect changes, if any, in subsurface conditions that may be due to changes in saturation and/or rock matrix conditions. The results of the survey will be calibrated with available data from groundwater bores and soil located on and near the resistivity transects. The following surveys are proposed: • Pre-rehabilitation survey of Swamp 1b • Post-rehabilitation survey of Swamp 1b • 1st baseline pre-mining survey in Swamps 13 (complete) and 14 • 2nd baseline premining survey in Swamps 13 and 14 • 1st post mining survey Longwall 14 • 2nd post mining survey Longwall 15	
Statement of Commitments						
SOC3	Subsidence Impact – Avoidance, Mitigation and Rehabilitation If the monitoring program identifies impacts to natural features that exceed those predicted, the following contingent measures will be implemented.	Refer to Annex A3 SMP Compliance conditions above re; Swamp impacts and water quality, and Annex B Subsidence Impact Management Compliance Assessment.	O	Refer SMP Condition 9 above.	As above	Closed
SOC4	Swamp Contingency Plan Prior to the commencement of mining within Dendrobium Area 3A, 3B and 3C, Illawarra Coal will prepare a swamp remediation contingency plan for all swamps within each area.	Swamp Research and Rehabilitation Plan (SRRP) first submitted to the DPE in May 2013 for regulatory approval, however not yet approved. The SRRP was updated in August 2016 based on DP&E feedback (dated 29-June 16) and further discussion.	O	Confirm status of SRRP Approval.	As above	Closed