Illawarra Coal
Dendrobium Mine & Cordeaux Colliery

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Annual Environmental Management Report

1 July 2013 to 30 June 2014

Title Block

Name of Mine	Dendrobium Mine and Cordeaux Colliery		
Titles/Mining Leases	ML1510, CCL768, ML1566, ML25, ML28, ML23, ML30, ML24, Lease No. 66 portion D1106, MPL205		
MOP Commnecment Date Dendrobium	October 2012	MOP Completion Date	September 2019
MOP Commnecment Date Cordeaux	October 2012	MOP Completion Date	October 2019
AEMR Commencment Date	01 July 2013	AEMR End Date	30 June 2014
Name of Leasholder	Dendrobium Coal P/L (Dendrobium Mine), Endeavour Coal P/L (Cordeaux Colliery)		
Name of Mine Operator (if different)	Dendrobium Coal P/L		
Reporting Officer	Peter McMillan, Mugunthan Kandasamy		
Title	Environment Superintedent		
Signature	(MUGUNTHAN) (P. MCMILLAN)		
Date			

General Manager Dendrobium Coal	Wayne Price
Signature & Date	27/8/14
Surface operations manager Cordeaux Colliery	Mick Loney
Signature & Date 27/8/14.	

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1. Introduction

Background

This Annual Environmental Management Report (AEMR) governs environmental management outcomes at Dendrobium Mine and Cordeaux Colliery for the period 1 July 2013 to 30 June 2014. The report has been developed in accordance with the NSW Department of Trade, Investment, Regional Infrastructure and Services (DTIRIS) 'EDG03' Guidelines to the Mining, Rehabilitation and Environmental Management Process-MREMP Guideline. The AEMR is based on the Mining Operations Plan – Mining Area 3A submitted to DTIRIS (formerly Industry and Investment NSW) in December 2009. The AEMR is submitted to relevant agencies as per the requirements of Schedule 8, Condition 5 of the Dendrobium Development Consent.

A copy of the report is publicly available via the BHP Billiton website under Dendrobium Mine:
http://www.bhpbilliton.com/home/society/regulatory/Pages/default.aspx

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 wholly owned subsidiary of BHP Billiton. 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 8km west of Wollongong, NSW, on the Illawarra Escarpment. Mt Kembla village, located within 500m of the Pit Top site and has close historical links with coal mining.

The Pit Top facilities have been developed on the site previously known as Nebo Colliery, which was combined with Wongawilli Colliery in 1993 to form Elouera Colliery. The Nebo Portal site was relinquished from the ownership and responsibility of Elouera Colliery in December 2001 to enable Dendrobium Mine to acquire formal responsibility, ownership and identity of the site.

Dendrobium Mine extracts coal from the No. 3 Seam (Wongawilli Seam) of the Southern Coalfields. Three mining areas make up the approved mine plan for Dendrobium and are named Areas 1, 2, and 3 respectively. Longwall mining is currently being undertaken in Area 3 (refer to Plan 1). The mine primarily produces hard coking coal and is approved to produce up to 5.2 million tonnes per annum until 31 December 2030. The BlueScope Port Kembla Steel Works and Whyalla Steel Works are the major customers. In addition to these Australian based customers; coal is exported via the Port Kembla Coal Terminal to international markets.

Dendrobium Mine is comprised of a number of sites as detailed below.

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Dendrobium Pit Top

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)

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 (commissioned in 2007), into a rill tower and deposited onto a 150,000 tonne capacity stockpile. Coal is loaded on to 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). The Processing and Logistics Department at Illawarra Coal manage the rail operations.

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. An asset protection zone is maintained at this site. The Ventilation Shaft 1 site layout is outlined in Plan 4.

Ventilation Shaft 2/3 Site (Mining Lease 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 the No. 1 Seam coal in the coke making process at the Port Kembla Steelworks. The Processing and Logistics Department at Illawarra Coal manages the DCPP.

Cordeaux Colliery

Cordeaux Colliery is owned and operated by Endeavour Coal Pty Ltd, a wholly owned subsidiary of BHP Billiton. Coal production ceased towards the end of 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.

Introduction continued

The Cordeaux Colliery pit-top site functions as the central headquarters of Illawarra Coal's Resource Planning & Development, Environmental Field Crew, Gas and Ventilation Department and Survey Department. Dendrobium Mine's future underground mining operations consider Cordeaux Colliery pit-top site and Corrimal No. 3 shaft site to be of potentially significant strategic value. Non production sites that are of no strategic value are being progressively decommissioned and rehabilitated inline with planned arrangements.

The Cordeaux Colliery Pit Top is wholly contained within an area of approximately 10.7 Ha located within the Sydney Catchment Area (Plan 11&12). Cordeaux Colliery was serviced by four vertical shafts consisting of:

- Men and Materials (M&M) 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 mine.
- Corrimal No.2 Shaft - mine ventilation fan shaft (Ex-Corrimal Mine). This fan was used to complement ventilation flow through Cordeaux mine.

Cordeaux Colliery is considered a "zero discharge site", prohibiting liquid discharge directly to the surface lands of the Sydney Catchment Area. 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', the following activites were not undertaken (or are not relevant) during the reporting period and therefore have been excluded from this report.

- Exploration
- Land Preparation
- Construction
- Minining
- Mineral Processing/Coal Wash
- Stockpiling of Ore and Product
- Blasting
- Spontaneous Combustion
- Mine Subsidence
- Air Pollution
- Operational Noise
- Community Relations

Consents, Lease and Licences

There are a number of current approval and consent documents for the Dendrobium Mine Operations. These documents and their subsequent approval dates are listed in the following tables.

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Table 1: Development Consent Approvals associated with the Dendrobium & Cordeaux Operations (as at 30 June 2014)

Development Approvals	Approval	Expiry
DA 60-03-2001	20/11/2002	21/12/2023
MOD-11-2-2001	28/02/2002	21/12/2023
MOD-36-5-2002-I	15/08/2002	21/12/2023
60-03-2001 MOD3	28/08/2003	21/12/2023
60-03-2001 MOD4	5/4/2006	21/12/2023
60-03-2001 MOD5	30/11/2006	21/12/2023
60-03-2001 MOD6	8/12/2008	31/12/2030
D74/134	20/12/1974	N/A

Table 2: Mining Leases associated with the Dendrobium & Cordeaux Operations

Mining Lease/ Sub- Lease	Number	Issue Date	Expiry Date	Mine Site
Mining lease	1510	24/04/2002	24/04/2013	Dendrobium
Consolidated Coal Lease	768	29/12/2001	18/10/2010*	Dendrobium
Mining Lease	1566	7/9/2005	7/9/2026	Dendrobium
Mining Lease	ML25	31/10/75	As per CCL 768	Cordeaux
Mining Lease	ML28	31/10/75	As per CCL 768	Cordeaux
Mining Lease	ML23	020/9/81	As per CCL 768	Cordeaux
Mining Lease	ML30	18/10/76	As per CCL 768	Cordeaux
Mining Lease	ML24	02/02/76	As per CCL 768	Cordeaux
Mining Lease	Lease No. 66 portion D1106	18/10/76	As per CCL 768	Cordeaux
Mining Purposes Lease	MPL205	29/9/82	Relinquished (~2003)	Cordeaux

* Application has been submitted and is progressing.

Introduction continued

Table 3: Licences associated with the Dendrobium Operations

Licence	Number	Issue Date	Expiry Date
Licence to Store – Explosives (WorkCover)	XSTR100152	14/01/2008	10/01/2018
Radiation Licence (EPA)	RL30137	27/07/2012	27/07/2015
Environmental Protection Licence	3241	August 2000	----
Environmental Protection Licence	611	December 1999	----
Water Access Licence (Office of Water)	10WA118772	1/07/2013	27/06/2018

Table 4: Current Mining Approvals for the Dendrobium Operations

Current Mining Approvals	Number	Issue Date
SMP Approval - Longwalls 6-8 and 19	S03/01444	28/06/2010
SMP Approval-Longwalls 9 to 13	DGTO13/42	5/2/2013

Table 5: Major documents to support Approvals for the Dendrobium Operations

Current Mining Approvals	Issue Date
Mining Operations Plan Area 3A & 3B	Accepted Feb 2010

Mine Contacts

Table 6: Contacts

Position	Name	Number
General Manager- Dendrobium	Wayne Price	(02) 4255 4450
Surface operations manager- Cordeaux	Mick Loney	(02) 4286 3394
Environment Superintendent	Peter McMillan	(02) 4255 4480
Environmental Technician	David Thomas	(02) 4255 4463

The Environmenal Technician – Southern is based at Dendrobium Mine Site and is supported by the:

- Illawarra Coal Manager – Environment;
- Illawarra Coal Superintendent - Environment Execution;
- Illawarra Coal Environment Specialists; and the
- Illawarra Coal HSE Reporting Team.

Introduction continued

Actions Required at Previous AEMR Review

Table 7: Issues arising from the Previous Dendrobium AEMR

Action Required	Where dealt with in this AEMR
Bushfire - Provide additional detail about bush fire management measures	Bushfire Secton
Provide a list of all received complaints, including dates and company response	Envionmental Complaints & Appendix D
Rehabilitation Summary Table needs to be consistent between Section C and E	Table 36: Dendrobium Rehabilitation Summary for the Reporting Period
Differentiate individual dams and storage in the Stored Water Table	Table 13: Stored Water – Dendrobium
Mining Activities plan needs to show areas mined in the reporting period and areas proposed for mining in the next 12months.	Plan 1
Rehabilitation Plans need to differentiate between rehabilitation undertaken prior to the reporting period and rehabilitation that is to be undertaken in the next 12months.	Plan 10
OEH raised concerns that the statement "to date there has been no quantitative significant e evidence that modern surface, dam or rain water has reported through to the mine workings" may be misleading.	Groundwater – Dendrobium Mine
No assessment in the AEMR has been made as to the impact of depressurisation of the Bulgo and Hawkesbury sandstone aquifers and base flow	Groundwater – Dendrobium Mine & Surface Water and Shallow Groundwater
Expand Subsidence Management Plan summary table to include Area 3B	Mine Subsidence Section
Include ground water monitoring data (piezometer) for swamps in the groundwater section.	Surface Water and Shallow Groundwater & Appendix E

2. Operations During the Reporting Period

Exploration

Dendrobium Mine

Drilling/Seismic Program

A Review of Environmental Factors (REF) within CCL768 are prepared and submitted to the Sydney Catchment Authority (SCA) and the NSW Department of Trade and Investment for exploration activities on an as required basis.

During FY14 the Wongawilli Seam Exploration Program included seven coal quality exploration boreholes with one redrill. The purpose of the coal quality boreholes was to assess coal thickness, depth of seam, quality, gas content, and to assist in determining possible future mining conditions by conducting geotechnical tests on the core samples.

Plan 6 provides an overview of the locations of the exploration boreholes drilled during the reporting period.

Rehabilitation/Remediation

All of the exploration boreholes drilled during the reporting period (shown in Plan 6) have been rehabilitated. Most of these boreholes contain piezometers which are 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 not required monitoring sites are remediated.

Remediation includes removal of any monitoring headworks/standpipes and cutting off the surface casing to below ground level. During rehabilitation erosion controls and re-vegetation will be undertaken on an as required basis.

Rehabilitation includes sealing and cementing of the borehole with the surrounds returning it initial condition prior to work. In the cost estimation of the rehabilitation model (CCL768) the following items are covered:

- All material associated with the drilling activities removed from the site.
- Removal of above ground tanks.
- Filling in of any sumps (only one borehole had a sump due to the difficult terrain) and re-contouring/stabilising the site (if required) to prevent erosion;
- Top soil, rocks and logs, set aside from the site during initial setup, returned to site to arrest water flow over disturbed ground and provide structure for emergent seedlings.

Cordeaux Colliery

This aspect is not considered relevant as the Cordeaux site is under ‘care and maintenance’.

Land Preparation

Dendrobium Mine

No land preparation works occurred during the reporting period with the exception of activities which are detailed in the Dendrobium Tunnel Subsidence Rehabilitation Section.

Operations During the Reporting Period continued

Cordeaux Colliery

This aspect is not considered relevant as the Cordeaux site is under 'care and maintenance'.

Construction

Dendrobium Mine

Construction Activities

Minor construction that was started during the FY13 reporting period on a compressor building at the Kemira Valley Coal Loading Facility (Figure 1) was commissioned and completed in early FY14.

Figure 1: Construction of compressor building

There was also some minor construction on the Dendrobium Pit Top which included the extension of the awning for the sites main store.

Figure 2: Tube bundle shed

An upgrade to the ventilation monitoring at the Ventilation Shaft 2/3 site was undertaken which included the installation of the tube bundle shed.

Operations During the Reporting Period continued

Emplacement Operations

Activities associated with the West Cliff Empalcement Area (where the coal wash from the Dendrobium operations is emplaced) are addressed in the Bulli Seam Operation Annual Environmental Management Report.

Where possible Illawarra Coal diverts coal wash for beneficial uses such as engineered fill with the aim to minimise the volume emplaced at the West Cliff Emplacement Area.

In November 2011, 154 hectares of land was transferred from Illawarra Coal to the Minister for the Environment for inclusion into the Illawarra Escarpment State Conservation Area as part of the Stage 3 Emplacement Area offset.

Cordeaux Colliery

This aspect is not considered relevant as the Cordeaux site is under 'care and maintenance'.

Mining

Dendrobium Mine

The Run of Mine (ROM) product for the reporting period was 3,842,886 tonnes with a saleable product yield of 79%. A comparison showing the ROM production at Dendrobium Mine for the past eight reporting periods is provided in Figure 3.

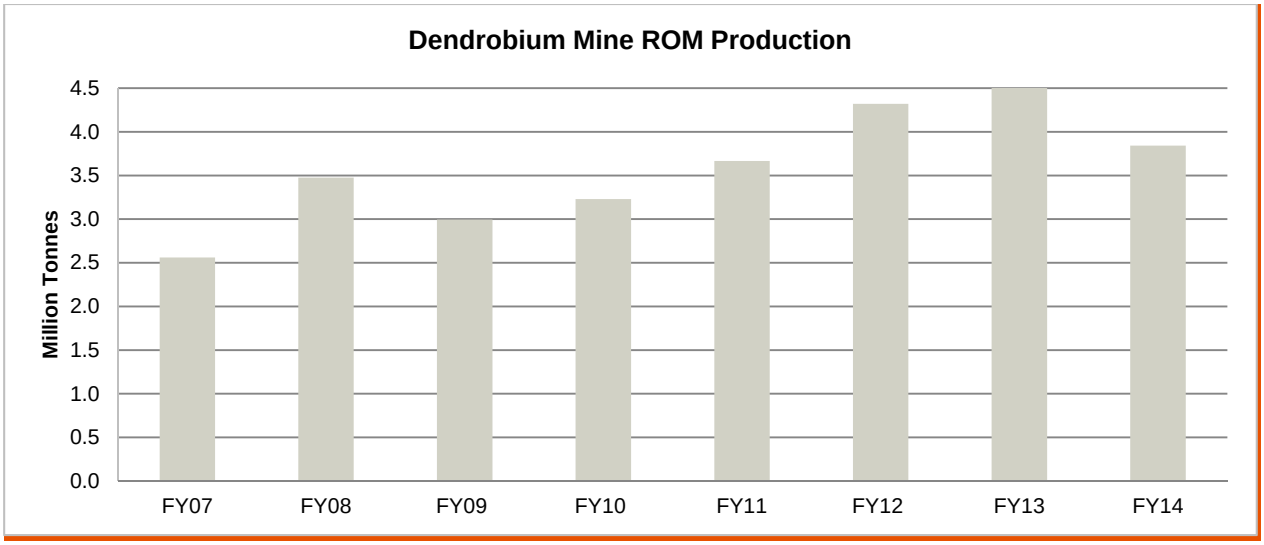

Figure 3: ROM Production: FY07 to FY14

The start and finish dates for the current Dendrobium mining domain is provided in Table 8.

Table 8: Area 3 Longwall start and finish dates

Longwall Number	Start Date	Finish Date
7	4th May 2011	23rd January 2012
8	24th February 2012	29th of December 2012

Operations During the Reporting Period continued

9	9th February 2013	2nd June 2014
10	20th January 2014	Predicted Finish December 2014
11	Predicted Start January 2015	---

Cordeaux Colliery

This aspect is not considered relevant as the Cordeaux site is under 'care and maintenance'.

Mineral Processing

Dendrobium Mine

Mineral processing of the ROM coal produced at Dendrobium Mine is undertaken at the DCPP. Coal wash (or reject) is emplaced at the West Cliff Colliery Emplacement Area. Additional information on the emplacement operations is provided in the Bulli Seam Operation's Annual Environmental Management Report.

The production and waste schedule for Dendrobium Mine is outlined in Table 9.

Table 9: Cumulative Production and Waste Schedule

	Start of Reporting Period	At End of Reporting Period	End of Next Reporting Period (Estimate)
Topsoil stripped (ha) #	0	0	0
Topsoil used/spread (ha) #	0	0	0
Waste Rock	0	0	0
Ore	0	0	0
Processing Waste (Coal Wash Tonnes)	N/A	831,769	1,000,000
Product (ROM tonnes)	N/A	3,842,886	5,100,000

#Refer to Bulli Seam Operation Annual Environmental Management Report for West Cliff emplacement operations

Cordeaux Colliery

This aspect is not considered relevant as the Cordeaux site is under 'care and maintenance'.

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, 2,359 trains were loaded at KVCLF and transported 3,906,267 tonnes of ROM coal to DCPP. The difference between ROM production and coal transported tonnes occurs as ROM coal

Operations During the Reporting Period continued

is measured at Dendrobium Mine prior to placement on the stockpile and coal transported is measured at the coal preparation plant (i.e. stockpile balance accounts for the difference).

Cordeaux Colliery

Aspect is not considered relevant as the Cordeaux site is under 'care and maintenance'.

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 waste is directed into its correct waste stream for recycling or disposal. If equipment or materials are found within the waste it is set aside and the mine site is contacted to see if it can be reused.

Dendrobium Mine's main solid waste streams and volumes are listed in Table 10.

Table 10: Waste Streams and Total Volumes

Waste Stream	Treatment / Disposal	Volume
Timber	Recycled off site	163 tonnes
Cardboard and paper	Recycled off site	13 tonnes
Steel and Scrap Metal	Recycled off site	165 tonnes
Commingle	Recycled off site	7 tonnes
Particulate (diesel) filters	Off-site treatment and disposal	59 tonnes
General Waste	Landfill	452 tonnes

Table 11: Recycled volumes for reporting period

Year	Total recycled (tonnes)	Total disposed (tonnes)	% Recycled
FY14	382	512	43

Coal wash management

Coal wash material produced from Dendrobium Mine is classified as 'inert waste' and therefore it may be deposited to landfill without further processing.

During the reporting period, Illawarra Coal diverted 177,000 tonnes of coal wash for beneficial uses such as engineered fill. Illawarra Coal will continue to research, develop and implement alternative uses for coal wash and with the aim to minimise the volume emplaced at the West Cliff site. Illawarra Coal is a member of 'Sustainability Advantage', a business support service.

One of the projects from the 'Sustainability Advantage' is a stable road base mixture formed using coal wash with other binding reagents to produce a material for reuse applications. During the reporting period,

Operations During the Reporting Period continued

Illawarra Coal in conjunction with StabilCo conducted a trial to explore the use of Dendrobium coal wash as a road base. An RMS road in Kangaroo Valley was targeted for the trial with positive outcomes.

Cordeaux Colliery

General Waste General waste produced at Cordeaux Colliery is negligible throughout the reporting period due to the inactivity of the mine and the small number of personnel utilising offices on site. Periodically, Trans-Pacific Cleanaway waste management services attend site to remove general waste from the bins. The lack of activity on site is reflected in the amount of accumulated waste shown in Table 12.

Recyclable waste such as cardboard, paper and batteries are set aside for reuse.

Table 12: Volumes for reporting period

Waste Stream	Treatment / Disposal	Volume
Commingle	Recycled off site	1.7 tonnes
General Waste	Landfill	25 tonnes

Sewage Treatment / Disposal

All bathhouse and sewerage effluent is contained on site and tankered off site to the Port Kembla Sewerage Treatment Plant by Trans- Pacific (a licensed 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 licensed contractor. No maintenance activities are undertaken on site which would potentially generate industrial waste or remnant oils.

Security barricading and shielding were installed around and above the oil separator at the pit top workshop to prevent the entrapment of animals in the separator as noted in the previous reporting period. These arrangements have remained in place this reporting period.

Water Management

Dendrobium Mine

Water Supply and Use

Underground and surface operations at Dendrobium utilise a combination of potable and recycled mine water. The ‘Recycled Water Project’ was implemented during the first quarter of 2008, which resulted in recycled water being used for general-purpose applications on the surface.

Potable Water use

Potable Sydney mains 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.

Fresh water usage for the reporting period was 30.6ML, a 12.74% increase compared to the previous reporting period. Usage is tracked on a monthly basis and annual consumption is shown in Table 13 below.

Operations During the Reporting Period continued

Table 13: Sydney Water Consumption for Dendrobium Mine

Year	Volume (ML)	Water efficiency (L/tonne)
FY07	105.5	41.5
FY08	89.3	25.6
FY09	21.8	7.3
FY10	22.2	6.9
FY11	23.8	6.5
FY12	24.5	5.7
FY13	26.7	5.9
FY14	30.6	7.96

Recycled Water use

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

- Surface Operations:
  - Portal Road dust suppression;
  - Wash down bay;
  - General hose down; and
  - Cleaning and fire fighting.

- Underground Operations:
  - Secondary support;
  - Development and production units; and
  - Dust suppression and fire fighting.

Surface Water Management

Surface water runoff is separated into three streams at the Pit Top site (as shown on Plan 2 B - Site drainage). 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:

Operations During the Reporting Period continued

- 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.
- Dirty Water – This system captures all site runoff. The runoff is treated and reused in the site dust suppression system and/or the fire fighting system. If there is excess water in the sediment ponds, water may be disposed via the mine water discharge pipeline into Allans Creek via Licensed 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 14.

Table 14: Stored Water – Dendrobium

Year FY14	Start of Reporting Period	At End of Reporting Period	Storage Capacity
Clean Water (ML) – Pit Top Tank	0.35	0.35	0.35
Dirty Water (ML) - Kemira Valley Main Sed Pond	6	6	14
Dirty Water (ML) - Pit Top Sed 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)	NA		
Contaminated Water	NA		

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

Rainfall

Dendrobium rainfall is recorded at the Kemira Valley weather station which is located on the coal clearance gantry structure.

Total rainfall recorded during the reporting period was 1,482 mm, a slight decrease when compared to the previous reporting period in which 1,532 mm rainfall was recorded. Table 15 presents the rainfall at the Kemira Valley site for the past five reporting periods.

Table 15: Rainfall during the Reporting Period

Year	Total rainfall (mm)
FY10	1260
FY11	1299
FY12	1318
FY13	1532
FY14	1482

Operations During the Reporting Period continued

Cordeaux Colliery

Water supply and use

Historically, most of the water used at the mine to support coal production was recycled mine water. The recycled water was primarily used for dust suppression and for charging of fire lines. With the cessation of mining and the subsequent reduction in personnel on site, the amount of water utilised by Cordeaux Colliery has reduced significantly. Water use is now limited to potable water use for personal consumption, showering and toilet facilities only. Potable water is brought to site by road tanker on an as required basis.

During this reporting period the average potable water use by site was 58 kL per month.

Surface Water Management

The surface facilities at Cordeaux Colliery have been designed to prevent dirty water run-off from the site entering the Sydney Catchment Authority land. The design ensured 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 are still directed to a dirty water holding lagoon. The clean and dirty water surface drainage circuits of the site remain in place.

Due to the cessation of mining activities the amount of dirty water generated at the surface of the mine has significantly reduced. Water from the potentially dirty water catchment 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 water quality containing no contaminants.

Details of the monitoring and pumping volumes is provided in Section 3 of this report. A summary of the stored water for the reporting period is provided in Table 16.

Table 16: Stored Water – Cordeaux

Year FY14	Start of Reporting Period	At 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 / Stormwarer Lagoon	2.0	2.0	5.5
Controlled Discharge Water (ML): Sand Filter Lagoon	0	0	0
Contaminated Water	NA		

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

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 886 mm of rainfall during the reporting period, which was a decrease from the previous reporting period (1278 mm).

Operations During the Reporting Period continued

Table 17 shows the average cumulative rainfall volumes for the past five reporting period.

Table 17: Rainfall at Cordeaux FY09 to FY14

Period	Annual Rainfall (mm)
2009/10	919
2010/11	1203.1
2011/12	1396.2
2012/13	1277.6
2013/14	885.5

Hazardous Material Management

Dendrobium Mine

A Licence to Store Explosives is in place for the Dendrobium premises. Limited quantity of explosives were stored at Dendrobium over the reporting period. 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 (SDS's) for each of the dangerous goods kept on site.

Illawarra Coal assesses new substances before their use on site by completing a Substance Evaluation Form and a risk assessment. SDS's and substance evaluation are available electronically from Chemalert, with a hard copy of all approved substances available in the Control Room. The Hazardous Materials Coordinator is responsible for the overall coordination of the hazardous materials system on site whilst the Materials Controller is responsible for the day-to-day management of hazardous materials. Regular inspections of the storage sites are undertaken to ensure compliance with relevant standards.

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

Cordeaux Colliery

Cordeaux has one bulk chemical storage (underground diesel tank 42,000L 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 in relation to operating exploration equipment and other field vehicles.

Environmental Protection Plan (EPP) has been developed for the below ground diesel fuel storage system (May 2011) in accordance with 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.

Operations During the Reporting Period continued

Other Infrastructure Management

Dendrobium Mine

No other infrastructure management issues arose during the reporting period.

Cordeaux Colliery

No other infrastructure management issues arose during the reporting period.

3. Environmental Management and Performance

Air Pollution

Dendrobium Mine

Air quality management is a fundamental aspect of the Environmental Management System for the Dendrobium operation.

At the Dendrobium Pit Top site, 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.

During the reporting period, progressive replacement of bitumen based sections of the portal road were replaced with concrete improving the effectiveness of the road sweeping and road washing in these areas. This replacement program will continue throughout the next reporting period.

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

- The 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;
- A 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;
- An enclosed train loading facility that enables coal to be loaded into the train without any fugitive emissions; and
- A 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 sourced from the Nebo workings.

Air Quality Monitoring System

During the reporing period, Dendrobium's air quality monitoring program consisted of seven dust deposition gauage (DDG) sites as required by the approved Air Quality Management Plan and Environmental Protection Licence (EPL).

The dust gauges (shown in Plan 7) are:

- Located around the site to ensure control effectiveness and throughout the community to determine amenity impacts;
- Measured on a monthly basis for ash content, combustible matter, total insoluble matter and total solids (analysis is performed at a NATA accredited laboratory);
- Compared to the EPA amenity goal of 4 g/m2/month for total insoluble matter as outlined in Table 18; and

Environmental Management and Performance continued

- Visually analysed to determine the percentage contribution of dirt, coal, vegetation and insect matter.

Two of the seven deposition monitoring locations were removed from the monitoring program in June 2014 as a result of long term compliance being achieved. The removal of the sites, Point 10 and Point 12, were undertaken in consultation with the Environment Protection Authority. The Environment Protection Licence (Variation: 1521876) and the Air Quality Management Plan (approval date: 13 June 2014) have both been updated to reflect the change, the change will be effective as at 1 July 2014.

Additional dust gauges can be deployed around the operations and throughout the community for investigative purposes.

Two High Volume Air Samplers (HVAS) measure total suspended particulates (TSP) and particulate matter less than 10 micrometres (PM10). The HVAS (shown on Plan 7) are:

- Located on site (Pit Top and Kemira Valley);
- Measured for TSP and PM10 on a monthly basis over a 24-hour period in accordance with the 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 18.

Results from the air quality monitoring program are reported:

- Internally to site management;
- Via the BHP Billiton website fortnightly and monthly; and
- Annually in the EPL Annual Return and AEMR.

Table 18: Relevant Standard for Air Quality

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

Dust Deposition Results

All of the dust deposition gauges located within the community were below the amenity goal of 4 g/m2/month (Insoluble Solids). Figure 4 shows the 12 month averages for each of the licenced sites monitored during FY14.

Environmental Management and Performance continued

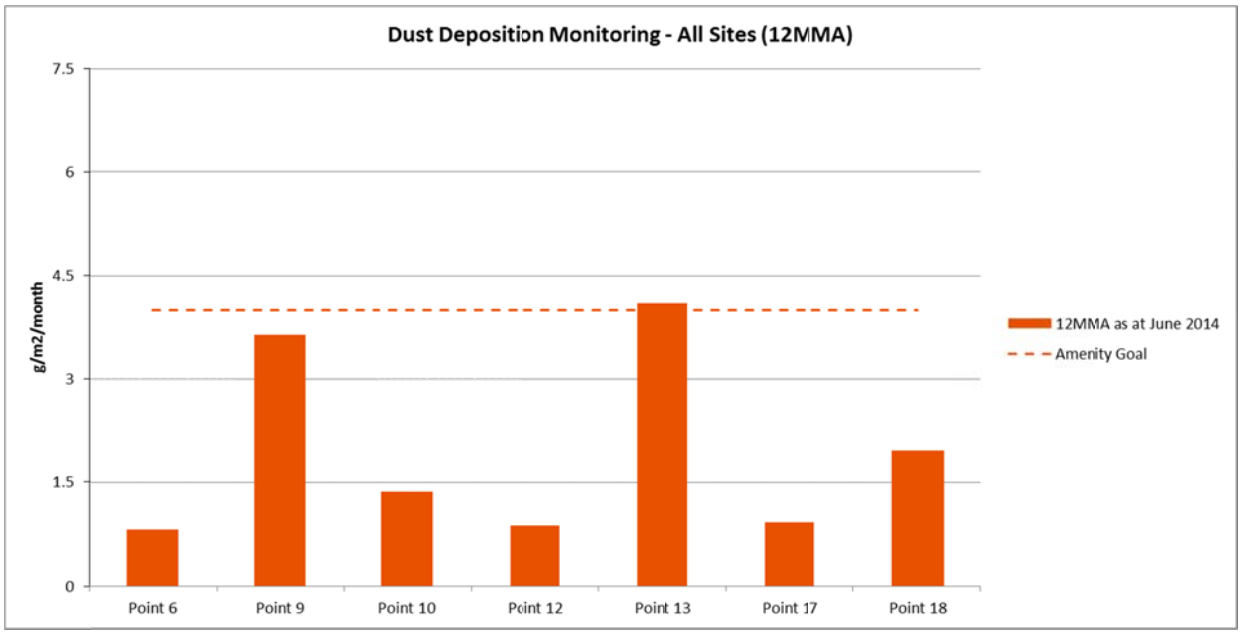

Figure 4: EPL Dust Deposition Gauge, average results summary as at 30 June 2014

Point 13 is an operational control gauge located on the Dendrobium Pit Top. Eight of the twelve readings for the year were below the amenity goal (Figure 5) with the four above the goal. The contributing factors for these excceded readings were due to dirt, insects and vegetation (Figure 6).

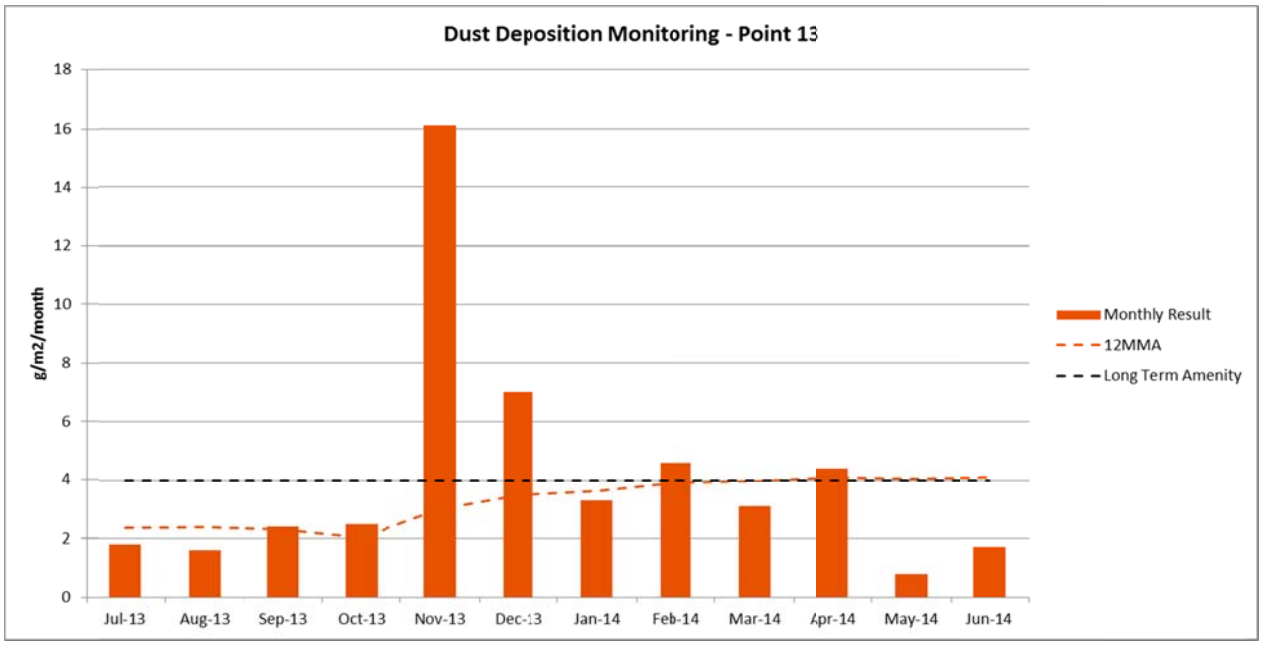

Figure 5: Point 13 Dust Deposition Gauge results for FY2014

Environmental Management and Performance continued

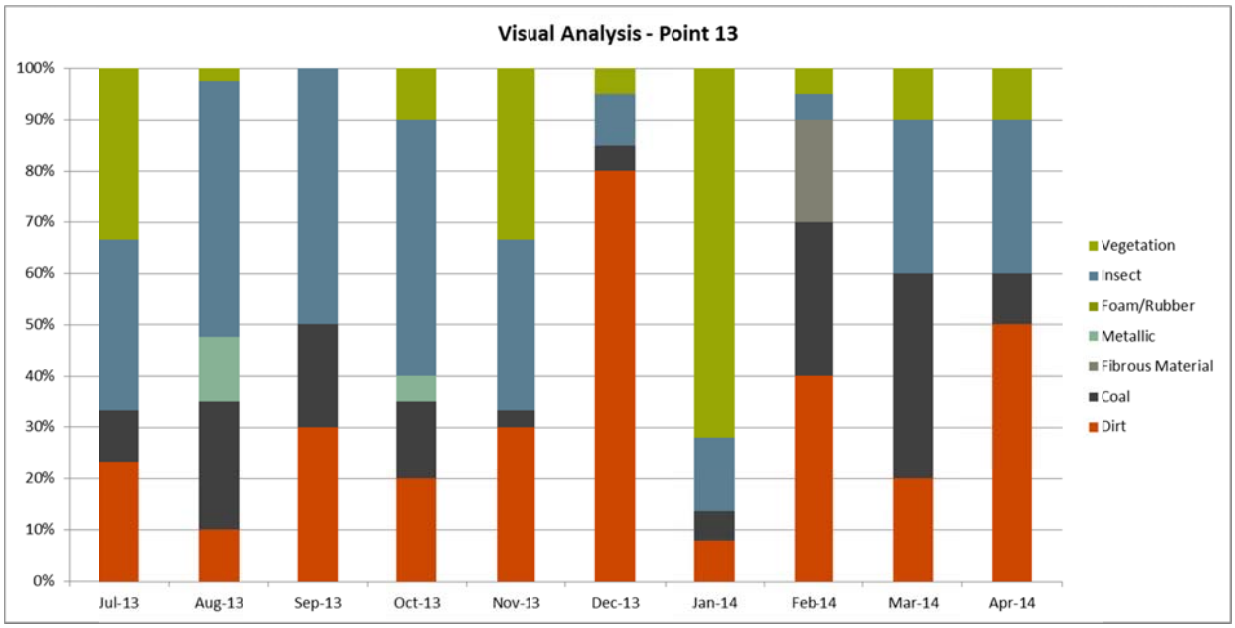

Figure 6: Visual Analysis for Point 13 Dust Deposition Gauge results for FY2014

HVAS Results

Apart from one occasion during the reporting period the dust levels from the High Volume Air Sampler (HVAS) were complied with the relevant standards specified in Table 18. Point 21 excedded the 24hr short term criteria for PM10 in August. The monthly TSP results and PM10 results for the Kemira Valley (Point 20) and the Pit Top sites (Point 21) are shown in the following figures (Figure 7 and Figure 8).

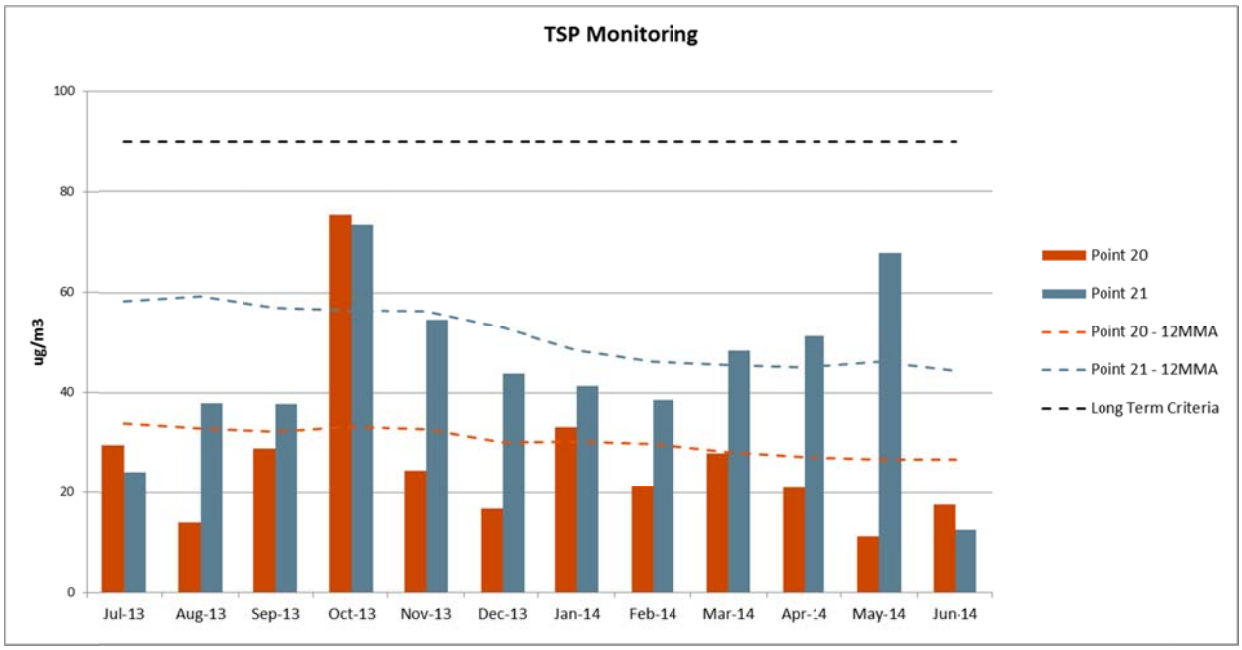

Figure 7: TSP results

Environmental Management and Performance continued

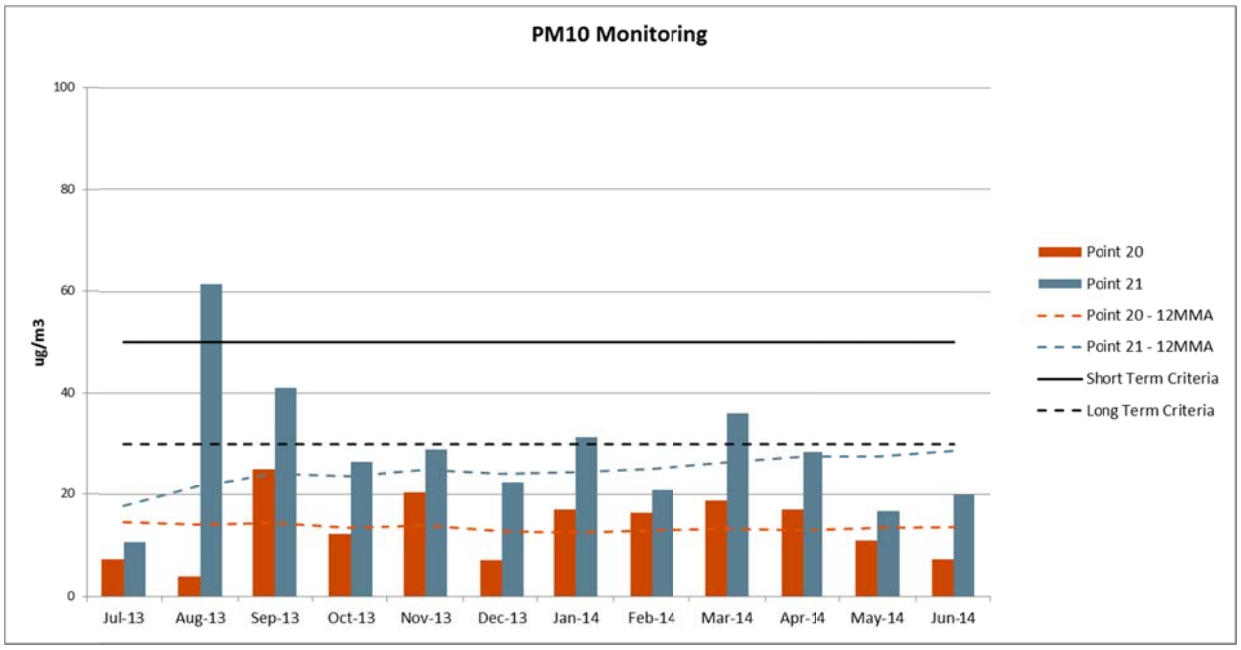

Figure 8: PM10 Results

Cordeaux Colliery

This aspect is not considered relevant as the Cordeaux site is under 'care and maintenance'.

Erosion and Sediment

Dendrobium Mine

Erosion and sediment control at Dendrobium is managed in accordance with the site Water Management Plan which was updated and resubmitted in May 2014 (approval date: 13 June 2014). This plan addresses 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 consists of sealed surfaces and vegetated areas. As limited soil is exposed, the potential for erosion is low.

Sediment Control

Sediment control structures are maintained via a work order system and are inspected by the environmental representative 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 on an as required basis. The sediment pond assists in settling out suspended solids before surface water enters the GWTP.

The GWTP pumping system was upgraded during the reporting period. The upgrade included the installation of new pumps and updates to the Programmed Logic Controller (PLC). Refer to Figure 9.

Environmental Management and Performance continued

Figure 9: Newly installed GWTP pumps

Cordeaux Colliery

Erosion is not a significant issue at the Cordeaux Colliery pit-top site as the majority of the mine surface is either paved or bitumen sealed with water run-off directed to appropriate holding dams and filter systems. There are minimal exposed earthen areas.

Only low volume traffic areas are used for storage. These include surplus or infrequently used equipment that are exposed or unsealed.

Most of the sloped embankments at Cordeaux Colliery are grassed, vegetated or sealed by some other appropriate means such as concrete spraying. The lower area road to the core shed area is the only unsealed road on the pit top.

Some erosion is evident at the spillway of the Dirty Water Catchment Lagoon which had resulted from a previous period heavy weather (storm) overflow event. This area is under watch to detect any further deterioration which may warrant repairs. Water overflowing from the Dirty Water Holding Lagoon reports to the underflow sandfilter lagoon.

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 3 (Dendrobium Mine – Mine Subsidence).

Mine Site Surface Facilities

The surface water monitoring network consisted of five regular sites (See Plans 8A and 8B) which includes sites upstream and downstream of both the Pit Top and Kemira Valley sites. Additional samples were taken during the reporting year in line with the site's Water Management Plan.

The monitoring program includes:

- Recording of field observations;
- In-situ monitoring for temperature, pH, conductivity and dissolved oxygen levels; and

Environmental Management and Performance continued

- Water chemistry analysis of the water covering pH, conductivity, total suspended solids (TSS) and oil and grease. The analysis is performed at a NATA accredited laboratory.

Monitoring and Results

The majority of the monitoring sites are located in natural watercourses that surround the Dendrobium Pit Top and Kemira Valley sites, Brandy and Water Creek and American Creek. Variations in response to local geology and rainfall were with in expectations during the reporting period. The results from the downstream sites are compared to the upstream results are as follows.

KVCLF

During the reporting period, there has been no significant difference between the upstream and downstream results for points Dend 7 and Dend 10. The 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.

A summary of the results is provided in the following tables Table 19 and Table 20.

Table 19: Summary of Water Quality results – Dend 7 (Upstream of KVCLF)

Parameter	Units	Min	Max	FY14 Average
pH	pH units	8.1	8.4	8.2
Total Suspended Solids	mg/L	<5	11	8
Oil and Grease	mg/L	<5	<5	<5
Conductivity	µS/cm	373	560	447

Table 20: Summary of Water Quality results – Dend 10 (Downstream of KVCLF)

Parameter	Units	Min	Max	FY14 Average
pH	pH units	8.2	8.8	8.4
Total Suspended Solids	mg/L	<5	54	12
Oil and Grease	mg/L	<5	<5	<5
Conductivity	µS/cm	389	627	483

Environmental Management and Performance continued

Pit Top

A comparison of the water quality results from Dend 12 (Table 21 upstream of pit top) and Dend 13 (Table 22 downstream of pit top) indicate that:

- no variation in oil and grease;
- a slight reduction in the total suspended solids level; and
- a slight increase in conductivity and 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.

The results are summarised in Table 21 and Table 22.

Table 21: Summary of Water Quality results – Dend 12 Upstream of Pit top

Parameter	Units	Min	Max	FY14 Average
pH	pH units	7.2	7.9	7.6
Total Suspended Solids	mg/L	<5	85	16
Oil and Grease	mg/L	<5	<5	<5
Conductivity	µS/cm	220	281	245

Table 22: Summary of Water Quality results – Dend 13 Downstream of Pit top

Parameter	Units	Min	Max	FY14 Average
pH	pH units	7.6	8.1	7.9
Total Suspended Solids	mg/L	<5	10	6.2
Oil and Grease	mg/L	<5	<5	<5
Conductivity	µS/cm	274	438	348

Monitoring and Results – LDP5

Water from the old Kemira Mine workings and KVCLF sediment ponds (during rain events) is discharged through Licensed Discharge Point 5 (LDP5), located at Marley Place (refer to Plan 8B). Brine from Illawarra Coal's Appin West Desalination Plant is trucked down to Marley Place and discharged through LDP5.

A total volume of 2,070 ML (includes 71.65 ML of Brine from Appin West Desalination Plant) was discharged in FY14. A summary of the monitoring requirements and limits for the reporting period for LDP 5 are provided in **Table** 23.

Environmental Management and Performance continued

Table 23: Monitoring requirements and prescribed limits for LDP 5

Parameter	Units	Frequency	Sampling method	Licence Limit
Arsenic	mg/L	Every 14 days	Grab sample	1.3
Conductivity	µS/cm	Every 14 days	Grab sample	----
Copper	mg/L	Every 14 days	Grab sample	0.08
Nickel	mg/L	Every 14 days	Grab sample	5
Oil and Grease	mg/L	Every 14 days	Grab sample	10
Total suspended solids	mg/L	Every 14 days	Grab sample	30
Zinc	mg/L	Every 14 days	Grab sample	0.4
pH	pH	Every 14 days	Grab sample	6.5-9.0

The monitoring results from the LDP5 sampling program are reviewed regularly and reported to site management. The results are also reported through to the relevant external stakeholders via the EPL Annual Return (see appendix) and this report. Monitoring results are also available via the BHPBilliton website which is updated fortnightly. Link to the website is provided below:

http://www.bhpbilliton.com/home/society/regulatory/Pages/default.aspx

A summary of monitoring results for the reporting period is provided in Table 24.

Table 24: EPL Annual Return Monitoring Summary

Parameter	Units	EPL Limit	Min	Max	Average
Arsenic	mg/L	1.3	0.013	0.251	0.038
Conductivity	uS/cm	NA	1540	14100*	3104
Copper	mg/L	0.08	<0.001	0.005	0.002
Nickel	mg/L	5	0.010	0.424	0.057
Oil and Grease	mg/L	10	<5	<5	<5
pH	pH	6.5 - 9.0	7.2	8.8	8.0
Zinc	mg/L	0.4	0.013	0.245	0.054
Total suspended solids	mg/L	30	<5	41**	8

Sampling via grab sample occurs every 14 days, in accordance with EPL 3241

**** The higher conductivity indicates brine discharge fromAppin Mine water Treatment Plant into LDP5.***
***** Discharge from Kemira Valley sediment ponds. Not an exceedances as there was >60mm of rainfall in the preceding 5 days.***

Environmental Management and Performance continued

No non-compliances occurred within the Annual Return Reporting Period. The Annual Return information is available online via the link: http://www.epa.nsw.gov.au/prpoeoapp/ (EPA website). A copy of the 2013/14 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 mining activities, the amount of dirty water generated at the surface of the mine has significantly reduced. Water from the catchment 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 essentially of good quality containing no contaminants.

During the reporting period approximately 5 ML of water was discharged from the mine water holding lagoons to the underground workings (Figure 10).

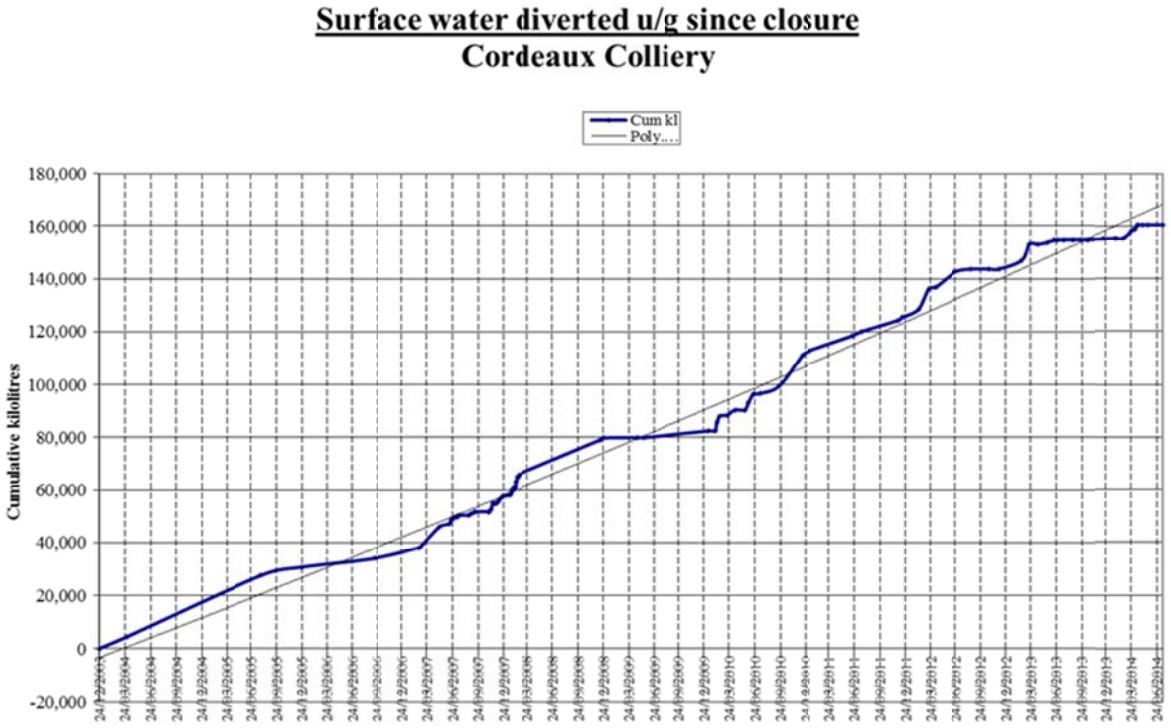

Figure 10: Cumulative water discharge from Mine Water Holding Lagoons to underground.

Historically, the mine water holding lagoon's water quality parameters were monitored for pH, total alkalinity, Conductivity, Arsenic, Zinc, MBAS and Oil and Grease. Testing for pH, Total Alkalinity, TSS, Conductivity, MBAS and Oil and Grease continued in this report period. Due to the history of good water quality results of mine water holding lagoons, it is proposed to reduce the suite of parameters analysed to pH, Conductivity and Oil and Grease on a monthly basis with the extended suite of parameters (including metals) to be analysed on an annual basis. Continuing with the analysis of the parameters proposed will ensure changes in water quality are detected.

Environmental Management and Performance continued

Figure 11 shows the trends for water quality results for pH, Conductivity and Total Alkalinity of water within the mine holding lagoons from March 2000 to July 2014. Historical trends show that water quality in the lagoon has significantly improved since the cessation of underground pumping operations in September 2002. During the reporting period, monitoring results within the mine water holding lagoons continue to reflect good water quality (ie: nil contamination of rainwater). The pH typically ranged between 7 and 8, Conductivity ranged between 150 and 300 µS/cm. Figure 12 shows water quality data for the mine water holding lagoons for FY14.

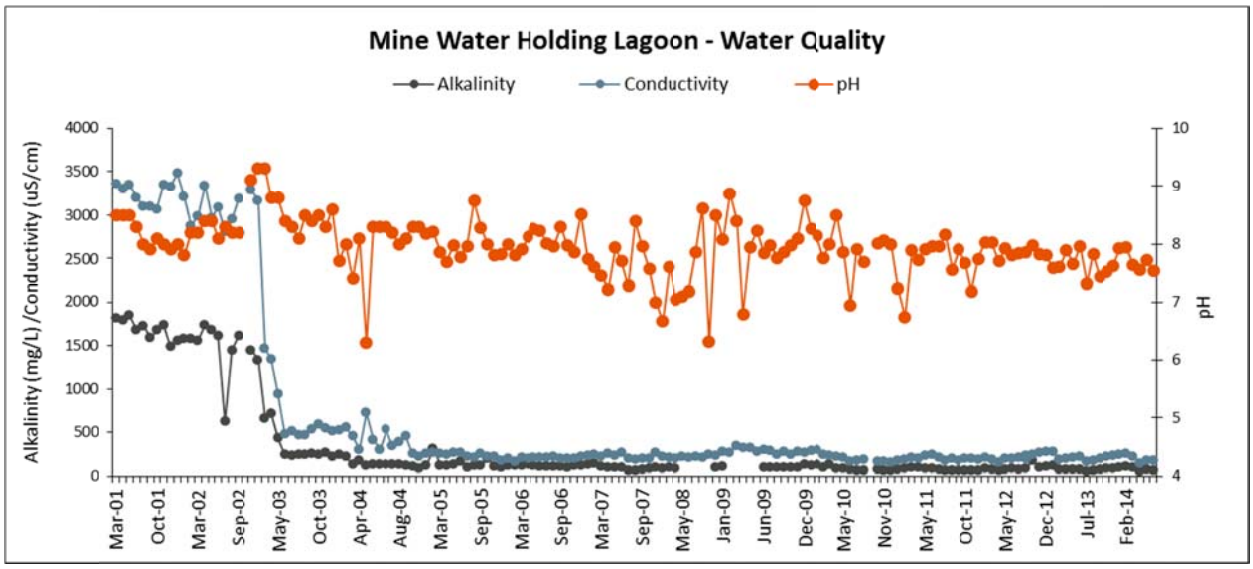

Figure 11: Water quality data from the Mine Water Holding Lagoon (2001 to 2014).

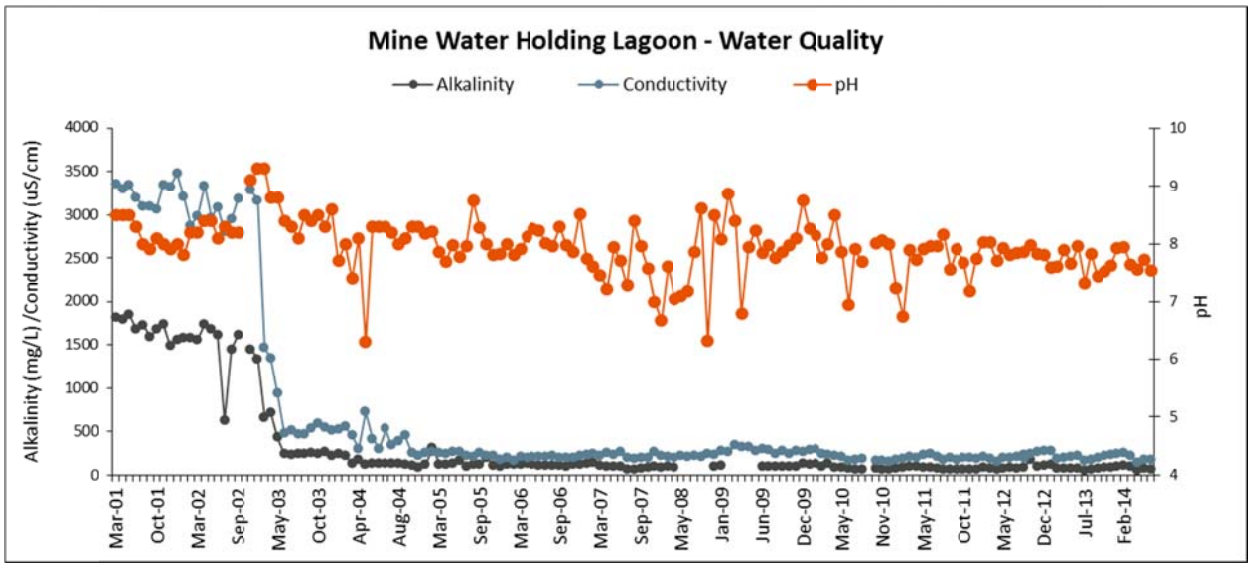

Figure 12: Water quality data from the Mine Water Holding Lagoon (2001 to 2014).

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

Environmental Management and Performance continued

this reporting period shows the discharge water quality consistently of pH 8, with conductivity ranging between 250 and 600 µS/cm, and Oil & Grease (O&G) resulting <5 mg/L (ie: below the Limit of Reporting of 5 mg/L). Due to O&G being below the limit of reporting, O&G results are not displayed in Figure 13. Historical water quality trends from 2001 onwards are shown in Figure 14.

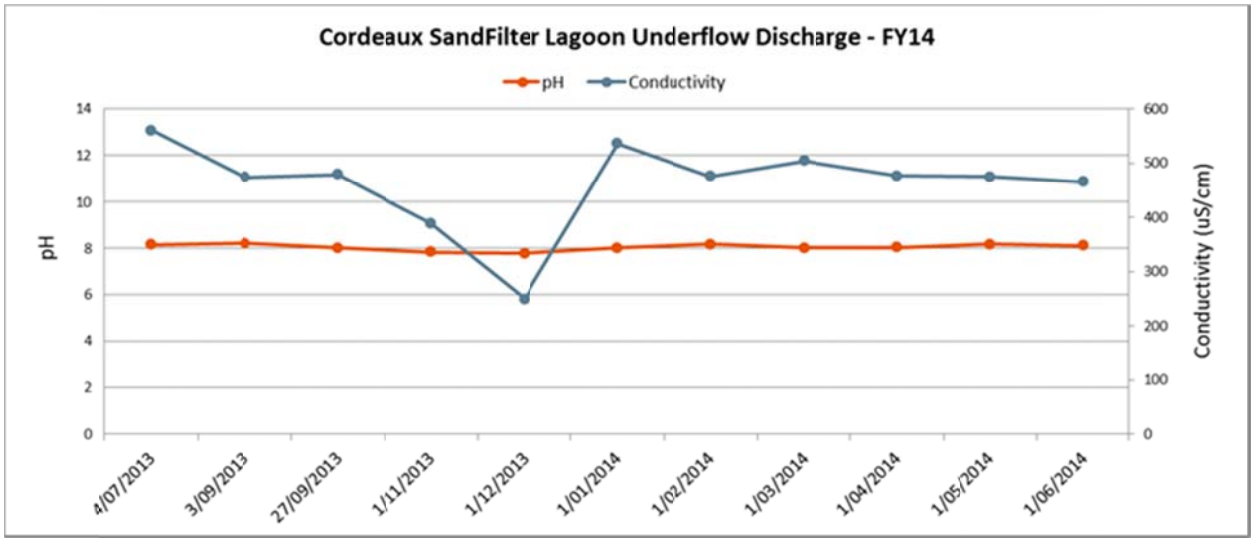

Figure 13: Water quality data from the Filter Lagoon underflow for this reporting period.

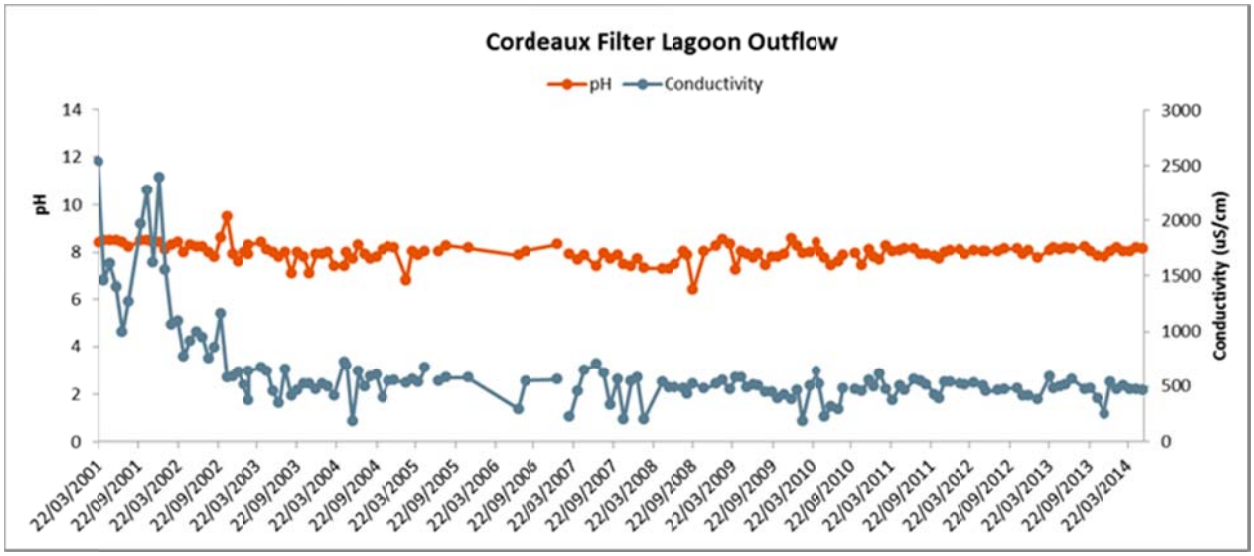

Figure 14: Historical trends of pH and Conductivity at the Cordeaux Filter Lagoon underflow

Rainwater runoff from the car park area was calculated to be approximately 5 ML during the reporting period. Oil and Grease (O&G) analysis has been added to the data trends as requested by the SCA for previous periods and future AEMR's.

The long term data suggests that the existing storage capacity and water level control arrangements in place for the mine water holding lagoons appear to be adequate in managing current activities and heavy rainfall events without risk to the local environment.

Environmental Management and Performance continued

Groundwater

Dendrobium Mine

The Dendrobium groundwater monitoring program was undertaken during the reporting period as defined in the Groundwater Management Plan (Oct 2012). The Groundwater Management Plan has been developed to comply with the Dendrobium Development Consent. 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 BHP Billiton Policies and Standards. The Plan was developed in consultation with the DSC, SCA, DoPI, NOW and I&I NSW (now DTIRIS).

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 on regularly (ie. 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, SCA and DTIRIS summarising water quality and the water balance at Dendrobium.

During the reporting period, Dendrobium operated under a Principal Trigger Action Response Plan (TARP) as outlined in the "Cordeaux Reservoir DSC Notification Area Contingency Plan". During this period the mine operated at 'Normal' in the Principal Response Flowchart (Figure 15).

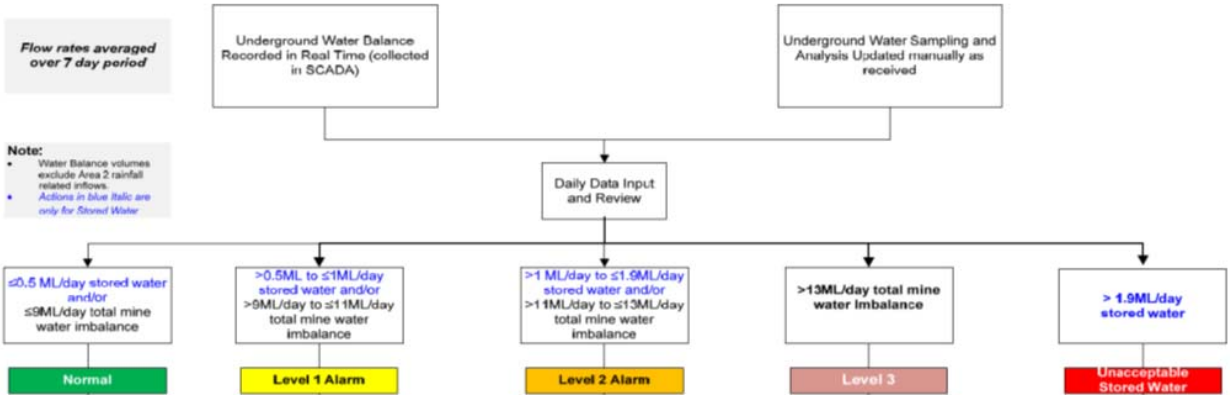

Figure 15: Extract from Principal Response Flowchart in "Cordeaux Reservoir DSC Notification Area Contingency Plan".

Table 25: TARP conditions throughout the reporting period

Level	Commencement Date	Finish Date
Normal	1st July 2013	30th June 2014

A summary of the mine water balance for the reporting period is provided in Figure 16.

Environmental Management and Performance continued

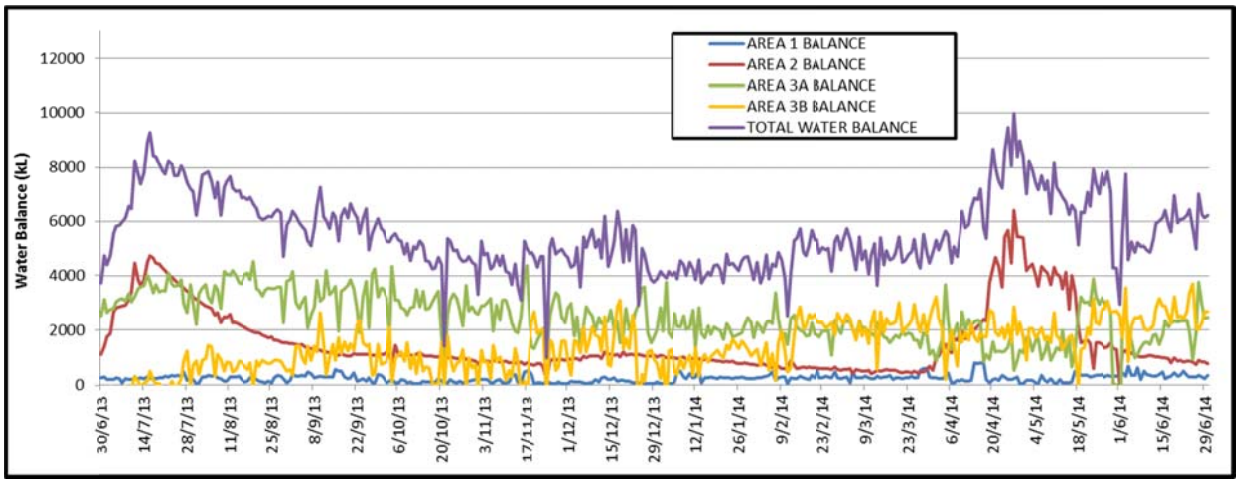

Figure 16: Mine Water Balance July 2013 - June 2014

The groundwater reporting to the mine workings during normal conditions is characteristic of coal measure water, this is determined to be relatively 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 working.

Table 26: Groundwater Statistics for the period 1st July 2013 – 30th June 2014.

Statistic	Value	Unit
Mean	5608	kL/day
Maximum	9992	kL/day
Minimum	976	kL/day
Total	2,047,058	kL

The piezometers in Area 2 monitor groundwater levels from the near surface to the coal seams, between longwall extraction and Cordeaux Reservoir to the east of the longwalls. The piezometers in Area 3 monitor groundwater level throughout Area 3A, 3B and 3C and also from the near surface to the coal seams. Targeted monitoring is also undertaken, meters have been installed between the mining areas and the reservoirs, Lakes Cordeaux and Avon. There has been no response to inflow events in the piezometers, this is consistent with previous events indicating a localised source which is not linked to the stratigraphy monitored by the piezometer array.

Piezometers located in the Scarborough Sandstone and Lower Bulgo Sandstone have continued to show a pressure drop due to Longwall mining in Area 3A and 3B. Piezometers in the Upper Bulgo Sandstone adjacent to Longwall 9 have seen an effect from the Longwall passing the piezometer. The Hawkesbury Sandstone piezometers do not show a mining influence as demonstrated by DDH 103 and 106 in Figure 17 and Figure 18. The Hawkesbury Sandstone piezometers typically show a response to rainfall.

Environmental Management and Performance continued

For mine safety reasons, piezometers that are intersected by the mine goaf are disconnected. During the reporting period boreholes S1800, S1908, S1995, S2002, S2003, S2126, S2126, S2192 were decommissioned.

A Regional Groundwater Model for Dendrobium is maintained by Dr Noel Merrick of Heritage Computing. This model is routinely revised and updated to incorporate new data and the conceptual understanding of the groundwater regime in the mining areas.

The below can be derived from the Dendrobium Regional Groundwater Model (2014) attributing to mining activities.

a. No more than negligible reduction in the quantity of surface water inflows to the reservoir;
b. No more than negligible reduction in the quantity of groundwater inflows to the reservoir;
c. Negligible leakage from the reservoir to underground workings.

The Model also indicates that mining is not resulting in greater than a 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.

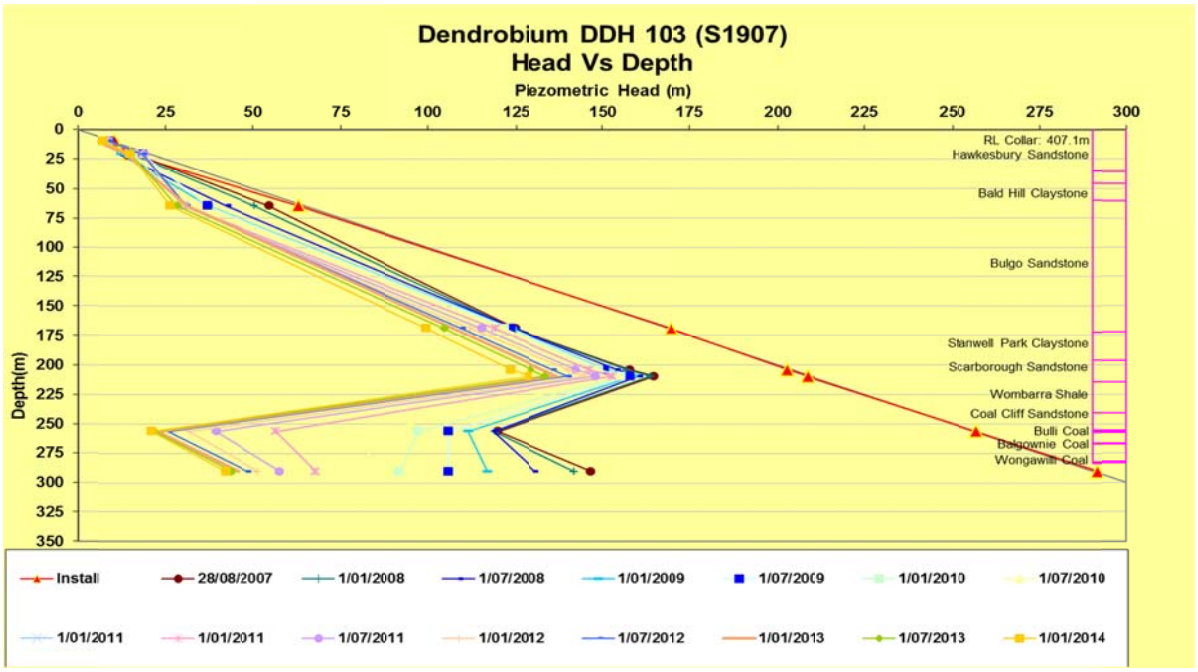

Figure 17: Piezometer DDH 103 Head Vs Depth

Environmental Management and Performance continued

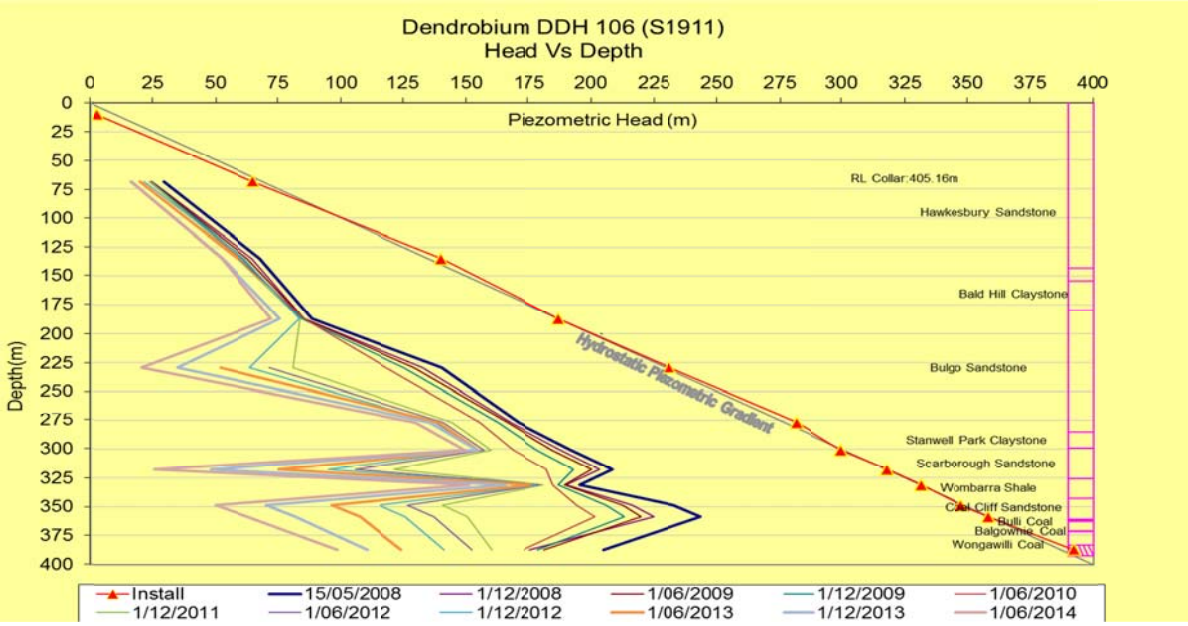

Figure 18: Piezometer DDH 106 Head Vs Depth

Cordeaux Colliery

Refer to the Surface Water Management Section.

Contaminated Polluted Land

Dendrobium Mine

On the 14th of November 2014, soluble oil was spilled onto a public road as it was being delivered to Dendrobium mine via Stones road. This occurred when material was being transported to the mine via Stones Road (Kemira Valley) as a result of a roof fall in mid-October which blocked the main travel road into the mine. As a result Kemira Valley tunnel was being used as the primary means of access to the mine for personnel and materials. The spill was immediately contained and cleaned up with no environmental impacts and was reported to the EPA.

No significant land pollution events occurred during the reporting period for Dendrobium Mine. Spills were cleaned up as soon as practical and had no environmental impacts.

Basix Environmental Solutions (BES, 2010) undertook a preliminary contamination assessment of the Dendrobium Mine Pit Top and KVCLF in March 2010. The results of from subsequent soil sampling were provided in previous AEMRs and indicated the below;

- PAH levels were below the NEPM HIL criteria for parks, recreation open space and playing fields;
- TPH levels were below the Dutch Intervention Value of 5,000 mg/kg; and
- Minor oil staining of sealed surfaces occured. 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.

Environmental Management and Performance continued

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 appears 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.

Threatened Flora

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 SMP process are detailed in sections

Dendrobium Mine

Mine Subsidence and Impacts to Natural Features of this report.

Cordeaux Colliery

Cordeaux Colliery has not taken part in any activities that could potentially affect threatened flora species. Flora study from 2003 indicated that no threatened species were in danger of being disturbed by the rehabilitation works planned for the four Cordeaux Colliery sites (Biosis Research 2003).

Threatened Fauna

Dendrobium Mine

Refer to section Mine Subsidence and section Impacts to Natural Features of this report.

Cordeaux Colliery

Cordeaux Colliery has not taken part in any activities that could potentially affect threatened fauna species. A 2003 fauna study indicated that no threatened fauna species were in danger of being disturbed by the rehabilitation works planned for the four Cordeaux Colliery sites (Biosis Research 2003).

Weeds

Dendrobium Mine

Weeds are managed in accordance with Illawarra Coal's Weed Management Plan. Dendrobium carried out regular maintenance which included weed control during the reporting period.

In November 2009, Dendrobium contracted Biosis Pty Ltd to undertake a detailed weed assessment of the Dendrobium Pit Top and surrounding land owned by Illawarra Coal. The weed management plan was implemented in FY14.

Within the Dendrobium Pit Top area, some of the more accessible areas were targeted for weed species removal. This included the removal or treatment of Crofton Weed, Lantana, Privet, Ginger Lily and other woody and herbaceous weeds.

Environmental Management and Performance continued

Kemira Valley operations targeted accessible areas for Mysore Thorne removal or treatment.

Cordeaux Colliery

Grass cutting, weeds management and grounds maintenance on site are addressed by a contractor who attends site regularly. Weeds are controlled on a routine basis by the site contract gardener through targeted spray activities. The location, classification and recommended control measures of these are summarised in Table 27. Weed growth within the area of the boundary fire break zone is addressed on an as required basis.

Monthly site environmental inspections now include weeds surveys across the site. The site has been mapped to identify weed zones for specific attention during these site inspections (Figure 19).Results of weed surveys with details on areas for special focus are to be communicated to the gardener prior to carrying out spraying activities.

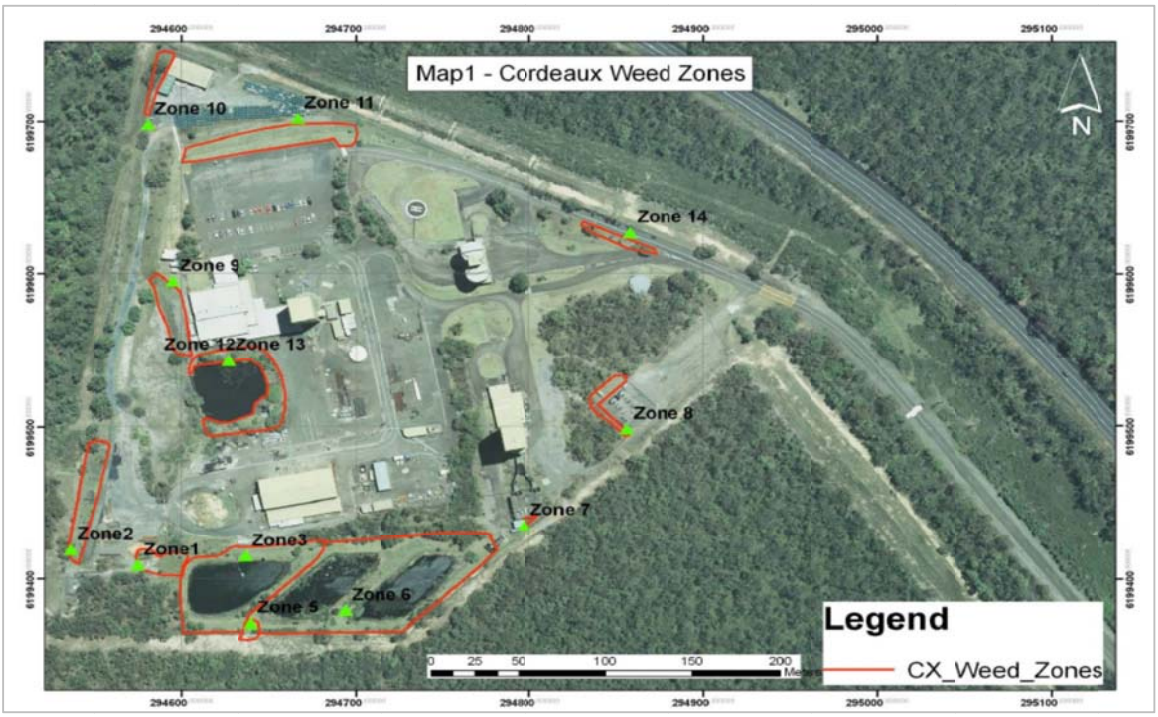

Figure 19: Weed zones surveyed during the monthly site environmental inspection.

Weed spraying and removal have been undertaken within identified zones during this reporting period. Application of weed spraying and removal will continue to be an ongoing process due to the weed dispersal rate onsite.

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Table 27: Weed species found in each weed zone of Cordeaux Colliery.

Site Name	Dominant Species	Classification	Recommended Control Measure
Zone1	Crofton Weed (Ageratina adenophora)	Class 4	Spot spray with Glyphosate.
Zone1	Scotch Thistle (Onopordum acanthium)	Weed, not declared noxious in this council area.	Slash all large plants, spot spray regrowth with Glyphosate.
Zone1	Balloon Cotton Bush (Gomphocarpus fruticosus)	Weed, not declared noxious in this council area.	Spot spray with Glyphosate.
Zone2	Crofton Weed (Ageratina adenophora)	Class 4	Spot spray with Glyphosate.
Zone2	Balloon Cotton Bush (Gomphocarpus fruticosus)	Weed, not declared noxious in this council area.	Spot spray with Glyphosate.
Zone2	Scotch Thistle (Onopordum acanthium)	Weed, not declared noxious in this council area.	Slash all large plants, spot spray regrowth with Glyphosate.
Zone4	Pampas Grass (Cortaderia jubata)	Class 4	Remove and destroy any seed heads. Slash plants and spot spray regrowth with Glyphosate.
Zone3	Scotch Thistle (Onopordum acanthium)	Weed, not declared noxious in this council area.	Slash all large plants, spot spray regrowth with Glyphosate.
Zone2	Balloon Cotton Bush (Gomphocarpus fruticosus)	Weed, not declared noxious in this council area.	Spot spray with Glyphosate.
Zone 5	Bamboo (Phyllostachys spp)	Weed, not declared noxious in this council area.	Gardening contractor to arrange removal.
Zone 6	Scotch Thistle (Onopordum acanthium)	Weed, not declared noxious in this council area.	Slash all large plants, spot spray regrowth with Glyphosate.
Zone 7	Crofton Weed (Ageratina adenophora)	Class 4	Spot spray with Glyphosate.
Zone 8	Crofton Weed (Ageratina adenophora)	Class 4	Spot spray with Glyphosate.
Zone 9	Balloon Cotton Bush (Gomphocarpus fruticosus)	Weed, not declared noxious in this council area.	Spot spray with Glyphosate.
Zone 10	Blackberry (Rubus Fruticosus)	Class 4	Use long handled secateurs to cut stems and paint with Glyphosate.
Zone 11	Scotch Thistle (Onopordum acanthium)	Weed, not declared noxious in this council area.	Slash all large plants, spot spray regrowth with Glyphosate.
Zone 12	Crofton Weed (Ageratina adenophora)	Class 4	Spot spray with Glyphosate.
Zone 13	Cotoneaster (Cotoneaster glaucophyllus)	Weed, not declared noxious in this council area.	Gardening contractor to arrange tree removal.
Zone 14	Cotoneaster (Cotoneaster glaucophyllus)	Weed, not declared noxious in this council area.	Gardening contractor to arrange tree removal.

Environmental Management and Performance continued

Blasting

Dendrobium Mine

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

Cordeaux Colliery

Aspect not considered relevant as Cordeaux Colliery is in 'care and maintenance'.

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;
- Continued use of the Buy Quiet Procedure which states that equipment that is to be purchased is to have lower noise emission levels than previous equipment;
- Replacement of old compressor units with newer quieter noise attenuated units; and
- Replacement of Eimco with quieter coal trams (Load Haul Dump Vehicles).

Noise from the rail operations on the Nebo Main (Rail) Line has been raised as a potential community concern since the Environmental Impact Statement was prepared for the Dendrobium mine operations.

The rail line is located within 200 metres 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. To address the brake and/or wheel squeal or other noise issues the Rail Noise Working Group (RNWG) meets regularly with the below objectives:

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

Illawarra Coal's RNWG consists of operational, community and environmental personnel from Illawarra Coal and our rail contract partners (Fluor and Pacific National). During the reporting period, the RNWG has

Environmental Management and Performance continued

undertaken numerous rail trials and noise monitoring campaigns to identify noise sources and minimise the rail noise generated in the local area.

Based upon this work, the following improvements were made during FY14:

- Multiple trials were carried out in FY13 from these, the maximum rail speed limit was increased to 40km/hr to accommodate the optimum speed range for reduced wheel and brake squeal. Information from these trials was used to develop a best practice train handling procedure/guide line.
- Coaching of the train drivers on the train handling procedure.
- From further trials and feed bacl from the driver trainers and operators, the best practice procedure was reviewed and slightly modified to reflect improvements.
- The introduction of on-board data loggers on the 82 class locomotives have been used to monitor compliance to the best practice guideline.

Accurate monitoring of rail noise is another key component of the overall management strategy that allows;

- The performance of the rail operations to be tracked over time.
- Measurement of the effectiveness of noise controls and potential noise reduction initiatives.
- Fault finding exercises to be undertaken to determine possible causes.

In addressing the monitoring aspect, a rail noise monitoring system was designed in conjunction with an acoustic specialist. Commissioned in May 2010, it provides ‘slightly delayed’ real time noise monitoring for each train movement along the line. The raw data collected by the rail noise monitoring device is transferred to a remote server for analysis. The system was designed to monitor a number of variables, including LAmax and LAeq. In addition to this it is also able to automatically detect squeal events via a frequency distribution analysis.

The availability of the analysed data assists the RNWG to; a) identify potential causes of squeal events b) identify/implement rail noise mitigation initiatives, c) assess the effectiveness of the rail noise mitigation initiatives.

During the reporting period additional temporary or hand held noise monitoring devices were deployed during trials and/or located in areas where complaints have been received for data evaluation.

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 on a quarterly basis at five locations as outlined Plan 9. The rail haulage noise measurements are undertaken on a six monthly basis. This monitoring has been undertaken as per the approved Noise Management Plan.

The Noise monitoring locations are classified as high or low priority based on percentage compliance with the Noise Criteria. Increased monitoring was undertaken at those sites identified as high priority (R1, R6a and R39a) during the reporting period.

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 LAeq noise criteria are shown in the table below.

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Table 28: Table shows LAeq (15 minute) and Sleep Disturbance Criteria (1 minute)

Location	Noise Criteria LAeq,15min (dBA)			Noise Criteria for Dendrobium Operations, L_{A1},1min (dBA)
	Daytime (7am -6pm)	Evening (6pm-10pm	Night time (10pm- 7am)	Night Time (10pm-7am)
R1	40	40	39	49
R5a	40	40	37	47
R6a	40	40	37	47
R15a	40	40	39	49
R39a	37	35	35	45

Attended noise monitoring was conducted on four occasions throughout the FY14 reporting period. Monitoring was undertaken in the following months:

- July 2013
- October 2013
- January 2014
- May 2014

During the reporting period Dendrobium achieved 97% compliance against the LAeq, 15min criterion, with four out of the five sites achieving 100% compliance for the reporting period. 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. There were fourteen occasions where the mine operations noise was inaudible. The LAeq,15 minute results for R1 are provided in Figure 20.

There was no exceedance of the LAmax, 1 minute noise criteria at Site R1 during the reporting period.

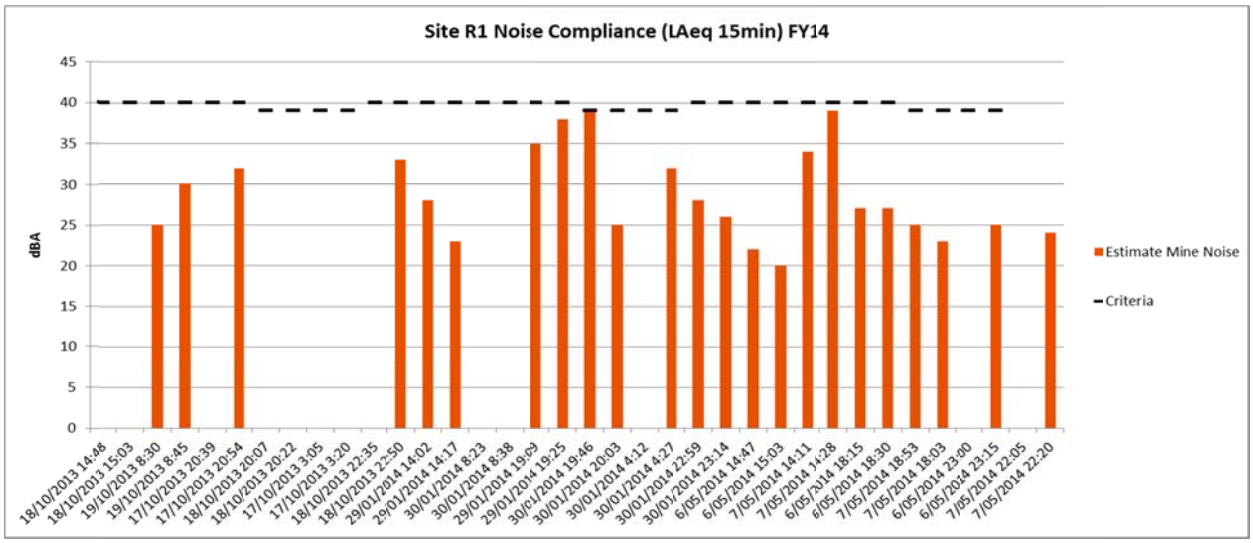

Figure 20: Site R1 Noise Compliance (LAeq, 15 minute) during the Reporting Period

Environmental Management and Performance continued

Location R5a (Benjamin Road)

R5a is located to the east of the Dendrobium Pit Top.

There were no exceedances of the daytime, evening or night time of LAeq and 15 minute noise criteria at Site during the reporting period. Generally, the mine site noise was inaudible at night with the exception of six occasions.

There were no exceedances of the LAmax, 1 minute noise criteria during the reporting period.

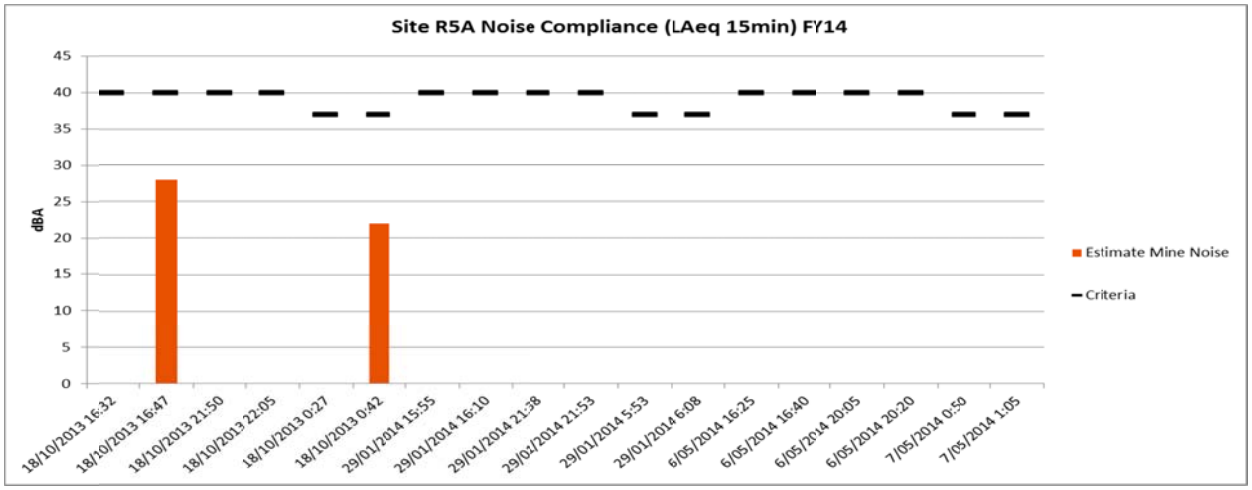

Figure 21: Site R6a Noise Compliance $L_{Aeq, 15min}$ results

Location R6a (374 Cordeaux Road)

R6a is located to the east of the Dendrobium Pit Top.

There were no exceedances of the LAeq, 15 minute noise criteria during the reporting. There were eleven occasions when the mine operations noise was inaudible.

There were no exceedances of the LAmax, 1 minute noise criteria at Site R6a during the reporting period.

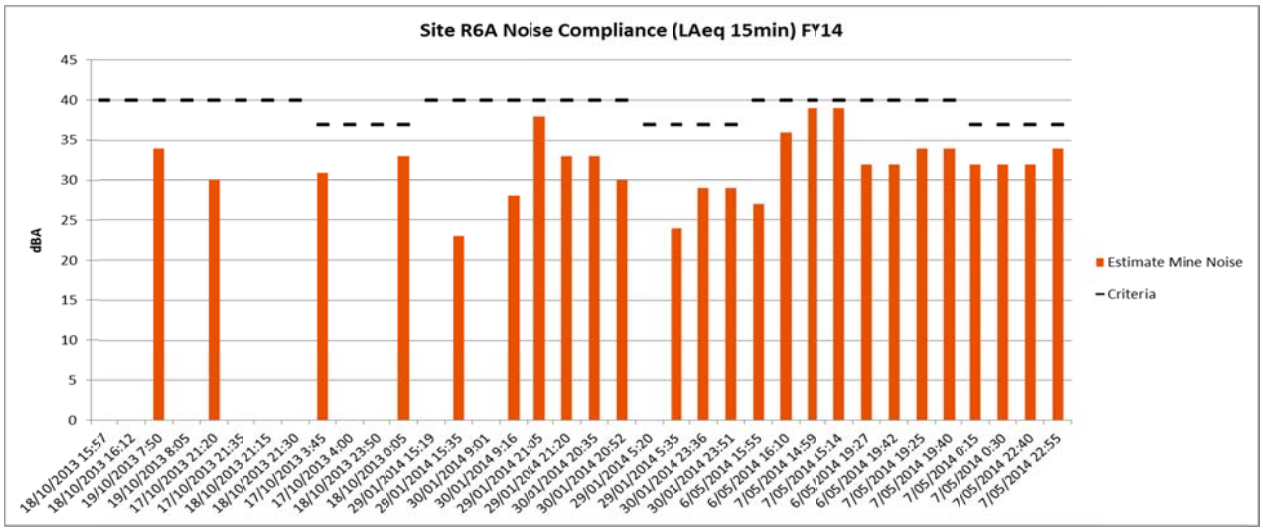

Figure 22: Site R6a Noise Compliance $L_{Aeq, 15min}$ results

Environmental Management and Performance continued

Location R15a

R15a is located to the west of the Dendrobium Pit Top.

There were no exceedances of the daytime, evening or night time LAeq, 15 minute noise criteria at Site R15a during the reporting period. There were thirteen occasions when the mine operations noise was inaudible.

There were no exceedances of the LAmax, 1 minute noise criteria during the reporting period.

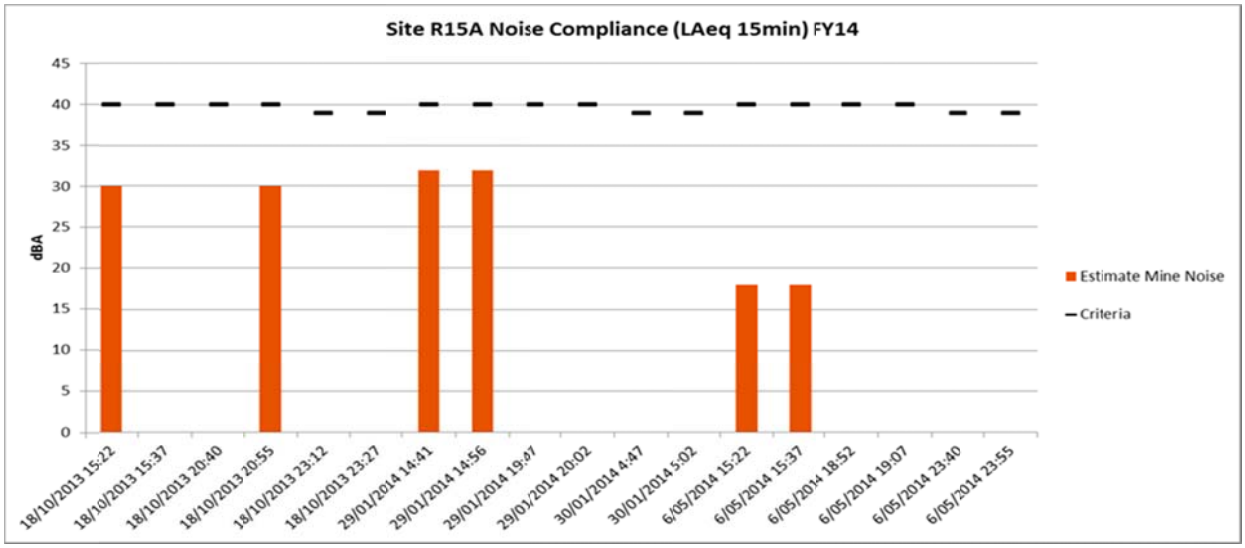

Figure 23: Site R15A Noise Compliance LAeq, 15min results at Site R15A

Location R39a

R39a is located to the south-east of KVCLF at Figtree Farm.

There were six exceedances of the LAeq, 15 minute noise criteria during the reporting period, one during the day, four during the evening and one during the night Site R39a during the reporting period.

There were six occasions when the mine operations noise was inaudible. The source of the exceedances were due to rail movements within KVCLF (train idling) and vehicles working on the stockpile.

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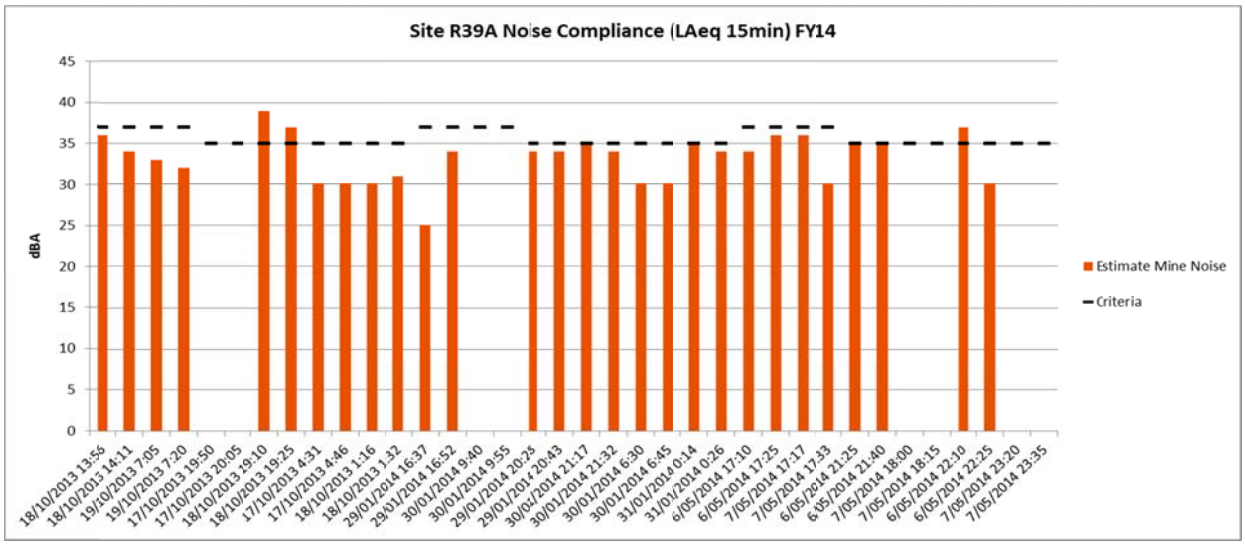

Figure 24: Site R39A Noise Compliance LAeq, 15min results at Site R39A

There were one exceedances of the LAmax, 1 minute noise criteria at Site R39a during the reporting period. This was associated with train movements/train horn at KVCLF.

Rail Haulage

A summary of the rail haulage noise criteria is presented in Table 29. The noise levels from all locomotives in use on the Kemira Valley Rail line are governed by these specific noise limits.

Table 29: Rail Haulage Noise Criteria

Operating Condition	Speed & Location of Measurement	Noise Limits L_{A1} (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 were conducted during 2013 and 2014 on the Kemira Valley main line. The results fall within compliance of each operating condition.

Cordeaux Colliery

Aspect not considered relevant as Cordeaux Colliery is in 'care and maintenance'.

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.

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.

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Cordeaux Colliery

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

Aboriginal Heritage

Dendrobium Mine

The Aboriginal Heritage Plan sets out the requirements to satisfy the Consent Conditions for Aboriginal Heritage management in Dendrobium Area 3A. Aboriginal Heritage Impact Permit (AHIP) No: 1098243 was issued to BHP Billiton Illawarra Coal on 27 March 2009. AHIP No: 1098243 allows for potential impacts (associated with subsidence movements from longwall mining) to Aboriginal archaeological sites within Dendrobium Area 3A. The management measures described in this Aboriginal Heritage Plan are the same as those to be implemented for AHIP No: 1098243. This plan fulfils the requirements of DTIRIS NSW in relation to their SMP Guidelines.

This plan is available on the BHP Billiton website under Dendrobium Mine:
http://www.bhpbilliton.com/home/aboutus/regulatory/Pages/default.aspx

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 poteintial rehabilitation activities.

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 3 (

Dendrobium Mine

Mine Subsidence) of this report.

Cordeaux Colliery

Aspect not considered relevant as Cordeaux Colliery is in ‘care and maintenance’.

Spontaneous Combustion

Dendrobium Mine

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

Environmental Management and Performance continued

Cordeaux Colliery

Aspect not considered relevant as Cordeaux Colliery is in 'care and maintenance'.

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 were maintained or established in the following areas:

Asset Protection Zones maintained:

- 28-38 Harry Graham Drive – Kembla Heights; and
- Northern Side of Cordeaux Road – Mount Kembla

Fire Trail Maintenance:

- Containment Line southern side of Dendrobium Mine Pit Top;
- Benjamin Road Fire Trail – Kembla Heights; and
- Stones Road Fire Trail – Kembla Heights.

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 fire fighting water pipeline (with booster pump facility) around and over 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 undertaken on an as required basis, 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, Illawarra Coal 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 M&M tower at the Cordeaux Pit top site.

Mine Subsidence

Dendrobium Mine

Mining using the longwall method results in subsidence (lowering) of the land surface. Dendrobium Mine has an approved Subsidence Management Plans (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), Sydney Catchment Authority (SCA), Industry and Investment (I&I NSW – Minerals and Fisheries), Department of Planning and Environment (DoPE), Dams Safety Committee (DSC), NSW Office of Water (NOW) and NSW Office of Environment and Heritage (OEH). The implementation of the plan relates to monitoring and management of:

Environmental Management and Performance continued

- 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 9 extraction was completed on the 2nd of June 2014, and mining of Longwall 10 commenced on the 20th of January 2014. As of the 30th of June 2014, Longwall 10 had extracted 1105.7 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 9 and 10 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; and
- Dendrobium Area 3B Watercourse Impact, Monitoring, Management and Contingency Plan.

A summary of monitoring commitments for FY14 are provided in Table 30. Additional information can be found in the Longwall 9 End of Panel report, Area 3B SMP and supporting management plans, which can be accessed from the BHP Billiton Website:

http://www.bhpbilliton.com/home/society/regulatory/Pages/default.aspx

Table 30: Monitoring program for Dendrobium Mine

Aspect	SMP Commitments for FY14	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 3A and 3B 2D monitoring lines	• Monthly for first 1000m of extraction then 6 monthly • Monthly during mining for key features	• As per SMP commitments • Two surveys were not undertaken as required in February and March 2014 - this was reported to Department of Trade and Investment May 2014
	• 3D control survey	• Conclusion of each longwall and 12 months after the completion of each area	• As per SMP commitments
Watercourses	**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	• 6 monthly baseline and reference site monitoring • Weekly monitoring when longwall is within 400m • 6 monthly monitoring for 2 years post mining	• As per SMP commitments
	Water Quality		
	• **Wongawilli Creek** - WWU1, WWU4, WC Pool 49, WWM1, WWM2, WWM3, WWL2, WC21_S1, WC21 Pools 30 and 53, WC15_S1 • **Lake Avon** - LA4_S1 , LA4_S2, LA5_S1, LA5_S2, LA3 Pool 4, LA2 Pool 5 and LA1 • **Donalds Castle Creek** - DCU3, DCL3, DC_S2, DC13_S1 • **Sandy Creek** - SCU1, SCL	• Monthly monitoring during and post mining for two years or until required	• As per SMP commitments
	Flow		

Environmental Management and Performance continued

Aspect	SMP Commitments for FY14	Monitoring Frequency	Monitoring Undertaken
	• **Wongawilli Creek** - WWU, WWL, WC21S1 and WC15S1 • **Donalds Castle Creek** - DCU, DC13S1 and DCS2 • **Lake Avon** - LA4S1	• Continuous 1 hour logging intervals	• As per SMP commitments
	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**		
	Swamps 01A, 01B, 03, 04, 05, 08, 10, 11, 12, 13, 14, 15A, 15B, 23, 35A and 35B	• SLMMP sites: pre and post mining, monthly when longwall is within 400m • Other sites: monthly 2 years pre and post mining, weekly when longwall is within	• As per SMP commitments

Environmental Management and Performance continued

Aspect	SMP Commitments for FY14	Monitoring Frequency	Monitoring Undertaken
		400m of monitoring site	
	Erosion Monitoring		
	Swamps 1A, 1B, 3, 4, 5, 8, 10, 11, 13, 14, 23, 35A, and 35B	• 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, 15A, 15B, 16, 23, 35A & 35B	**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 1A, 1B, 3, 4, 5, 8, 10, 11, 13, 14, 23, 35A & 35B	• 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		

Environmental Management and Performance continued

Aspect	SMP Commitments for FY14	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-CF25, DA3-CF26, DA3-CF41, DA3-CF42, DA3-CF43 • **Steep Slopes**	• Baseline monitoring campaign prior to mining • Monthly monitoring during subsidence • Monitoring to continue 6 monthly for 2 years following the completion of mining	• As per SMP commitments

Environmental Management and Performance continued

Aspect	SMP Commitments for FY14	Monitoring Frequency	Monitoring Undertaken
	- 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		
	Inspection of Active Mining Area – Landscape Features, Vegetation, Watercourses		
	• All mapped cliff, steep slopes, 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 SMP Figures 21.1, 21.2 and 21.3 and 3B Figure 20.1	• Two baseline monitoring campaigns 1 year prior to mining during autumn and spring	• As per SMP commitments

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Aspect	SMP Commitments for FY14	Monitoring Frequency	Monitoring Undertaken
	• 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	
	Terrestrial Fauna		
	• 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 o 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

A summary of the results from the subsidence monitoring program is provided below.

Subsidence Movements

Subsidence movements resulting from the extraction of Longwall 9 were measured at the following survey points and 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
- Airborne Laser Scan of the area.

The subsidence parameters measured during the extraction and at the completion of Longwall 9 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 9, refer to the Longwall 9 End of Panel Report. This report can be accessed via the BHP Billiton website:

http://www.bhpbilliton.com/home/society/regulatory/Pages/default.aspx

The Subsidence Monitoring Program for Longwall 10 includes:

- Dendrobium Area 3B 3D GPS survey;
- Swamps 1a, 1b and 5 3D surveys;
- Donalds Castle Creek, WC21 and Wongawilli Creek Tributary Cross Lines; and
- Dendrobium Area 3B Airborne Laser Scan.

The subsidence parameters measured during extraction of Longwall 10 up to the 30th of June 2014 were generally similar or less than what was predicted within the Area 3B SMP. Subsidence within Swamps 1a and 1b have exceeded predictions and this was reported to key stakeholders. Further detail will be provided in the Longwall 10 End of Panel Report.

Impacts to Natural Features

Natural features in the Dendrobium SMP Areas include the following:

- Cliffs and rock outcrops;
- Steep slopes;
- Wongawilli Creek;
- Sandy Creek;
- Drainage lines;
- Swamps; and
- Archaeological sites.

Landscape Features

The Illawarra Coal 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, Dendrobium Area 3B Watercourse Impact, Monitoring, Management and Contingency Plan (WIMMCP) (versions dated November 2012 and December 2013) and the Dendrobium Area 3B Swamp Impact, Monitoring, Management and Contingency Plan (SIMMCP) (versions dated November 2012 and October

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2013). During the period of extraction updated Trigger Action Response Plans, for the WIMMCP and SIMMCP, 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.

Twenty eight surface impacts were identified by the ICEFT. Seventeen of these impacts were observed in watercourses, seven in the general area above Longwall 9 and four were observed on fire roads and access tracks. Reductions in pool water levels were observed in Donalds Castle Creek, DC13 (a tributary of Donalds Castle Creek) and WC21 (a tributary of Wongawilli Creek). TARP triggers in relation to shallow groundwater levels (reduction and recession rates) in Swamps 1a, 1b and Swamp 5 were also reported during Longwall 9 extraction.

Surface Water and Shallow Groundwater

Ecoengineers assessed pre-mining monitoring data (from May 2001 to the commencement of Longwall 9 on 9 February 2013), during mining data, and post mining data after the completion of Longwall 9 on 2nd June 2014.

Assessments of shallow groundwater levels and rates of recession in Swamps 1a, 1b, 5 and 8 indicate that Longwall 9 mining has impacted local shallow groundwater in these upland swamps, with the effect confined to the areas directly mined beneath.

Comparison of pre-mining baseline and post-mining stream flows indicates there have been no statistically significant hydrologic changes within the Donalds Castle or Wongawilli Creek catchments under mid- to late stage recessional and base flow conditions.

Surface fracturing, localised flow diversions and reductions in groundwater levels in DC13, Swamps 1a and 1b, Donalds Castle Creek, Swamp 5, WC21 and Swamp 8 during the mining of Longwall 9 resulted in Level 2 TARPs for these features.

As required by the Level 2 TARP each of these impacts was further assessed by a specialist consultant. It was concluded that the observed impacts on surface water quality, shallow groundwater levels, and catchment hydrologic performances due to the mining of Longwall 9 were consistent with predicted impacts in the Dendrobium Area 3B SMP.

Water quality monitoring within the Sandy Creek tributary SC10C indicated that a Level 3 TARP had been triggered in site BCT for electrical conductivity. As required for a Level 3 trigger in the Dendrobium Watercourse Impacts, Triggers and Response Plan this impact was further assessed by a specialist consultant and reported to relevant Government agencies.

There is no hydrologic evidence that Longwall 9 has had any measurable impact on the hydrologic performance of the upper Donalds Castle or Wongawilli Creek catchments. For further information refer to the Appendices E (Ecoengineers (2014) End of Panel Surface and Groundwater Impact Assessment Dendrobium Area 3B Longwall 9 (this includes swamp piezometer summary).

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.

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

Aquatic ecology monitoring for Dendrobium Area 3 commenced in spring 2008. To date, two years of pre, two years of during, and one year of post-extraction data have been collected for Dendrobium Area 3A and two years of pre and one year of during-extraction data have been collected for Dendrobium Area 3B.

The fracturing of bedrock and reductions in pool water levels and flow associated with the extraction of Dendrobium Area 3A Longwalls 7 and 8 that was first observed in December 2011 represents a direct loss of aquatic habitat and probably also biota. Monitoring data suggests that the aquatic ecology at this site is becoming increasingly dominated by taxa that are considered to be pollution tolerant or adaptable to changes in their habitat. There is no evidence of similar impacts to aquatic ecology occurring downstream and the impacts appear localised to the areas directly affected by physical mining impacts and are thus relatively minor in the context of the larger catchment.

There was evidence at one site on Wongawilli Creek of transient changes to aquatic ecology. However, as there are no indications of changes in habitat in Wongawilli Creek resulting from the mining, it is unclear what causal factor is contributing to the measured changes. Monitoring will continue in Wongawilli Creek to determine any effect of mining. For further information refer to the Cardno (2014) report in the Longwall 9 EoP report.

Terrestrial Ecology and Swamps

Swamps 1, 15B, 15A, 1A and 1B have been monitored for terrestrial ecology before, during and after mining. Statistical analysis reveal a trending decline in vegetation species richness at two upland swamp impact sites (Swamps 1 and 15B) from pre- to post-mining. The rate of decline is not faster in these mined under sites but there is indications the overall richness and diversity is lower at these post-mining sites. In statistical terms, this decrease in species richness at impact sites could be attributed to the natural year-to-year variation or succession of species.

Investigation of species abundance changes over time indicates a statistically significant decline in abundance of moisture dependant species and minor increases in abundance of woodland species. There has also been a general decline in species richness as well as increases in height and foliage cover of woody shrubs and evidence of establishment of woodland species. This may indicate a drying trend at Swamp 1 over the past five years of monitoring.

Frog data showed no significant trends in species richness or diversity between control and mining sites. Littlejohn's Tree Frog and Giant Burrowing Frog (threatened species) breeding pools were recorded in significant numbers throughout the Study Area. Loss of breeding habitat at those sites subject to subsidence fracturing and water loss has resulted in a decline in the counts of adults and tadpoles to zero at two of the survey transects (SC10C and DC13). Following a count of zero in 2012, low numbers of Littlejohn's Tree Frog were detected at the impacted WC17 (tributary of Wongawilli Creek) in 2013 in one pool that contained water. For further information refer to Biosis (2014) report.

Cultural Heritage

During monitoring of site Dendrobium 1 (a shelter with deposit - AHIMS 52-2-2208) on 16 April 2014, some impact was observed. This impact included the minor expansion of pre-existing vertical cracking adjoining the horizontal bedding plane as well as the extension of this cracking horizontally. While rock cracking has occurred, it is considered to be minor and unlikely to lead to water seepage or rock falls at Dendrobium 1.

There is no art on the shelter walls and the archaeological deposit was not impacted by this crack. For further information refer to the Biosis (2014) cultural heritage report as part of the Longwall 9 EoP report.

Summary of Longwall 9 Impacts

The observed impacts to natural features and Aboriginal heritage above Longwall 9 were generally less than or consistent with those predicted in the assessments undertaken prior to mining. A summary of the observed and predicted impacts is provided in Table 31. For further detail on impacts associated with Longwall 9, refer to the Longwall 9 EoP report in appendix.

Table 31: Predicted vs Observed Impacts for Longwall 9

Natural Feature	Predicted Impacts	Observed Impacts
Landscape features		
Wongawilli Creek	Possible for some very localised additional ponding or flooding developing in the locations of pools, steps or cascades	No reported impacts
	Some minor fracturing of the bedrock within 400 metres of the longwalls	Localised fracture
	Unlikely that surface water flow diversions would occur	No reported impacts
Donalds Castle Creek	Some minor fracturing of the bedrock within 400 metres of the longwalls	Localised fracturing
	Unlikely that surface water flow diversions would occur	Localised flow diversion
Drainage Lines	Some localised additional ponding, flooding or scouring along sections of the drainage lines located directly above the longwall	No reported impacts
	Some buckling and fracturing of the bedrock along the drainage lines above or within 250 metres of the longwalls	Rock fracturing and flow diversion
	Some surface water flow diversions into the dilated strata beneath the drainage lines which are directly mined beneath	Rock fracturing and flow diversion
Water Quality	Minor environmental consequences including: minor fracturing, gas release and iron staining; and minor impacts on water flows, water levels and water quality. See Ecoengineers (2014) report	Impacts within prediction
Rock outcrops	Fracturing of bedrock which could result in rockfalls along the exposed rock faces	Localised fracturing and rockfalls
Steep slopes	Potential for soil slippage resulting in tension cracks and compression ridges	Some soil / surface cracking observed on or near fire trails or tracks
Swamps	Potential for fracturing of the underlying strata which could result in the diversion of surface water	Rock fracturing observed in nearby exposed bedrock, however no observed impacts to the surface of swamps
Archaeological sites	Potential impacts on overhang sites include fracturing of sandstone, rock falls, or water seepage through joints which may affect artwork	Minor expansion and extension of vertical cracking in horizontal bedding plane observed
Surface waters		
Wongawilli Creek (3rd order creek)	Minor environmental consequences including minor fracturing, gas release and iron staining	Fracture in Wongawilli Creek
	Minor impacts on water flows, water levels and water quality	No observable flow diversion
	No significant surface water flow diversions	No observable flow diversion
Donalds Castle Creek (2nd order) and all other drainage lines (1st or 2nd order)	Some localised additional ponding, flooding or scouring	Localised change in water appearance in Donalds Castle Creek
	Some cracking in creek bed and fracturing of bedrock which are directly mined beneath.	Fracturing, changes to water appearance and pool water level reduction observed in WC21 and

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		DC13
	Some surface water flow diversions into the dilated strata beneath the drainage lines that are directly mined beneath	Rock fracturing with some flow diversion in Donalds Castle Creek and tributaries
Swamps		
Swamps 1a, 1b, 5 and 8	Negligible erosion to the surface of swamps	No impacts identified
	Minor changes in the size of swamps	No more than minor changes in swamp size observed
	Minor changes in the ecosystem functionality	No more than minor changes observed
	No significant change to the composition or distribution of species within the swamp	No significant changes detected
Groundwater		
Deep groundwater	Large drawdowns were expected in the Wongawilli Seam after Longwall 9 in the north-western parts of Area 3B Lesser reductions in head were expected in the Wongawilli Seam around the main roadways due to substantial depressurisation having already occurred in these areas Drawdowns of 10-40 m were expected in the south-western parts of Area 3B	Large reductions in head of 20-50 m were observed in the north-western areas of Area 3B during LW9 Small drawdowns (5-20m) were observed in the eastern half of Area 3B, including LW9, probably due to earlier depressurisation of this area by development headings and roadway development, in addition to earlier mining and depressurisation of Area 3A Longwalls 6, 7 and 8 In the south-western parts of Area 3B, observed drawdown reached as much as 20-44 m (in piezometers S2194, S1932, S2001 and S1911), similar to that expected
	Little further drawdown in deeper formations in Area 3A was expected, as heads there should have stabilised at their depressurised levels following mining of Longwalls 6, 7 and 8. Minor drawdown (up to 7-8 m) could occur in the Bulgo Sandstone over LW7 and 8, with less than 5 m drawdown in the deeper, more depressurised strata	Less than 5 m drawdown was generally observed in the Wongawilli Seam in Area 3A, whilst the available data for the Bulli Seam suggests up to 10 m drawdown. In the Scarborough Sandstone, observed Area 3A drawdowns reached 18 m at one piezometer (S1870), whilst all other piezometers exhibited up to 8 m drawdown. In the Bulgo Sandstone, observed drawdowns reached up to 8 m
	Large drawdowns of more than 100 m should occur in the Bulli Seam over Area 3B when LW9 is mined, focused over the mined panel. Drawdown magnitude should increase to the west along LW9	Limited data for the Bulli Seam over Area 3B LW9 showed drawdown of up to 47 m. This is significantly less than expected
	Large drawdowns of more than 100 m should occur in the Scarborough Sandstone over Area 3B when LW9 is mined, focused over the mined panel. Drawdown magnitude should increase to the west along LW9	Limited data for the Scarborough Sandstone over Area 3B LW9 showed drawdown of up to 107 m. This is similar to the expected drawdown

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	Drawdowns of more than 40-55 m were expected in the Bulgo Sandstone over the western two thirds of LW9, and 10-40 m drawdowns were expected in the eastern third of LW9. Drawdown was expected to decline a short distance to the south (over LW10 and LW11), to 20-30 m. Drawdown magnitude should decline further to the south, to less than 10 m	Observed drawdown at two piezometers monitoring the Bulgo Sandstone over LW9 showed 50-80 m drawdown during mining of LW9 in the western two thirds of LW9. Data from piezometer S1926 (over LW10, close to LW11) exhibited 19 m drawdown during mining of LW9, in good agreement with the expected drawdown. Observed drawdown further to the south of LW10/LW11 generally ranged from 0-8 m, although one bore (S2194) on the south of Area 3B exhibited a spurious drawdown of 25 m
Aquatic Ecology		
Wongawilli and Donalds Castle Creeks	Changes in ponding, flooding and scouring due to subsidence would have only minor, localised effects on aquatic habitats or biota in the watercourse	No impacts observed
	The effects on aquatic ecology associated with fracturing of the bed and diversion of surface flows would be minor, localised and transient	Rock fracturing with some flow diversion in Donalds Castle creek has not had a significant impact on aquatic biota
	Changes in water quality as a result of the formation of ferruginous springs or weathering of underlying substrata are also unlikely to have any effect on aquatic habitat or biota	No impacts observed
	It is unlikely that the proposed mining would have any significant impact on any threatened species that may be present in the SMP area	No impacts observed
Terrestrial Ecology		
Endangered Ecological Communities (and other vegetation)	Potential gas emissions may result in small, isolated areas of vegetation dieback. Potential surface fracturing and gas emissions considered unlikely to result in alteration of species composition or distribution. Unlikely to have a significant impact on any plant communities	No significant vegetation impacts. No significant impacts to EECs or vegetation
Upland Swamps	It is expected, at the magnitudes of predicted curvatures and strains, that fracturing of the bedrock beneath the swamps would occur as the result of extraction of the proposed longwalls (MSEC 2012). Subsidence could result in increased ponding above the centrelines of the longwalls, and decreased water levels above the chain pillars and longwall goaf edges. Should changes in the water level within the Upland Swamp occur, this may impact on the distribution of local vegetation within the swamps	Monitoring to date has not determined any impacts to terrestrial ecology within the Upland Swamps
Threatened flora	Volume of water available for plant use is unlikely to be significantly impacted. It is considered unlikely that subsidence impacts would result in a broad change in the floristic composition of the riparian zone. No significant impact to threatened flora	No impacts to threatened flora

Threatened fauna and fauna habitat	Changed surface water conditions, such as effects to pools and streams. Impacts to steep slopes and cliffs. Impacts of gas emissions on water quality and riparian vegetation. Significant impacts to Littlejohns Tree Frog, Red-crowned Toadlet, Giant Burrowing Frog and Giant Dragonfly	One isolated rock collapse and rock fracturing. No noticeable change to habitats. No significant vegetation impacts. No significant impacts to fauna and fauna habitat
Cultural Heritage		
Donalds Castle Creek 1	Possible fracturing and shear movement of strata and rockfalls. Impacts to heritage values are highly unlikely as the shelter has a volume of less than 50 cubic metres. Overall risk of impact is very low	No observed impacts
Browns Road Site 13	Possible fracturing and shear movement of strata and rock falls. Impacts to heritage values are highly unlikely as the shelter has a maximum predicted subsidence of less than 300mm. Overall risk of impact is very low	No observed impacts
Dendrobium 1	Possible fracturing and shear movement of strata and rock falls. Impacts to heritage values are unlikely as the shelter has a volume larger than 50 cubic metres and maximum predicted subsidence of greater than 300mm. Overall risk of impact is Low	Minor expansion and extension of vertical cracking in horizontal bedding plane observed
DM2	Possible fracturing and shear movement of strata and rock falls. Impacts to heritage values are unlikely as the shelter has a volume larger than 50 cubic metres and maximum predicted subsistence of greater than 300mm. Overall risk of impact is low	No observed impacts

Summary of Longwall 10 Impacts

As of the 30th of June 2014, two impacts associated with Longwall 10 have been observed. One surface soil crack was observed that was consistent with a Level 1 TARP, and groundwater level reduction was identified to be exceeding baseline trends within an additional borehole located in Swamp 1a. This impact is consistent with a Level 2 TARP under the Dendrobium Area 3B Swamp Impact, Monitoring, Management and Contingency (SIMMC) Plan.

Corrective Management Actions (CMA's) were implemented following TARP triggers and are summarised in Table 321 below.

Table 32: Summary of LW10 impacts and CMA's

Impact Name	Type	TARP level	CMA's
LW10_001	Soil crack	Level 1	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and report in the EoP and AEMR
LW10_002	Groundwater	Level 2	• Continue monitoring program • Submit an impact report to OEH, DoPI, DPI, SCA and other relevant resource managers • Report in the End of Panel Report • Report in the AEMR • Review monitoring frequency

Reports on the impacts were provided to key stakeholders and will be covered in further detail in the Longwall 10 End of Panel report following completion of Longwall 10 extraction.

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Cordeaux Colliery

Aspect not considered relevant as Cordeaux Colliery is in 'care and maintenance'.

Hydrocarbon Contamination

Dendrobium Mine

Specifically designed hydrocarbon bunded areas are located:

- along the Pit Top portal road;
- at the rear of the workshop; and
- at the diesel refuelling area were utilised during the reporting period.

Bunded areas are checked on a weekly basis 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. Various spill kits and/or bins containing oil absorbent material are located around the site in areas where there is a high potential for spillage. Surface personnel are made aware of the locations of these spills 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.

Hydrocarbon management was covered within the Environment and Community Awareness Training Package that was rolled out during FY14 to Dendrobium personnel.

There has been no incident of hydrocarbon contamination in the reporting period.

Cordeaux Colliery

There has been no incident of hydrocarbon contamination in the reporting period.

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 235 m^3/s with the discharge air (mine vent air) having an average concentration of methane (CH4) of 0.155% and an average concentration of carbon dioxide (CO2) of 0.195%.

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. Historically, gas emissions to the atmosphere via the main mine ventilation fans averaged 0.25% methane and 0.12% carbon dioxide in a total volume vent air flow rate of 300 cubic metres per second when producing coal.

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Following cessation of mining, the emissions to the atmosphere via the main mine ventilation fans significantly decreased. The mine ventilation fans were shutdown and the shafts temporarily sealed in December 2003.

Historically there had been occasions when mine gas was detected at the collar level of the Men and Materials shaft. Methane levels recorded at the Corrimal No. 3 and Cordeaux Bulk Coal Winder shafts are reflected in the following chart (Figure 25). The chart shows that the gas levels recorded at the Cordeaux BCW have continued to remain low since Cordeaux No.3 Shaft dampers were opened in June 2006.

Throughout this reporting period methane levels at the Corrimal No.3 Shaft ranged between 1.4 to 3.8% with an average of 2.5% and the Cordeaux BCW and M&M shaft remained zero (Figure 25).

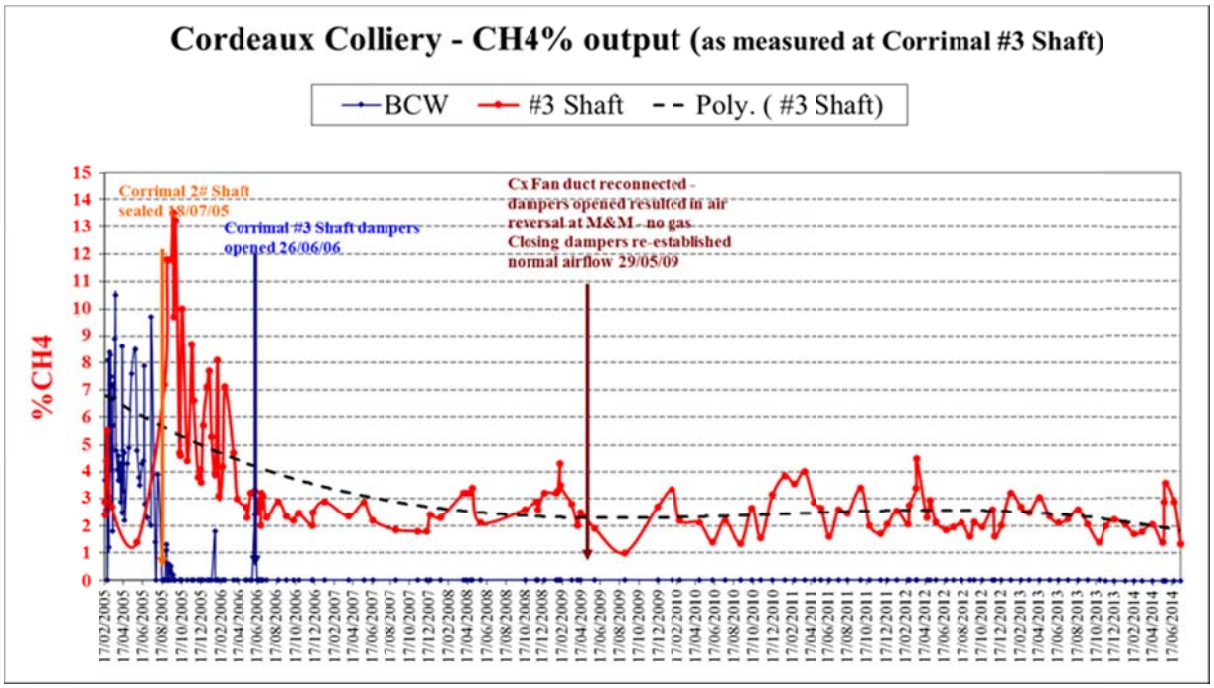

Figure 25: Cordeaux Colliery Methane output from the BCW and Corrimal No.3 Shafts

Public Safety

Dendrobium Mine

Public and workplace safety is a major consideration in achieving the BHP Billiton corporate goal of zero harm. Site safety risks and control mechanisms associated with the Dendrobium operations are provided in Table 33.

Table 33: Site Safety Risks and Control Mechanisms

Safety Issue	Controls
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 regards to safety. In addition to the site induction, awareness material is presented in a number of different ways, which include: - Alternate three weekly safety scrums/training days that are attended by all persons

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	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 are fenced, with the main sites patrolled on a regular basis by a contracted security firm. 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 Illawarra Coal personnel are not in attendance
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. Critical Risk Observations and site inspections are undertaken to maintain safety systems Community announcements, news letters and letter box drops are used to communicate relevant safety information to the public.

Public Safety around mining areas

The current Dendrobium Longwall mining is occurring within Sydney Catchment Authority lands. Illawarra Coal has developed procedures for working around and accessing potentially unstable ground. The controls are outlined in:

- Sandy Creek Waterfall Access Procedure (ICHP0157); and
- Working around Rock falls, cliff lines and unstable areas (ICHP0145).

The controls currently in place are listed in the table below:

Table 34: Public Safety and Controls around Mining Areas

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

Cordeaux Colliery

The 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 Illawarra Coal personnel are not in attendance. The current condition of the site poses no threat to the general public. As various areas are decommissioned

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and rehabilitated, the sites will be left in a permanently safe condition to the satisfaction of relevant authorities. Remote sites have remained fenced and locked during this report period.

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

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. Further work in relation to maintenance and line marking at the pit top car park area was undertaken in this report period to improve traffic movement and personnel safety.

Other Issues and Risks

Dendrobium Mine

Environmental Audits

During this reporting period the performance of Dendrobium's Environmental Management System (EMS) and overall HSEC Management System was assessed in a comprehensive series of audits (shown in Table 35).

Table 35: Environmental Audits undertaken FY14

Date	Type	Internal	External	Comments
July 2013	EMS		X	IC External EMS Audit
Oct 2013	EMS	X		Internal EMS Audit
May 2014	KPMG		X	Assurance audit for the BHP Billiton Sustainability Report.
June 2014	EMS	X		Internal EMS Audit

No non-conformances were recorded during for the EMS, EPBC or the KPMG audit. If non-conformances are identified during audits, they are recorded and tracked via the event reporting system utilised by Illawarra Coal operations.

Environmental Risk Register

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

Consent Condition Compliance

During the reporting period Dendrobium Mine complied with 98% of the required conditions. Dendrobium Mine Compliance report is attached in as Appendix C.

Cordeaux Colliery

It was reported in previous period reports that there were occasions when elevated levels of methane gas were detected in buildings adjacent to the temporarily sealed Men and Materials (M&M) Winder Shaft. The leakage of gas from the shaft is associated with barometric pressure differential between the surface and underground. Continuous methane gas monitors are strategically placed within the adjacent building. A direct reading "Magnehelic" pressure differential gauge has been fitted at the collar of the M&M shaft, permitting monitoring of atmospheric changes and instantaneous checks on air flow direction within the

continued

shaft. There have been no methane emissions issues at shaft collars during the last seven report periods. The monitors are inspected to ensure correct functionality every six months by Coal Mines Technical Services.

The filling and sealing of the Corrimal No. 2 shaft has had a positive effect upon the frequency of airflow reversals within the M & M shaft and since the opening of the dampers on the stationary fan at Corrimal No.3 shaft, a greater and more consistent down flow within both the M & M and Bulk Coal Winder (BCW) shafts at the Cordeaux Colliery pit top is occurring. It would appear that the natural ventilation established between Corrimal No. 3 shaft and the two Cordeaux Colliery shafts remains stable and is being monitored.

5. Community Relations

Envionmental Complaints

Dendrobium Mine

Illawarra Coal operates a 24hr Community Call Line (freecall 1800 102 210) and a general email address ICEnquiries@bhpbilliton.com. The call line and email address enables 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 has been advertised throughout the reporting period in all correspondence distributed to the community.

For all calls to the community call line, an initial call back is made within 24 hours of the call. 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, Dendrobium mine site and Illawarra Coal management, and government agencies on a regular basis.

A total of 100 community complaints were received during the reporting period. Of these, approximately 90% were related to rail noise. Complaints made against the operations and the resolution of them are reported each month on the BHP Billiton website. A summary of the complaints recorded is provided in Appendix D.

As discussed in section “Noise Management Strategies”, the Rail Noise Working Group 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 Noise Management Strategies.

Cordeaux Colliery

There were no community complaints received during the reporting period.

Community Liason

Dendrobium Mine

Community Consultation

Due to the location of the Dendrobium Pit Top facilities and KVCLF, it is essential that frequent and effective communication occurs between the mine personnel and the residents of Mt Kembla and surrounding areas. Illawarra Coal 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 (distributed quarterly) and other letterbox drops

Community Relations continued

- Dendrobium Community Consultative Committee meetings are held every two months
- Dendrobium Community Enhancement Committee meetings are held every two months
- Dendrobium section on the BHP Billiton 'Regulatory Information' webpage
- Participation in community events and activities
- Community Perception Surveys
- Attendance at community 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 BHP Billiton 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.
- 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, up to five community members, two environmental group representatives, one representative from the Wollongong City Council and BHP Billiton representatives as outlined in Table 36.

Table 36: Membership of the DCCC at 30 June 2014

Name	Member Category
Mike Archer	Independent Chairperson
Alex Beccari	Community Representative
Phil Diamond	Community Representative
Phil Grant	Community Representative
Vivien Twyford	Community Representative
Chris Haley	Community Representative
Julie Sheppard	Environmental Group Representative
Ann Young	Environmental Group Representative
Anthony Barnes	Wollongong City Council
Peter McMillan	Illawarra Coal (appointed Environmental Representative)
Nathan Menser	Illawarra Coal (appointed Communications Representative)
Wayne Price	Illawarra Coal – GM, Dendrobium Mine

The Independent Chairperson Mike Archer was appointed to the Chair in October 2013. Prior to his appointment, the meeting held in August 2013 (ie within the reporting period) was chaired by Acting

Community Relations continued

Chairperson Phillip Costa. Mr Costa is the Independent Chairperson for the Illawarra Coal Community Consultative Committee, associated with Illawarra Coal's Appin and West Cliff Mines.

Table 37 below outlines a summary of the information presented to the Dendrobium Community Consultative Committee during the reporting period.

Table 37: Summary meeting information from of community consultation

Month	Presentation
15 August 2013	MEETING – Items discussed: - Operational update on Longwall 9 and logistics issues. - Environment overview, including environmental audit results. - Update on community initiatives and concerns. - Discussion on surface water modelling for Dendrobium Mine [request for study tabled] - Site visit opportunity discussed: view longwall equipment in testing phase (surface visit)
23 September 2013	EXTRAORDINARY MEETING: - Opportunity for DCCC membership to meet potential Independent Chairperson Mike Archer.
17 October 2013	MEETING postponed: Due to concerns relating to weather and bushfire conditions, the meeting was postponed for one month.
21 November 2013	MEETING – Items discussed: - Operational update on Longwall 9 and logistics issues. - Environment overview, including recent mining impacts. - Update on actions required under the Development Consent. - Update on community initiatives. - Confirmation of 2014 meeting dates
28 November 2013	EXTRAORDINARY MEETING: - In response to the request for a study on surface water modelling (August 2013), Illawarra Coal arranged for its surface water consultant to present an overview of the surface water model.
20 February 2014	MEETING – Items discussed: - Operational update on Longwall 9 and logistics issues. - Environment overview, including recent mining impacts. - Update on actions required under the Development Consent. - Update on community initiatives. - Discussion relating to surface water study. Following the November 2013 extraordinary meeting, community representatives on the CCC again called for an independent peer review of the surface water model for improved understanding.
10 April 2014	MEETING – Items discussed: - Operational update on Longwall 9 and logistics issues. - Environment overview, including recent mining impacts. - Update on actions required under the Development Consent. - Update on community initiatives. - Update on the finalisation of the surface water study review seeking an interpretation of technical information; and acceptance to engage consultant.
15 May 2014	SITE VISIT - Site visit undertaken by the DCCC to the land directly above Dendrobium Area 3B (primarily Longwalls 9 and 10), within the Metropolitan Special Area.

Community Relations continued

Month	Presentation
2 June 2014	EXTRAORDINARY MEETING: - The consultant engaged to conduct the peer review of the surface water study attended a special meeting of the DCCC to present his findings and interpretation of the surface water flow (as per the brief).
19 June 2014	MEETING – Items discussed: - Operational update on Longwall 9 and logistics issues. - Environment overview, including recent mining impacts. - Update on actions required under the Development Consent. - Update on community initiatives. - Formal acceptance of the surface water study peer review.

Newsletters and Information Sheets

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

- Operations updates, including longwall progress and development
- Environmental improvement works, including rehabilitation works-Stage 2 of the Mt Kembla Mine Memorial Pathway and Kembla Heights Wetland Rehabilitation weed removal conducted by Conservation Volunteers Australia;
- Events and organisations supported by Dendrobium Mine, including the 96 Candles Ceremony and Mt Kembla Heritage Fair.
- DCCC and DCEC activities, including information on inspections and projects supported.

Letterbox drops

Letterbox drops are used to raise awareness of work being undertaken during the reporting period, particularly where the activity carried out was not a part of regular operations. For example, letterbox drops were conducted during FY14 for increased road movements along Stones Road for mine access via Kemira Valley conveyor road.

Community Partnerships Program

The Dendrobium Community Enhancement Program (DCEP) was developed 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, Illawarra Coal has contributed over $1.2 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 Illawarra Coal representatives. The committee met regularly during the reporting period, with extraordinary meetings also convened to conduct business planning and review of operations.

Community Relations continued

The DCEC has adopted a strategic approach to the way applications for funding are received and considered with a Business Strategy which is reviewed annually. 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:

http://www.bhpbilliton.com/home/society/regulatory/Pages/default.aspx

Some recent organisations the DCEP has supported include:

- Mt Kembla Mining Heritage (Conservation assessment and rental assistance)
- Mt Kembla Memorial Pathway Group (equipment storage)
- Unanderra and Figtree Area Residents Association (Unanderra Homework Club)
- Mt Kembla Public School (interactive whiteboard)
- Life Education Illawarra (subsidised school visits)
- Unanderra Public School P&C (computer equipment)
- Mt Kembla Tennis Club (tennis court upgrade)
- Kembla Heights Bowls & Recreation Club (solar panels)

Community Land Rehabilitation

Conservation Volunteers Australia representatives and volunteers continued to weed the Kembla Heights Wetland area throughout the reporting period, with a number of secondary weeds starting to show signs of new growth.

During the year more than 240 grasses, trees and shrubs have been planted including locally sourced native tube stock. There has also been a reasonable amount of natural regeneration of native plants at the site; particularly Kangaroo Apple, Bleeding Hearts as some Eucalypts species.

Cordeaux Colliery

There were no targeted community liaison activities associated with the Cordeaux site during the reporting period.

6. Rehabilitation for reporting period

Dendrobium Mine

The rehabilitation security cost estimate for the Dendrobium operations was reviewed in December 2013 and again at the end of this reporting period. No major changes to the existing security estimate were identified. A copy of the revised security cost estimate is provided as Appendix B.

A rehabilitation summary associated with the Dendrobium operation is provided below.

Table 38: Dendrobium Rehabilitation Summary for the Reporting Period

	Area affected /rehabilitated (hectares)		
ITEM	As at June 2013	As at June 2014	As at June 2015 (Estimated)
A1 Mine Lease area	18,816	18,816	18,816
DISTURBED AREAS			
B1: Infrastructure area	20.37	20.37	20.37
B2: Active mining area (surface)	0	0	0
B3: Waste emplacements	0	0	0
B4: Tailings emplacements	0	0	0
B5: Shaped waste emplacement	0	0	0
ALL DISTURBED AREAS	43	43	43
REHABILITATION PROGRESS			
C1: Total rehabilitated area	8.76	8.76	8.76
D: REHABILITATION ON SLOPES			
D1: 10 to 18 degrees	0	0	0
D2: Greater than 18 degrees	0	0	0
E: SURFACE OF REHABILITATED LAND			
E1: Pasture and grasses	0	0	0
E2: Native forest/ecosystems	8.035	8.035	8.035
E3: Plantations and crops	0	0	0
E4: Other (Bradford Breaker stg 3)	0.725	0.725	0.725

Monitoring of the 2/3 Ventilation Shaft site was inspected on six monthly basis during the reporting period by Environmental representatives. Refer to the photo catalogue provided in Figure 26.

Rehabilitation for reporting period continued

Figure 26: Photo locations monitoring rehabilitation

	
Photo Point 4, Facing South October 2008	Photo Point 8, Facing East October 2008
	
Photo Point 4, Facing South December 2011	Photo Point 8, Facing East December 2011
	
Photo Point 4, Facing South April 2014	Photo Point 8, Facing East April 2014

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

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 bund has been constructed to divert clean water around the site, and drainage channels have been established within the

Rehabilitation for reporting period continued

site to divert seepage around infrastructure areas. Table 39 outlines the maintenance activities undertaken on the rehabilitated land during the reporting period.

Table 39: Maintenance Activities on Rehabilitated Land

NATURE OF TREATMENT	Area affected /rehabilitated (hectares)		Comment / Control Strategies / Treatment Detail
	Reporting period	Next Period	
Additional Erosion Control Works	0	0	Erosion and Sediment Control devices inspected as part of the rehabilitation program at No.2/3 Vent Shaft Site. Sediment control structures have been maintained throughout the reporting period
Recovering (topsoil, subsoil sealing)	0	0	Not applicable
Soil Treatment	0	0	Not applicable
Treatment Management (grazing, cropping, slashing)	0	0	Not applicable
Re-seeding / Planting	0	0	Not applicable
Adversely affected by Weeds	0	0	Exotic plant growth included in the inspection regime for the rehabilitation No.2/3 Vent Shaft Site.
Feral Animal Control	0	0	Not applicable.

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

Dendrobium Tunnel Subsidence Rehabilitation

On 12th November 2013, a localised surface failure was observed on a BHP Billiton owned property above the Dendrobium Tunnel. This occurred in bushland east of Harry Graham Drive, adjacent to a decommissioned power line easement.

As soon as the feature was identified, temporary safety measures were put in place, these include:

- Chain mesh fencing around the perimeter.
- Warning signage around the perimeter.
- Continued inspections by BHPB IC to identify physical changes to the feature and determine the adequacy of safety measures in place.
- The relevant government agencies and the closest residents in Kembla Heights were informed of this feature and the management actions that were proposed to be undertaken.

Rehabilitation works commenced in June 2014 and involved the following activities

- placing fill material in the subsidence feature
- installation of topsoil over the disturbed area.
- establishment of a stable landform and permanent drainage with appropriate benches, sediment control devices.

Rehabilitation for reporting period continued

Figure 27: Fill material being deliverd to site 23/6/2014

Figure 28: Landform established 12/8/2014

Rehabilitation of the site will continue to be progressed and monitored during FY15 and results/outcomes will be reported in the next AEMR.

Mount Kembla Rehabilitation Project

The Mount Kembla Rehabilitation Project site was the original train haulage route from the historic Mount Kembla and Nebo Colliery sites to the Port Kembla steelworks. In addition to the rail line, coal bins were located in the corridor from which trains were loaded moved to Port Kembla Steelworks. The line and associated infrastructure was decommissioned in the early 1990s, however only minimal rehabilitation was undertaken at the time.

In 2002, with the development of Dendrobium Mine, a commitment was made by Illawarra Coal to provide an area of land for the establishment of the Mount Kembla Mine Memorial Pathway (the Pathway). The Pathway was planned to be completed in three stages; Stage 1 commencing at the start of Mount Kembla to Stones Road and was completed in 2008, Stage 2 incorporating an area of land between Stones Road

Rehabilitation for reporting period continued

and Benjamin Road and was completed in April 2013, and Stage 3 from Benjamin Road to the old Bradford Breaker station is progressing.

The stage 2 pathway area will be proposed to be removed from the mining lease at the renewal of the mine lease.

Southern Habitat, an environmental contracting firm have been hired to maintain and monitor the rehabilitation works conducted at the Stage 2 pathway project until June 2016. Ongoing maintenance activities will include erosion and sediment control, weed management and vegetation health.

During the reporting period, the following activities were undertaken as part of the Stage 3 rehabilitation:

- Weed removal and treatment targeting-Bidens,Fireweed,Fleabane,Thistles
- Installation of fencing and safety barriers (to keep out deers)
- Tubestock plantings
- Watering and application of fertiliser

Other Infrastructure

A project scope was developed for the removal of structures associated with O'Briens Drift (OBD) e.g. the removal of the tipping sheds at the top of the drift, the bins and conveyors at the bottom of OBD. Some of the old offices have also been removed.The project is currently on hold due to capital expenditure restrains.

Rehabilitation Trials and Research

No rehabilitation trial or research was conducted during the reporting period. Illawarra Coal continues to support a number of Australian Coal Association Research Programs such as the CSIRO study into coal wash strata injection and the Strata Control Technology study into the rehabilitation of mining impacts to rivers. BSO underground coal wash trial will continue to look at using coal wash as a road base.

Further Development of the Final Rehabilitation Plan

A Landscape Management Plan has been developed to mee 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 DITRIS NSW and internal BHP Billiton requirements. The Conceptual Closure Plan document outlines that are required to be rehabilitated after the closure of the mine.

During the reporting period the Landscape Management Plan was resubmitted with an addendum to cover the rehabilitation works associated with the Dendrobium Tunnel Surface Feature.

Cordeaux Colliery

No rehabilitation activities occurred on the Cordeaux surface lease during the reporting period. Rehabilitation activities associated with exploration were detailed in Section 2 (Exploration) of this report.

The rehabilitation summary associated with Cordeaux Colliery as provided in **Table** 40.

Rehabilitation for reporting period continued

Table 40: Cordeaux Rehabilitation Summary for the Reporting Period

ITEM	Area affected /rehabilitated (hectares)		
	As at June 2013	As at June 2014	As at June 2015 (Estimated)
A1 Mine Lease area	30,139	30,139	30,139
DISTURBED AREAS			
B1: Infrastructure area	26.31	26.31	26.31
B2: Active mining area (surface)	0	0	0
B3: Waste emplacements	0	0	0
B4: Tailings emplacements	0	0	0
B5: Shaped waste emplacement	0	0	0
ALL DISTURBED AREAS	26.31	26.31	26.31
REHABILITATION PROGRESS			
C1: Total rehabilitated area	21.32	21.32	21.32
D: REHABILITATION ON SLOPES			
D1: 10 to 18 degrees	0	0	0
D2: Greater than 18 degrees	0	0	0
E: SURFACE OF REHABILITATED LAND			
E1: Pasture and grasses	11.3	11.3	11.3
E2: Native forest/ecosystems	10.02	10.02	10.02
E3: Plantations and crops	0	0	0
E4: Other (Bradford Breaker stg 3)	0.725	0.725	0.725

A summary of the maintenance activities on rehabilitated land associated with the Cordeaux operations is provided in the table below.

Rehabilitation for reporting period continued

Table 41: Maintenance Activities on Rehabilitated Land

NATURE OF TREATMENT	Area affected /rehabilitated (hectares)		Comment / Control Strategies / Treatment Detail
	Reporting period	Next Period	
Additional Erosion Control Works	0	0	Existing measures appear to be adequate. No further actions undertaken during the period.
Recovering (topsoil, subsoil sealing)	0	0	None undertaken this period
Soil Treatment	0	0	None undertaken this period
Treatment Management (grazing, cropping, slashing)	0	0	Not applicable
Re-seeding / Planting	0	0	Not applicable
Adversely affected by Weeds	0	0	Weed control measures are addressed on a as required basis.
Feral Animal Control	0	0	Not applicable.

7. Activities Proposed in the Next AEMR Period

Dendrobium Mine

Mining Operations

During the next reporting period (FY15), Dendrobium will continue Longwall mining in Area 3B with Longwall 10 scheduled to be complete in December 2014 & Longwall 11 extraction to start in January 2015. Development will continue in Area 3B Main Gate 11&12 and Wonga Mains.

Construction Activities

No major Construction activities are planned for FY15. No new land disturbance will be required.

Construction of a bulk store along the Portal road and the Dendrobium Pit top will commence in July 2014. This structure is being constructed over an existing hardstand area and will be a covered storage area.

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 systems;
- Continued sealing of unsealed areas.
- Replacement of some bitumen areas with concrete

Noise Management

Additional monitoring is planned during the next reporting period using real-time and handheld noise monitoring units to identify feasible noise reduction initiatives. It is proposed that Underground Load Haul Dump Vehicles (CoalTrams replacing Eimcos) are to be changed to a quieter model at the end operating period.

Environmental Management System

Dendrobium Mine is planning to continue the environmental management in accordance with ISO14001.

Community Activities

A number of community-based activities are scheduled to be undertaken during the FY15 reporting period. These activities are detailed in the Stakeholder Engagement and Community Development Management Plan and include:

- Participation in Clean-up Australia Day;
- Organising a Charity Golf Day;
- Organising the Charity OZTAG Match;
- Continued sponsorship of the Mt Kembla Rugby League Football Club and Mt Kembla Mining Heritage.

continued

There will be continued meetings of the DCEC and DCCC, with various inspections undertaken with DCCC members.

Maintenance works associated with Stage 2 of the Mt Kembla Mine Memorial Pathway will continue during FY15. The Stage 3 of the path way project will progress during FY15 and will consit of caretaking of the existing fence and establishing tube-stock and building up of the biomass on the skeletal and flinty soils.

Cordeaux Colliery

No rehabilitation activities of significance are planned for the next report period.

It is intended that the site activities and nature of the sites will be maintained throughout the next period.

References continued

9. References

Dendrobium Mine

- Air Quality Management Plan
- Bushfire Management Plan
- Landscape Management Plan
- Lighting Management Plan
- Noise Management Plan
- Waste Management Plan
- Water Management Plan
- Environmental Protection Licence 3241
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality- Volume 1, Chapter 3 (2000)
- Cardno, 2012. Dendrobium Area 3B Subsidence Management Plan. Prepared for BHPBIC.
- BHPBIC, 2012. Dendrobium Mine SCA Asset Protection Plan, Revision 5, Area 3B.
- BHPBIC, 2012. Dendrobium Colliery Area 3B SMP Groundwater Management Plan.
- Cardno, 2012. Swamp Impact, Monitoring, Management and Contingency Plan, Dendrobium Area 3B. Prepared for BHPBIC.
- Cardno, 2012. Watercourse Impact Monitoring, Management and Contingency Plan, Dendrobium Area 3B.
- BHP Billiton Illawarra Coal. (2014). Swamp Impact, Monitoring, Management and Contingency Plan.
- Biosis. (2014). Dendorbium 3B, Longwall 9 End of Panel Report (Cultural Heritage).
- Biosis. (2014). Dendrobium Ecological Monitoring Program - Annual report for 2012/2013 Financial Year.
- Cardno. (2014). Dendrobium Areas 3A and 3B - Aquatic Ecology Monitoring 2008 - 2013.
- Ecoengineers. (2013). Level 2 TARP Specialist Review and Recommendations Donalds Castle Creek and Swamp 5 (Dendrobium Area 3B).
- Ecoengineers. (2013). Level 2 TARP Specialist Review and Recommendations Donalds Castle Creek Catchment Tributary DC13 and Swamp 1 a and b (Dendrobium Area 3B).
- Ecoengineers. (2014). End of Panel Surface and Shallow Groundwater Impact Assessment - Dendrobium Area 3B Longwall 9.
- Ecoengineers. (2014). Level 2 TARP Specialist Review and Recommendations WC21 and Swamp 8 (Dendrobium Area 3B).
- Ecoengineers. (2014). Level 3 TARP Specialist Review and Recommendations SC10C and Swamp 15b (Dendorbium Area 3A).

Appendices continued

Cordeaux Colliery

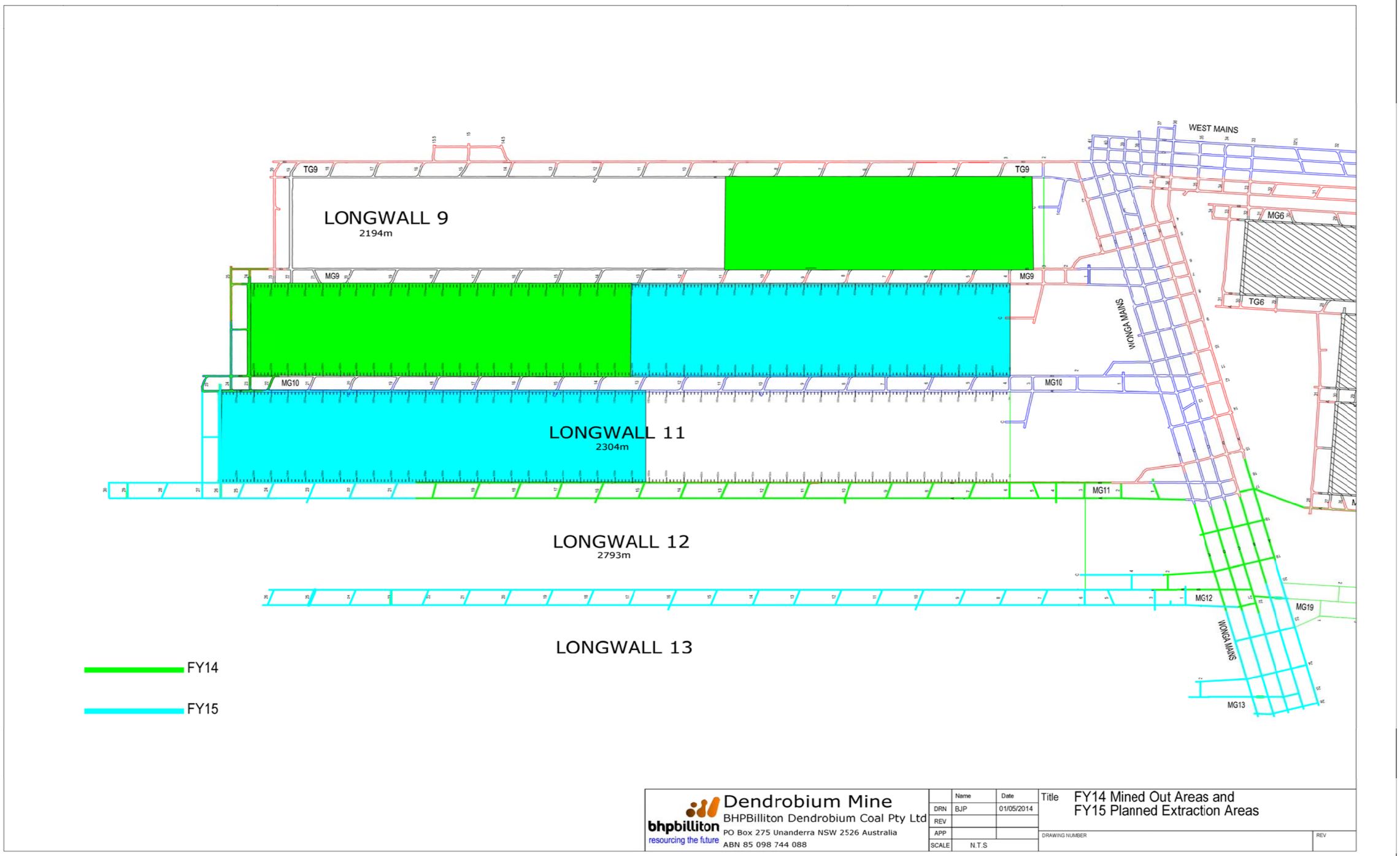
- Cordeaux Colliery - Locality Plan
- Cordeaux Colliery - Regional Context Plan
- Cordeaux Colliery – Leases, Colliery Holding and Location
- Cordeaux Colliery – Pit Top Infrastructure Plan
- Cordeaux Colliery – Extent of Underground Workings at Time of Closure – DP-3086
- Cordeaux Colliery Pit Top Surface Water Management
- Landcover Status – Cordeaux – Site 2012
- Landcover Status – Cordeaux – Corrimal No2 Shaft 2012
- Landcover Status – Cordeaux – Corrimal No3 Shaft 2012
- Landcover Status – Cordeaux – ML28 2012
- Cordeaux Colliery Rehabilitation Corrimal No. 2 Shaft – Work As Constructed Survey Plan
- Cordeaux Colliery – Corrimal No.3 Shaft Restoration Plan – Lower Level DP-3468
- Cordeaux Colliery - Corrimal No.3 Shaft Coal Bin Site Restoration Plan – Upper Level DP-3469
- Cordeaux Colliery – Corrimal No.3 Shaft Restoration Plan – Services Corridor DP-3470

10. Appendices

Dendrobium Mine

PLAN 1

Location of Mining Domain (and LW status as at end of FY14)



bhpbilliton resourcing the future	Dendrobium Mine BHPBilliton Dendrobium Coal Pty Ltd PO Box 275 Unanderra NSW 2526 Australia ABN 85 098 744 088	

	Name	Date
DRN	BJP	01/05/2014
REV		
APP		
SCALE	N.T.S	

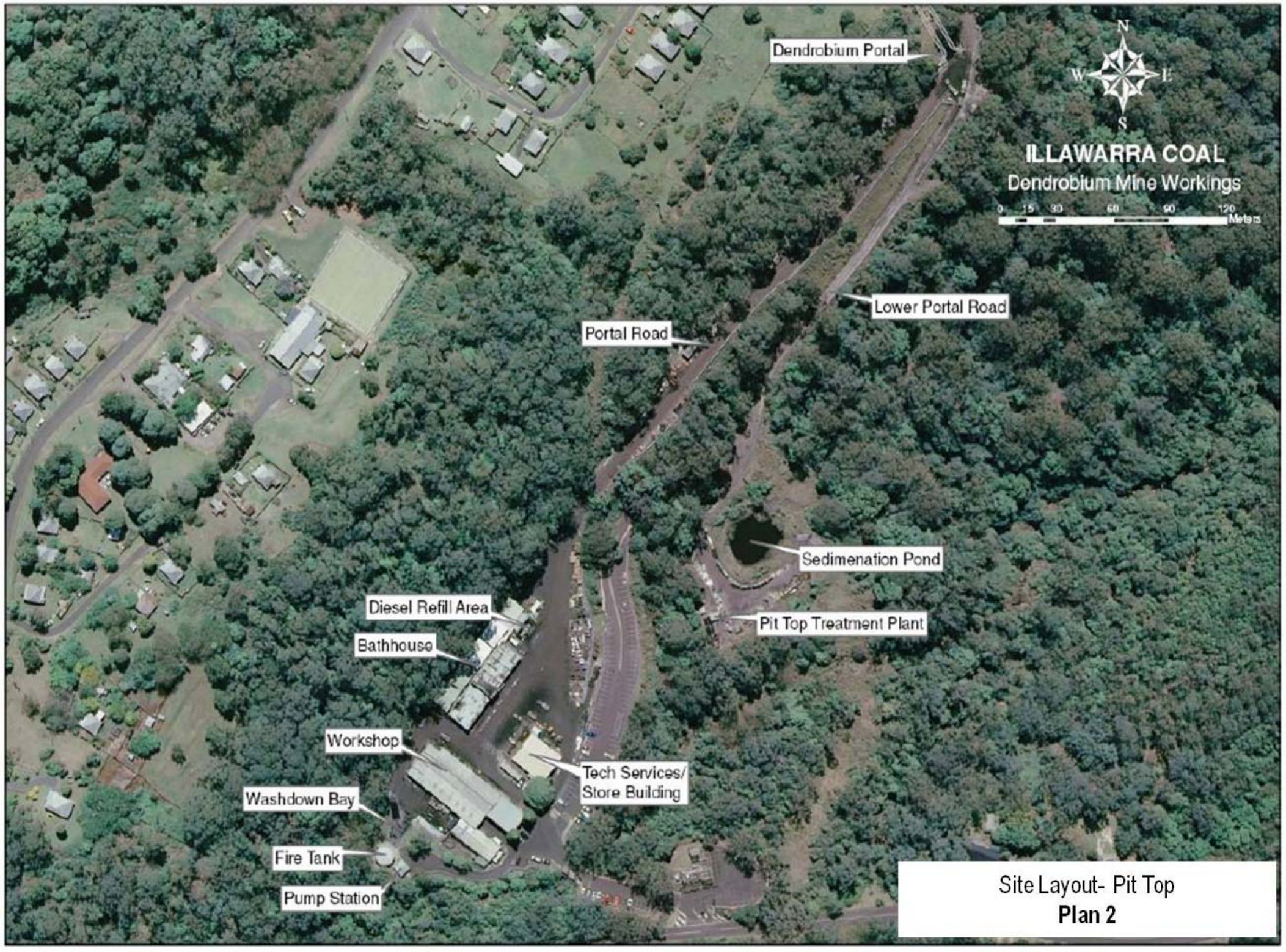
Title: FY14 Mined Out Areas and FY15 Planned Extraction Areas

DRAWING NUMBER | REV

PLAN 2

A-Site Layout – Pit Top

B- Site Drainage


Dendrobium Portal
N
W
E
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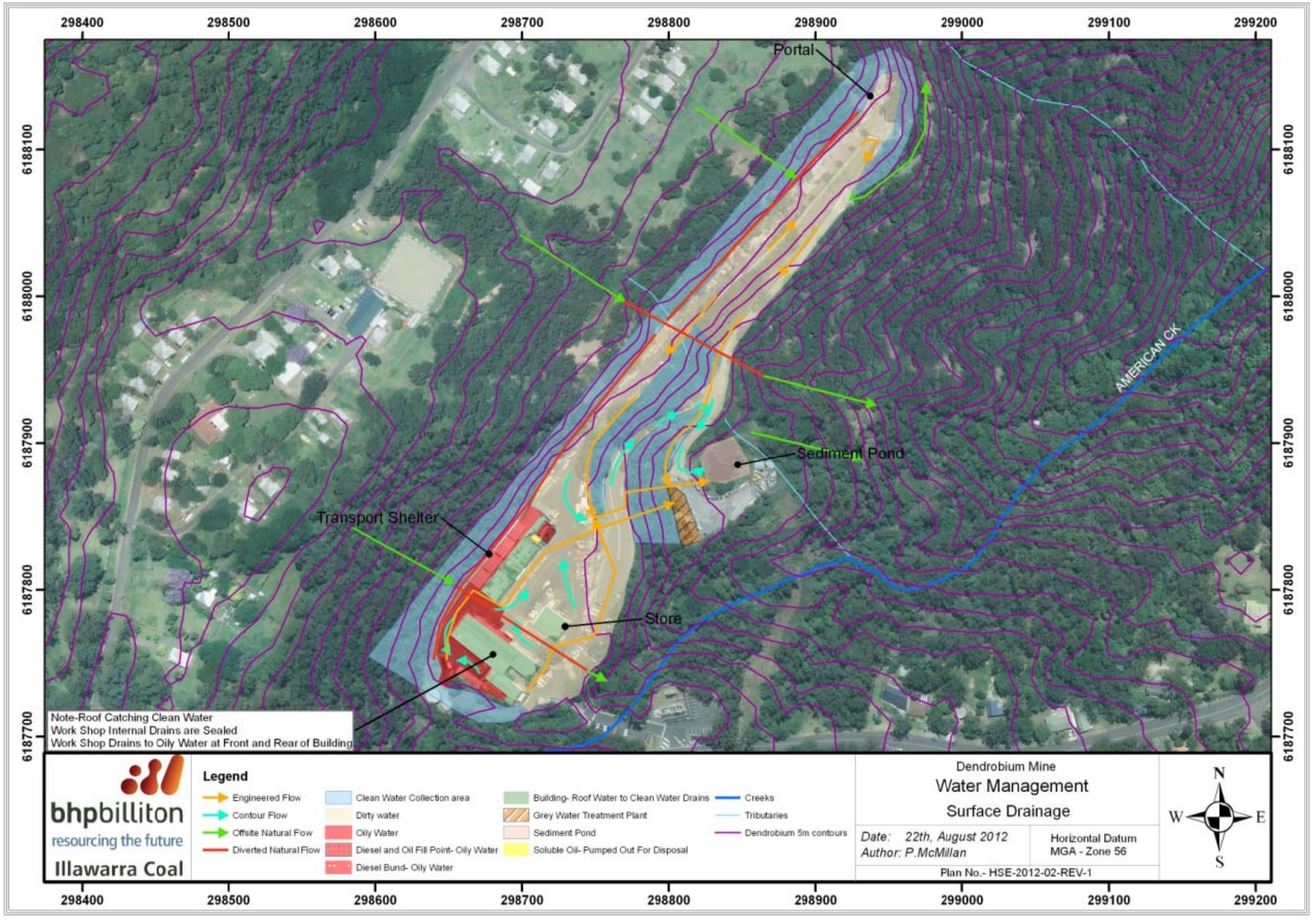
ILLAWARRA COAL
Dendrobium Mine Workings
0 15 30 60 90 120
Metres
Lower Portal Road
Portal Road
Sedimenation Pond
Diesel Refill Area
Pit Top Treatment Plant
Bathhouse
Workshop
Tech Services/
Store Building
Washdown Bay
Fire Tank
Pump Station
Site Layout- Pit Top
Plan 2

A)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298900
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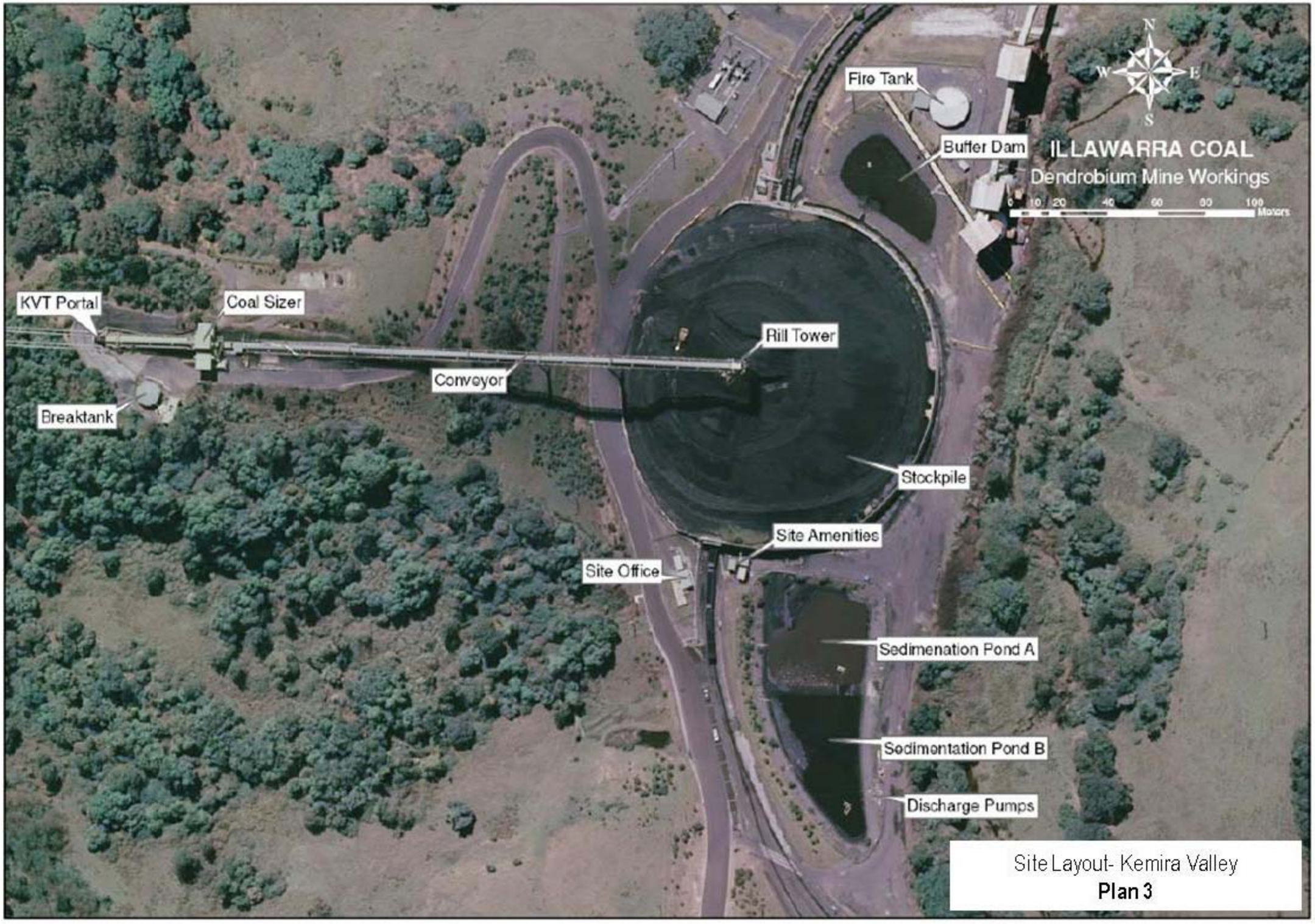
299200
6188100
6188000
6187900
6187800
6187700
Portal
AMERICAN CK
Sediment Pond
Transport Shelter
Store
Note-Roof Catching Clean Water
Work Shop Internal Drains are Sealed
Work Shop Drains to Oily Water at Front and Rear of Building
bhpbilliton
resourcing the future
Illawarra Coal
Legend
Engineered Flow
Contour Flow
Offsite Natural Flow
Diverted Natural Flow
Clean Water Collection area
Dirty water
Oily Water
Diesel and Oil Fill Point- Oily Water
Diesel Bund- Oily Water
Building- Roof Water to Clean Water Drains
Grey Water Treatment Plant
Sediment Pond
Soluble Oil- Pumped Out For Disposal
Creeks
Tributaries
Dendrobium 5m contours
Dendrobium Mine
Water Management
Surface Drainage
Date: 22th, August 2012
Author: P.McMillan
Horizontal Datum
MGA - Zone 56
Plan No.- HSE-2012-02-REV-1
N
W
E
S

B)

PLAN 3

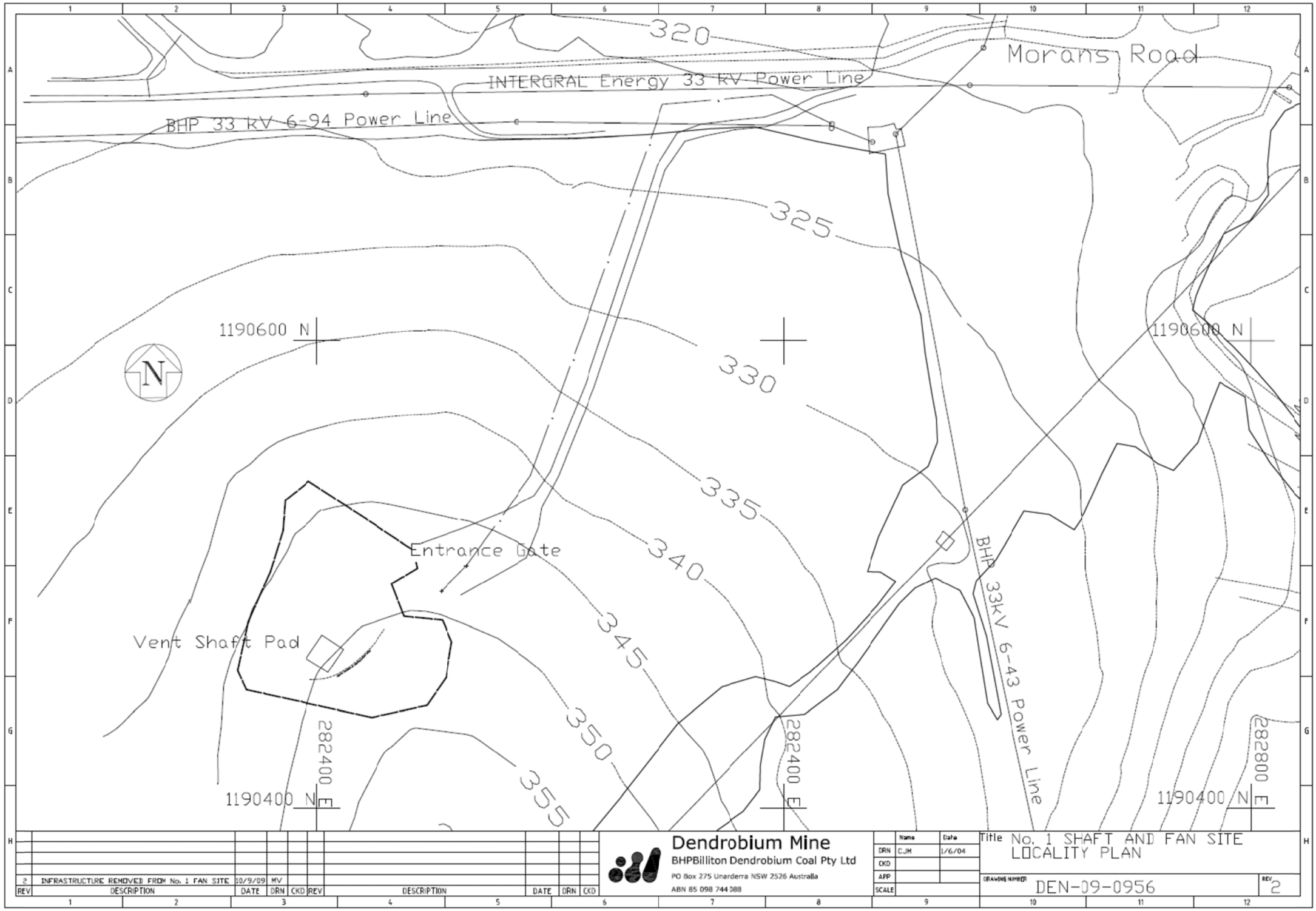
Site Layout – Kemira Valley



Site Layout- Kemira Valley
Plan 3

PLAN 4

No. 1 Ventilation Shaft Site Layout


320
Morans Road
INTERGRAL Energy 33 kV Power Line
BHP 33 kV 6-94 Power Line
325
1190600 N
330
335
340
Entrance Gate
345
Vent Shaft Pad
350
355
282400 E
1190400 N
BHP 33KV 6-43 Power Line
282800 E
N
2 INFRASTRUCTURE REMOVED FROM No. 1 FAN SITE 10/9/09 MV
REV DESCRIPTION DATE DRN CKD
Dendrobium Mine
BHPBilliton Dendrobium Coal Pty Ltd
PO Box 275 Unanderra NSW 2526 Australia
ABN 85 098 744 088
Name Date
DRN CJM 1/6/04
CKD
APP
SCALE
Title No. 1 SHAFT AND FAN SITE LOCALITY PLAN
DRAWING NUMBER DEN-09-0956
REV 2

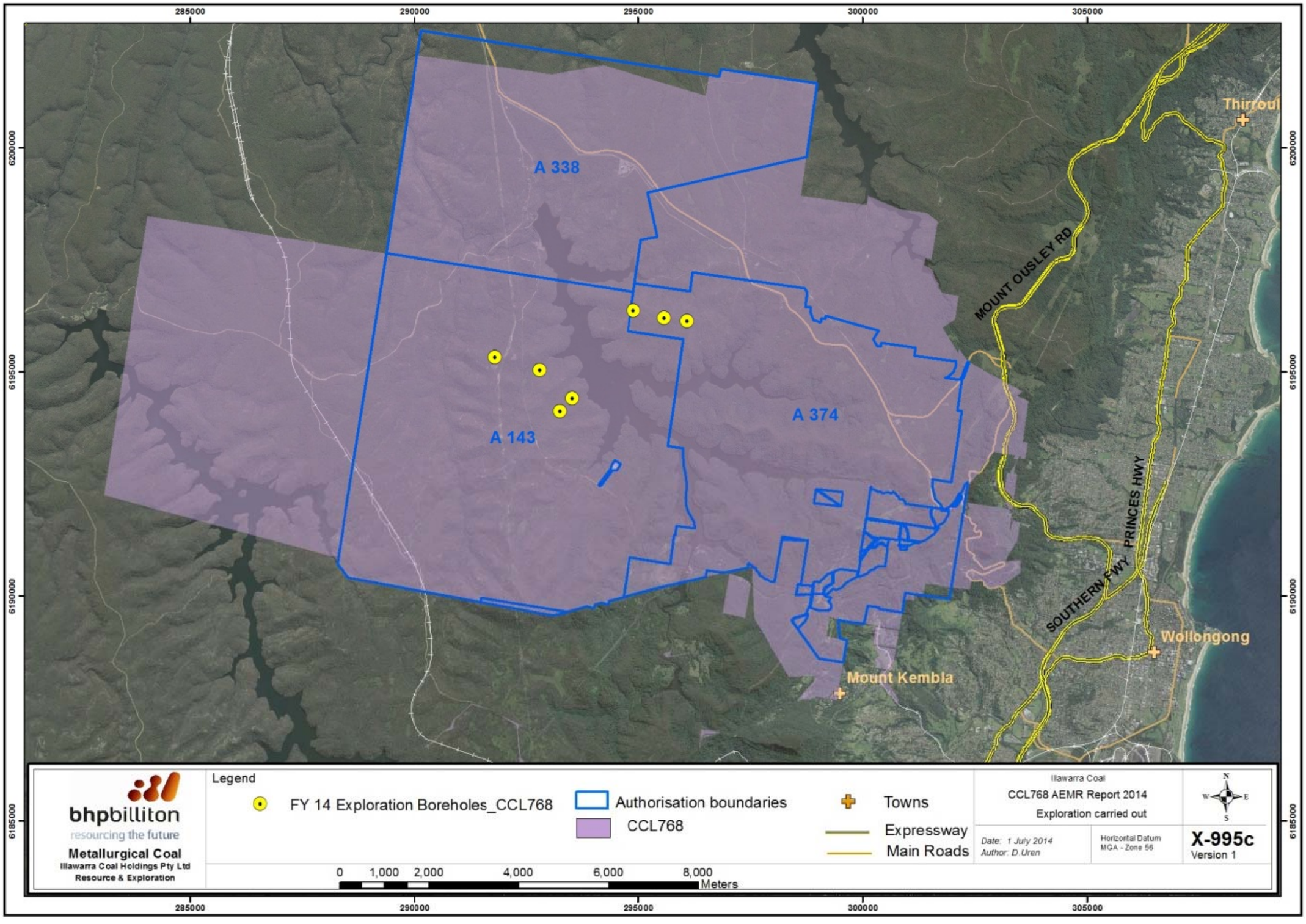
PLAN 5

No. 2 and 3 Ventilation Shaft Site Layout


N 6193000
N 6192750
N 6192500
E 294000
E 294250
E 294500
E 294750
N
LEGEND
LEASE
WATER
BUILDINGS
CONTOURS
SCALE IN METRES
0 20 40 60 80 100 120 140 160 180 200
Sed Pond
Sed Pond
Sed Pond
Dendrobium Mine
BHPBilliton Dendrobium Coal Pty Ltd
PO Box 275 Unanderra NSW 2526 Australia
ABN 85 098 744 088
Name Date
DRN Craig Straton 03/02/10
CKD
APP
SCALE NTS
Title Number 2 & 3 Shafts
Detail Site Survey
DRAWING NUMBER DEN-08-5701 Shaft Detail
REV 0
REV DESCRIPTION DATE DRN CKD

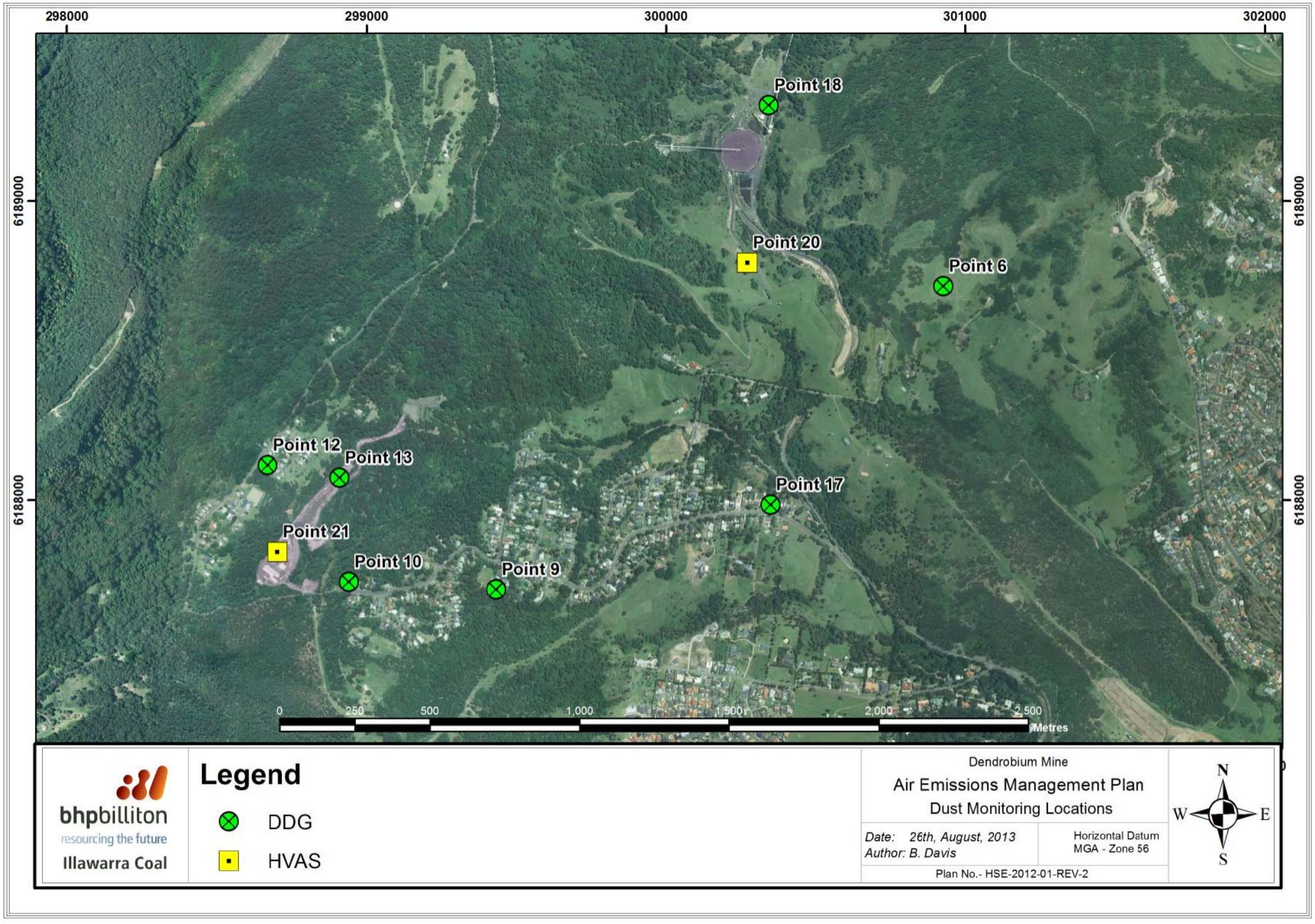
PLAN 6

Exploration Activities – Dendrobium Mine


285000
290000
295000
300000
305000
6200000
6195000
6190000
6185000
A 338
A 143
A 374
MOUNT OUSLEY RD
PRINCES HWY
SOUTHERN FWY
Thirroul
Wollongong
Mount Kembla
bhpbilliton
resourcing the future
Metallurgical Coal
Illawarra Coal Holdings Pty Ltd
Resource & Exploration
Legend
FY 14 Exploration Boreholes_CCL768
Authorisation boundaries
CCL768
Towns
Expressway
Main Roads
0 1,000 2,000 4,000 6,000 8,000
Meters
Illawarra Coal
CCL768 AEMR Report 2014
Exploration carried out
Date: 1 July 2014
Author: D.Uren
Horizontal Datum
MGA - Zone 56
X-995c
Version 1
N
W
E
S

PLAN 7

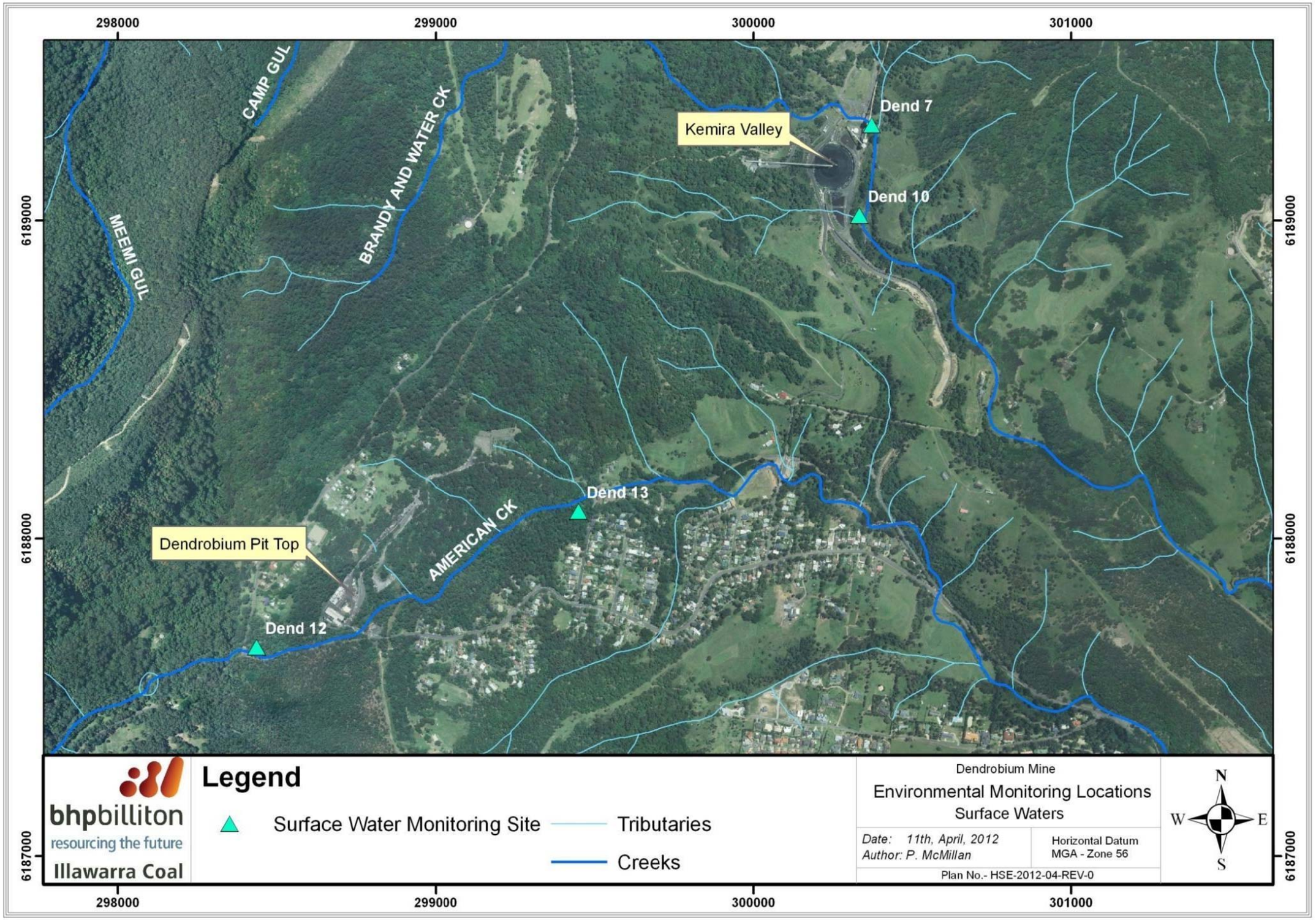
Air Quality Monitoring Locations


298000
299000
300000
301000
302000
6189000
6188000
Point 18
Point 20
Point 6
Point 12
Point 13
Point 17
Point 21
Point 10
Point 9
0
250
500
1,000
1,500
2,000
2,500
Metres
bhpbilliton
resourcing the future
Illawarra Coal
Legend
DDG
HVAS
Dendrobium Mine
Air Emissions Management Plan
Dust Monitoring Locations
Date: 26th, August, 2013
Author: B. Davis
Horizontal Datum
MGA - Zone 56
Plan No.- HSE-2012-01-REV-2
N
W
E
S

PLAN 8

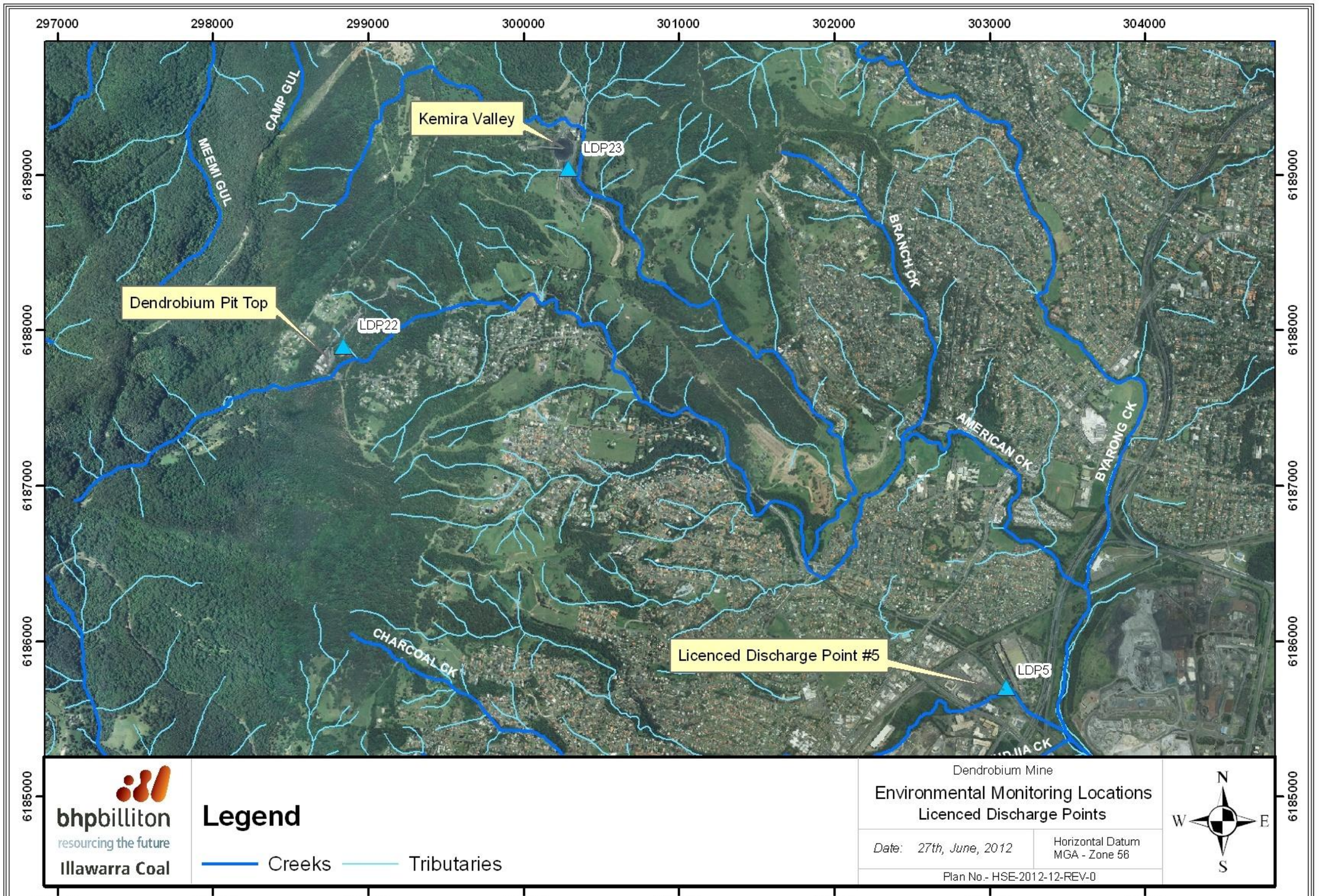
A – Surface Water Quality Monitoring Locations

B – LDP Location


298000
299000
300000
301000
6189000
6188000
6187000
CAMP GUL
MEEMI GUL
BRANDY AND WATER CK
AMERICAN CK
Kemira Valley
Dend 7
Dend 10
Dend 13
Dend 12
Dendrobium Pit Top
bhpbilliton
resourcing the future
Illawarra Coal
Legend
Surface Water Monitoring Site
Tributaries
Creeks
Dendrobium Mine
Environmental Monitoring Locations
Surface Waters
Date: 11th, April, 2012
Author: P. McMillan
Horizontal Datum
MGA - Zone 56
Plan No.- HSE-2012-04-REV-0
N
W
E
S

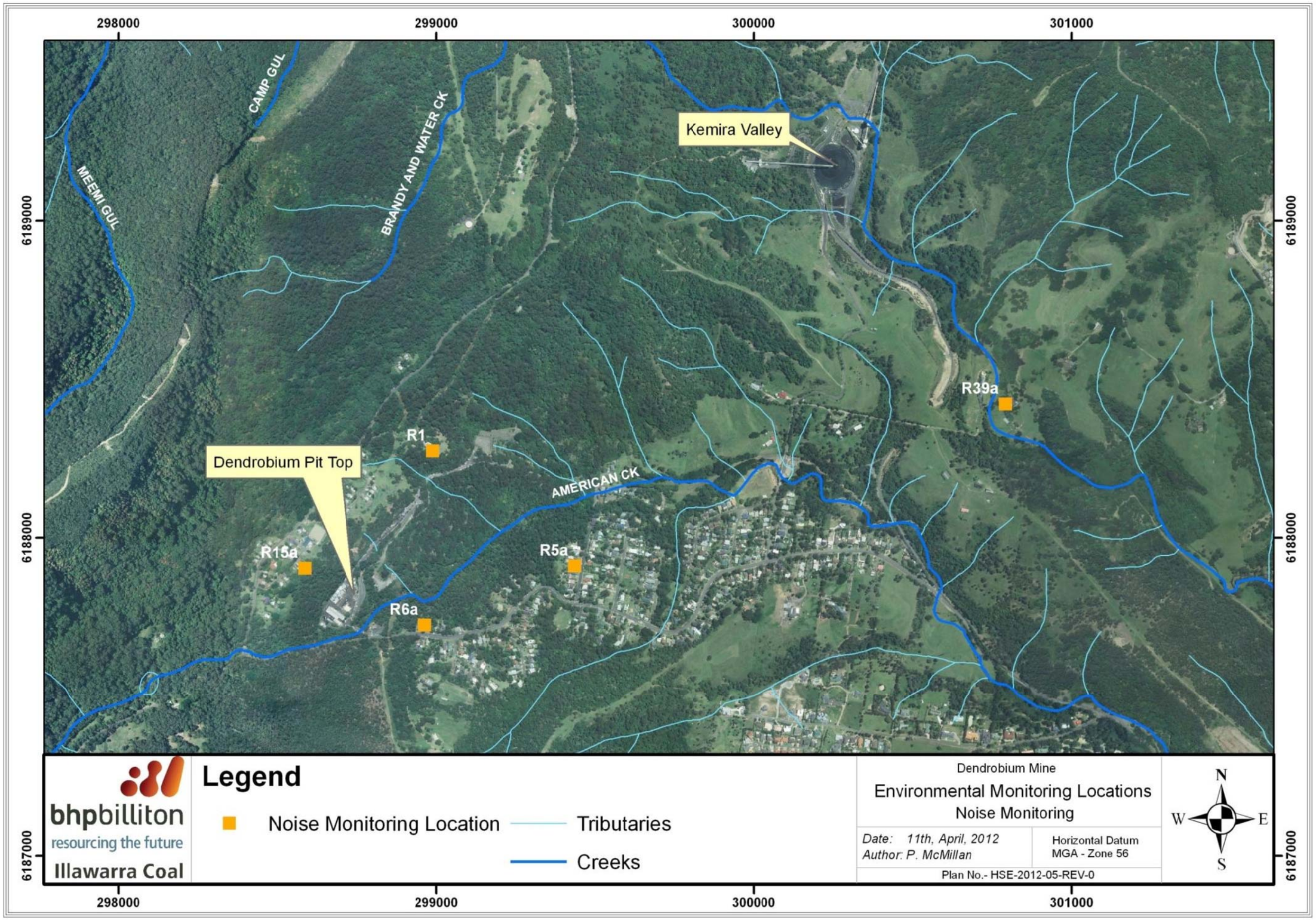
A)

Appendices continued



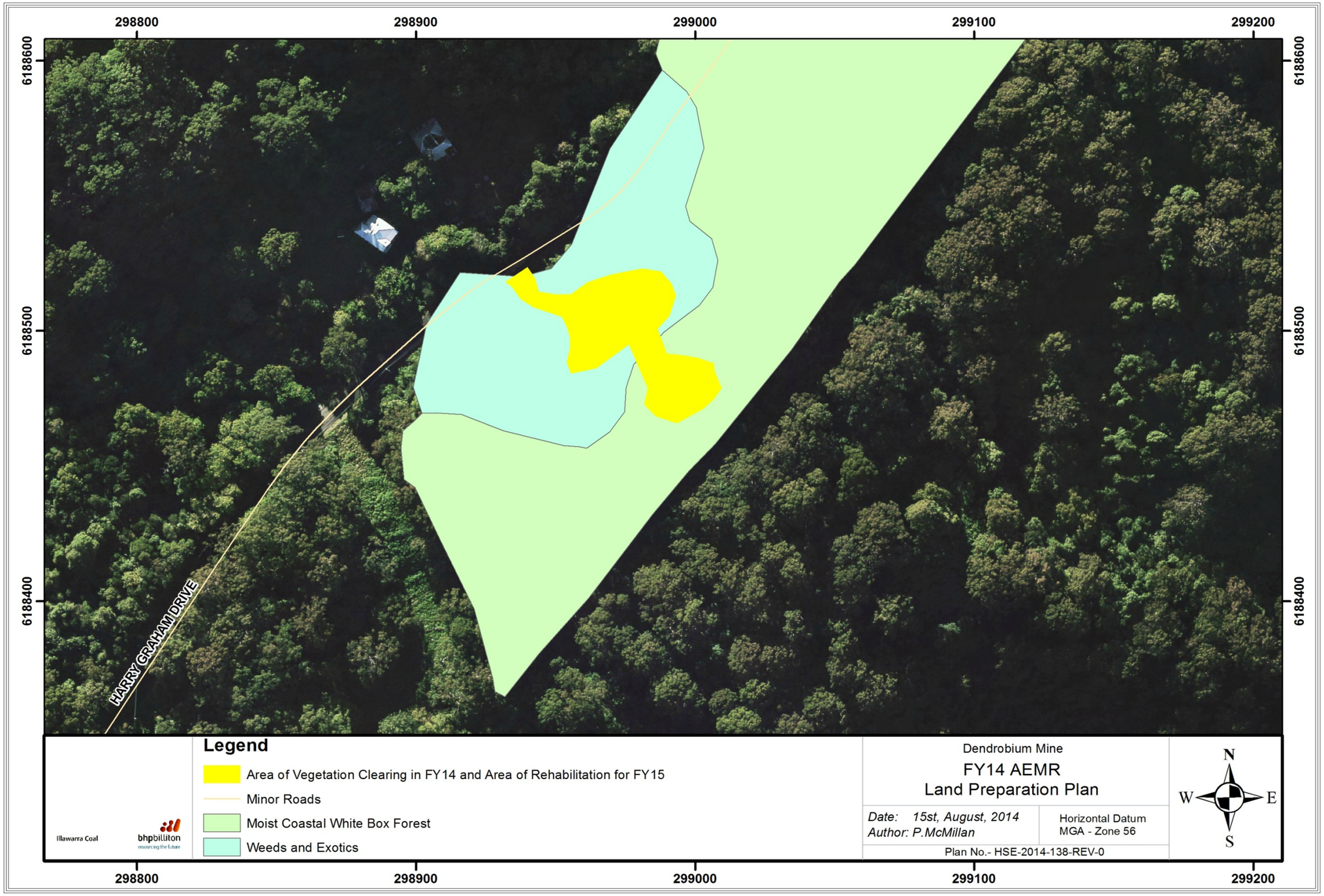
PLAN 9

Noise Monitoring Locations


298000
299000
300000
301000
6189000
6188000
6187000
CAMP GUL
MEEMI GUL
BRANDY AND WATER CK
Kemira Valley
R39a
R1
Dendrobium Pit Top
AMERICAN CK
R15a
R5a
R6a
bhpbilliton
resourcing the future
Illawarra Coal
Legend
Noise Monitoring Location
Tributaries
Creeks
Dendrobium Mine
Environmental Monitoring Locations
Noise Monitoring
Date: 11th, April, 2012
Author: P. McMillan
Horizontal Datum
MGA - Zone 56
Plan No.- HSE-2012-05-REV-0
N
W
E
S

PLAN 10

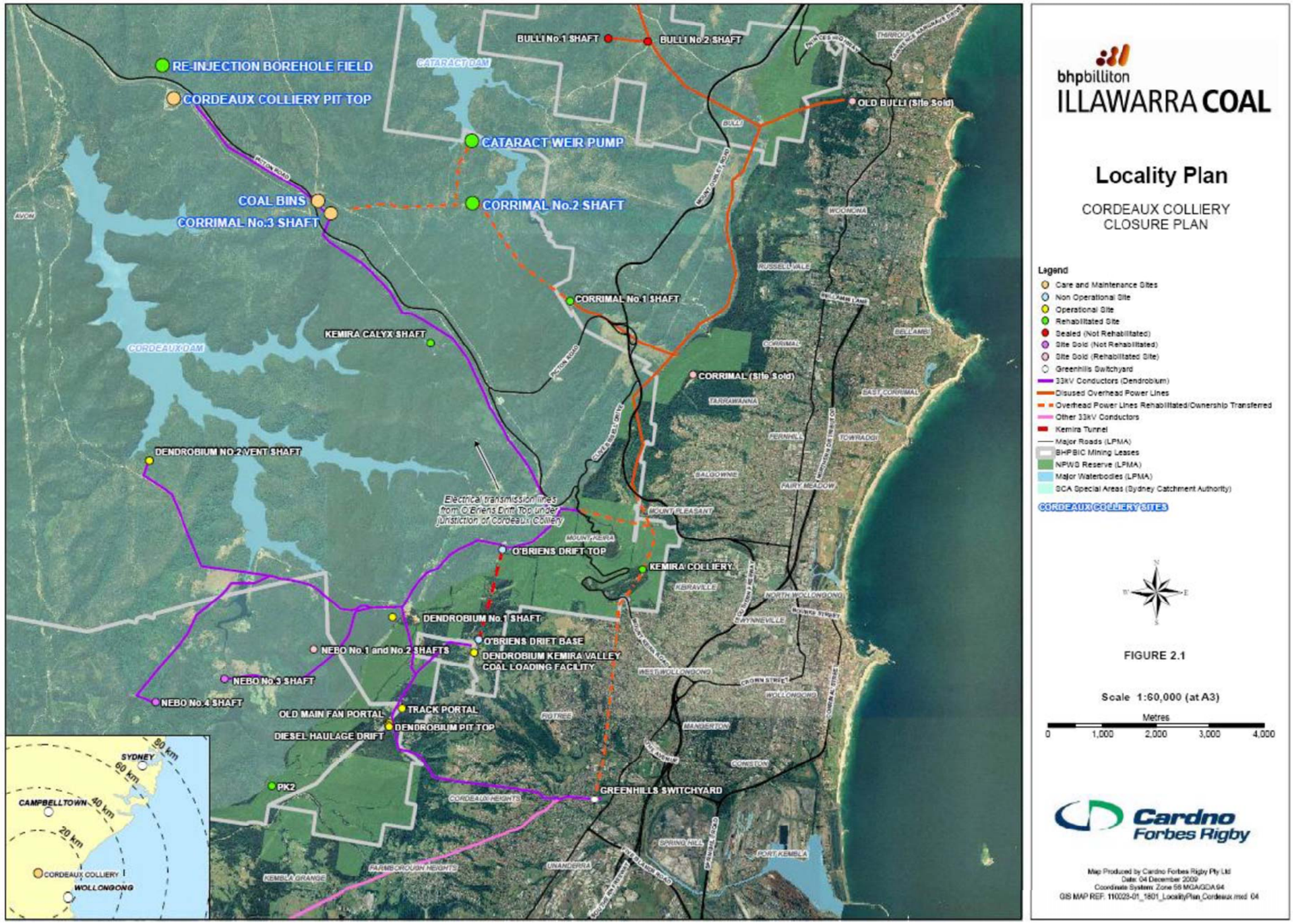
Active Emplacement Area and Rehabilitation Progress


298800
298900
299000
299100
299200
6188600
6188500
6188400
HARRY GRAHAM DRIVE
Legend
Area of Vegetation Clearing in FY14 and Area of Rehabilitation for FY15
Minor Roads
Moist Coastal White Box Forest
Weeds and Exotics
Illawarra Coal
bhpbilliton
resourcing the future
Dendrobium Mine
FY14 AEMR
Land Preparation Plan
Date: 15st, August, 2014
Author: P.McMillan
Horizontal Datum
MGA - Zone 56
Plan No.- HSE-2014-138-REV-0
N
W
E
S

Appendices continued

PLAN 11

Cordeaux Colliery Locality Plan


RE-INJECTION BOREHOLE FIELD
CORDEAUX COLLIERY PIT TOP
CATARACT DAM
BULLI No.1 SHAFT
BULLI No.2 SHAFT
OLD BULLI (Site Sold)
CATARACT WEIR PUMP
COAL BINS
CORRIMAL No.3 SHAFT
CORRIMAL No.2 SHAFT
CORRIMAL No.1 SHAFT
KEMIRA CALYX SHAFT
CORDEAUX DAM
CORRIMAL (Site Sold)
DENDROBIUM NO.2 VENT SHAFT
Electrical transmission lines from O'Briens Drift Top under jurisdiction of Cordeaux Colliery
O'BRIENS DRIFT TOP
KEMIRA COLLIERY
DENDROBIUM No.1 SHAFT
O'BRIENS DRIFT BASE
NEBO No.1 and No.2 SHAFTS
DENDROBIUM KEMIRA VALLEY COAL LOADING FACILITY
NEBO No.3 SHAFT
NEBO No.4 SHAFT
OLD MAIN FAN PORTAL
TRACK PORTAL
DENDROBIUM PIT TOP
DIESEL HAULAGE DRIFT
PK2
GREENHILLS SWITCHYARD
SYDNEY
CAMPBELLTOWN
CORDEAUX COLLIERY
WOLLONGONG
80 km
60 km
40 km
20 km
bhpbilliton
ILLAWARRA COAL
Locality Plan
CORDEAUX COLLIERY
CLOSURE PLAN
Legend
Care and Maintenance Sites
Non Operational Site
Operational Site
Rehabilitated Site
Sealed (Not Rehabilitated)
Site Sold (Not Rehabilitated)
Site Sold (Rehabilitated Site)
Greenhills Switchyard
33kV Conductors (Dendrobium)
Disused Overhead Power Lines
Overhead Power Lines Rehabilitated/Ownership Transferred
Other 33kV Conductors
Kemira Tunnel
Major Roads (LPMA)
BHPBIC Mining Leases
NPWS Reserve (LPMA)
Major Waterbodies (LPMA)
SCA Special Areas (Sydney Catchment Authority)
CORDEAUX COLLIERY SITES
FIGURE 2.1
Scale 1:60,000 (at A3)
Metres
0
1,000
2,000
3,000
4,000
Cardno Forbes Rigby
Map Produced by Cardno Forbes Rigby Pty Ltd
Date: 04 December 2009
Coordinate System: Zone 56 MGA/GDA 94
GIS MAP REF: 110029-01_1801_LocalityPlan_Cordeaux.mxd 04

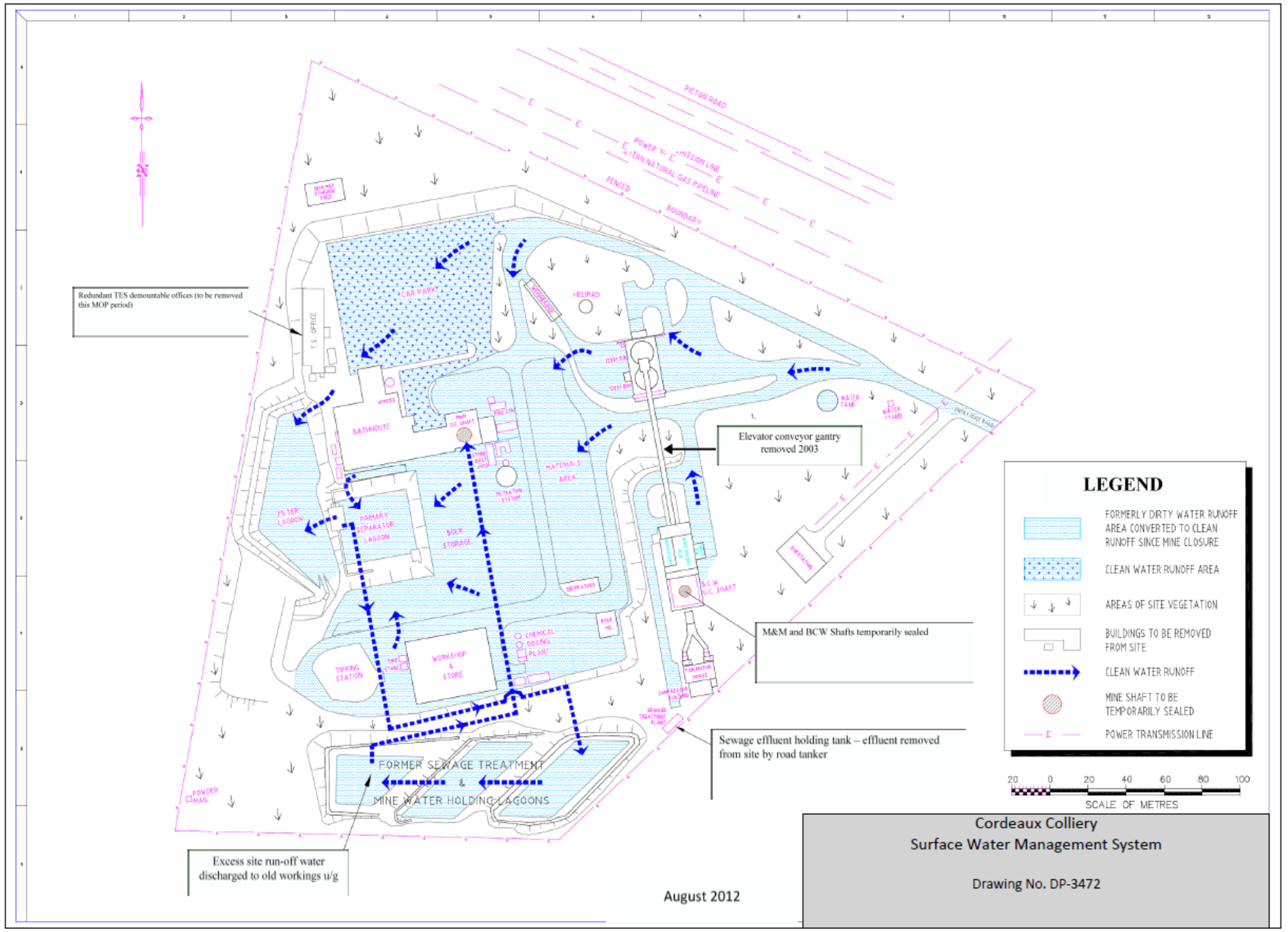
PLAN 12

Cordeaux Colliery Pit Top Infrastructure


CORE SHED
CORE STORAGE AREA
WEIGHBRIDGE (INOPERABLE)
HELIPAD
1200t COAL BINS (UNUSABLE)
FORMER T.S. OFFICE (PARTIALLY REMOVED)
CAR PARK
WATER TANK
WATER STAND (INOPERABLE)
Locality of Telstra Mobile Phone Tower
SEWAGE COLLECTION TANK
BATH HOUSE & OFFICES
FIRE STN
M&M D.C. SHAFT
R & E CORE SAMPLE STORE SHED
MATERIALS AREA
BULK STORAGE
FILTER LAGOON
WATER TANK (EMPTY)
PRIMARY SEPARATOR LAGOON
OIL SUMP
FIRE STORE
TIPPING STATION
WORKSHOP & STORE
SHED
STORAGE AREA
ACCESS ROAD
Picton Road
SUBSTATION
Locality of Cordeaux Pit Top HV tee-off from Endeavour Energy 33 KV Feeder
SWITCH ROOM
M.G. ROOM
BCW CONTROL ROOM
B.C.W U.C. SHAH
FAN DUCTS
DIESEL BOWSER
FAN MOTOR HOUSE
FORMER COMPRESSOR BUILDING
SEWAGE HOLDING TANK
UNDERGROUND DIESEL TANK
EQUIPMENT STORE
FORMER CHEMICAL DOSING PLANT
CHEMICAL STORAGE (EMPTY)
TRANSFORMER COMPOUND
SITE ACCESS
LEGEND
INDUSTRIAL BUILDINGS
MISCELLANEOUS PLANT
WORKSHOP AREA
ADMIN BUILDINGS
ROADS / HARDSTAND AREAS
DAMS / WATER HOLDING
WATER TANKS
SURFACE LEASE BOUNDARY
SHAFTS
POWDER MAGAZINE
MINE-WATER HOLDING LAGOON
SECONDARY STABILISATION LAGOON
PRIMARY STABILISATION LAGOON
STORAGE SHEDS
N
W
E
S
August 2012
Pit Top Infrastructure Plan
Cordeaux Colliery
Pit Top Site

PLAN 13

Cordeaux Colliery Pit Top Surface Water Management


PICTON ROAD
POWER TRANSMISSION LINE
EASTERN NATURAL GAS PIPELINE
FENCED BOUNDARY
Redundant TES demountable offices (to be removed this MOP period)
T.S. OFFICE
CAR PARK
HELIPAD
BATHHOUSE
WATER TANK
Elevator conveyor gantry removed 2003
MATERIALS AREA
FILTER LAGOON
PRIMARY SEPARATOR LAGOON
BULK STORAGE
M&M and BCW Shafts temporarily sealed
TIPPING STATION
WORKSHOP & STORE
CHEMICAL DOSING PLANT
SEWAGE TREATMENT PLANT
Sewage effluent holding tank – effluent removed from site by road tanker
FORMER SEWAGE TREATMENT & MINE WATER HOLDING LAGOONS
POWDER MAG.
Excess site run-off water discharged to old workings u/g
LEGEND
FORMERLY DIRTY WATER RUNOFF AREA CONVERTED TO CLEAN RUNOFF SINCE MINE CLOSURE
CLEAN WATER RUNOFF AREA
AREAS OF SITE VEGETATION
BUILDINGS TO BE REMOVED FROM SITE
CLEAN WATER RUNOFF
MINE SHAFT TO BE TEMPORARILY SEALED
POWER TRANSMISSION LINE
20 0 20 40 60 80 100
SCALE OF METRES
Cordeaux Colliery
Surface Water Management System
Drawing No. DP-3472
August 2012

APPENDIX A

EPA Annual Return

Appendices continued

APPENDIX B

Rehabilitation Security Cost Estimate

Appendices continued

APPENDIX C

Dendrobium Mine Compliance Report

Appendices continued

APPENDIX D

Dendrobium Mine Complaint Report

Appendices continued

APPENDIX E

End of Panel Surface and Groundwater Impact Assessment Dendrobium Area 3B Longwall 9