

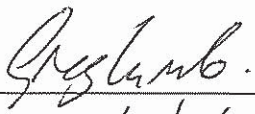
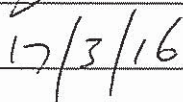


# **BLOOMFIELD COLLIERY**

## **Annual Environmental Management Report 2015**

# Bloomfield Collieries Pty Ltd

## Annual Environmental Management Report 2015

Name of Mine	Bloomfield Colliery		
Titles/Mining Leases	Consolidated Coal Lease 761		
MOP Commencement Date	2012	MOP Completion Date	2016
AEMR Commencement Date	1/1/2015	AEMR End Date	31/12/2015
Name of leaseholder	Bloomfield Collieries Pty Limited		
Name of Mine Operator	Bloomfield Collieries Pty Limited		
Reporting Officer	Greg Lamb		
Title	Environmental Officer		
Signature			
Date			

## EXECUTIVE SUMMARY

Bloomfield Collieries (Bloomfield) is one of two open cut coal mines owned by its parent company, Big Ben Holdings Pty Limited (Big Ben). Bloomfield Colliery is located at East Maitland, NSW, and produces approximately 0.6 million tonnes of product coal by open cut methods per year. Coal has been mined on the property for over 100 years. Underground mining by the current owner commenced in 1937 and the last coal extracted from underground operations was in 1992. The open cut commenced operations in 1964.

This report covers the reporting period from 1 January 2015 to 31 December 2015.

The Community Consultative Committee (CCC) met three times during 2015. The minutes of the CCC meetings can be viewed on the Bloomfield website ([www.bloomcoll.com.au](http://www.bloomcoll.com.au)).

Five (5) community complaints were received during 2015.

The total rainfall for the twelve month period was 1378 mm. This was 468mm above the annual average of 910 mm.

All dust deposition gauges recorded annual averages below the 4g/m<sup>2</sup>/month limit for 2015. The long term average annual dust deposition rates are all within the nominated EPA criteria.

All Particulate Matter <10 micron (PM10) results recorded 24-hour averages below the 50 ug/m<sup>3</sup> limit for 2015. The annual average PM10 result recorded was below the 30 ug/m<sup>3</sup> limit for 2015. The annual average Total Suspended Particulates (TSP) result recorded was below the 90 ug/m<sup>3</sup> limit for 2015. Dust monitoring during the reporting period indicates that dust results are close to predicted levels.

There were 25 licensed water discharges conducted during the reporting period, with a total discharge volume of 1625 ML.

There was a reportable surface water incident during 2015. In April 2015 a water discharge to Four Mile Creek was being undertaken at Bloomfield Colliery in accordance with EPL 396 water discharge conditions. During the course of the discharge the Total Suspended Solids (TSS) exceeded the EPL concentration limits. The incident was reported to the EPA in accordance with EPL 396 conditions as well as DRE and DP&E.

A Biodiversity Offset Area has been established to compensate for land clearance at the mine. The land was purchased by Bloomfield in December 2011 and consists of 40 Ha of remnant vegetation adjacent to the Watagan State Forest.

During 2015 a total of 101 blasts were initiated on the site. One blast (1% of total shots) exceeded 115dB blast overpressure. No blasts exceeded 120 dB blast overpressure limits. No blasts exceeded the 5mm/sec or 10mm/sec ground vibration limits. Blast monitoring during the reporting period indicates that mean and median results are at or below predicted levels.

All noise monitoring indicated that compliance with consent criteria was met at all locations during day, evening and the night-time periods with the exception of two locations during the March 2015 quarterly monitoring. The results of the night time monitoring show that there was an exceedance of the noise criteria at two privately owned properties which are located to the south of the site on John Renshaw Drive. The cause of the noise exceedance was due to be haul trucks being parked on a high stockpile dump at the end of afternoon shift. The noise exceedances coincided with the start of night shift. In response Bloomfield has put in place measures to prevent haul trucks being parked up on high dumps at the end of shifts.

A hazard reduction burn was conducted on land managed by Bloomfield along John Renshaw Drive, Buttai.

To date 458 Ha has been rehabilitated. A total of 4 ha of land were rehabilitated during the reporting period which is less than the MOP rehabilitation for 2015 which was estimated to be 6.2 Ha. However the net rehabilitation completed during the MOP period to date is 31 Ha which exceeds the MOP estimate of 25 Ha.

**TABLE OF CONTENTS**

<b>1</b>	<b>INTRODUCTION .....</b>	<b>8</b>
1.1	Consents, Leases and Licences.....	8
1.2	Mine Contacts .....	9
1.3	Actions Required at Previous AEMR Review .....	10
<b>2</b>	<b>OPERATIONS DURING THE REPORTING PERIOD.....</b>	<b>11</b>
2.1	Exploration .....	11
2.2	Land Preparation .....	11
2.3	Construction.....	11
2.4	Mining .....	11
2.5	Mineral Processing.....	11
2.6	Waste Management.....	12
2.7	Product Stockpiles .....	14
2.8	Water Management.....	14
2.9	Hazardous Materials Management.....	17
2.10	Other Infrastructure Management .....	17
<b>3</b>	<b>ENVIRONMENTAL MANAGEMENT AND PERFORMANCE .....</b>	<b>18</b>
3.1	Meteorological Monitoring .....	18
3.2	Air Pollution.....	21
3.3	Erosion and Sediment.....	25
3.4	Surface Water .....	26
3.5	Ground Water .....	32
3.6	Contaminated Land.....	35
3.7	Threatened Flora and Fauna.....	36
3.8	Weeds & Pests .....	36
3.9	Blasting .....	38
3.10	Operational Noise .....	40
3.11	Visual, Stray Light .....	41
3.12	Aboriginal Heritage.....	42
3.13	Natural Heritage.....	42
3.14	Spontaneous Combustion.....	43
3.15	Bushfire.....	43
3.16	Mine Subsidence .....	44
3.17	Hydrocarbon Contamination.....	45
3.18	Public Safety .....	45
<b>4</b>	<b>COMMUNITY RELATIONS .....</b>	<b>47</b>
4.1	Environmental Complaints .....	47
4.2	Community Liaison.....	48
<b>5</b>	<b>REHABILITATION.....</b>	<b>50</b>
5.1	Buildings .....	50
5.2	Rehabilitation of Disturbed Land .....	50
5.3	Other Infrastructure.....	53
5.4	Rehabilitation Trials and Research.....	54
5.5	Further Development of the Final Rehabilitation Plan.....	54
<b>6</b>	<b>ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD .....</b>	<b>54</b>

**LIST OF TABLES**

Table 1: Approvals, Leases and Licenses for Bloomfield Colliery.....	8
Table 2: Action Required from AEMR 2015 Review .....	10
Table 3: Production and Waste Summary .....	12
Table 4: Stored Water .....	15
Table 5: Input – Output Statement Data .....	16
Table 6: Monthly Rainfall Records.....	19
Table 7: Dust Monitoring Sites .....	21
Table 8: Annual Average Dust Deposition.....	22
Table 9: PM10 and TSP Results Summary 2015 .....	23
Table 10: Dust Predictions .....	24
Table 11: Background Water Sample Locations.....	26
Table 12: Background Water Analysis .....	27
Table 13: Trigger Values .....	31
Table 14: Discharge Sampling Analytical Results .....	32
Table 15: Groundwater Monitoring Program .....	33
Table 16: Weed Priority Level .....	37
Table 17: Blast Monitoring Summary .....	39
Table 18: Blast Predictions.....	39
Table 19: Summary of Attended Noise Monitoring Results.....	40
Table 20: Community Contacts Register .....	47
Table 21: Rehabilitation Summary .....	51
Table 22: Maintenance Activities on Rehabilitated Land .....	52
Table 23: Topsoil Balance.....	52

**LIST OF FIGURES**

Figure 1: Rainfall 2015 .....	18
Figure 2: Windroses for Bloomfield 2015.....	20
Figure 3: Four Mile Creek Catchment Electrical Conductivity .....	28
Figure 4: pH of Four Mile Creek .....	29
Figure 5: pH & EC in Site Water Storages.....	30
Figure 6: pH & EC in Four Mile Ck Tributary .....	30
Figure 7: pH & EC in Wallis Ck Tributary.....	31
Figure 8: Groundwater Levels .....	34
Figure 9: Groundwater pH.....	34
Figure 10: Groundwater EC .....	35
Figure 11: Community Complaints .....	47
Figure 12: Rehabilitation Monitoring Summary.....	53

## **LIST OF PLANS**

- Plan 1. Environmental Monitoring Sites
- Plan 2. Rehabilitation Plan

## **APPENDICES**

- Appendix A. Dust Monitoring Results
- Appendix B. Water Monitoring Results
- Appendix C. Groundwater Monitoring Results
- Appendix D. Blast Monitoring Results
- Appendix E. Complaints Register
- Appendix F. 2015 Rehabilitation Monitoring

## 1 INTRODUCTION

Bloomfield Collieries (Bloomfield) is one of two open cut coal mines owned by its parent company, Big Ben Holdings Pty Limited (Big Ben). Bloomfield Colliery is located at East Maitland, NSW, and produces approximately 0.6 million tonnes of product coal by open cut methods per year. Coal has been mined on the property for over 100 years. Underground mining by the current owner commenced in 1937 and the last coal extracted from underground operations was in May 1992. The open cut commenced operations in 1964. Bloomfield produces mainly thermal coal with some semi soft coking coal, principally for the Asian export market.

The parent company also owns Rix's Creek Mine which is located north of Singleton. Rix's Creek currently produces approximately 1.4 million tonnes of product coal per year.

This report covers the calendar year 2015. Prior to the 2012 AEMR, reports had been based on Bloomfield's fiscal reporting year, which is April to March.

This report is prepared to meet the requirements for the production of Annual Environmental Management Reports (AEMR), as outlined by the NSW Department of Primary Industries - Mineral Resources (DPI-MR) in the Guidelines to the Mining, Rehabilitation and Environmental Management Reporting Process (edg03 V3, DPI-MR, 2006).

### 1.1 Consents, Leases and Licences

Bloomfield operates under consents, leases and licenses presented in Table 1.

**Table 1: Approvals, Leases and Licenses for Bloomfield Colliery**

Approval/Lease/License	Issue Date	Expiry Date	Details/ Comments
Project Approval 07_0087	3 September 2009	31 December 2021	Granted by the Minister for Planning
Consolidated Coal Lease (CCL) 761	20 October 1991	8 October 2029	Granted by Minister for Mineral Resources
Project Approval 05_0136 (Abel)	7 June 2007	31 December 2030	Granted by Minister for Planning
Environmental Protection License 396	31 December 2007	Renewed Annually	Issued by Department of Environment and Climate Change (now EOH)
Project Approval Modification, 07_0087_ Mod 1	16 May 2011	31 December 2021	Granted by Minister for Planning and Infrastructure
Project Approval Modification, 07_0087_ Mod 2	29 March 2012	31 December 2021	Granted by Minister for Planning and Infrastructure
Project Approval Modification, 07_0087_ Mod 3	20 February 2013	31 December 2021	Granted by Minister for Planning and Infrastructure



The lease area for CCL 761 is shown on the Bloomfield site locality plan in Plan 1.

Project Approval (05\_0136) for the Abel Underground Mine allows for the operation of the Bloomfield Coal Handling and Preparation Plant (CHPP), Rail Loading Facility (RLF) and other related facilities required for the handling and processing of coal.

Project Approval (07\_0087) was granted by the Minister for Planning under Part 3A of the *Environment Planning & Assessment Act 1979* (EP&A Act) to allow for the completion of open cut mining operations and rehabilitation. The approval was issued 3 September, 2009 and is subject to a number of conditions. A variation to modify the Project Approval under s75W of the EP&A Act was granted on 16 May 2011 (07\_0087\_Mod 1). An additional variation to modify the Project Approval under s75W of the EP&A Act was granted on 29 March 2012 (07\_0087\_Mod 2). A further variation to modify the Project Approval under s75W of the EP&A Act was granted on 20 February 2013 (07\_0087\_Mod 3).

A Mining Operations Plan (MOP) has been prepared under DREs new Interim MOP Guidelines. The new MOP has been accepted by DRE and covers the period 2012 – 2016.

## 1.2 Mine Contacts

The Bloomfield Colliery Mine Manager, Mr Brendon Clements, is the primary mining contact and is responsible for regulatory compliance. The Environmental Officer is Mr Greg Lamb who coordinates environmental management and rehabilitation operations at Bloomfield Colliery.

Postal Address	PO Box 4 East Maitland. NSW 2323	
Site Address	Four Mile Creek Rd Ashtonfield NSW 2323	Tel:02 4930 2600 Fax:02 4933 8940
Environmental / Community Hotline		24hr: 02 4930 2680
Mr Brendon Clements	Mine Manager	Tel: 02 4930 2641 Mob: 0437 684 222 Email: bclements@bloomcoll.com.au
Mr Greg Lamb	Environmental Officer	Tel: 02 4930 2689 Mob: 0457 819 211 Email: glamb@bloomcoll.com.au

### 1.3 Actions Required at Previous AEMR Review

Listed in Table 2 below are the actions required from the DP&E review of the 2014 AEMR. The review of the AEMR was conducted on the 9<sup>th</sup> September 2015. Also listed are the relevant sections of the report that describe the measures taken in response to these actions.

**Table 2: Action Required from AEMR 2014 Review**

<b>Action Required</b>	<b>Status</b>	<b>AEMR Section</b>
Provide an Executive Summary of significant activities, complaints, incidents, breaches and non-compliances.	Complete	Executive Summary
Provide further information on waste management including volumes of waste streams	Complete	Section 2.6
Include Input-Output model of the Water Accounting Framework.	Complete	Section 2.8
Provide plans further detailing monitoring points and dam locations	Complete	Plan 1

## **2 OPERATIONS DURING THE REPORTING PERIOD**

### **2.1 Exploration**

There were no exploration activities at Bloomfield during the reporting period.

### **2.2 Land Preparation**

No additional land was prepared for mining during the reporting period. A small 2 Ha area of existing rehabilitated land was cleared for coal storage purposes. Vegetation and groundcover was removed and topsoil stripped. The topsoil was removed and placed directly on shaped overburden areas as part of the rehabilitation program. Topsoil volumes are presented in Table 3.

### **2.3 Construction**

No major construction was undertaken on the site during the reporting period.

### **2.4 Mining**

During the reporting period, Bloomfield operated 15 shifts a week for 48 weeks employing 93 personnel. Production was 1,220,000 tonnes of raw coal, 743,000 tonnes of saleable coal and 5.9 million cubic metres of overburden moved primarily using a Hitachi 5500 excavator and Caterpillar rear dump trucks.

Mining operations continued in S Cut and Creek Cut throughout the year, generally in accordance with the mining methods described in the 2012-2016 MOP. During the next reporting period, Mining in S Cut will continue towards the west and Creek Cut will continue towards the south and west.

### **2.5 Mineral Processing**

The coal handling and preparation plant (CHPP) has a throughput of up to 8.5 Mtpa, as approved under the Abel Consent. The throughput is currently rated at 1000 tonnes per hour. ROM coal and clean coal volumes are presented in Table 3.

Table 3: Production and Waste Summary

	Cumulative Production (Annual Production)		
	Start of Reporting Period	At end of Reporting Period	End of next reporting (estimated)
<b>Topsoil stripped (bcm)</b>	403,000	411,000 (8,000)	436,000
<b>Topsoil used (bcm)</b>	283,000	291,000 (8,000)	303,000
<b>Waste Rock (bcm)</b>	65,402,000	71,314,000 (5,912,000)	77,314,000
<b>Run Of Mine Coal (t)</b> (Bloomfield)	11,183,000	12,403,000 (1,220,000)	13,503,000
(Donaldson)	18,794,000	18,794,000 (0)	18,794,000
(Tasman)	3,707,000	3,707,000 (0)	3,707,000
(Abel)	9,103,000	10,934,000 (1,831,000)	12,934,000
<b>TOTAL ROM</b>	42,787,000	45,838,000 (3,051,000)	48,938,000
<b>Processing Waste (t)</b> (Bloomfield)	5,315,000	5,792,000 (477,000)	6,192,000
(Donaldson)	5,827,000	5,827,000 (0)	5,827,000
(Tasman)	1,233,000	1,233,000 (0)	1,233,000
(Abel)	2,919,000	3,468,000 (549,000)	4,068,000
<b>TOTAL WASTE</b>	15,294,000	16,320,000 (1,026,000)	17,320,000
<b>Coal (tonne)</b> (Bloomfield)	6,538,000	7,281,000 (743,000)	7,881,000

## 2.6 Waste Management

### Process Waste

Process Waste from the CHPP consists of breaker reject, coarse rejects and fine rejects (tailings). Breaker reject consists of large diameter (>150mm) rocks and coal rejects, and is hauled by truck to operational open cut pits and placed under advancing overburden dumps. Coarse rejects which are separated out during processing, and are currently disposed of under advancing overburden dumps. Fine tailings are currently pumped as 20% solids slurry to Tailings Dam, a disused open cut pit in north of the mine site. Reject fines settle out of the slurry, gradually backfilling the pit, whilst the decant water is returned to the CHPP for re-use in processing. Process waste volumes are provided in Table 3.

### Waste Oil

Waste oil from scheduled maintenance of mining equipment and the workshop oil separator is collected in a storage tank and periodically evacuated for reprocessing and re-use by a licensed waste oil contractor. The waste contractor re-synthesise the waste oil to a fuel oil product for re-use in ANFO explosive for blasting operations. In 2015 a total of 74,000 litres of waste oil was collected for recycling.

### Waste Oil Filters

During the reporting period a recycling bin was installed for disposal of used oil filters. Used oil filters are placed in a 1.5m<sup>3</sup> bin and collected by licensed waste contractor for disposal. In 2015 a total of 4 tonnes of used filters was collected for disposal.

### Waste Metal

Bloomfield has a well implemented scrap metal recycling program, and has a high rate of on-site re-use of suitable steel. If no longer suitable for re-use, scrap metal is collected in designated skips and sold for recycling. In 2015 a total of 210 tonnes of scrap metal was collected for recycling.

### Waste Tyres

Discarded earthmoving machinery tyres are used on site wherever possible for the protection of the base of concrete plinths and metal columns located in areas where heavy vehicles are operated. As there is no recycling process available for heavy earthmoving machinery tyres, surplus tyres are disposed of progressively in the open cut void and buried. Tyres are disposed of as deep in the void as possible, without being placed on the pit floor, to avoid the potential of re-surfacing. The void is then progressively backfilled with overburden and rehabilitated in the normal process.

### General Waste

General waste is placed in 1.5m<sup>3</sup> and 3m<sup>3</sup> bins and collected by licensed waste contractor for disposal. In 2015 a total of 45 tonnes of general waste was collected for disposal.

### Waste Paper

During the reporting period recycling bins were installed for disposal of paper and cardboard. Waste paper and cardboard waste is placed in 1.5m<sup>3</sup> and 3.0m<sup>3</sup> bins and collected by licensed waste contractor for disposal. In 2015 a total of 10 tonnes of waste paper and cardboard was collected for recycling.

### Paint Waste

During the reporting period a recycling bin was installed for disposal of paint drums. Used paint drums are placed in a 1.5m<sup>3</sup> bin and collected by licensed waste contractor for disposal.

## **2.7 Product Stockpiles**

The ROM stockpile pad has a capacity of 150,000 tonnes and the clean coal stockpiles have a capacity of approximately 500,000 tonnes.

## **2.8 Water Management**

The water management system has been designed with three primary goals and objectives:

- separation of clean water and mine water;
- safe storage and priority use of mine water on-site;
- management of water that is discharged so as to preserve the environmental values of Four Mile Creek and comply with the conditions of EPL 396.

In meeting these objectives, the following components of the system have been constructed or implemented.

### Mine Water

Bloomfield has two major mine water storage facilities referred to as Lake Kennerson and Lake Foster (see Plan 1). Water pumped from the open cuts (S Cut and Creek Cut) reports via open drains to Lake Kennerson. Run off from disturbed areas (i.e. high wall, haul roads, overburden dumps awaiting rehabilitation) which has the potential to carry suspended solids, is also directed to Lake Kennerson. Lake Kennerson dissipates velocity and allows the settlement of suspended solids.

Lake Kennerson has a valve controlled pipe which, when opened, feeds to Lake Foster. Lake Foster also receives decant water from the tailings storage facility (U Cut) and water from the stockpile dam, which collects the runoff from the CHPP and coal stockpile pads. Mine water is pumped, primarily from Lake Foster, to the CHPP for use in coal processing and for dust suppression spraying on the coal stockpile pads.

Mine water is discharged, via lockable valve pipes, into an open drain that flows to Four Mile Creek. Discharges are undertaken in accordance with conditions of the Environmental Protection Licence (EPL 396). Water samples are collected during discharge for independent water quality analysis. A monitoring station located downstream in Four Mile Creek continuously measures electrical conductivity (EC) and water level. Monthly background sampling is conducted in Lake Kennerson, Lake Foster and various upstream and downstream watercourses (see Section 3.3 for details).

During the reporting period, fine coal rejects (tailings) was transferred for disposal to a disused open cut pit (U Cut). Water from the historic underground workings is used in dust suppression and coal processing. Water storage volumes are presented in Table 4.

Table 4: Stored Water

	Volumes held (ML)		
	Start of Reporting Period	End of Reporting Period	Storage Capacity
<b>Clean Water</b>	90	90	90
<b>Dirty Water</b>			
Lake Kennerson	150	100	190
Lake Foster	40	20	45
Tailings Dam	175	350	600
S Cut (operational pit)	15	NIL	-
Creek Cut (operational pit)	NIL	650	-
<b>Controlled Discharge Water</b> (EPL 396)		1625	
<b>Contaminated Water</b>	NIL	NIL	NIL

A water balance was calculated for 2015 providing information on inputs and outputs for the site in accordance with the Water Accounting Framework. The results are shown in Table 5. The marked increase in water storage is due to the storm event in April where 420mm of rain fell in less than two days (see Figure 1).

#### Clean Water

Run off from undisturbed and rehabilitated areas is directed away from operational areas and mine water storages via diversion banks and channels. These banks and channels direct this run off into clean water dams or natural watercourses. The major clean water storage dam is Possums Puddle. No clean water is accessed for operational purposes and these dams overflow into natural drainage systems. Further isolation of smaller rehabilitated catchment areas from the mine water system will continue as rehabilitation work progresses.

The major natural creek running through the site is Four Mile Creek. Most of the operational mining areas at Bloomfield are located within the catchment of Four Mile Creek. A series of drains and levees direct Four Mile Creek around Lake Foster (mine water storage) and into Possums Puddle (clean water storage). From Possums Puddle clean water overflows back into Four Mile Creek.

#### Waste Water

Wastewater generated on site, consisting of domestic waste from bathhouses, administration offices and associated amenity areas, passes through a Cessnock City Council approved anaerobic waste water treatment system.

Table 5: Input – Output Statement Data

Reporting Period Details	Date	Storage (ML)
Start	01-January-2015	380
Finish	31-December-2015	1120

## INPUTS-OUTPUTS

Input-Output	Source/Destination	Inputs/Outputs	Total (ML)
Input	Surface Water	Precipitation and Runoff	2242
		Rivers and Streams	
		External Surface Water Storages	
	Groundwater	Aquifer Interception	397
		Bore Fields	
		Entrainment	245
	Sea Water	Estuary	
		Sea/Ocean	
	Third Party Water	Contract/Municipal	
		Waste Water	266
TOTAL INPUTS			3150
Output	Surface Water	Discharge	1625
		Environmental Flows	
	Groundwater	Seepage	
		Reinjection	
	Sea Water	Discharge to Estuary	
		Discharge to Sea/Ocean	
	Supply to Third Party		
	Other	Evaporation	606
		Entrainment	237
		Other (define)	
TOTAL OUTPUTS			2468



## **2.9 Hazardous Materials Management**

Bloomfield held dangerous goods notification and a licence to store and handle explosives in accordance with WorkCover legislation for substances stored on site. The notification covers depots for explosives, distillate, gas cylinder stores, sodium hydroxide and MIBC reagent.

Explosives are stored in an explosive magazine located on site. The magazine complies with the relevant standards for storage of explosives. Bulk materials are also stored on site in a hopper for loading into a mobile mixing unit. This area is enclosed within concrete bunding and any spillage from this area is directed into a collection tank for periodic evacuation by a licensed contractor.

A bunded fuel farm, designed in accordance with AS1940, is used for bulk distillate storage at the open cut workshop. Spill protected racks are used for small volume oil and lubricant storage. Distillate, MIBC and sodium hydroxide used for coal processing in the CHPP are stored in tanks contained in bunded enclosures.

ChemAlert is an online Material Safety Data Sheet (MSDS) database service and is used to provide up to date MSDS information. If new chemicals are introduced to site they must comply with system requirements and be approved by the Mine Manager.

No hazardous materials-related environmental incidents were reported during the reporting period.

## **2.10 Other Infrastructure Management**

Silt traps along the edges of haul roads and hard stand areas are cleaned at regular intervals. They have been designed to capture surface run off during rain events and allow sediment to settle. All silt traps, dams, drains, bunds, lines, valves and other infrastructure used to manage runoff are inspected on a quarterly basis as part of the site Environmental Management System (EMS). Issues identified during the inspections are reported and appropriate actions taken to address these matters.

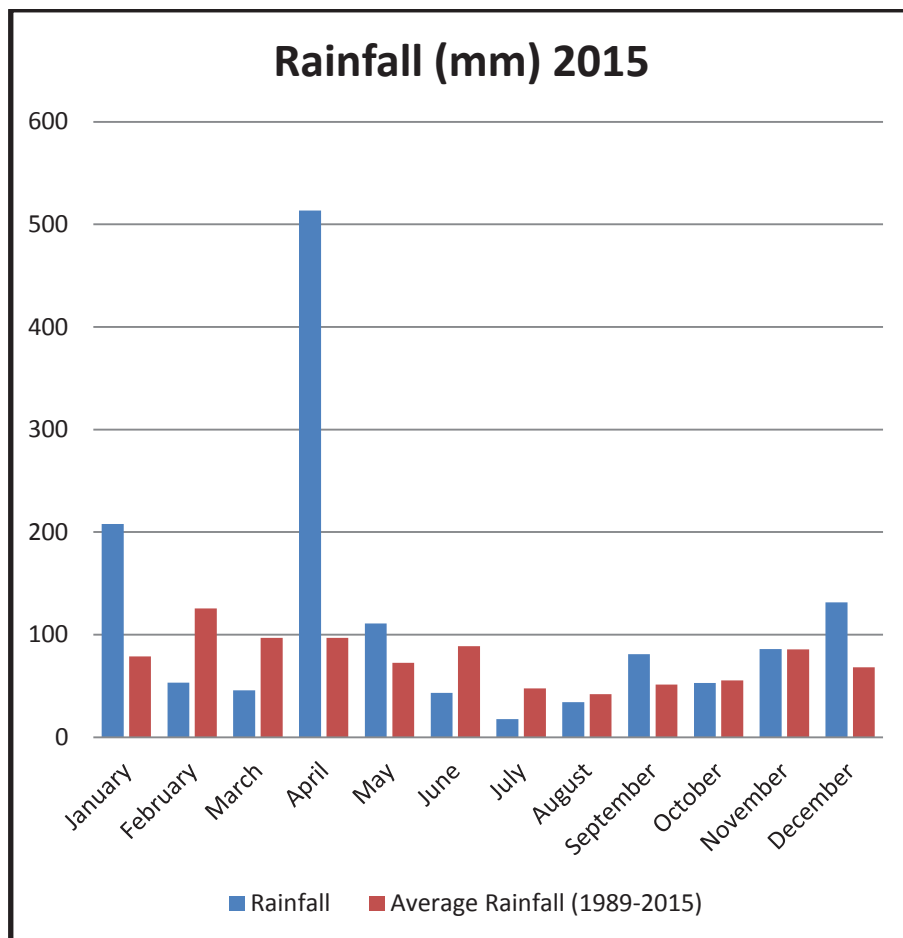
### 3 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

#### 3.1 Meteorological Monitoring

Bloomfield Colliery has installed a continuously operating meteorological station in accordance with Development Consent requirements for the operation of the mine. The weather station has real-time capabilities for all personnel to access via computer or phone. The station records the following environmental parameters:

- wind speed;
- wind direction;
- temperature;
- relative humidity;
- rainfall
- solar radiation; and
- evaporation.

A comparison of monthly recorded rainfall for the 2015 reporting period and annual average data is shown in Figure 1. The total rainfall for the twelve month period was 1378 mm. This was 468mm above the annual average of 910 mm.



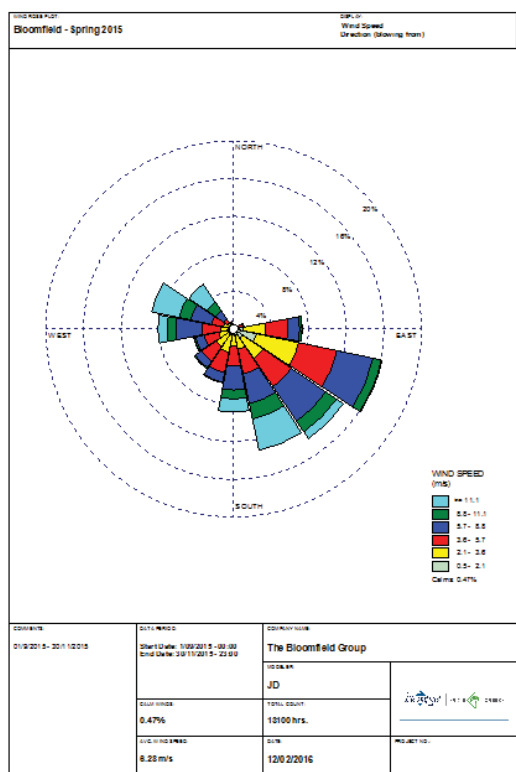
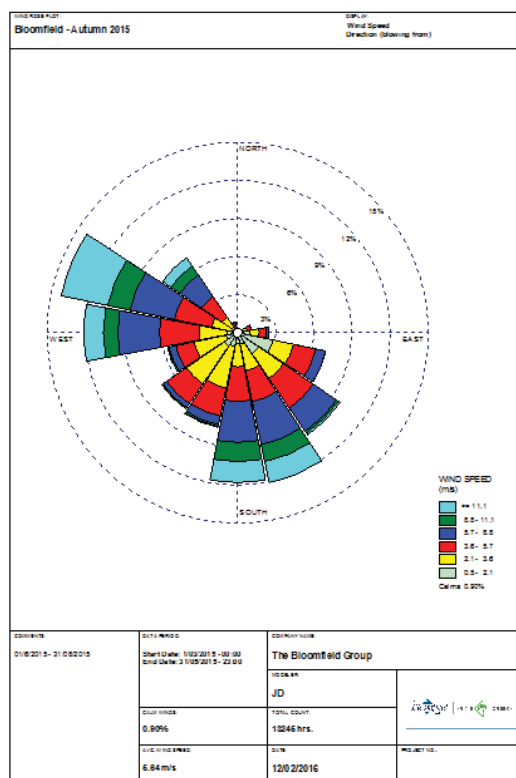
**Figure 1: Rainfall 2015**

A summary of the rainfall data for the past 27 years is presented in Table 6.

**Table 6: Monthly Rainfall Records**

Period	Average Monthly Rainfall (mm)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
1989	177	62	168	133	95	208	52	6	15	33	48	43	1038
1990	42	448	80	190	80	58	71	135	73	57	6	39	1278
1991	83	14	4	12	90	104	39	9	6	30	37	167	593
1992	64	235	91	86	23	72	12	22	20	25	87	175	911
1993	125	53	65	16	29	81	109	64	36	31	72	33	713
1994	30	102	89	76	53	36	4	11	0	36	64	13	514
1995	162	48	171	0	129	51	1	0	78	37	184	80	942
1996	70	71	28	7	106	74	50	59	48	24	59	30	625
1997	105	101	63	0	85	78	65	28	50	34	25	56	688
1998	89	81	3	45	203	90	84	155	73	63	108	121	1114
1999	66	74	64	129	8	122	156	47	64	173	36	58	997
2000	95	34	281	149	44	12	51	36	31	58	93	28	912
2001	44	163	174	113	156	7	44	21	21	30	124	46	941
2002	54	235	172	48	55	28	31	26	25	10	43	129	856
2003	1	93	53	72	133	13	42	42	0	112	102	39	701
2004	76	163	72	45	18	10	27	44	64	154	59	38	769
2005	64	135	153	27	112	67	10	1	40	81	72	14	775
2006	38	66	39	23	11	62	50	58	194	21	53	24	635
2007	24	101	103	87	66	377	20	75	28	32	144	94	1150
2008	139	173	46	240	4	131	33	32	195	65	70	59	1184
2009	6	340	107	129	83	66	33	2	31	60	40	48	943
2010	78	35	75	28	75	118	62	43	27	66	151	70	826
2011	32	41	73	125	100	162	127	54	109	100	179	81	1182
2012	65	205	137	122	7	179	57	20	19	6	58	40	915
2013	180	184	121	101	59	99	18	11	22	43	288	22	1147
2014	16	83	138	106	30	47	22	102	38	68	23	169	844
2015	208	53	46	513	111	43	18	34	81	53	86	132	1378
<b>Average</b>	<b>79</b>	<b>126</b>	<b>97</b>	<b>97</b>	<b>73</b>	<b>89</b>	<b>48</b>	<b>42</b>	<b>51</b>	<b>56</b>	<b>86</b>	<b>68</b>	<b>910</b>

The results of wind speed and direction monitoring shows a pattern typical in the Hunter Valley. During summer the winds predominate from the south east and winter the west-northwest. Autumn and spring are transitional seasons with winds distributed between both northwest and south-easterly directions. Figure 2 shows the seasonal windroses generated for the site on a seasonal basis.



### 3.2 Air Pollution

#### 3.2.1 Environmental Management

Dust can be generated by the operation of mobile plant on unsealed surfaces, loading and handling of coal and overburden in dry and windy conditions, or by blasting.

Operational procedures are in place to minimise dust impacts on the surrounding environment and community. Vehicular generated dust is controlled through the use of water carts on all internal roads and high traffic areas. The company provides a fleet of three water trucks to allow for greater coverage and flexibility in dry and/or windy conditions.

Sprinkler systems operate on coal stockpile areas and the surrounds of the washing plant. Conveyor systems at the washing plant and rail loader are enclosed on at least two sides. Operational practices such as not dumping to exposed locations, minimizing the drop height into trucks during loading are also employed.

The use of a predictive meteorological modeling software program is utilised to assist in planning mine operations. The software incorporates regional weather station data to predict daily weather events that may exacerbate dust impacts from operations.

A dust monitoring program is in place with 10 dust deposition gauges and 2 High Volume Air Samplers (HVOL) located on and around the mine lease area. The locations are listed in Table 7 and are shown in Plan 1. Samples are collected by independent environmental consultants and analysed by a NATA registered laboratory.

**Table 7: Dust Monitoring Sites**

Site	Location
On Lease	
D1	Adjacent to Buttai Reservoir
D2	Adjacent to Main Haul Road
D3	Communications Tower
D4	Adjacent John Renshaw Drive
D9	Shamrock Lane
Off Lease	
D5	Bali Close Ashtonfield
D6	Off Four Mile Creek Road
D7	Off New England Highway Avalon Estate
D8	Adjacent of Main North Rail line at Rail Loop
D10	Private property adjacent to John Renshaw Drive
HVOLs	Private property adjacent to John Renshaw Drive

## 3.2.2 Environmental Performance

Dust Deposition

Table 8 summarises the monthly deposition rates for insoluble solids during the reporting period and includes long-term averages for the site and the EPA guideline of 4 g/m<sup>2</sup>/month.

**Table 8: Annual Average Dust Deposition**

Insoluble Solids (g/m <sup>2</sup> /month)										
Site	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Jan-15	0.7	0.9	3.3	3.2	1.9	2.7	4.3c	1.0	1.9	2.1
Feb-15	0.7	1.1	1.1	0.5	0.7	1.2	1.1	0.8	0.9	0.7
Mar-15	0.9	1.0	1.5	1.8	0.9	1.5	1.3	2.6	1.4	1.8
Apr-15	2.4	1.7	3.1	1.2	2.3	1.3	1.5	1.5		1.0
May-15	0.7	0.7	1.9	1.2	1.0	1.0	1.3	1.6	0.7	1.4
Jun-15	0.8	1.3	0.4	0.5	0.9	0.2	0.4	0.5	0.5	0.5
Jul-15	1.0	0.8	1.1	0.5	0.9	0.6	0.9	1.3	0.4	1.3
Aug-15	1.4	2.1	1.1	1.0	0.8	4.2c	1.3	1.0	0.6	2.4
Sep-15	1.4	3.8c	0.9	2.9	2.0c	0.5	0.7	0.6	0.5	1.3
Oct-15	3.7	2.2	1.2	1.8	1.9	1.3	3.8c	1.6	1.3	2.6
Nov-15	0.9	1.0	1.0	1.0	1.8	2.2	1.7	1.7	0.8	1.4
Dec-15	1.4	1.6	1.4	1.2	0.8	1.4	4.5c	1.0	1.1	3.0c
<b>Annual Averages</b>										
1997-1998	1.2	1.8	1.8	1.5	1.1	1.9	1.6	1.5	1.8	1.7
1998-1999	1.5	2.1	1.8	1.6	1.3	2.4	1.6	1.1	1.8	0.9
1999-2000	1.8	2.6	1.8	1.1	1.5	1.9	2.0	1.3		
2000-2001	1.2	1.6	1.3	1.4	1.2	3.1	1.8	1.1		
2001-2002	1.1	1.8	1.4	6.6	1.3	2.0	2.4	1.3	1.4	1.7
2002-2003	1.7	2.0	1.2	4.3	1.9	2.3	1.9	1.8	1.4	2.2
2003-2004	2.4	1.6	0.8	6.5	1.2	1.5	1.4	1.3	1.0	1.0
2004-2005	1.6	1.5	1.1	3.2	1.1	2.2	1.4	1.4	0.9	1.1
2005-2006	3.4	1.9	1.2	3.1	1.0	1.4	1.5	1.4	1.2	1.9
2006-2007	2.8	2.2	1.5	3.9	3.0	1.7	1.8	1.7	1.2	1.8
2007-2008	2.7	1.9	1.6	5.2	2.1	2.0	1.9	2.2	1.2	2.3
2008-2009	1.8	1.9	3.3	6.0	1.3	1.7	2.0	1.9	1.5	2.9
2009-2010	1.8	2.4	3.2	3.1	1.4	1.6	2.3	1.8	1.5	2.8
2010-2011	1.1	1.6	1.8	1.6	0.9	2.4	1.4	1.4	1.1	2.1
2011-2012	1.6	1.5	1.3	3.4	1.5	3.8	1.2	3.2	1.0	1.9
2012	1.5	1.7	1.9	3.1	1.4	3.4	1.8	1.6	1.1	2.2
2013	1.7	1.6	2.5	1.3	1.5	2.5	1.7	1.7	1.3	1.5
2014	1.2	1.4	1.6	1.5	1.5	2.5	1.4	1.7	1.1	1.5
2015	1.3	1.3	1.5	1.4	1.3	1.3	1.1	1.3	0.9	1.5
Overall	1.7	1.8	1.7	2.9	1.4	2.2	1.7	1.6	1.2	1.9
<b>EPA Licence Limit</b>	<b>4</b>									

Notes: \* - Overall annual average since 1997.

C - "Denotes highest result contaminated with insects, vegetation or bird droppings and considered non standard"

All dust deposition gauges recorded annual averages below the 4g/m<sup>2</sup>/month limit for 2015. The long term average annual dust deposition rates are all within the nominated criteria.

Results are graphically provided in Appendix A. Figure A1 in Appendix A shows yearly results since PA 07\_0087 approval. The results show a slight trend downwards. Sites D2 and D3 are located adjacent to operational areas well within lease boundaries. Results from these sites indicate the level of dust generated by mining operations and are unlikely to impact off site. Site D4 was located adjacent to operational areas and was repositioned in December 2012 to the southern mining lease boundary, adjacent to John Renshaw Drive.

### PM10 and TSP

Table 9 summarises the PM10 and TSP monitoring results during the reporting period and detailed results are provided in Table A1 in Appendix A. All PM10 results recorded 24-hour averages below the 50 ug/m<sup>3</sup> limit for 2015. The highest result recorded was 48 ug/m<sup>3</sup>. The annual average PM10 result recorded was below the 30 ug/m<sup>3</sup> limit for 2015. The average annual PM10 level was 14 ug/m<sup>3</sup>. The annual average TSP result recorded was below the 90 ug/m<sup>3</sup> limit for 2015. The average annual TSP level was 29 ug/m<sup>3</sup>.

**Table 9: PM10 and TSP Results Summary 2015**

	PM10 24hr (ug/m <sup>3</sup> )	TSP (ug/m <sup>3</sup> )
Maximum 24hr Average result 2015	48	-
<b>EPA Licence Limit PM10 24hr Average</b>	<b>50</b>	-
Annual Average 2015	14	29
<b>EPA Licence Limit Annual Average</b>	<b>30</b>	<b>90</b>

Figures A2 and A3 in Appendix A shows yearly results of PM10 and TSP dust levels. The results show seasonal trends as well as rolling averages. In general higher results occur in the summer months and lower results occur in the winter months. All results are within EPA criteria.

### Dust Predictions

Dust modelling predictions conducted as part of the Environmental Assessment (PA 07\_0087) are shown in Table 10. Monitoring during the reporting period indicates that dust results are close to predicted levels. As shown in Plan 1, the nearest modelled resident to the monitoring locations is Resident N. The dust monitoring locations are actually situated closer the mine site than Resident N and as expected the dust results are slightly higher.

**Table 10: Dust Predictions**

<b>Resident ID: N</b>	<b>EA Predictions</b>	<b>2015 Actual</b>
Dust Deposition D10 (g/m <sup>2</sup> /month)	0.7	1.5
PM10 (ug/m <sup>3</sup> )	13.8	14
TSP (ug/m <sup>3</sup> )	29.7	29

### 3.2.3 Reportable Incidents

No reportable incidents relating to air pollution occurred within the reporting period.

### 3.2.4 Further Improvements

The air quality monitoring program will be continued in accordance with Air Quality Monitoring Plan requirements. The existing predictive meteorological modeling software program will be upgraded to a predictive dust emissions management tool for the mine. In addition to meteorological data it will also incorporate terrain data, mining equipment locations and aerial photographs.



### **3.3 Erosion and Sediment**

#### **3.3.1 Environmental Management**

Erosion and sedimentation control is an integral part of the site's water management system. The design of rehabilitated areas incorporates water management structures to effectively shed run-off water, whilst minimising erosion and sediment load. Progressive rehabilitation of disturbed areas as soon as is practicable also reduces the potential for erosion and downstream sedimentation.

There are a number of sediment basins around the site that are positioned to intercept run-off from other disturbed areas on-site, such as along haul roads, stockpile pads, infrastructure areas, and recently rehabilitated areas. These structures are inspected as part of the site EMS and cleaned as necessary.

Site drains used to transport mine water, or natural catchment flow, are inspected for erosion or damage as part of the site EMS, and remedial maintenance works conducted as necessary.

#### **3.3.2 Environmental Performance**

No major erosion or problems with erosion and sediment control were observed during the reporting period. Rehabilitated areas are regularly inspected in addition to quarterly inspections of erosion and sediment controls across the site.

#### **3.3.3 Environmental Incidents**

No reportable incidents relating to erosion and sediment occurred during the reporting period.

#### **3.3.4 Further Improvements**

An erosion and sediment control plan has been prepared in accordance with the conditions of the Project Approval. As mining and rehabilitation progresses the recommendations will be followed including ongoing quarterly inspections of erosion and sediment control structures.

### 3.4 Surface Water

#### 3.4.1 Environmental Management

Bloomfield Colliery has prepared and submitted a Water Management Plan (WMP) in accordance with Development Consent requirements for the operation of the mine. The Plans prescribe the process water source and supply requirements, site-water balance, storage, impact management and monitoring of surface water in the vicinity of the mining operations.

Bloomfield has several sources of surface water (mine water) that require management to avoid pollution, or a non-compliance with the site EPL.

In addition to the physical, or infrastructure, components of the mine water management system (as detailed in Section 2.8), the two major management controls for surface water pollution are *water quality monitoring* and *licensed mine water discharge*.

#### Water Quality Monitoring

The water monitoring program at Bloomfield consists of discharge sampling, which is under *licensed mine water discharge*, and background monitoring. The background monitoring sites are centred on Four Mile Creek and its tributaries and Wallis Creek tributaries to the west of the mining lease. Plan 1 shows the location of the monitoring sites and Table 11 lists the monitoring sites.

**Table 11: Background Water Sample Locations**

Creek	ID	Location
Four Mile Creek	WM10	John Renshaw Drive
	WM6	Upstream from Lake Foster
	WM7	Possums Puddle
	WM4	Possums Puddle Overflow
	WM3	Elwells Creek & Four Mile Creek junction
	WM12	Shamrocks Creek & Four Mile Creek junction
	WM11	New England Highway
Four Mile Creek tributary	WM2	Shamrock Creek
	WM5	Elwells Creek
Wallis Creek tributary	WM1	Adjacent old Rathluba Colliery
	WM13	Buttai Creek
On-site water storage	WM8	Lake Foster
	WM9	Lake Kennerson

Table 12 outlines the background surface water analysis program undertaken at Bloomfield Colliery.

**Table 12: Background Water Analysis**

Analyte	Monthly	Quarterly	6 Monthly
pH	✓	✓	✓
Electrical Conductivity	✓	✓	✓
Dissolved Oxygen	✓	✓	✓
Turbidity	✓	✓	✓
Total Suspended Solids		✓	✓
Total Dissolved Solids		✓	✓
Filterable Iron		✓	✓
Chloride			✓
Sulphate			✓
Alkalinity			✓
Calcium			✓
Magnesium			✓
Sodium			✓
Potassium			✓

These results are reviewed and, if required, remedial action or further investigation initiated to identify the cause of anomalies.

#### Mine Water Discharge

Mine water is discharged in accordance with conditions P1, L2 and L3 of EPL 396. These conditions allow discharge of 40ML of mine water per day, within water quality limits, dependent on rainfall. Representative samples are collected at the discharge point and at the Four Mile Creek monitoring station during each day of discharge. Samples are tested on site to ensure discharge water is within the allowed water quality limits, before being dispatched to an independent NATA accredited laboratory for analysis. Discharge samples are tested for:

- pH;
- EC;
- Total Suspended Solids (TSS);
- Total Dissolved Solids (TDS); and
- Filterable Iron (for discharge point samples).

A permanent monitoring station is located on Four Mile Creek, approximately 500m upstream of the New England Highway. It records EC and water level (via pressure sensor and V-notch weir) every 15 minutes and logs the results every hour.

### Other Management

All infrastructure (i.e. drains, dams, spillways, discharge pipes and valves) used for the separation of clean water and mine water, or the discharge of mine water, are inspected as part of the site EMS, with a documented quarterly check sheet being completed.

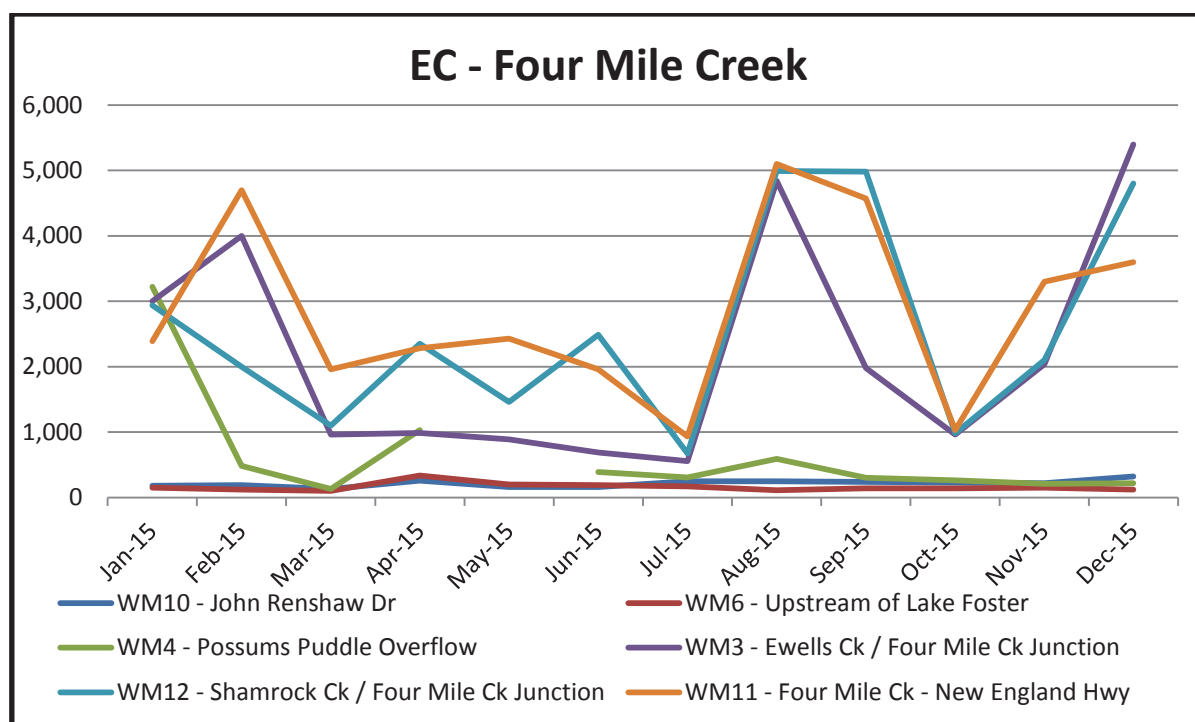
### 3.4.2 Environmental Performance

#### Background Monitoring Results

The background surface water monitoring results for the reporting period are shown in Figures 3 to 7 below. Figures 3 to 7 provide a graphical presentation of EC and pH which are the main surface water parameters, with the full data set provided in Appendix B.

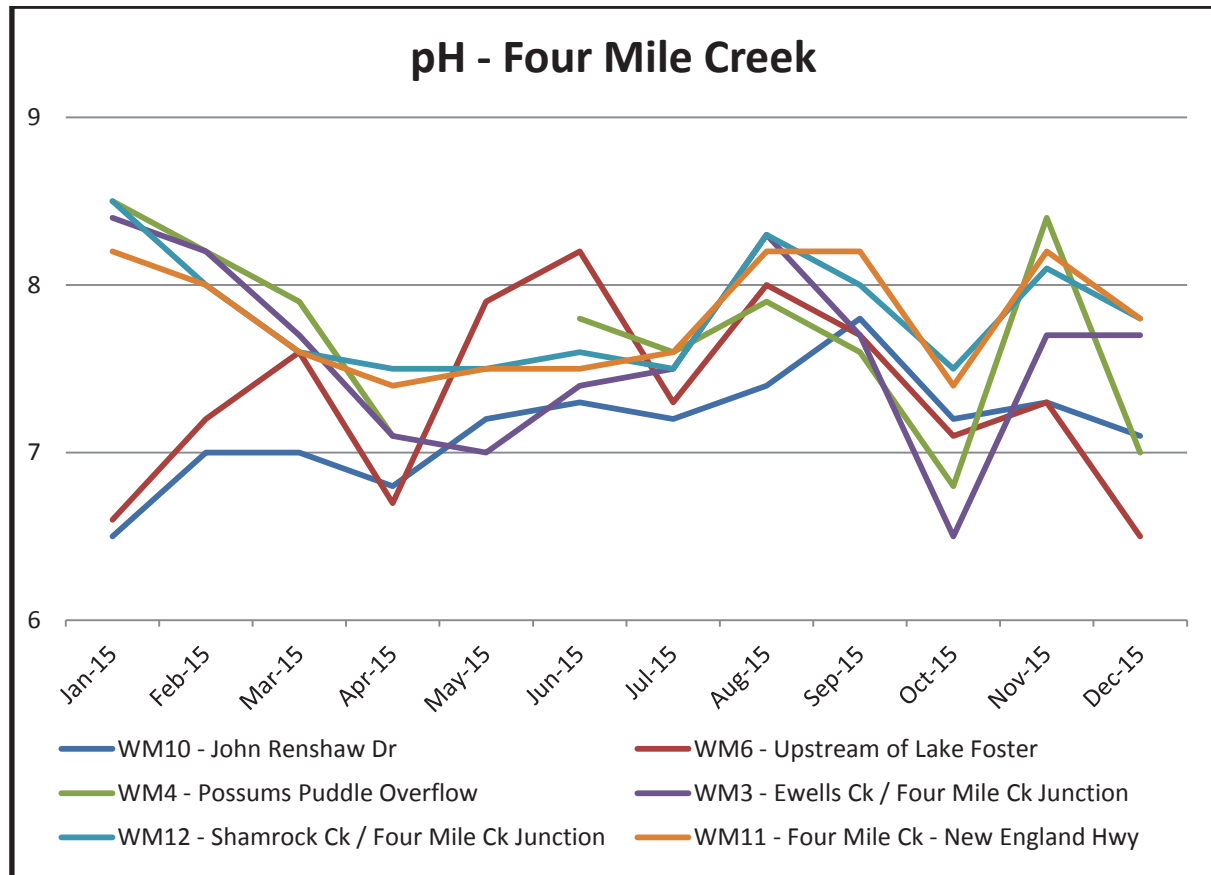
Figure 3 and 4 shows EC and pH results for the Four Mile Creek sites. Figure 3 shows salinity levels are slightly elevated in the lower end the catchment. Four Mile Creek is ephemeral and the EC level varies due to rainfall and mine discharge. The higher salinity results along Four Mile Creek (Elwells Creek and Shamrock Creek junctions and New England Hwy) reflect concentration of solutes in ponds during low flow periods and from licensed discharges in addition to offsite sources such historic underground workings.

As outlined later, there were 25 licensed discharges throughout the reporting period. The monthly sample collected in February, August, September and December coincided with a licensed discharge event. EC levels vary due to rainfall and mine discharge therefore monthly and yearly trends cannot be assessed.



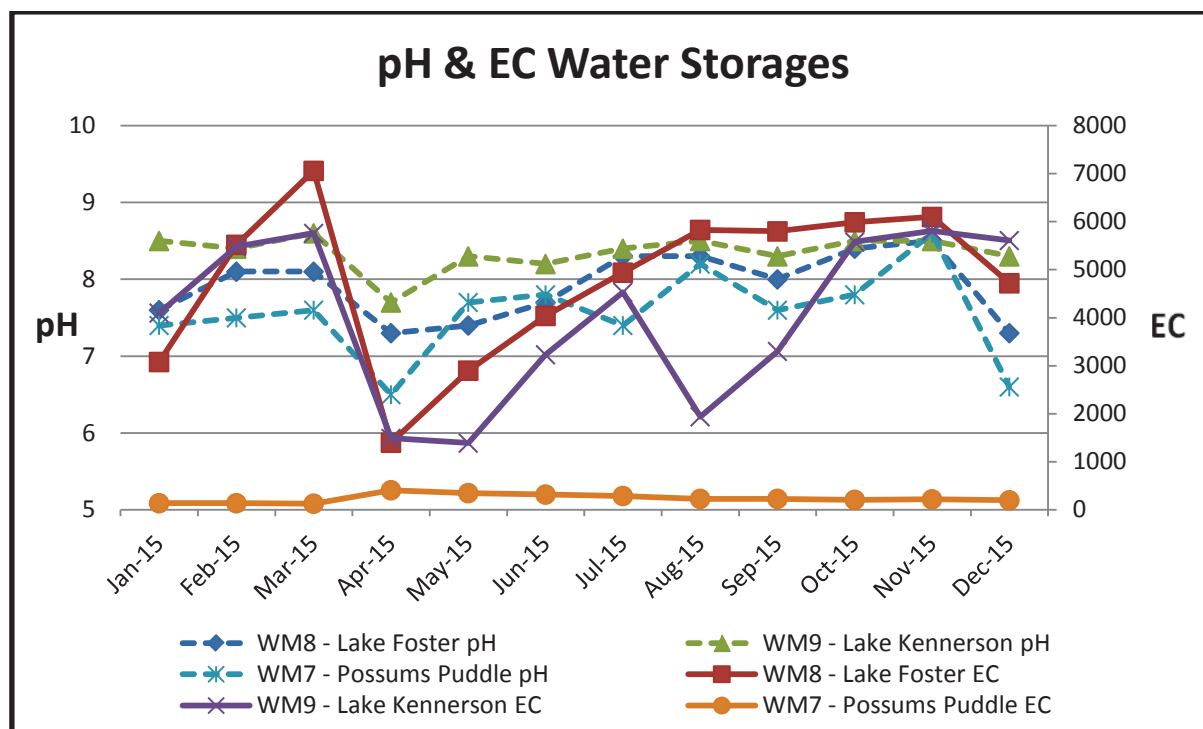
**Figure 3: Four Mile Creek Catchment Electrical Conductivity**

Figure 4 shows the pH levels in Four Mile Creek are generally consistent with ANZECC water quality guidelines (pH 6.5-8.5). pH levels vary due to rainfall and mine discharge therefore monthly and yearly trends cannot be assessed.



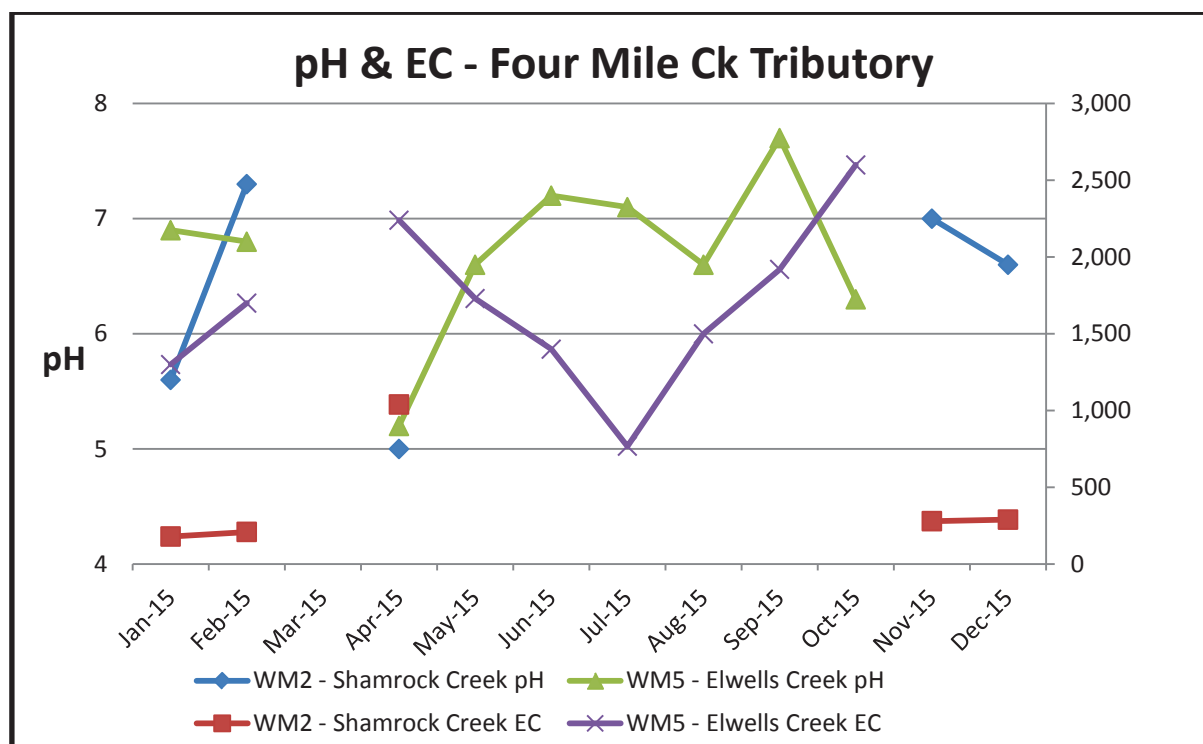
**Figure 4: pH of Four Mile Creek**

Figure 5 shows EC and pH results for water storage dams. Water quality within the mine water storage dams (Lake Kennerson and Lake Foster) varies throughout the year depending on rainfall capture in the open cut pits, CHPP water usage and frequency of licensed discharge events, which are also rainfall dependent. The freshwater dam (Possums Puddle) remains fairly constant throughout the year as it is separate from mining influences.



**Figure 5: pH & EC in Site Water Storages**

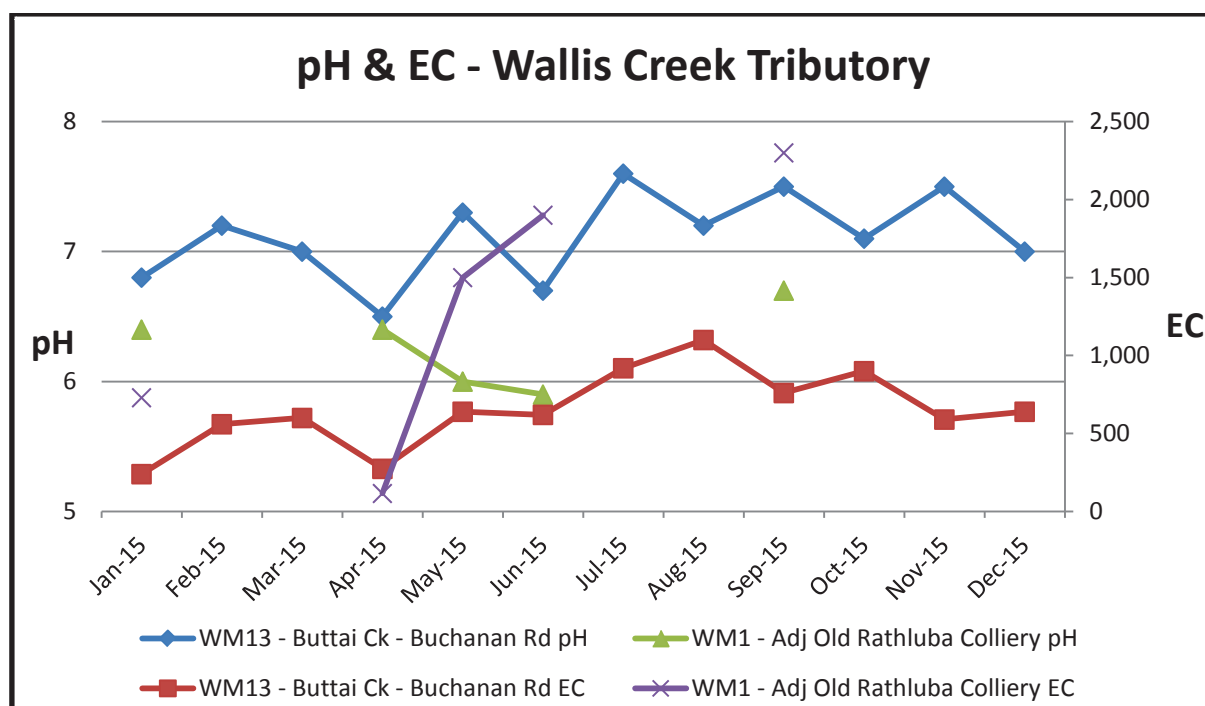
Figure 6 shows the pH and salinity levels in Four Mile Creek tributaries are generally consistent with ANZECC water quality guidelines (pH 6.5-8.5 & EC 125-2200). These tributaries are ephemeral streams and are often dry or not flowing. This results in gaps in the graphed data.



**Figure 6: pH & EC in Four Mile Ck Tributary**

Figure 7 shows the pH and salinity levels in Wallis Creek tributaries are generally consistent with ANZECC water quality guidelines (pH 6.5-8.5 & EC 125-2200).

Previous results indicate that the surface flow adjacent to Rathluba has historically been of low pH, regardless of mining impacts. Prior to 2006 pH results were less than 4 however pH levels have been steadily increasing since then. This drainage line carries surface flow from non-mining land and rehabilitated mining land, indicating that other off-site effects may be influencing the water quality in the area. The drainage line is ephemeral and is usually dry resulting in gaps in the graphed data.



**Figure 7: pH & EC in Wallis Ck Tributary**

The WMP proposed water quality trigger values for Buttai Creek (WM13) and Elwells Creek (WM5). Table 13 summarises the results, with the full data set provided in Appendix B. Results were within either WMP or ANZECC 2000 trigger.

**Table 13: Trigger Values**

Sampling Site	pH	EC	TSS
WM5 – Elwells Creek	5.2 to 7.7	768 to 2600	5 to 19
<b>WMP Trigger Level</b>	5.2 - 8.0	430 - 4000	4 - 85
WM13 – Buttai Creek	6.5 to 7.6	240 to 1100	2 to 44
<b>WMP Trigger Level</b>	6.4 – 7.8	380 - 1100	5 - 45
<b>ANZECC 2000 Trigger Level</b>	6.5 - 8.5	125 - 2200	50*

\* Standard Industry Criterion

Discharge Monitoring Results

There were 25 licensed discharges conducted during the reporting period, with a total discharge volume of 1625 ML. Table 14 shows the average, maximum and minimum water quality results at the discharge point, compared to EPA discharge water quality thresholds. Detailed daily discharge results are provided in Table B1 in Appendix B.

**Table 14: Discharge Sampling Analytical Results**

DATE	pH	TOTAL SUSPENDED SOLIDS (mg/L)	TOTAL DISSOLVED SOLIDS (mg/L)	CONDUCTIVITY (uS/cm)	IRON (mg/L)	DISCHARGE VOLUME (ML/day)
<b>EPA Limits</b>	<b>6.5-8.5</b>	<b>30</b>	<b>-</b>	<b>6,000</b>	<b>1</b>	<b>40</b>
Average	8.0	17	3,634	4,676	0.28	31
Maximum	8.4	350	4,860	5,740	<0.05	40
Minimum	7.5	1	588	953	<0.01	10

**3.4.3 Environmental Incidents**

There was a reportable surface water incident during 2015. In April 2015 a water discharge to Four Mile Creek was being undertaken at Bloomfield Colliery in accordance with EPL 396 water discharge conditions. During the course of the discharge the Total Suspended Solids (TSS) exceeded the EPL concentration limits. The incident was reported to the EPA in accordance with EPL 396 conditions as well as DRE and DP&E. The report is provided in Appendix B. No action taken by the EPA as at the end of the reporting period.

There were no other reportable surface water incidents during the reporting period.

**3.4.4 Further Improvements**

The surface water monitoring program will be continued in accordance with WMP requirements.

**3.5 Ground Water****3.5.1 Environmental Management**

Bloomfield Colliery has prepared and submitted a Water Management Plan (WMP) in accordance with Development Consent requirements for the operation of the mine. The Plans prescribe the process water source and supply requirements, site-water balance,



storage, impact management and monitoring of groundwater in the vicinity of the mining operations.

Table 15 outlines the groundwater monitoring program undertaken at Bloomfield Colliery.

**Table 15: Groundwater Monitoring Program**

Analyte	Quarterly	6 Monthly	Annual
Water Levels	✓	✓	✓
pH		✓	✓
Electrical Conductivity		✓	✓
Total Dissolved Solids		✓	✓
Filterable Iron			✓
Chloride			✓
Sulphate			✓
Alkalinity			✓
Calcium			✓
Magnesium			✓
Sodium			✓
Potassium			✓

### 3.5.2 Environmental Performance

Monitoring was undertaken during the period and the results for 2015 and previous years are summarised in Figures 8 – 10, with the full data set provided in Appendix C. The results are fairly consistent and do not show any real trends. The S Cut high wall has moved west and is now within a few metres of Bore PD7.1. Bore PD7.1 is now dry.

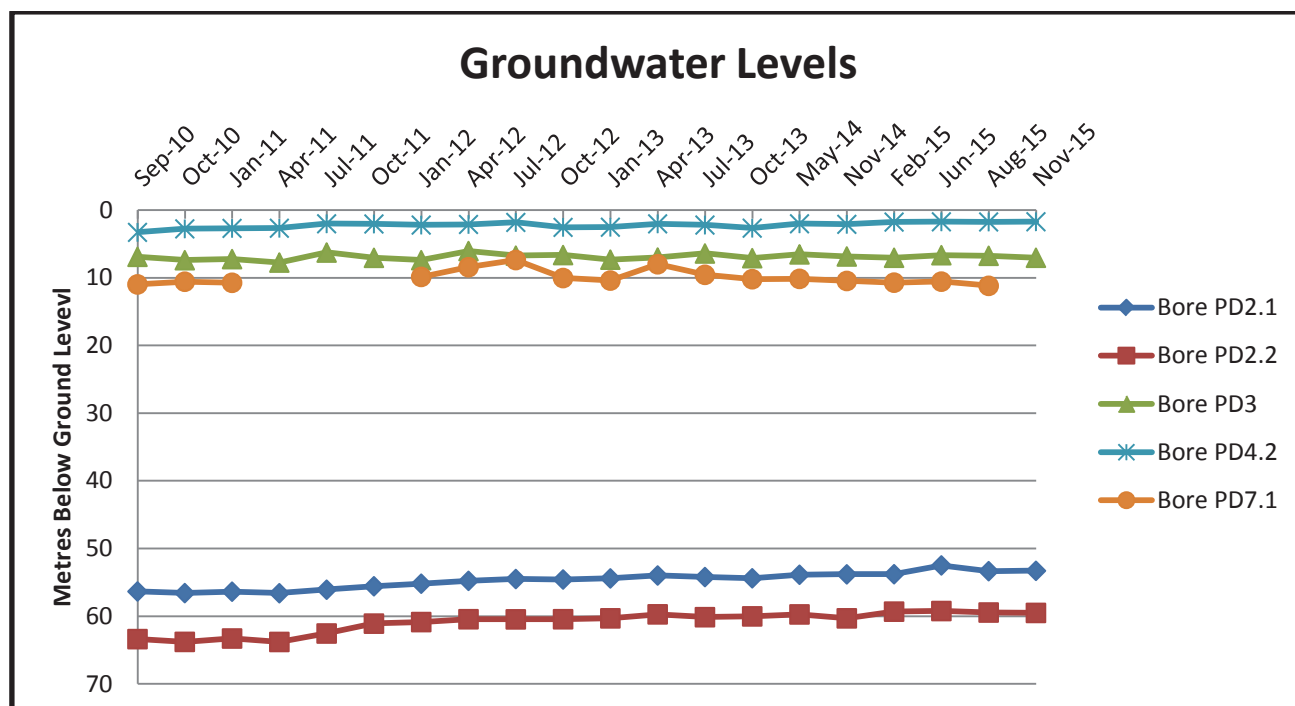


Figure 8: Groundwater Levels

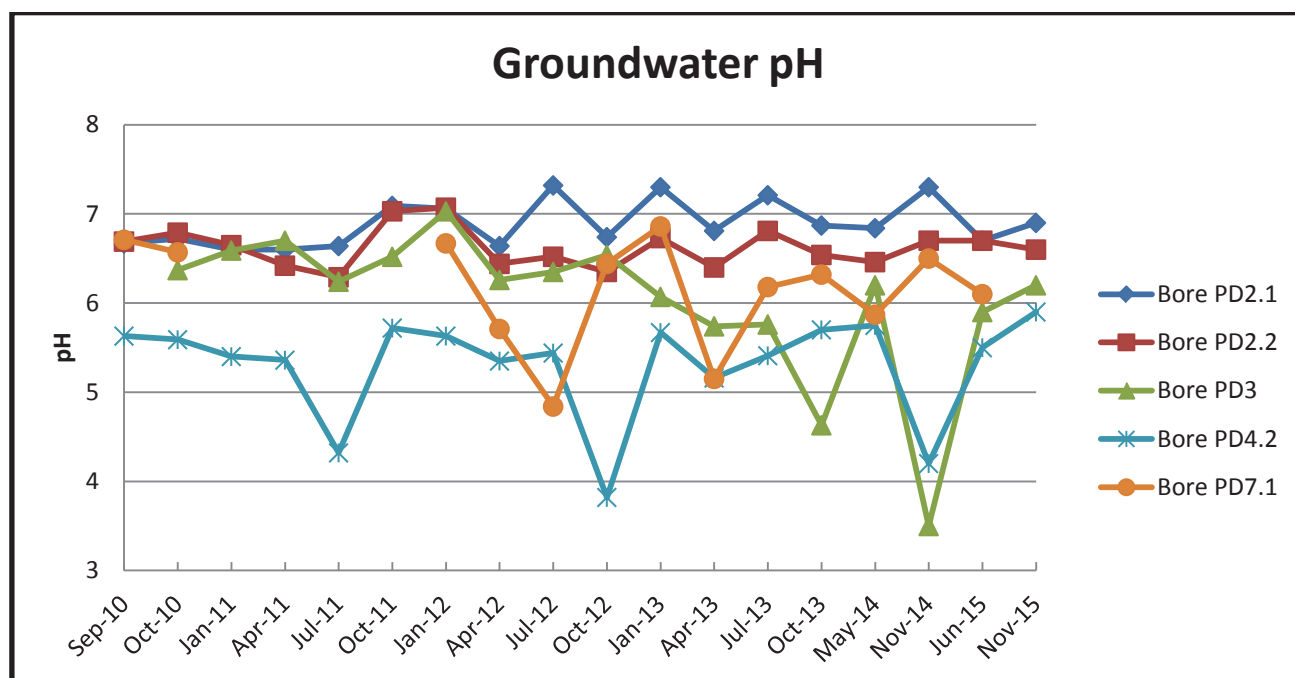
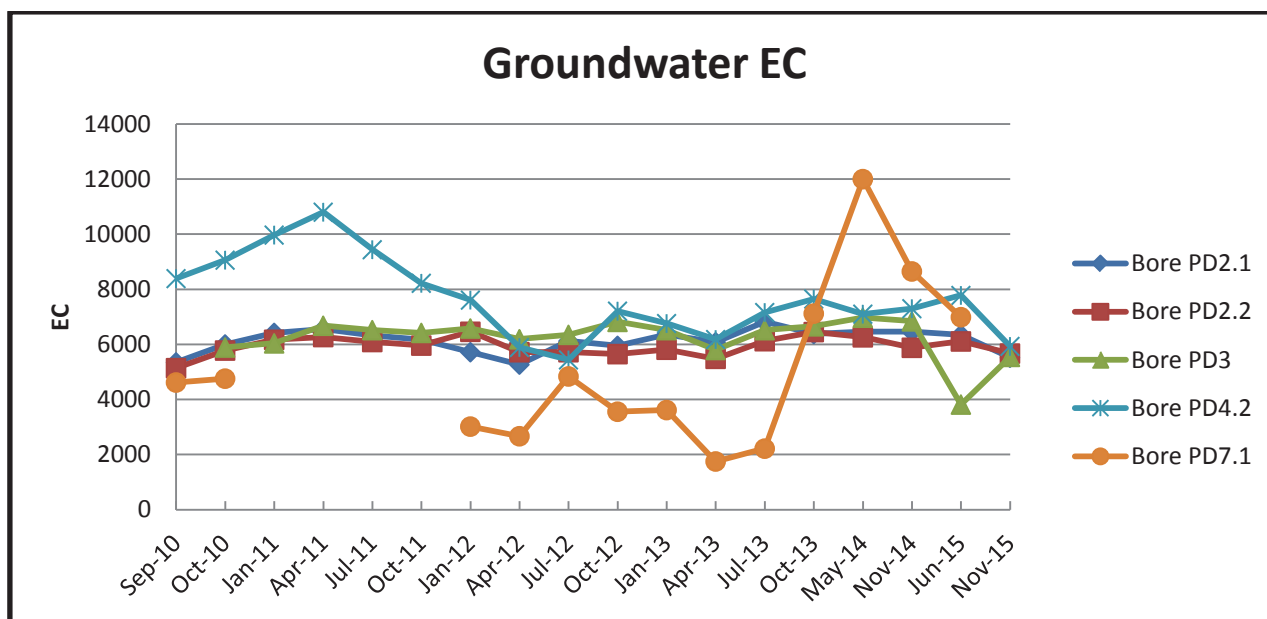


Figure 9: Groundwater pH



**Figure 10: Groundwater EC**

### 3.5.3 Environmental Incidents

No reportable incidents relating to groundwater pollution occurred during the reporting period.

### 3.5.4 Further Improvements

The groundwater monitoring program will be continued in accordance with WMP requirements. As more groundwater data is collected any long-term trends may be identified.

## 3.6 Contaminated Land

### 3.6.1 Environmental Management

No contaminated or polluted land has been identified at Bloomfield. No significant hydrocarbon or chemical spills occurred within the Lease requiring special response, clean-up or ongoing management.

### 3.6.2 Environmental Performance

Quarterly inspections of hydrocarbon storage facilities are completed as part of the site EMS, and no land contamination or significant polluting incidents were reported during these inspections.

### 3.6.3 Reportable Incidents

No reportable incidents relating to land contamination occurred during the reporting period.

### 3.6.4 Further Improvements

As no areas of land contamination have been identified, no improvements to the current management system are planned. Quarterly inspections will be maintained.

## 3.7 Threatened Flora and Fauna

### 3.7.1 Environmental Management

The Environmental Assessment included an assessment of the potential impacts associated with the clearance vegetation. Any clearing of vegetation within the project area must be undertaken in accordance with the requirements of the Project Approval.

### 3.7.2 Environmental Performance

No vegetation was cleared for Bloomfield mining or coal washing operations during the reporting period. Biodiversity enhancement has also been considered during the planning and implementation of land rehabilitation.

A Biodiversity Offset Area has been established to compensate for future land clearance at the mine. The land was purchased by Bloomfield in December 2011 and consists of 40 Ha of remnant vegetation adjacent to the Watagan State Forest. The western boundary abuts a part of Watagan State Forest on the eastern side of the Corrabare Range. A Biodiversity Offset Management Plan was submitted to DP&I for approval in November 2011. Bloomfield is waiting on approval of the Plan before undertaking conservation works on the site.

### 3.7.3 Reportable Incidents

No reportable incidents relating to flora and fauna management occurred during the reporting period.

### 3.7.4 Further Improvements

Further details on progress of the implementation measures of the Biodiversity Offset Area will be provided in the next AEMR.

## 3.8 Weeds & Pests

### 3.8.1 Environmental Management

A Weed Management Plan has been developed to provide a plan for weed management at Bloomfield Colliery. The purpose of the Weed Management Plan is to conduct regular

surveys to identify weed species requiring control, identify and map weed infestation locations, and implement a weed control priority action plan to control weeds. Bloomfield undertakes regular inspections and has a treatment program to control weeds across the site. A contract weed-sprayer is employed in addition to mechanical support from mine plant such as dozers and backhoes when required. Over the reporting period priority was given to the control of pampas grass, blackberry and mother-of-millions. Lantana was also targeted during the reporting period.

Periodic feral animal control programs are undertaken in conjunction with neighboring mines. Activities include feral dog baiting programs. These programs are conducted on an as need basis.

### 3.8.2 Environmental Performance

Approximately \$58,000 was spent across the site on weed control during the reporting period. This consisted of a combination of spraying and slashing. Weed control works included rehabilitation areas and remnant vegetation within CCL 761 as well as land outside the mining lease under the control of Bloomfield. No Class 1 or Class 2 declared weeds were identified onsite. Table 16 lists the weed species identified and treated on site.

**Table 16: Weed Priority Level**

Common Name	Scientific Name	Priority Level
African Daisy	<i>Senecio pterophorus</i>	Medium
Blackberry	<i>Rubus fruticosus</i>	Medium
Castor Oil	<i>Ricinus communis</i>	Low
Crofton Weed	<i>Ageratina adenophora</i>	Low
Farmers Friend	<i>Bidens pilosa</i>	Low
Giant Parramatta Grass	<i>Sporobolus fertilis</i>	Low
Lantana	<i>Lantana camara</i>	High
Mother of Millions	<i>Bryophyllum delagoense</i>	Low
Pampas Grass	<i>Cortaderia selloana</i>	High
Morning Glory	<i>Ipomoea indica</i>	Low
Tobacco Bush	<i>Solanum mauritianum</i>	Low

During the reporting period a wild dog and fox baiting program was undertaken in conjunction with neighbouring mines and the Livestock Health and Pest Authority. This was conducted in July 2015. The baiting program proved to be very successful with 29 out of 30 baits taken.

### 3.8.3 Reportable Incidents

No reportable incidents relating to weed management occurred during the reporting period.

### 3.8.4 Further Improvements

The weed management budget for the upcoming reporting period will be maintained at a similar level to previous years. The control of pampass grass and African daisy remains the priority for the next reporting period in addition to the ongoing management of Lantana.

## 3.9 Blasting

### 3.9.1 Environmental Management

A blast monitoring plan has been prepared in accordance with the conditions of the Project Approval. It is expected that the blast monitoring plan will be endorsed by the Director General during the next reporting period. Blasting activities are licensed under EPL 396. The EPL stipulates monitoring requirements, restricts blasting hours, as well as limiting airblast overpressure and ground vibration impacts at the nearest residences.

Blasting techniques have been developed in conjunction with ORICA, utilising the “nonel” initiation system and implemented to achieve maximum fragmentation and maintain levels ground vibration and overpressure levels within the approved criteria for the site.

Each blast is monitored at four nearby residences for ground vibration and overpressure. Monitors are located at residences to the south, south-east, west and north-west of current open cut operations. The location of the blast monitors is shown on Plan 1.

Also the use of a predictive meteorological modeling software program is utilised to assist in planning blast operations. The software incorporates regional weather station data to predict daily weather events that may exacerbate overpressure impacts from blasting operations.

### 3.9.2 Environmental Performance

All blast results for the reporting period are included in Appendix D and are summarised in Table 17 and Table 18.

During the reporting period a total of 101 blasts were initiated on the site. One blast (1% of total shots) exceeded 115 dB blast overpressure. No blasts exceeded 120 dB blast overpressure limits. No blasts exceeded the 5mm/sec or 10mm/sec ground vibration limits.

**Table 17: Blast Monitoring Summary**

<b>Blasting Criteria Limits</b>	<b>Allowable Exceedance<sup>1</sup></b>	<b>Results 2015</b>
<b>Airblast Overpressure Level dB (Lin Peak)</b>		
115	5 %	1 %
120	0 %	0 %
<b>Ground Vibration Peak Particle Velocity (mm/s)</b>		
5	5 %	0 %
10	0 %	0 %

Note: 1. Percentage of the total number of blasts over a period of 12 months

Blast modelling predictions conducted as part of the Environmental Assessment (PA 07\_0087) are shown in Table 18. Monitoring during the reporting period indicates that mean and median results are at or below predicted levels.

**Table 18: Blast Predictions**

<b>Location</b>	<b>N – Elliotts</b>		<b>M - MacNaughtons</b>		<b>H - Mt Vincent Rd</b>		<b>G - Richards</b>	
	<b>Airblast dBL</b>	<b>Vibration mm/s</b>	<b>Airblast dBL</b>	<b>Vibration mm/s</b>	<b>Airblast dBL</b>	<b>Vibration mm/s</b>	<b>Airblast dBL</b>	<b>Vibration mm/s</b>
Max	118.6	4.9	115.6	1.0	107.5	0.9	112.1	1.1
Min	98.0	0.3	91.7	0.1	80.2	0.02	75.5	0.03
Mean	104.4	1.5	103.5	0.5	90.3	0.2	95.4	0.4
Median	104.3	1.1	103.3	0.4	90.3	0.1	95.1	0.3
<b>EA Prediction</b>	<b>113.0</b>	<b>4.8</b>	<b>103.5</b>	<b>1.2</b>	<b>96.5</b>	<b>0.4</b>	<b>102.1</b>	<b>1.0</b>

### 3.9.3 Reportable Incidents

No reportable incidents relating to blasting occurred during the reporting period.

### 3.9.4 Further Improvements

Monitoring of blasts will continue in accordance with EPL and Project Approval requirements.

### 3.10 Operational Noise

#### 3.10.1 Environmental Management

A noise monitoring plan has been prepared in accordance with the conditions of the Project Approval. The noise monitoring plan has been endorsed by the Director General. Quarterly noise monitoring has been undertaken in accordance with the monitoring plan.

The use of a predictive meteorological modeling software program is utilised to assist in planning mine operations. The software incorporates regional weather station data to predict daily weather events that may exacerbate noise impacts from operations.

#### 3.10.2 Environmental Performance

Attended and unattended quarterly noise monitoring was undertaken during the reporting period which assessed noise impacts from Bloomfield Colliery against relevant criteria detailed within PA 07\_0087 at five monitoring locations (see Plan 1). Monitoring results are summarised in Table 19 and copies of the monitoring reports can be viewed on the Bloomfield website ([www.bloomcoll.com.au](http://www.bloomcoll.com.au)) .

All noise monitoring indicated that compliance with consent criteria was met at all locations during day, evening and the night-time periods with the exception of Location M and N during the March 2015 quarterly monitoring. The noise criteria were set based on the noise predictions conducted in the Environmental Assessment (PA 07\_0087).

**Table 19: Summary of Attended Noise Monitoring Results**

Location	Time	Noise Criteria	Attended Monitoring	Bloomfield generated noise
F – Black Hill Rd, Black Hill	Day (LAeq (15 min))	35	<35 to <42	Inaudible
	Evening (LAeq (15 min))	35	<30 to <44	Inaudible
	Night (LAeq (15 min))	35	<30 to <39	Inaudible
G – Buchanan Rd, Buchanan	Day (LAeq (15 min))	39	<30 to 33	
	Evening (LAeq (15 min))	42	<31 to 42	
	Night (LAeq (15 min))	37	<30 to 35	
L – Kilshanny Ave, Ashtonfield	Day (LAeq (15 min))	35	<30 to <30	
	Evening (LAeq (15 min))	35	<30 to <35	
	Night (LAeq (15 min))	35	<30 to <37	Inaudible
M – John Renshaw Dr, Buttai	Day (LAeq (15 min))	39	<35 to <41	Inaudible
	Evening (LAeq (15 min))	39	<35 to 38	
	Night (LAeq (15 min))	37	<36 to 49	
N – Lings Rd, Buttai	Day (LAeq (15 min))	42	<35 to <48	Inaudible
	Evening (LAeq (15 min))	42	<33 to 40	
	Night (LAeq (15 min))	35	<30 to 39	

1 – Mine owned property

2 – Within 2 dB as per Industrial Noise Policy



The results of the night time monitoring show that there was an exceedance of the noise criteria at two privately owned properties (M & N) which are located to the south of the site on John Renshaw Drive. The results were 49 dB and 39 dB respectively. The cause of the noise exceedance was due to be haul trucks being parked on a high stockpile dump at the end of afternoon shift. The noise exceedances coincided with the start of night shift. In response Bloomfield has put in place measures to prevent haul trucks being parked up on high dumps at the end of shifts.

Night time sleep disturbance criteria ( $LA1_{(1min)}$ ) were in compliance during all monitoring events with the exception of Location M and N during the March 2015 quarterly monitoring.

#### 3.10.3 Reportable Incidents

No reportable incidents relating to operational noise occurred during the reporting period.

#### 3.10.4 Further Improvements

The noise monitoring program will be continued in accordance with Noise Monitoring Plan requirements. The existing predictive meteorological modeling software program will be upgraded to a predictive noise emissions management tool for the mine. In addition to meteorological data it will also incorporate terrain data, mining equipment locations and aerial photographs.

### 3.11 Visual, Stray Light

#### 3.11.1 Environmental Management

Progressive rehabilitation of disturbed land is the main strategy for minimising visual impacts. In addition to providing a safe and stable landform, one of the key objectives of rehabilitation planning is to provide vegetated landforms that blend with the surrounding landscape.

Fixed lighting around the site has been positioned and/or shielded where possible to minimise light shed. Consideration is also given to the location and alignment of mobile light to minimise stray light.

#### 3.11.2 Environmental Performance

The visual assessment of the Bloomfield open cut noted that the main visual impacts are on residences to the south of John Renshaw Drive, to the south of the mine.

#### 3.11.3 Reportable Incidents

No reportable incidents relating to visual amenity or stray light occurred during the reporting period.

#### 3.11.4 Further Improvements

Rehabilitation of areas visible from nearby residences or road traffic will be given priority during mine planning and rehabilitation scheduling.

### 3.12 Aboriginal Heritage

#### 3.12.1 Environmental Management

An Aboriginal Cultural Heritage Management Plan (ACHMP) was prepared in consultation with Mindaribba LALC. The plan was endorsed by DECCW and the Director General of Planning during the reporting period.

#### 3.12.2 Environmental Performance

A number of Aboriginal sites identified during the Project Approval process were previously salvaged in 2010 in accordance with the ACHMP. Representatives from Mindaribba LALC participated and monitored the process ahead of preparation for mining activities. In all, 80 artefacts were salvaged and are being stored at Bloomfield Colliery.

In 2014 an additional 3 Ha was stripped of topsoil in preparation for mining activities. In accordance with the approved ACHMP Bloomfield engaged an archaeologist and the Mindaribba LALC to monitor the ground disturbance works and salvage identified artefacts. In all a further 6 artefacts were salvaged and are being stored at Bloomfield Colliery.

#### 3.12.3 Reportable Incidents

No reportable incidents relating to Aboriginal heritage occurred during the reporting period.

#### 3.12.4 Further Improvements

Any Aboriginal heritage evidence that is identified will be managed in accordance with the ACHMP and reported in the 2016 AEMR.

### 3.13 Natural Heritage

#### 3.13.1 Environmental Management

No National Parks, nature reserves, or other areas of protected natural heritage are located near Bloomfield. The nearest, Pambalong Nature Reserve, is located approximately 6km to the south-east of Bloomfield mining operations. Therefore, natural heritage management is not considered a significant environmental risk.

3.13.2 Environmental Performance

N/A

3.13.3 Reportable Incidents

No reportable incidents relating to natural heritage occurred during the reporting period.

3.13.4 Further Improvements

No improvements are planned with regards to natural heritage management.

**3.14 Spontaneous Combustion**

3.14.1 Environmental Management

There was no major spontaneous combustion incidences recorded during the reporting period.

3.14.2 Environmental Performance

A small area of spontaneous combustion was identified in an overburden dump that required capping with clay to seal off the available air supply.

3.14.3 Reportable Incidents

No reportable incidents relating to spontaneous combustion occurred during the reporting period.

3.14.4 Further Improvements

No improvements are planned with regards to spontaneous combustion management.

**3.15 Bushfire**

3.15.1 Environmental Management

A Bushfire Management Plan for Bloomfield Colliery was prepared in consultation with representatives of the NSW Rural Fire Service (RFS). The plan divides the site into 44 fire management Sectors, describes fire risk levels across the site, and outlines site features relevant to fire management such as vegetation type, access trail locations, asset locations, and water supplies.

Weather conditions permitting, hazard reduction burns are conducted periodically by the RFS. Selection of burn location is based on risk levels, as determined by fuel load assessment and location of assets/asset protection zones. Hazard reduction

clearing/slashing was also undertaken by Bloomfield along fire trails, asset protection zones and the mine boundary.

#### 3.15.2 Environmental Performance

An asset protection zone adjacent to residential areas near Ashtonfield and Buchanan was slashed and maintenance work carried on a number of tracks to enable access for hazard reduction activities by the RFS. A hazard reduction burn was conducted on land managed by Bloomfield along John Renshaw Drive.

#### 3.15.3 Reportable Incidents

No reportable incidents relating to bushfire management occurred during the reporting period.

#### 3.15.4 Further Improvements

No improvements to the Bushfire Management Plan are planned, however, ongoing hazard reduction burning and clearing will continue in consultation with the RFS. A hazard reduction burn is planned for winter 2016.

### 3.16 Mine Subsidence

#### 3.16.1 Environmental Management

Areas of the Bloomfield mine site (CCL 761) are undermined by historic underground workings, some relatively shallow. Sink holes associated with shallow workings are infrequent, but have previously been identified. If identified, the standard management procedure is to flag off and isolate the sink holes from access, back fill the holes and monitor for further subsidence. Once deemed stable, the area will then be rehabilitated and periodical inspections will continue.

#### 3.16.2 Environmental Performance

A sink hole identified and filled in X-Cut near Buchan Road has been rehabilitated. There is no damage to any infrastructure.

#### 3.16.3 Reportable Incidents

No reportable incidents relating to subsidence management occurred during the reporting period.

#### 3.16.4 Further Improvements

Other than the remediation and rehabilitation of sink holes as identified, no improvements to subsidence management are planned.

### **3.17 Hydrocarbon Contamination**

#### **3.17.1 Environmental Management**

As no areas of hydrocarbon contamination have been identified within the Bloomfield lease area, management is geared to contamination prevention. Bulk hydrocarbon storages (including the NALCO products) are located within bunded areas. The volumes of these bunded areas are capable of containing greater than 110% of the largest storage tank.

All machinery is fitted with quick fill mechanisms. The inlets and outlets, at the refueling bay and mobile tanker are positively closed with an automatic cut off when full. This refueling method is quick and minimises any potential for spillage during the refueling operation.

Hydrocarbon storage infrastructure at the CHPP and open cut is inspected regularly and documented maintenance check sheets are completed quarterly.

A dedicated contaminated soil land farming area is established on-site to treat any hydrocarbon contaminated due to accidental spills.

#### **3.17.2 Environmental Performance**

No major areas of hydrocarbon contamination were identified during the reporting period. Soil from minor spills were collected and deposited the contaminated soil land farming area.

#### **3.17.3 Reportable Incidents**

No reportable incidents relating to hydrocarbon contamination occurred during the reporting period.

#### **3.17.4 Further Improvements**

No improvements are planned for hydrocarbon management.

### **3.18 Public Safety**

#### **3.18.1 Environmental Management**

Being situated close to urban areas, Bloomfield has historically had a problem with dumping of rubbish, theft and vandalism on the site. A major fencing and exclusion barrier program has greatly reduced these occurrences. Bloomfield continues to invest significant time and resources into keeping the site closed to unauthorised access, including fencing along all public roads, installing lockable gates and other temporary barriers (such as logs, rocks and concrete blocks) on major access tracks and ensuring clear signage is placed covering likely approaches.

### 3.18.2 Environmental Performance

No public safety incidents were recorded or reported during the reporting period.

### 3.18.3 Reportable Incidents

No reportable incidents relating to public safety during the reporting period.

### 3.18.4 Further Improvements

No overall improvements are planned to manage public safety; however, Bloomfield will continue to maintain existing fencing, gates, barriers and signage.

## 4 COMMUNITY RELATIONS

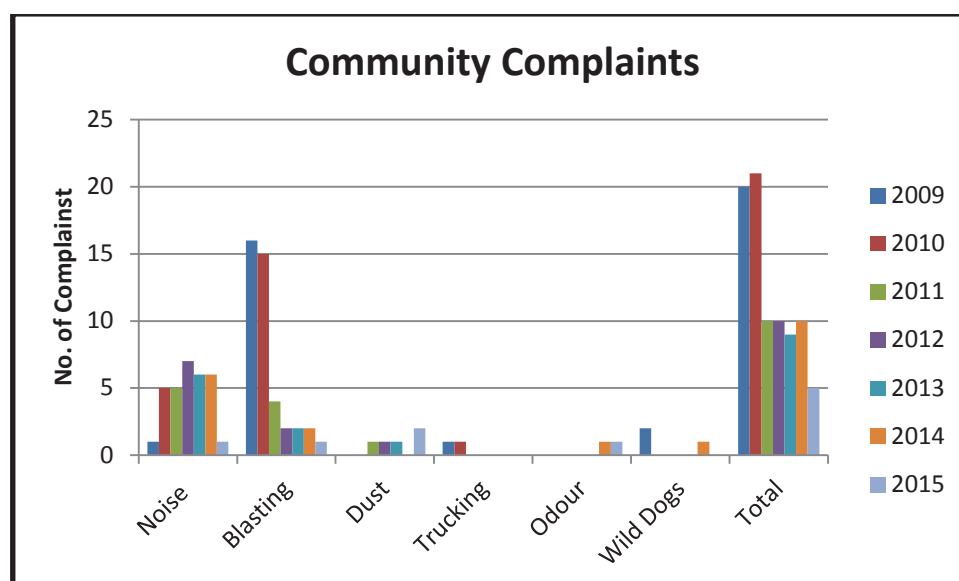
### 4.1 Environmental Complaints

Five community complaints were received during the reporting period and a summary is provided below in Table 20. The complaints register for the reporting period is presented in Appendix E.

**Table 20: Community Contacts Register**

Date	Issue	Type	Location
13-Jan-15	Blasting	Resident	Black Hill
03-Mar-15	Noise	Resident	Buttai
03-Sept-15	Odour	Regulator	No details
28-Oct-15	Dust	Resident	Ashtonfield
23-Nov-15	Dust	Resident	Black Hill

Figure 11 displays a comparison of complaints with previous reporting periods, which demonstrates a decline in the number of complaints received.



**Figure 11: Community Complaints**

## **4.2 Community Liaison**

### **4.2.1 Community Consultative Committee**

In accordance with the Project Approval, a Community Consultative Committee (CCC) has been established. The CCC meets three times a year basis. The minutes of the CCC meetings can be viewed on the Bloomfield website ([www.bloomcoll.com.au](http://www.bloomcoll.com.au)).

Additional information about the operation has been included on the company website ([www.bloomcoll.com.au](http://www.bloomcoll.com.au)) and information about blasting schedules advertised quarterly in local newspapers.

### **4.2.2 Adopt-a-Road Program**

Bloomfield is a participant in Cessnock City Council's Adopt-a-Road program. Bloomfield has entered into an agreement with the Council to undertake litter collection campaigns along Buchanan Road, between John Renshaw Drive and Louth Park Road, Buchanan, including Valley View Lane. Bloomfield has contracted the Kurri Kurri Community Center Inc to conduct quarterly litter collection programs.

### **4.2.3 Community Sponsorship**

The Bloomfield Group has a commitment to support local community projects and activities. As part of this commitment, during 2015 financial sponsorship was provided for the following community groups, schools, charities and community events:

- Alambi Care
- Australian Red Cross
- Cancer Council NSW
- Cancer Council Relay for Life
- Carrie's Place
- Children's Cancer Institute
- Chuck Duck & Roosters Cluck Good Life Truck
- Country Education Foundation of Australia
- Cystic Fibrosis
- Darlington Rural Fire Brigade
- East Maitland Rugby League
- Friends of Palliative Care
- Gresford Public School P & C
- Harry Perkins Institute
- Hunter Medical Research Institute
- Hunter Research Foundation
- Hunter Research Foundation YOUNite Youth Summit
- Hunter River Agricultural Show
- Hunter Valley Junior Cricket
- Institute Deaf & Blind Children
- Kaleidoscope



- Kurri Kurri Community Centre Roadside Litter Reduction
- Kurri Kurri Community Festival
- Legacy Australia Inc
- Leukaemia Foundation World Greatest Shave
- Macquarie Yacht Club Sailing Day
- Maitland Art Gallery (Artist in Residence)
- Maitland City Council - AROMA Coffee & Chocolate Festival
- Maitland City Council - Steamfest Sponsorship
- Maitland Polocrosse
- Maitland Rugby Club - Sponsor Maitland Blacks 2015 Season
- Medecins Sans Frontieres Aust
- Morpeth Men's Shed
- MS Australia
- Northern Agricultural Assoc
- NSW Minerals Council - Mining Scholarship
- Red Shield Appeal
- Samaritans Foundation
- Scouts Association of Australia - Singleton
- Singleton Chamber of Commerce - 2015 Outstanding Business Awards
- Singleton Council - Mayoral Scholarship 2016
- Singleton Family Support Inc
- Singleton Fire Brigade Social Club
- Singleton High School
- Singleton Hospital Aux - Sponsorship Annual Fete
- Singleton Hospital Community Trust
- Singleton Sports Council
- Special Childrens Xmas Party
- St Josephs East Maitland P&F
- Tahlia Smith Campaign
- The Smith Family
- Thornton Public School
- Towns with Heart Inc.(Kurri Kurri Nostalgia Festival)
- University of Newcastle
- We Help Ourselves
- Wean Amateur Picnic Race Club
- West Wallsend Public School
- Woodberry Warriors Junior Rugby League Club
- Youth off the Streets

## **5 REHABILITATION**

### **5.1 Buildings**

There have been no buildings or structures decommissioned over the site during the reporting period.

### **5.2 Rehabilitation of Disturbed Land**

The Mining Operations Plan (MOP) 2012-2016 for Bloomfield Collieries has been accepted by DRE. The MOP was prepared under DREs new Interim MOP Guidelines.

Landscape re-contouring, topsoil handling and revegetation techniques are well established at Bloomfield. The objectives of the rehabilitation program being:

- To establish post-mining surfaces and vegetation cover which ensure a safe and stable landform of land capability class equal to that which existed prior to mining disturbance.
- Return the land to a condition suitable for a range of post-mining landuses, which take into account the proximity of the site to the urban areas of Maitland and possible future development demands.
- Create landforms that can accommodate overburden and waste products produced during coal mining and processing, and merge with adjoining undisturbed landforms.
- Reinststate a surface drainage network on the rehabilitated landforms that is hydrologically stable and incorporates adequate erosion and sediment control structures so as to effectively protect adjoining areas from potential water-borne impacts.
- Undertake a maintenance program to ensure the continued sustainability of previously rehabilitated areas.

Rehabilitation is carried out throughout the year, with the aim of timing vegetation seeding operations in Spring and Autumn. The majority of the lease area is relatively undisturbed remnant native bushland and no other activities are carried out on the area other than the mining operation. To date 458 Ha has been rehabilitated.

As reported in the previous AEMR, the major rehabilitation program undertaken over the past decade has now resulted in only relatively small areas becoming available for rehabilitation each year. Combined with this was an expansion of dumping area over areas previously categorised as rehabilitated.

A total of 4 ha of land were rehabilitated during the reporting period (see Table 21). Although 4 ha of land was rehabilitated during the reporting period, there was a net increase in rehabilitated land of 2 ha recorded for the reporting year. A 2 ha area previously rehabilitated was cleared for infrastructure use. The rehabilitated land that was cleared had been rehabilitated to pasture with scattered trees. The area was stripped of topsoil and surface vegetation and these materials were placed directly on a prepared slope for the 2015 rehabilitation.

The 4 Ha of rehabilitation completed during the reporting period is less than the MOP rehabilitation for 2015 which was estimated to be 6.2 Ha. However the net rehabilitation completed during the MOP period to date is 31 Ha which exceeds the MOP estimate of 25 Ha. Plan 2 provides an overview of the site showing areas previously rehabilitated, rehabilitation undertaken during the reporting period, shaped areas ready for rehabilitation, unshaped areas (active dumps), and active mining areas.

**Table 21: Rehabilitation Summary**

		Area Affected/Rehabilitated (hectares)		
		To date	Last report	Next Report (estimated)
<b>A: MINE LEASE AREA</b>				
<b>A1</b>	<b>Mine Lease(s) Area</b>	1,453		
<b>B: DISTURBED AREAS</b>				
<b>B1</b>	<b>Infrastructure area</b> (other disturbed areas to be rehabilitated at closure including facilities, roads)	74	72	74
<b>B2:</b>	<b>Active Mining Area</b> (excluding items B3 – B5 below)	78	78	83
<b>B3</b>	<b>Waste emplacements,</b> (active/unshaped/in or out-of-pit)	130	140	132
<b>B4</b>	<b>Tailings emplacements,</b> (active/unshaped/uncapped)	87	87	87
<b>B5</b>	<b>Shaped waste emplacement</b> (awaits final vegetation)	17	11	10
<b>ALL DISTURBED AREAS</b>		386	388	386
<b>C REHABILITATION PROGRESS</b>				
<b>C1</b>	<b>Total Rehabilitated area</b> (except for maintenance)	458	456	466
<b>D: REHABILITATION ON SLOPES</b>				
<b>D1</b>	<b>10 to 18 degrees</b>	28	28	28
<b>D2</b>	<b>Greater than 18 degrees</b>	-	-	-
<b>E: SURFACE OF REHABILITATED LAND</b>				
<b>E1</b>	<b>Pasture and grasses</b>	453	451	461
<b>E2</b>	<b>Native forest/ecosystems</b>	-	-	-
<b>E3</b>	<b>Plantations and crops</b>	5	5	5
<b>E4</b>	<b>Other</b> (include nonvegetative outcomes)	-	-	-

F1

F2

Table 22 provides a summary of the maintenance activities during the period and activities proposed for the next reporting period.

**Table 22: Maintenance Activities on Rehabilitated Land**

NATURE OF TREATMENT	Area Treated (ha)		Comment/control strategies/ treatment detail
	Report period	Next period	
<b>Additional erosion control works</b> (drains re-contouring, rock protection)	-	-	Construction of contour drain to manage run off from expanded workings.
<b>Re-covering</b> (detail – further topsoil, subsoil sealing etc)	0.4	-	Small, isolated bare patches & washouts across the site to be ripped, retreated with lime, biosolids and/or fertiliser, and re-seeded during the next reporting period. Actual areas small and difficult to calculate.
<b>Soil treatment</b> (detail – fertiliser, lime, gypsum etc)	-	-	See "Re-covering" above.
<b>Treatment/Management</b> (detail – grazing, cropping, slashing etc)	50  -	40  5	The western area of K Cut fenced and cattle grazing introduced to maintain pasture. The northern area of K Cut fenced to be fenced and cattle grazing introduced to maintain pasture. Slashing of established rehabilitation to encourage nutrient recycling and, where needed, fertiliser application.
<b>Re-seeding/Replanting</b> (detail – species density, season etc)	-	-	See "Re-covering" above.
<b>Adversely Affected by Weeds</b> (detail - type and treatment)	ML	ML	Continual localised areas of weed treatment across all disturbed and undisturbed areas (see Section 3.7), but no specific areas of intensive treatment.
<b>Feral animal control</b> (detail – additional fencing, trapping, baiting etc)	1500	1500	Feral dog baiting undertaken during the reporting period in consultation with other large land holders in the area.

Topsoil Balance

Table 23 provides a topsoil balance as at the end of the reporting period and the current disturbance area.

**Table 23: Topsoil Balance**

	Start of Period	End of Period
Current Disturbance Area	388 Ha	386 Ha
Stockpiled Soil Material	250,000 m <sup>3</sup>	250,000 m <sup>3</sup>
In-Situ Soil Material	210,000 m <sup>3</sup>	210,000 m <sup>3</sup>
<b>Total Soil Material</b>	<b>460,000 m<sup>3</sup></b>	<b>460,000 m<sup>3</sup></b>
Soil Cover Depth	0.12 m	0.12 m

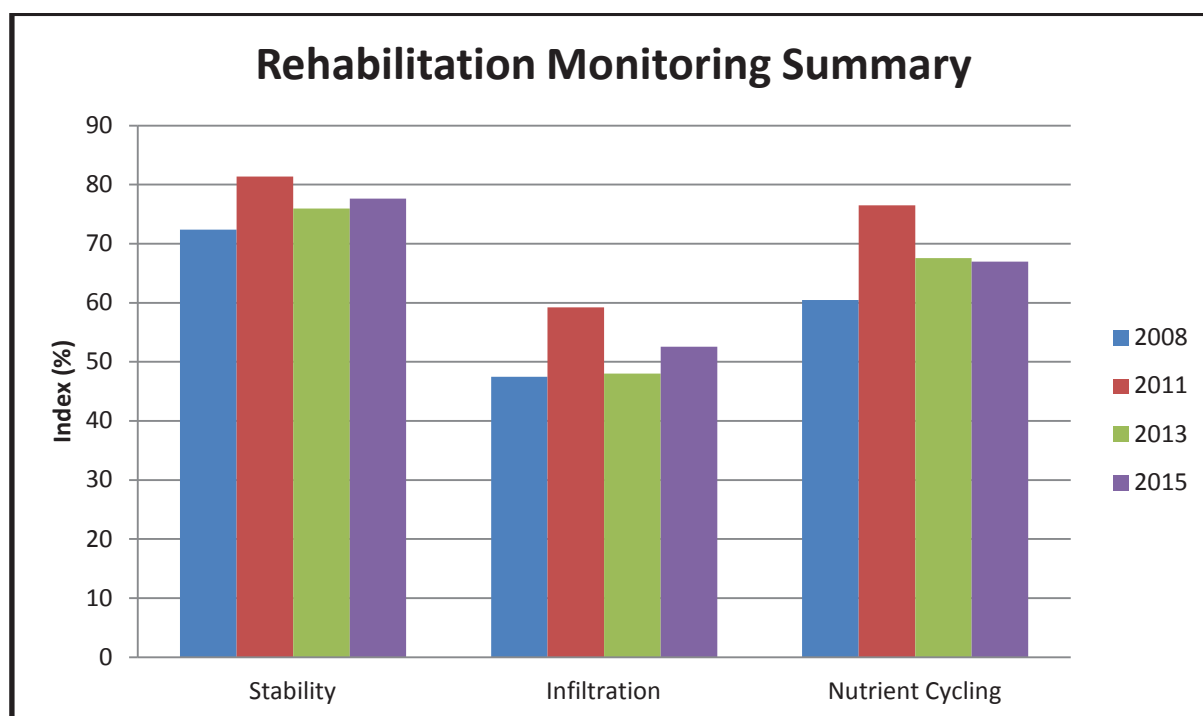
### Rehabilitation Monitoring

Bloomfield Colliery has prepared and submitted a Landscape Management Plan (LMP) which includes a Rehabilitation Management Plan (RMP) in accordance with Development Consent requirements for the operation of the mine. The RMP outlines the objectives, methodology and monitoring of rehabilitation.

The Bloomfield rehabilitation monitoring program is based on Landscape Function Analysis (LFA) developed by the CSIRO. LFA is the core of the monitoring procedures and uses visually assessed indicators of soil surface processes that gauge how effectively a hillslope is operating as a biophysical system.

There are currently 23 established monitoring sites within the rehabilitated areas. Additional sites will be added as rehabilitation progresses. Rehabilitation monitoring is carried every 2 years and was carried out in 2015.

The results of the monitoring program are summarised in Figure 12. More detailed results are summarised in Appendix F. The results reported in Appendix F include all monitoring results conducted since 2008. The next round of monitoring will be conducted in 2017 and the results will be presented in the 2017 AEMR.



**Figure 12: Rehabilitation Monitoring Summary**

### **5.3 Other Infrastructure**

No infrastructure was decommissioned during the reporting period.

#### **5.4 Rehabilitation Trials and Research**

No trials or research were undertaken during the reporting period.

#### **5.5 Further Development of the Final Rehabilitation Plan**

In accordance with the Project Approval, the Landscape Management Plan, Rehabilitation Management Plan, Mine Closure Plan and Final Void Management Plan have been prepared and submitted to DP&I for approval. These documents outline the rehabilitation planning, operation and monitoring process for Bloomfield Group mining operations. All are expected to be approved during the next reporting period.

Under the current mine plan mining will cease at Bloomfield in 2021. The Bloomfield washery, rail loader and tailings facility will continue to operate after the mining is scheduled to be completed. The continued use of the washery, rail loader and tailings facility is approved under Project Approval 05\_0136 for the Abel Underground Mine. These items associated with the operation of the washery are currently used to process coal from Bloomfield, Abel and Tasman mines. When mining is completed at Bloomfield Colliery, the washery will continue processing coal from the Abel and Tasman mines. Project Approval 05\_0136 permits operations until 2030.

The final void remaining at the end of mining will be used as the tailings facility for the washery operations. An estimated 20 M m<sup>3</sup> of storage capacity will be required for the final void as a tailings facility. This will be used for the disposal of approximately 18 M m<sup>3</sup> of waste rejects and a further 2 M m<sup>3</sup> of overburden capping. The tailings material will be capped with 2 metres of overburden material and soil and rehabilitated. Overburden material and topsoil will be stockpiled adjacent to the final void towards the end of Bloomfield mining operations to be utilised for final closure when washery operations are completed in 2030.

### **6 ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD**

The activities for the ensuing year will generally be in accordance with the rehabilitation and landscape management strategy outlined in the Environmental Assessment and the MOP schedule. Environmental activities proposed for the next AEMR period have been previously reported within relevant sections of this document.

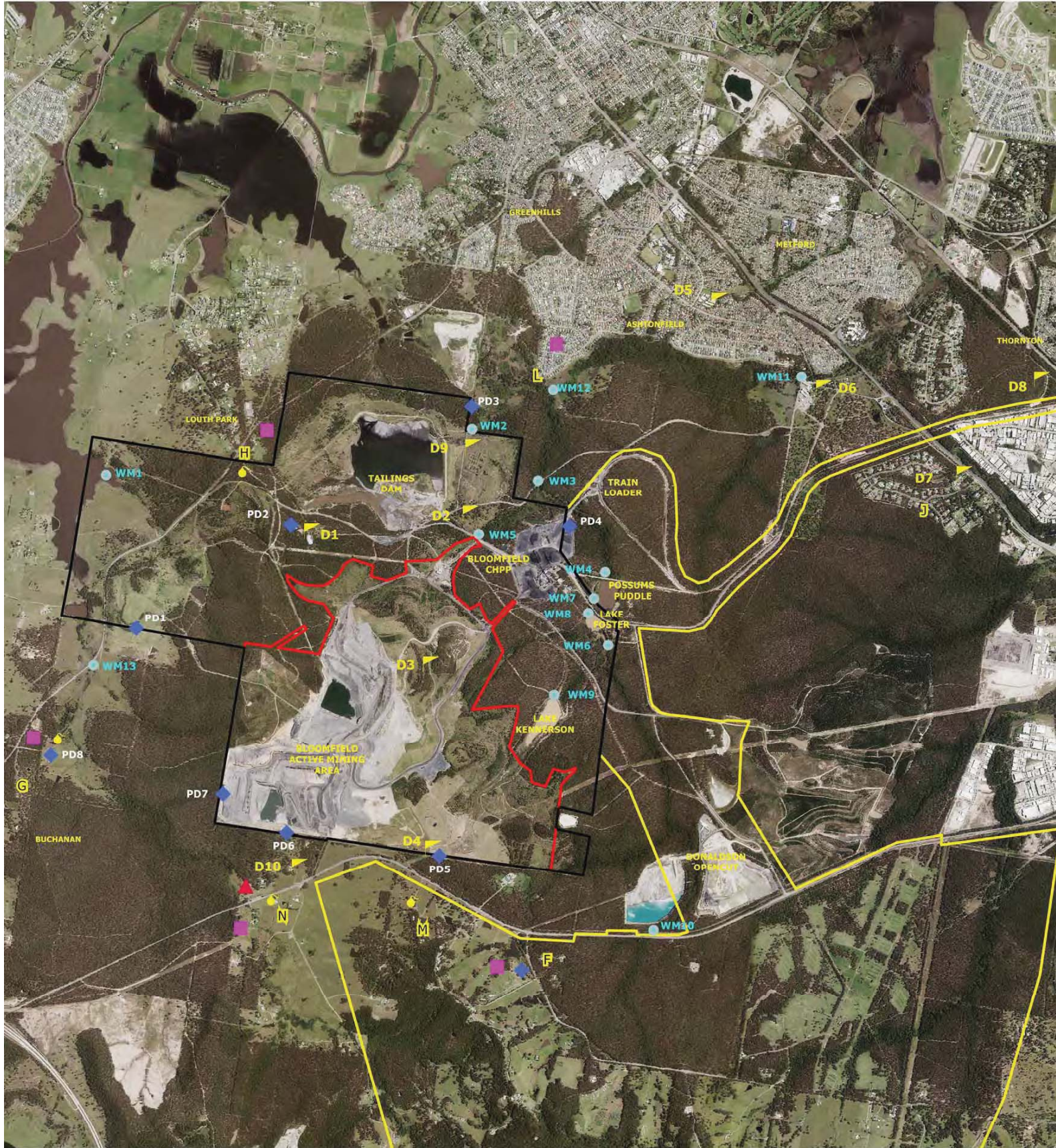
In accordance with the rehabilitation and landscape management strategy outlined in the Environmental Assessment and the MOP, an approximately 40 Ha area of the established rehabilitation area will be fenced and stock introduced for grazing purposes. The area will consist of the western part of K-Cut. Further details will be provided in the next AEMR.

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# PLANS

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## LEGEND

0 1 km



- |  |   |
|--|---|
| <span style="color: red;">—</span> Bloomfield Project Area   | <span style="color: pink;">▲</span> High Volume Air Sampler |
| <span style="color: yellow;">—</span> Abel Mine Project Area | <span style="color: pink;">■</span> Noise Monitor           |
| <span style="color: black;">—</span> Bloomfield Mining Lease | <span style="color: blue;">◆</span> Peizometers             |
| <span style="color: yellow;">▲</span> Blast Monitor          | <span style="color: blue;">●</span> Water Monitoring        |
| <span style="color: yellow;">▲</span> Dust Monitor           |   |



## Bloomfield Colliery

Annual Environmental Management Report

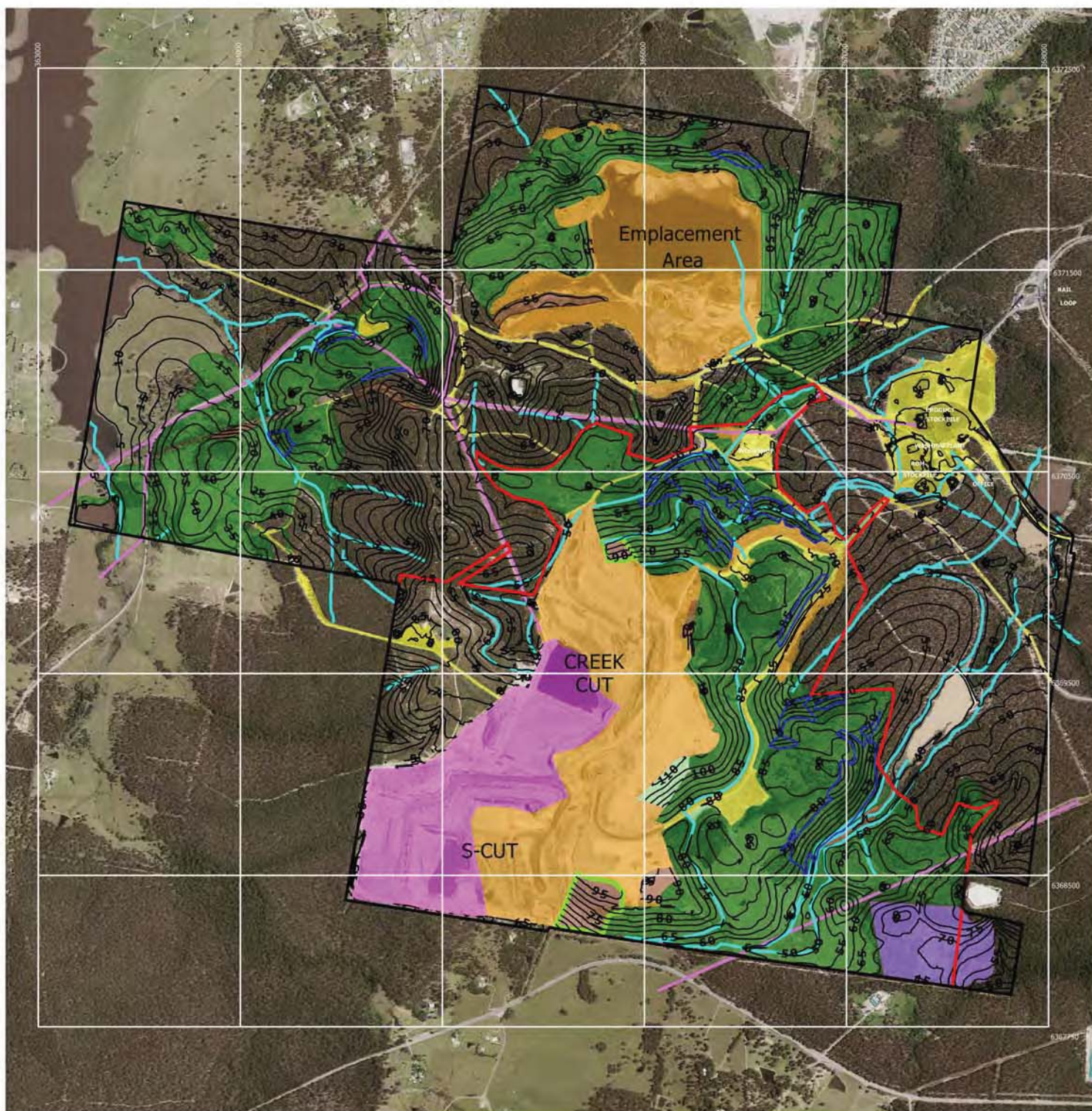
### Plan 1 Environmental Monitoring Sites

Scale: 1:33,333

Date: January 2016  
Photo: January 2016

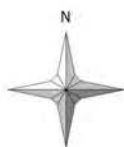
Drawing: A3





## LEGEND

0 1 km  
Contour Interval 5m



— Contour (m AHD)	— Slopes 10 to 18 Degrees	— Unshaped Areas
— Clean Water	— Power Lines	— Shaped Areas
— Dirty Water	— Relinquished	— Active Areas
— Approval Area	— Previous Rehabilitation	— Infrastructure
— Colliery Holding	— 2015 Rehabilitation	— 2016 Rehabilitation



## Bloomfield Colliery

Annual Environmental Management Report

### Plan 2

### Rehabilitation Plan 2015

Scale: 1:20000

Date: January 2016  
Photo: January 2016

Drawing: A3

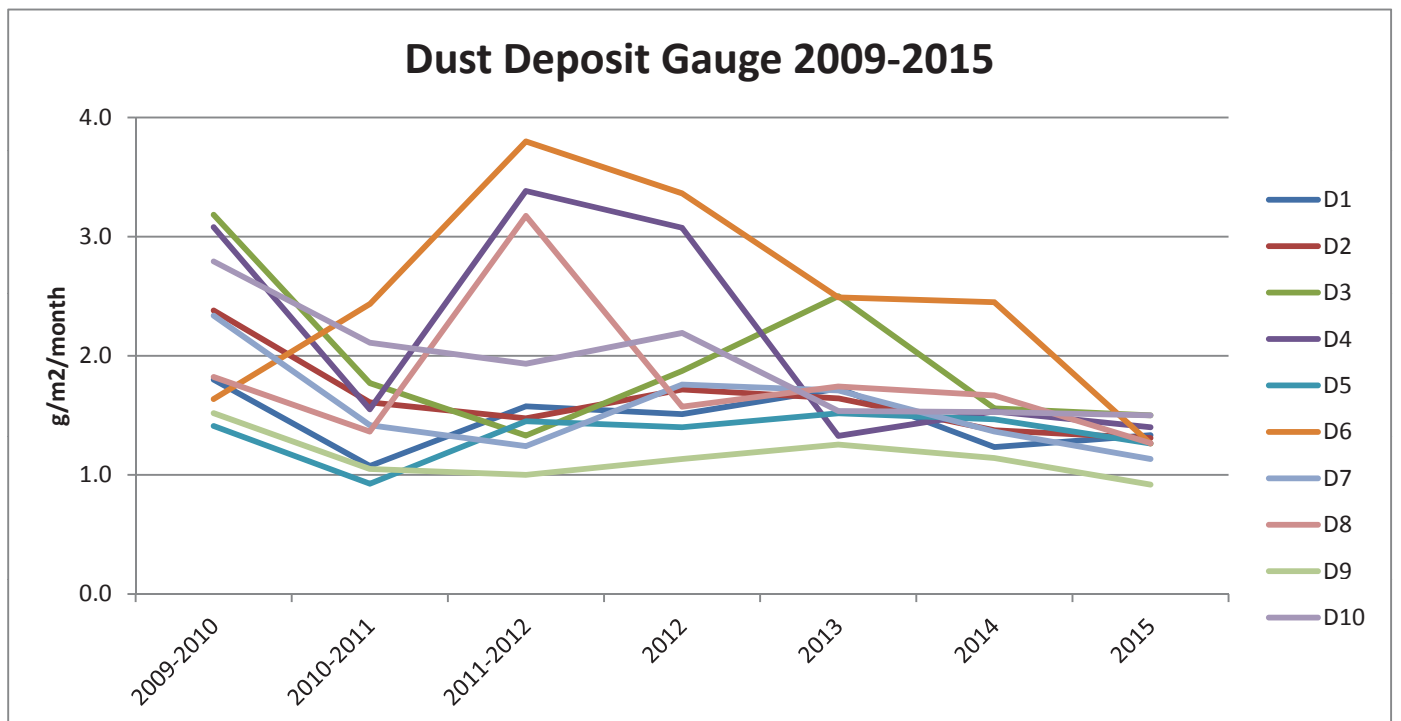
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# **APPENDIX A**

## **DUST MONITORING RESULTS**

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Figure A1





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**Table A1: PM10 and TSP Results 2015**

Date	TSP Concentration (ug/m <sup>3</sup> )	PM <sub>10</sub> Concentration (ug/m <sup>3</sup> )
5/01/2015	36	22
11/01/2015	14	8
17/01/2015	41	19
23/01/2015	30	15
29/01/2015	22	11
4/02/2015	27	15
10/02/2015	29	15
16/02/2015	29	15
22/02/2015	15	7
28/02/2015	63	17
6/03/2015	53	24
12/03/2015	45	24
18/03/2015	49	24
24/03/2015	25	12
30/03/2015	25	10
5/04/2015	10	4
11/04/2015	14	6
17/04/2015	33	17
23/04/2015	21	14
29/04/2015	16	7
5/05/2015	28	12
11/05/2015	23	12
17/05/2015	14	7
23/05/2015	12	6
29/05/2015	20	11
4/06/2015	25	13
10/06/2015	23	11
16/06/2015	15	7
22/06/2015	14	8
28/06/2015	16	9
4/07/2015	24	11
10/07/2015	28	13
16/07/2015	14	-
22/07/2015	17	-
28/07/2015	24	9
3/08/2015	30	10
9/08/2015	-	11
11/08/2015	32	15
13/08/2015	-	4
15/08/2015	25	15
21/08/2015	59	38
27/08/2015	15	7
2/09/2015	41	19
8/09/2015	15	5
14/09/2015	34	16
20/09/2015	11	3
26/09/2015	16	6
2/10/2015	37	19

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Date	TSP Concentration (ug/m <sup>3</sup> )	PM <sub>10</sub> Concentration (ug/m <sup>3</sup> )
8/10/2015	39	18
14/10/2015	41	17
20/10/2015	47	23
26/10/2015	33	18
1/11/2015	27	17
7/11/2015	18	9
13/11/2015	14	7
19/11/2015	58	29
25/11/2015	46	19
1/12/2015	101	48
7/12/2015	25	9
13/12/2015	36	13
19/12/2015	40	26
25/12/2015	14	4
31/12/2015	24	6
Maximum 24 hr Average	-	48
<b>EPA Limit 24hr Average</b>	-	<b>50</b>
Annual Average	29	14
<b>EPA Limit Annual Average</b>	<b>90</b>	<b>30</b>

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Figure A2

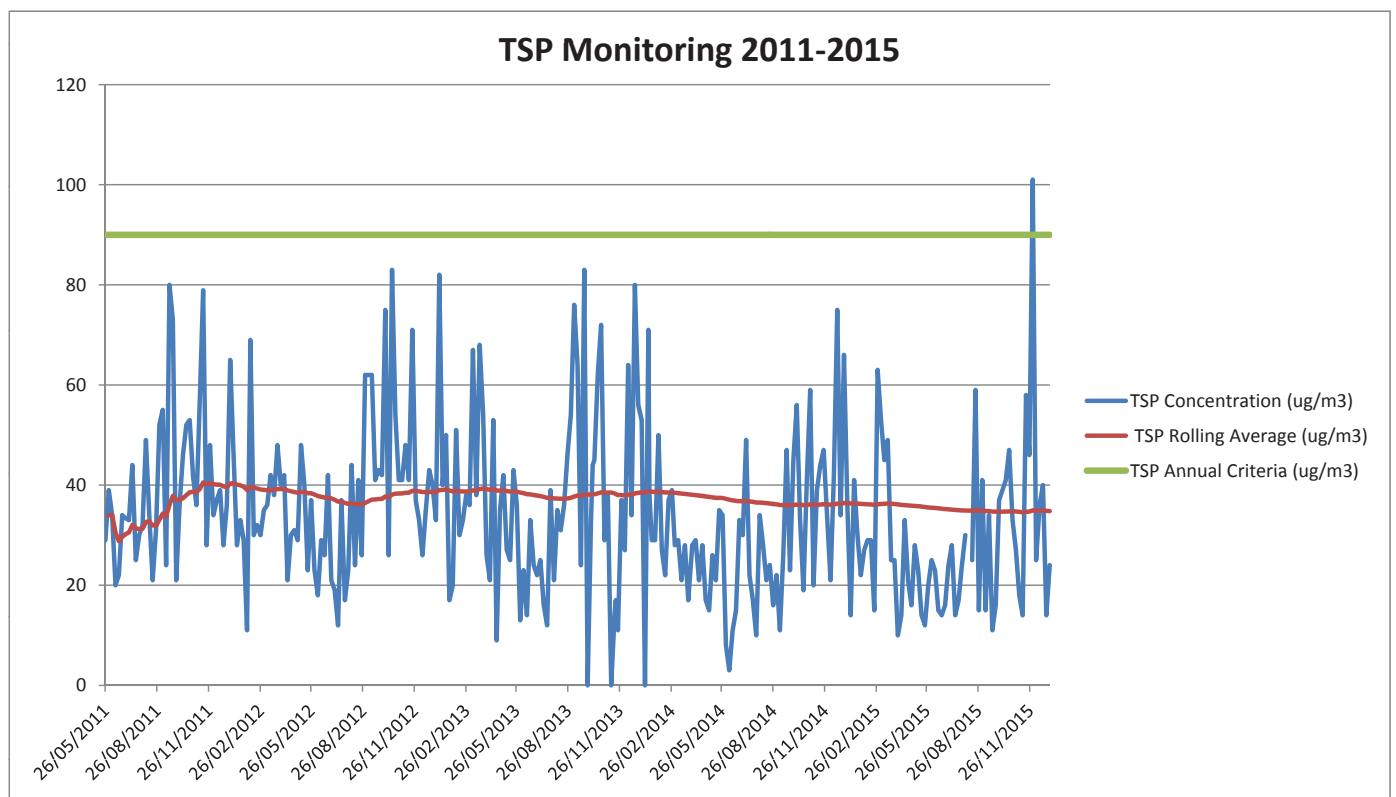
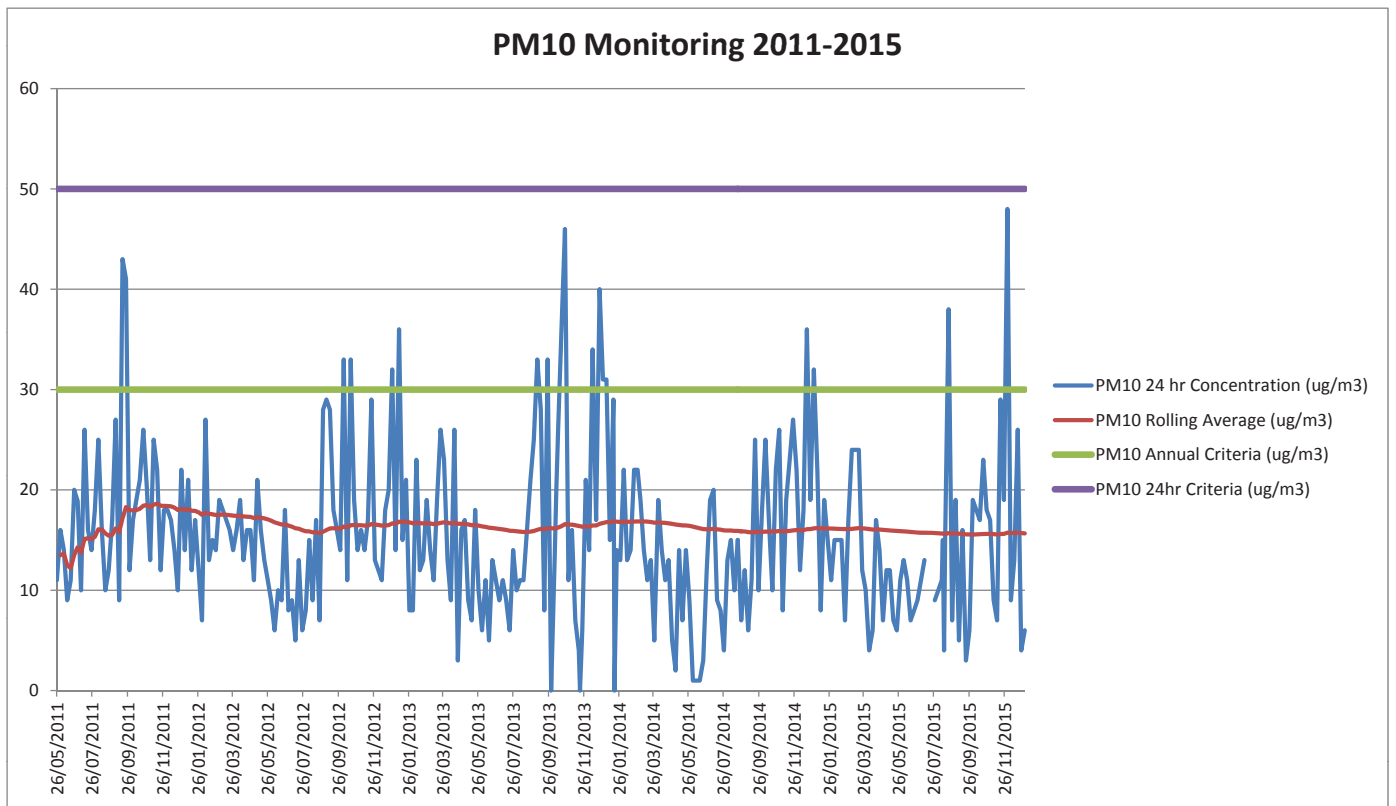


Figure A3



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## **APPENDIX B**

# **WATER MONITORING RESULTS**

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Site  
WM1[illegible]

[illegible]

Site  
WM2[illegible]

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	5.6	180	42	234	1.4	126								
23-Feb-15	7.3	210				16.5								
30-Mar-15														Dry
28-Apr-15	5	1,040	47	790	0.04	74	5	485	37	45	66	76	13	
28-May-15														Dry
24-Jun-15														Dry
29-Jul-15														Dry
27-Aug-15														Dry
28-Sep-15														Dry
22-Oct-15														Dry
30-Nov-15	7	280				43.8								
29-Jan-15	5.6	180	42	234	1.4	126								

**Site**  
**WM3**                      **Elwells Creek / Four Mile Creek Junction**

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
24-Sep-09	8.80	360	14	220	0.74	34								
13-Oct-09	8.10	310	370	210	0.61	46	52		38	15	10	39	3	
03-Nov-09	8.30	640	10	500	0.70	27								
13-Dec-09	7.60	410	8	140	0.23	18								
13-Jan-10	6.80	280	10	200	0.61	17	92		39	14	10	34	3	
09-Feb-10	7.30	220	14	130	0.28	14								
04-Mar-10	8.90	280	9	200	0.35	86								
08-Apr-10	8.70	323	7	220	0.20	23	54		42	18	9	33	3	
14-May-10	7.50	193	7	131	0.10	10								
10-Jun-10	6.80	462	41	370	0.14	65								
07-Jul-10	7.30	581	14	354	0.21	33	75		57	19	16	67	4	
25-Aug-10	6.10	419	10	266	0.29	28								
20-Sep-10	7.42	1,950	10	1,390	0.11		89	710	143	95	81	256	9	
19-Oct-10	7.38	336	7	166	0.15									
19-Nov-10	7.94	2,840	31	1,740	0.05									
21-Dec-10	7.44	1,150	9	674	0.30									
14-Jan-11	7.74	2,140	9	1,430	0.09		181	642	217	59	70	353	8	
22-Feb-11	7.93	4,590	10	3,730	0.05									
24-Mar-11	7.96	4,940	12	3,630	0.06									
27-Apr-11	7.01	326	16	234	0.46		60	52	39	14	9	41	3	
26-May-11	8.24	5,460	24	3,800	0.05									
27-Jun-11	7.44	2,950	21	2,230	0.05									
25-Jul-11	7.78	2,420	67	1,440	0.20		148	504	311	56	57	358	7	
26-Aug-11	7.24	780	20	514	0.32									
21-Sep-11	8.02	1497	15	934	0.12									
26-Oct-11	7.71	627	190	436	0.39		43	140	74	19	18	80	5	
22-Nov-11	7.43	1871	29	1330	0.13									
15-Dec-11	7.76	3180	32	2190	0.05									
25-Jan-12	8.17	4810	14	3770	0.07		327	1760	513	109	201	813	18	
17-Feb-12	6.9	442	45	372	0.72									
30-Mar-12	8	3150	17	2190	0.05									
27-Apr-12	7.17	426	24	314	0.95		45	84	48	14	13	49	6	
24-May-12	7.58	351	23	224	1.25									
27-Jun-12	8.21	4810	24	3740	0.63									
27-Jul-12	7.45	1912	35	1370	0.39		82	689	192	85	81	269	8	
30-Aug-12	7.68	711	30	508	0.42									
25-Sep-12	7.94	2140	15	1330	0.1									
25-Oct-12	7.78	786	17	458	0.36		86	147	91	22	23	104	5	
29-Nov-12	8.06	4790	14	3180	0.05									
20-Dec-12	8.14	3620	12	2420	0.05									
24-Jan-13	8.03	2290	6	1510	0.06		204	690	253	62	79	400	9	
25-Feb-13	7.96	2450	54	1560	0.09									
22-Mar-13	7.58	1640	8	1110	0.27									
22-Apr-13	8.29	4150	54	2940	0.09		286	1370	427	109	149	734	15	
17-May-13	7.64	935	54	498	0.59									
21-Jun-13	7.64	860	10	580	0.35									
24-Jul-13	7.48	650	49	416	0.44		52	150	57	19	19	78	4	
28-Aug-13	7.58	596	15	345	0.34									
17-Sep-13	7.52	1180	38	758	0.17									
22-Oct-13	7.79	1250	8	703	0.17		137	246	135	23	31	192	5	
14-Nov-13	7.94	4210	14	2820	0.05									
11-Dec-13	7.29	718	15	447	0.24									
24-Jan-14	8.47	3840	26		0.07									
20-Feb-14	8.1	2810	58		0.05									
25-Mar-14	7.98	1270	17		0.07									
30-Apr-14	7.78	2600	20	1860	0.05		189	965	240	100	109	452	12	
28-May-14	6.94	357	15		0.46									
26-Jun-14	7.85	667	6		0.31									
28-Jul-14	8.36	4960	19	3890	0.05									
31-Aug-14	7.84	1090	23		0.23									
22-Sep-14	7.4	750				62								
27-Oct-14	7.2	1100	17	702	0.26	20.6	108	323	116	25	32	163	5	
21-Nov-14	8	1000				19.3								
22-Dec-14	8	2700				15.9								

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	8.4	3000	26	2120	0.05	29.2								
20-Feb-15	8.2	4000				8.7								
30-Mar-15	7.7	960				18.1								
28-Apr-15	7.1	984	33	636	0.25	48	41	330	82	34	38	115	6	
28-May-15	7	890				62								
24-Jun-15	7.4	690				57								
29-Jul-15	7.5	554	8	382	0.41	29.9								
27-Aug-15	8.3	4840				31								
28-Sep-15	7.7	1980				16								
22-Oct-15	6.5	960	25	633	0.09	38.4	78	280	78	39	36	110	5	
30-Nov-15	7.7	2040				20.6								
21-Dec-15	7.7	5400				14								

Site  
WM4

Four Mile Creek @ Possums Puddle Discharge

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
24-Sep-09	8.70	160	6	120	0.72	5								
13-Oct-09	7.10	170	4	140	0.61	10	33		28	11	4	20	3	
03-Nov-09	8.80	150	6	130	0.44	22								
13-Dec-09	7.10	160	2	90	0.13	22								
13-Jan-10	7.10	150	6	120	0.17	8	46		24	12	4	14	2	
09-Feb-10	6.30	70	2	110	0.22	5								
04-Mar-10	9.30	190	4	120	0.18	12								
08-Apr-10	8.90	171	1	130	0.59	4	43		25	13	4	14	2	
14-May-10	7.40	157	2	117	0.05	2								
10-Jun-10	6.80	1,250	58	858	0.12	83								
07-Jul-10	7.30	190	13	148	0.24	31	34		27	11	4	13	2	
25-Aug-10	6.49	192	5	136	0.36	28								
20-Sep-10	7.74	180	2	128	0.46		31	15	22	13	4	13	2	
19-Oct-10	7.62	180	4	103	0.12									
19-Nov-10	7.69	332	12	226	0.63									
21-Dec-10	7.50	194	<5	164	0.70									
14-Jan-11	8.12	192	<5	123	0.37		39	14	30	10	4	18	3	
22-Feb-11	8.36	812	<5	656	0.12									
24-Mar-11	8.13	601	7	432	0.18									
27-Apr-11	7.43	185	12	116	0.50		41	12	21	13	4	16	2	
26-May-11	8.37	5,460	24	3,640	0.05									
27-Jun-11	8.04	3,250	20	2,480	0.05									
25-Jul-11	8.18	2,790	57	1,760	0.12		179	610	366	66	70	462	8	
26-Aug-11	7.36	319	14	257	0.41									
21-Sep-11	8.48	243	10	186	0.6									
26-Oct-11	8.71	4670	232	3480	0.5		328	1640	478	132	173	824	17	
22-Nov-11	7.94	760	126	534	0.37									
15-Dec-11	7.57	3340	22	2300	0.05									
25-Jan-12	8.65	2430	110	1770	0.36		126	733	250	52	87	373	10	
17-Feb-12	7.44	241	23	240	1.15									
30-Mar-12	7.8	521	5	374	0.69									
27-Apr-12	7.82	216	11	322	0.91		29	24	32	7	6	26	4	
24-May-12	7.73	206	6	163	1.02									
27-Jun-12	8.35	4710	29	3540	0.05									
27-Jul-12	7.09	342	15	289	47.7		42	52	50	14	10	41	4	
30-Aug-12	8.07	404	15	302	0.55									
25-Sep-12	7.68	255	10	160	0.58									
25-Oct-12	7.68	308	8	155	0.47		34	19	39	11	5	24	3	
29-Nov-12	8.23	550	5	364	0.33									
20-Dec-12	8.07	495	7	290	0.28									
24-Jan-13	8.25	290	6	229	0.14		51	38	32	16	7	30	3	
25-Feb-13	7.79	843	37	554	0.42									
22-Mar-13	7.54	764	8	474	0.63									
22-Apr-13	8.34	4430	16	3110	0.05		310	1510	463	119	159	810	16	
17-May-13	7.55	194	5	150	0.9									
21-Jun-13	7.6	261	5	174	0.62									
24-Jul-13	7.54	232	5	165	0.6		28	25	25	9	5	26	3	
28-Aug-13	7.69	179	5	136	0.37									
17-Sep-13	8.35	5750	25	4400	0.05									
22-Oct-13	8.05	180	5	136	0.41		37	12	22	10	3	16	2	
14-Nov-13	8.17	890	7	511	0.23									
11-Dec-13	7.67	202	5	160	0.56									
24-Jan-14	8.36	253	5		0.44									
20-Feb-14	7.56	413	18		0.23									
25-Mar-14	7.73	189	5		0.14									
30-Apr-14	7.74	493	9	321	0.39		53	120	45	17	16	74	4	
28-May-14	8.13	133	7		0.55									
26-Jun-14	7.91	187	5		0.47									
28-Jul-14	8.4	5220	8	3540	0.05									
31-Aug-14	8.17	297	6		0.32									
22-Sep-14	6.5	140				12.9								
27-Oct-14	7.9	230	3	112	0.24	5	30	10	30	10	3	15	2	
21-Nov-14	7	180				5								
22-Dec-14	8.3	140				3.7								

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	8.5	3220	28	2270	0.03	32								
20-Feb-15	8.2	480				5.7								
30-Mar-15	7.9	130				4.5								
28-Apr-15	7.1	1030	46	702	0.23	57	26	400	65	42	48	105	6.4	
28-May-15														No access
24-Jun-15	7.8	390				44								
29-Jul-15	7.6	308	5	222	0.61	29.1								
27-Aug-15	7.9	590				19								
28-Sep-15	7.6	300				19.7								
22-Oct-15	6.8	260	2	168	0.29	9.3	42	43	30	17	7.6	26	2.2	
30-Nov-15	8.4	210				2.5								
21-Dec-15	7	220				4								



**WM5**

## Elwells Creek @ Haul Road

[illegible]

[illegible]

Site WM6		Four Mile Creek U/S Possums Puddle												
Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
24-Sep-09	9.10	120	10	80	0.86	42								
13-Oct-09	8.30	110	10	85	0.54	23	38		13	12	2	8	1	
03-Nov-09	8.80	120	12	120	0.40	31								
13-Dec-09	7.90	120	5	50	0.19	13								
13-Jan-10	6.70	110	5	88	0.62	110	47		12	13	2	8	1	
09-Feb-10	7.60	150	38	130	0.77	52								
04-Mar-10	8.90	140	90	350	0.24	24								
08-Apr-10	9.00	122	29	200	0.50	10	35		13	14	2	6	1	
14-May-10	8.20	124	6	87	0.17	18								
10-Jun-10	6.70	250	73	268	0.67	122								
07-Jul-10	7.40	130	10	75	0.19	6	35		11	13	2	6	1	
25-Aug-10	6.87	156	13	103	0.22	20								
20-Sep-10	7.35	141	9	101	0.23		32	9	12	15	2	8	1	
19-Oct-10	7.14	127	5	69	0.19									
19-Nov-10	6.80	274	65	417	1.59									
21-Dec-10	7.13	164	24	156	0.94									
14-Jan-11	6.91	135	7	85	0.71		40	2	19	13	2	8	2	
22-Feb-11	7.16	129	<5	83	0.57									
24-Mar-11	7.34	119	5	94	0.18									
27-Apr-11	7.07	125	78	175	0.42		30	8	15	12	2	10	2	
26-May-11	7.17	125	40	144	0.05									
27-Jun-11	7.38	272	22	214	0.31									
25-Jul-11	6.84	305	30	238	0.79		21	20	60	6	6	40	5	
26-Aug-11	7.11	245	70	256	0.46									
21-Sep-11	7.15	158	18	115	0.18									
26-Oct-11	8.04	185	30	139	0.38		33	12	25	12	4	19	2	
22-Nov-11	7.53	167	51	157	0.38									
15-Dec-11	6.78	225	95	246	1.13									
25-Jan-12	8.21	171	9	105	1.06		45	3	24	13	4	13	2	
17-Feb-12	6.68	189	38	242	1.31									
30-Mar-12	7.3	284	21	230	0.94									
27-Apr-12	7.03	248	37	268	1.16		39	15	41	8	6	30	4	
24-May-12	7.32	176	28	107	0.52									
27-Jun-12	8.18	324	22	190	0.72									
27-Jul-12	7.15	292	44	270	1.14		38	17	57	9	7	34	4	
30-Aug-12	6.5	147	9	121	0.15									
25-Sep-12	7.27	166	14	97	0.23									
25-Oct-12	7.53	144	164	89	0.24		39	7	14	14	3	11	2	
29-Nov-12	7.44	141	12	121	0.69									
20-Dec-12	8.19	499	8	278	0.14									
24-Jan-13	7.4	160	54	109	0.59		50	3	14	18	3	10	2	
25-Feb-13	8.24	2780	31	1760	0.05									
22-Mar-13	7.23	297	8	200	1.25									
22-Apr-13	7.41	166	136	198	0.25		28	17	22	9	4	17	2	
17-May-13	7.29	173	69	115	0.24									
21-Jun-13	7.28	161	9	114	0.18									
24-Jul-13	7.24	159	16	114	0.33		27	7	13	10	3	14	2	
28-Aug-13	7.29	130	5	89	0.1									
17-Sep-13	7.36	138	7	82	0.21									
22-Oct-13	7.3	138	5	111	0.15		43	5	10	11	2	8	1	
14-Nov-13	7.12	271	5	165	0.16									
11-Dec-13	6.97	206	11	145	0.59									
24-Jan-14	7.81	237	5		1.11									
20-Feb-14	8.13	196	38		0.55									
25-Mar-14	7.39	145	5		0.25									
30-Apr-14	7.75	141	14	154	0.77		18	13	28	6	3	24	3	
28-May-14	8.22	112	6		0.15									
26-Jun-14	7.57	136	16		0.1									
28-Jul-14	7.47	109	7	79	0.13									
31-Aug-14	7.87	233	30		0.64									
22-Sep-14	6.9	150				34.7								
27-Oct-14	7.9	150	6	84	0.32	11.5	32	10	23	10	2	9	1	
21-Nov-14	6.3	120				10.8								
22-Dec-14	7.5	130				14.9								

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	6.6	150	56	20	0.88	121								
20-Feb-15	7.2	120				12.8								
30-Mar-15	7.6	100				15.4								
28-Apr-15	6.7	337	30	254	0.97	80	22	29	64	10	8.5	37	4.8	
28-May-15	7.9	200				58								
24-Jun-15	8.2	190				63								
27-Jul-15	7.3	171	14	114	0.2	33.2								
27-Aug-15	8	110				36								
28-Sep-15	7.7	140				27								
22-Oct-15	7.1	140	5	108	0.49	7.4	48	10	16	19	3.1	9	1.1	
30-Nov-15	7.3	150				9								
21-Dec-15	6.5	120				8								

Site WM7		Possums Puddle												
Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
24-Sep-09	8.50	170	7	110	0.81	82								
13-Oct-09	7.10	170	6	130	0.57	41	36		27	10	4	19	3	
03-Nov-09	8.70	160	4	140	0.38	108								
13-Dec-09	7.00	160	3	40	0.45	67								
13-Jan-10	6.80	150	2	110	0.16	11	44		24	12	4	14	2	
09-Feb-10	6.50	160	10	120	0.11	7								
04-Mar-10	8.80	170	9	97	0.81	12								
08-Apr-10	8.60	187	1	130	0.25	6	43		25	14	4	13	1	
14-May-10	7.30	158	2	119	<0.05	4								
10-Jun-10	6.80	167	46	161	0.16	75								
07-Jul-10	7.30	186	8	128	0.33	30	34		25	11	4	13	2	
25-Aug-10	6.93	188	6	145	0.37	32								
20-Sep-10	7.41	174	2	132	0.42		34	14	21	13	4	12	2	
19-Oct-10	7.40	174	6	107	0.12									
19-Nov-10	6.95	211	14	197	0.68									
21-Dec-10	7.08	194	12	159	0.77									
14-Jan-11	7.53	193	6	131	0.29		39	14	30	11	4	18	3	
22-Feb-11	7.69	175	<5	119	0.18									
24-Mar-11	7.29	164	<5	128	0.24									
27-Apr-11	7.03	178	5	133	0.49		41	8	22	13	4	15	2	
26-May-11	7.08	173	15	176	0.27									
27-Jun-11	6.94	235	50	270	0.48									
25-Jul-11	6.70	231	35	228	0.74		13	16	42	4	4	28	4	
26-Aug-11	7.01	247	16	230	0.38									
21-Sep-11	6.54	229	10	147	0.56									
26-Oct-11	8.45	202	5	142	0.35		34	10	24	11	4	18	2	
22-Nov-11	7.61	187	14	151	0.59									
15-Dec-11														No access
25-Jan-12	8.71	217	8	172	0.54		27	12	28	6	5	26	3	
17-Feb-12	6.9	194	38	218	0.94									
30-Mar-12	7.29	215	6	187	0.84									
27-Apr-12	7.41	219	26	152	0.89		28	11	29	6	4	23	4	
24-May-12	7.44	211	6	154	1.12									
27-Jun-12														No access
27-Jul-12	7.51	215	14	202	0.8		27	17	40	8	5	23	4	
30-Aug-12	7.02	202	9	191	0.66									
25-Sep-12	7.43	230	5	133	0.57									
25-Oct-12	7.8	204	5	143	0.44		32	14	35	11	4	21	3	
29-Nov-12	8.04	213	5	130	0.35									
20-Dec-12	7.84	213	5	133	0.21									
24-Jan-13	7.81	213	5	137	0.19		41	13	24	14	5	20	3	
25-Feb-13														No access
22-Mar-13	7.08	209	5	161	0.74									
22-Apr-13														No access
17-May-13	7.25	196	5	155	0.9									
21-Jun-13	8.06	4960	5	3580	0.05									
24-Jul-13	7.27	197	6	147	0.61		28	13	24	8	4	21	3	
28-Aug-13	7.44	179	5	137	0.44									
17-Sep-13	7.38	162	6	83	0.23									
22-Oct-13	7.64	182	5	127	0.43		38	12	22	9	3	16	3	
14-Nov-13	7.6	184	5	118	0.28									
11-Dec-13	7.37	204	5	156	0.5									
24-Jan-14	8.17	279	5		0.39									
20-Feb-14	7.6	202	8		0.25									
25-Mar-14	7.59	188	5		0.13									
30-Apr-14	7.65	163	5	106	0.48		34	13	25	7	4	24	4	
28-May-14	7.79	127	5		0.66									
26-Jun-14	7.6	176	5		0.42									
28-Jul-14	7.49	128	5	92	0.36									
31-Aug-14	7.91	210	2		0.33									
22-Sep-14	6.8	150				11.3								
27-Oct-14	7.7	190	3	107	0.23	12.4	30	10	30	10	3	15	2	
21-Nov-14	7.2	170				7.8								
22-Dec-14	8	150				3.4								

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	7.4	140	16	122	0.29	35								
20-Feb-15	7.5	140				3.8								
30-Mar-15	7.6	130				5.1								
28-Apr-15	6.5	410	48	302	0.75	93	16	105	45	12	13	48	4.9	
28-May-15	7.7	350				58								
24-Jun-15	7.8	320				45								
27-Jul-15	7.4	290	7	202	0.5	31								
27-Aug-15	8.2	230				19								
28-Sep-15	7.6	230				9								
22-Oct-15	7.8	210	2	157	0.36	4.5	44	32	27	17	5.9	22	2	
30-Nov-15	8.6	220				2.5								
21-Dec-15	6.6	200				4								

Site WM8		Lake Foster												
Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
24-Sep-09	8.30	5,900	10	4,400	0.06	51								
13-Oct-09	8.10	5,900	11	4,700	0.05	6	340		456	213	251	846	28	
03-Nov-09	8.50	5,000	3	3,600	0.06	29								
13-Dec-09	8.10	6,300	3	6,200	0.08	45								
13-Jan-10	7.80	6,600	14	5,600	0.05	9	271		497	265	290	1050	30	
09-Feb-10	7.60	9,300	13	5,200	0.05	11								
04-Mar-10	8.70	9,700	1	110	0.16	8								
08-Apr-10	8.70	7,720	4	6,100	0.05	6	315		556	302	318	1210	32	
14-May-10	8.20	7,670	9	5,730	0.05	7								
10-Jun-10	7.50	4,800	8	4,320	0.05	7								
07-Jul-10	8.10	5,610	6	4,390	0.05	3	325		459	237	270	988	23	
25-Aug-10	8.08	6,000	5	4,730	0.05	3								
20-Sep-10	8.15	5,110	5	4,610	0.05		375	2100	478	192	245	887	20	
19-Oct-10	8.31	5,710	2	4,600	0.05									
19-Nov-10	7.94	5,670	6	4,420	0.05									
21-Dec-10	7.89	6,110	<5	4,960	0.05									
14-Jan-11	8.26	6,410	8	4,890	0.05		275	2840	489	286	397	960	29	
22-Feb-11	8.28	5,700	<5	5,500	0.05									
24-Mar-11	8.33	6,560	8	5,530	0.09									
27-Apr-11	8.05	4,960	9	3,650	0.05		200	1640	508	136	179	811	18	
26-May-11	8.10	6,330	23	5,120	0.05									
27-Jun-11	8.03	4,160	6	3,210	0.05									
25-Jul-11	6.83	2,410	22	1,630	0.11		55	848	163	94	87	291	9	
26-Aug-11	8.10	4,750	7	3,710	0.05									
21-Sep-11	8.29	5720	12	4510	0.05									
26-Oct-11	8.5	5360	12	4330	0.05		245	2210	414	224	234	843	25	
22-Nov-11	8.1	5500	12	4670	0.06									
15-Dec-11														No access
25-Jan-12	8.47	5710	10	4950	0.05		307	2330	486	186	259	903	25	
17-Feb-12	7.02	5150	8	4170	0.05									
30-Mar-12	8.27	4070	11	3130	0.05									
27-Apr-12	7.77	3980	8	3490	0.05		122	2010	277	206	205	646	21	
24-May-12	8.12	5310	26	4480	0.05									
27-Jun-12	7.7	4160	12	3460	0.05									
27-Jul-12	7.43	4960	35	4220	0.05		235	2250	440	237	246	857	24	
30-Aug-12	7.95	5770	18	4840	0.05									
25-Sep-12	8.1	6060	50	4340	0.05									
25-Oct-12	8.36	5910	21	4330	0.05		329	2340	561	157	232	953	25	
29-Nov-12	8.31	6750	6	5100	0.05									
20-Dec-12	8.36	6750	18	5290	0.05									
24-Jan-13	8.28	7070	12	5350	0.05		428	2990	648	144	260	1460	22	
25-Feb-13	7.79	2110	68	1420	0.12									
22-Mar-13	8.25	5360	15	3850	0.05									
22-Apr-13	7.75	5200	12	4160	0.05		213	2310	404	182	221	945	25	
17-May-13	8.17	6580	12	5020	0.05									
21-Jun-13	7.99	6230	5	4930	0.05									
24-Jul-13	7.96	5810	6	4320	0.05		131	2580	374	232	201	1030	22	
28-Aug-13	8.24	5940	5	2910	0.05									
17-Sep-13	8.21	7090	10	5690	0.05									
22-Oct-03	8.25	7140	5	5920	0.05		354	3090	569	246	324	1160	31	
14-Nov-13	8.45	6230	5	4730	0.05									
11-Dec-13	8.23	4910	5	3910	0.05									
24-Jan-14	8.32	8200	5		0.05									
20-Feb-14	8.42	5610	23		0.05									
25-Mar-14	8.41	6860	5		0.05									
30-Apr-14	8.45	4130	21	2570	0.05		94	1620	282	155	149	619	18	
28-May-14	7.86	4510	5		0.05									
26-Jun-14	8.1	5940	5		0.05									
28-Jul-14	8.28	5260	9	3730	0.05									
31-Aug-14	7.33	4050	10		0.05									
22-Sep-14	7.5	5400				4.6								
27-Oct-14	7.7	5500	7	4980	0.12	4.7	176	2420	422	266	262	829	26	
21-Nov-14	8	6900				34								
22-Dec-14	8.5	6100				5.7								

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	7.6	3080	24	2380	0.01		35.2							
20-Feb-15	8.1	5520					5.9							
30-Mar-15	8.1	7060					6.9							
28-Apr-15	7.3	1400	61	986	0.05		114	63	530	83	58	60	155	7.8
28-May-15	7.4	2900					11							
24-Jun-15	7.7	4040					8							
27-Jul-15	8.3	4940	4	4620	0.01		4							
27-Aug-15	8.3	5830					3							
28-Sep-15	8	5800					3.7							
22-Oct-15	8.4	5990	5	5150	0.02		7.8	300	2630	425	275	300	790	31
30-Nov-15	8.5	6100					3							
21-Dec-15	7.3	4720					7							



Site  
WM9 Lake Kennerson

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
24-Sep-09	10.00	3,000	23	1,900	0.05	11								
13-Oct-09	9.90	3,600	8	2,400	0.21	19	38		355	45	131	528	12	
03-Nov-09	9.60	4,500	29	3,200	0.05	31								
13-Dec-09	8.10	6,000	5	5,500	0.05	27								
13-Jan-10	7.70	5,600	18	4,300	0.05	6	355		602	122	257	1100	24	
09-Feb-10	8.30	8,500	14	4,400	0.05	18								
04-Mar-10	8.90	8,800	15	530	0.05	6								
08-Apr-10	9.00	8,830	6	4,700	0.06	20	331		652	110	251	1130	23	
14-May-10	8.10	9,000	6	4,800	0.05	14								
10-Jun-10	7.80	2,190	30	1,800	0.06	48								
07-Jul-10	8.30	2,790	8	1,840	0.05	2	177		237	74	98	488	12	
25-Aug-10														
20-Sep-10	8.36	4,100	2	3,080	0.05		242	1440	373	105	167	648	15	
19-Oct-10	8.64	4,090	2	2,760	0.05									
19-Nov-10	9.15	2,990	3	1,680	0.05									
21-Dec-10	8.44	3,850	5	2,200	0.05									
14-Jan-11	8.59	4,440	7	2,970	0.05		310	983	638	88	132	816	15	
22-Feb-11	8.53	4,820	16	3,770	0.05									
24-Mar-11	8.68	5,070	6	3,690	0.08									
27-Apr-11	8.48	3,600	7	2,350	0.05		244	864	484	56	113	636	13	
26-May-11	8.65	4,730	78	2,790	0.07									
27-Jun-11	8.70	3,060	5	1,890	0.05									
25-Jul-11	8.20	2,770	58	1,640	0.05		186	435	482	50	55	497	7	
26-Aug-11	8.59	3,310	26	1,920	0.05									
21-Sep-11	8.68	4320	5	2900	0.05									
26-Oct-11	8.92	3960	6	2760	0.05		280	1350	419	118	134	673	13	
22-Nov-11	8.73	3250	36	2250	0.10									
15-Dec-11	7.90	2350	48	1370	0.05									
25-Jan-12	8.76	4900	12	4070	0.05		305	1780	575	97	204	852	18	
17-Feb-12	7.34	2389	20	1460	0.05									
30-Mar-12	8.35	2320	18	1410	0.05									
27-Apr-12	8.92	2,140	8	1,430	0.05		169	499	307	59	59	368	9	
24-May-12	8.55	2,910	18	1,810	0.05									
27-Jun-12	8.67	2,510	20	1,580	0.05									
27-Jul-12	8.25	2,620	12	1,630	0.05		224	418	549	50	46	532	8	
30-Aug-12	8.61	3,860	102	2,650	0.05									
25-Sep-12	8.52	4,270	5	2,800	0.05									
25-Oct-12	8.87	3,860	6	2,590	0.05		204	853	623	32	106	722	12	
29-Nov-12	9.2	4,450	6	2,920	0.05									
20-Dec-12	8.63	5,270	103	3,520	0.05									
24-Jan-13	8.39	6,650	8	4,770	0.05		505	2500	672	59	214	1440	16	
25-Feb-13	8.44	5,000	30	3,230	0.05									
22-Mar-13	8.36	4,240	5	3,040	0.05									
22-Apr-13	8.44	4,010	294	2,670	0.05		272	1070	501	80	115	738	13	
17-May-13	8.35	5,090	8	3,560	0.05									
21-Jun-13	8.38	4,460	5	2,770	0.05									
24-Jul-13	8.29	4,800	5	3,320	0.05		384	1430	525	126	159	873	14	
28-Aug-13	8.52	4,270	5	1,820	0.05									
17-Sep-13	8.66	4,640	5	2,910	0.05									
22-Oct-13	8.83	5,470	8	3,740	0.05		256	1880	571	74	225	938	17	
14-Nov-13	9.07	5,710	5	4,030	0.05									
11-Dec-13	8.23	5,370	5	3,760	0.05									
24-Jan-14	8.63	7,520	5		0.05									
20-Feb-14	8.23	4,910	38		0.05									
25-Mar-14	8.27	6,190	6		0.05									
30-Apr-14	8.44	4,070	19	3,000	0.05		365	1610	395	139	178	809	20	
28-May-14	8.51	3,790	5		0.05									
26-Jun-14	8.45	4,290	6		0.05									
28-Jul-14	8.39	5,190	5	3,530	0.05									
31-Aug-14	8.39	5,430	6		0.05									
22-Sep-14	8.4	6,000				3.8								
27-Oct-14	8.3	6,700	4	4,360	0.05	8.6	534	2020	605	85	210	1060	19	
21-Nov-14	8.5	6,000				3.8								
22-Dec-14	8.3	6,300				17								

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	8.5	4,100	23	2,980	0.01	36.8								
20-Feb-15	8.4	5,480				4.9								
30-Mar-15	8.6	5,760				30.3								
28-Apr-15	7.7	1,490	167	954	0.05	314	205	350	130	37	39	215	8.1	
28-May-15	8.3	1,390				62								
24-Jun-15	8.2	3,230				7								
27-Jul-15	8.4	4,530	5	3,640	0.01	2.3								
27-Aug-15	8.5	1,940				17								
28-Sep-15	8.3	3,300				3.7								
22-Oct-15	8.5	5,580	3	4,370	0.03	6	475	1940	480	150	220	875	24	
30-Nov-15	8.5	5,810				4.3								
21-Dec-15	8.3	5,610				6								

Site  
WM10      Four Mile Creek @ John Renshaw Drive

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
24-Sep-09	8.50	460			2.33									
13-Oct-09	8.30	440			1.26	66	84		109	10	13	73	7	
03-Nov-09	8.50	380	18	430	2.10	120								
13-Dec-09														Dry
13-Jan-10														Dry
09-Feb-10														Dry
04-Mar-10														Dry
08-Apr-10	8.70	241	17	230	1.28	21	74		29	9	7	31	4	
14-May-10	8.00	255	50	210	0.61	21								
10-Jun-10	7.70	408	14	324	0.69	47								
07-Jul-10	7.80	470	28	262	0.77	16	52		88	12	11	63	5	
25-Aug-10	7.74	512	4	308	0.90	17								
20-Sep-10	7.42	516	5	306	1.07		63	17	109	14	10	72	6	
19-Oct-10	7.47	512	12	268	0.42									
19-Nov-10	7.07	448	13	312	1.21									
21-Dec-10	7.20	505	8	352	2.91									
14-Jan-11	7.13	478	32	294	1.96		73	1	92	9	10	60	8	
22-Feb-11														Dry
24-Mar-11														Dry
27-Apr-11	6.96	258	21	174	0.73		60	21	25	11	7	29	4	
26-May-11	7.03	261	17	251	0.63									
27-Jun-11	7.23	559	16	308	0.62									
25-Jul-11	6.53	401	14	282	0.67		24	23	87	5	8	52	6	
26-Aug-11	7.25	411	8	290	0.86									
21-Sep-11	7.65	527	8	250	1.3									
26-Oct-11	7.32	595	42	362	0.98		56	22	138	14	14	83	7	
22-Nov-11	7.72	446	26	306	2.36									
15-Dec-11	8.29	369	12	268	1.34									
25-Jan-12	7.03	514	10	322	3.55		79	1	100	11	12	64	7	
17-Feb-12	5.68	316	8	272	1.16									
30-Mar-12	7.24	456	6	278	1.28									
27-Apr-12	7.78	375	10	280	1.6		46	14	85	8	10	54	6	
24-May-12	7.6	525	12	202	1.64									
27-Jun-12	7.51	501	18	324	1.22									
27-Jul-12	7.42	352	21	298	1.5		46	15	77	6	9	51	6	
30-Aug-12	6.08	527	11	348	1.86									
25-Sep-12	7.18	432	20	254	0.86									
25-Oct-12	7.92	470	84	302	1.32		72	10	95	10	11	60	8	
29-Nov-12	7.51	4,900	24	3,390	0.05									
20-Dec-12														Dry
24-Jan-13	7.63	428	5	260	1.08		106	10	75	12	12	55	12	
25-Feb-13	6.86	388	41	360										
22-Mar-13	6.94	353	7	268	1.1									
22-Apr-13	7.31	238	92	262	1.13		31	10	41	4	5	39	5	
17-May-13	7.32	274	36	276	1.2									
21-Jun-13	7.22	328	5	244	1.09									
24-Jul-13	6.97	382	10	249	1.24		45	12	70	6	8	49	6	
28-Aug-13	7.24	373	15	258	0.98									
17-Sep-13	7.4	362	14	234	1.1									
22-Oct-13	7.39	475	21	334	2.31		88	10	86	9	10	60	10	
14-Nov-13	6.75	199	6	197	1									
11-Dec-13	6.69	328	5	262	0.95									
24-Jan-14	7.94	465	18		1.52									
20-Feb-14														Dry
25-Mar-14	7.33	187	5		0.46									
30-Apr-14	7.35	168	17	217	1.17		29	11	34	4	4	31	5	
28-May-14	6.39	175	8		0.65									
26-Jun-14	7.14	194	7		0.57									
28-Jul-14	7.01	144	6	188	0.38									
31-Aug-14	7.16	348	7		0.88									
22-Sep-14	7.5	400				38.7								
27-Oct-14	7.2	250	19	207	1.63	32.1	51	10	50	7	6	34	6	
21-Nov-14	7.3	260				37.6								
22-Dec-14	7.2	230				36								

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	6.5	180	20	217	1	38.9								
23-Feb-15	7	190				31.5								
30-Mar-15	7	130				31.1								
28-Apr-15	6.8	255	25	230	0.88	75	20	20	48	5.8	7	28	6.5	
28-May-15	7.2	160				47								
24-Jun-15	7.3	160				67								
27-Jul-15	7.2	247	11	215	2.1	43								
27-Aug-15	7.4	250				27								
28-Sep-15	7.8	240				29.6								
22-Oct-15	7.2	230	10	230	1.4	18.8	78	9	23	17	9.9	17	4.6	
30-Nov-15	7.3	220				26.1								
21-Dec-15	7.1	320				41								

Site  
WM11      Four Mile Creek U/S New England Highway

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
24-Sep-09	8.10	3,100	8	2,100	0.23	14								
13-Oct-09	7.40	3,500	24	2,700	0.10	16	166		240	139	136	452	17	
03-Nov-09	8.10	4,400	33	3,200	0.10	17								
13-Dec-09	7.30	3,100	55	3,500	0.05	27								
13-Jan-10	6.50	530	18	370	0.38	11	146		63	22	18	81	6	
09-Feb-10	6.10	320	45	310	0.33	10								
04-Mar-10	8.40	550	16	4,500	0.05	15								
08-Apr-10	8.60	356	10	260	0.32	18	76		49	16	10	48	4	
14-May-10	8.20	818	27	202	0.08	117								
10-Jun-10	6.60	721	21	476	0.18	30								
07-Jul-10	7.80	2,840	10	2,050	0.05	8	114		203	110	113	438	13	
25-Aug-10	6.59	3,240	6	2,430	0.05	8								
20-Sep-10	7.59	3,860	5	3,020	0.05		145	1590	264	168	163	509	16	
19-Oct-10	7.43	712	8	402	0.11									
19-Nov-10	7.70	3,630	12	2,410	0.13									
21-Dec-10	7.60	3,080	5	2,200	0.20									
14-Jan-11	7.70	5,420	11	4,030	0.05		284	2330	472	217	231	843	23	
22-Feb-11	7.68	4,530	<5	3,840	0.07									
24-Mar-11	7.86	5,040	6	3,750	0.06									
27-Apr-11	7.18	671	14	432	0.26		89	109	72	17	18	89	4	
26-May-11	8.02	5,710	16	4,470	0.05									
27-Jun-11	7.47	2,690	16	1,920	0.08									
25-Jul-11	7.69	2,510	41	1,580	0.14		138	586	299	61	65	388	9	
26-Aug-11	7.26	2,580	30	1,880	0.10									
21-Sep-11	8.17	3560	10	2630	0.05									
26-Oct-11	7.90	890	22	524	0.15		51	184	125	23	23	126	5	
22-Nov-11	7.92	1243	32	832	0.32									
15-Dec-11	8.14	3160	40	2180	0.05									
25-Jan-12	8.29	4950	24	4050	0.08		318	1910	546	115	209	841	19	
17-Feb-12	6.98	1428	24	1140	0.72									
30-Mar-12	8.04	3430	16	2390	0.05									
27-Apr-12	7.74	3000	15	1490	0.21		133	1190	244	133	138	438	16	
24-May-12	7.72	2650	24	1880	0.18									
27-Jun-12	8.12	4680	42	3570	0.05									
27-Jul-12	7.23	3040	25	2250	0.07		228	938	400	105	120	525	12	
30-Aug-12	6.48	1,043	25	724	0.27									
25-Sep-12	7.94	4,240	14	2,900	0.06									
25-Oct-12	7.52	1,706	32	1,000	0.18		163	332	222	40	52	257	9	
29-Nov-12	7.90	4,580	19	3,000	0.05									
20-Dec-12	8.18	5,020	12	3,510	0.07									
24-Jan-13	7.78	2,940	34	1,970	0.18		242	825	301	82	103	475	13	
25-Feb-13	7.80	2,530	47	1,580	0.14									
22-Mar-13	7.72	4,150	8	3,070	0.05									
22-Apr-13	8.24	4,120	30	2,880	0.05		275	1310	415	104	149	716	15	
17-May-13	7.92	3,370	14	2,510	0.06									
21-Jun-13	8.06	2,480	5	1,610	0.05									
24-Jul-13	7.78	2,710	5	1,920	0.08		107	1020	205	109	116	386	12	
28-Aug-13	7.86	1,960	5	1,270	0.09									
17-Sep-13	7.75	1,710	7	1,040	0.12									
22-Oct-13	7.86	2,420	6	1,500	0.06		247	537	297	46	67	141	10	
14-Nov-13	7.84	5,270	15	3,570	0.06									
11-Dec-13	7.48	3,790	17	2,730	0.06									
24-Jan-14	7.65	8,070	5		0.27									
20-Feb-14	6.74	1,582	22		0.09									
25-Mar-14	7.82	2,830	43		0.37									
30-Apr-14	8.01	3,970	14	2,960	0.05		328	1610	379	154	176	757	19	
28-May-14	7.61	880	8		0.09									
26-Jun-14	7.98	2,840	6		0.05									
28-Jul-14	8.41	4,890	5	3,990	0.05									
31-Aug-14	7.75	2,551	13		0.07									
22-Sep-14	6.90	4,050				15.7								
27-Oct-14	7.90	2,650	9	1,700	0.06	14.2	237	756	259	49	76	398	9	
21-Nov-14	7.20	1,300				73								
22-Dec-14	8.00	3,950				14.5								

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	8.20	2,390	18	1,590			30.9							
20-Feb-15	8.00	4,700					6.6							
30-Mar-15	7.60	1,960					11.8							
28-Apr-15	7.40	2,280	21	1,640	0.10		42	86	870	180	89	95	275	11
28-May-15	7.50	2,430					23							
24-Jun-15	7.50	1,960					29							
27-Jul-15	7.60	931	7	632	0.16		20							
27-Aug-15	8.20	5,100					10							
28-Sep-15	8.20	4,570					14.9							
22-Oct-15	7.40	1,030	37	658	0.07		60	105	230	120	31	31	135	7.1
30-Nov-15	8.20	3,300					22.8							
21-Dec-15	7.80	3,600					64							

Site  
WM12 Shamrock Creek / Four Mile Creek Junction

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
24-Sep-09	8.00	2,800	16	1,800	0.74	52								
13-Oct-09	7.10	3,500	16	2,500	0.22	20	193		217	139	139	448	17	
03-Nov-09	8.30	6,200	2	5,200	<0.05	5								
13-Dec-09	7.30	550	64	300	<0.05	10								
13-Jan-10	6.10	310	6	190	0.30	16	90		39	13	8	32	4	
09-Feb-10	5.50	230	22	150	0.29	58								
04-Mar-10														
08-Apr-10	8.70	276	10	190	0.19	21	55		37	16	8	27	3	
14-May-10	7.50	200	6	171	0.07	9								
10-Jun-10	7.10	1,560	36	1,380	0.09	44								
07-Jul-10	7.70	2,750	16	1,960	0.09	17	110		194	111	110	414	13	
25-Aug-10	7.54	3,150	10	2,360	<0.05	20								
20-Sep-10	7.58	2,650	8	1,970	0.14		106	1050	183	116	111	364	12	
19-Oct-10	7.40	1,520	8	936	0.07									
19-Nov-10	7.86	4,370	30	3,080	0.06									
21-Dec-10	7.67	3,920	10	3,010	0.55									
14-Jan-11	7.78	5,840	12	4,420	<0.05		252	2230	462	245	244	813	26	
22-Feb-11	7.91	4,680	12	3,720	<0.05									
24-Mar-11	8.07	5,060	16	3,670	0.07									
27-Apr-11	7.41	420	26	304	0.43		66	66	44	14	11	51	3	
26-May-11	8.24	5,690	24	3,980	<0.05									
27-Jun-11	7.49	3,390	16	2,640	<0.05									
25-Jul-11	7.81	2,800	44	1,860	0.13		160	702	327	75	77	434	10	
26-Aug-11	7.62	2,130	22	1,510	0.17									
21-Sep-11	7.14	1,943	16	1,230	0.05									
26-Oct-11	8.17	774	134	502	0.33		43	189	86	25	25	93	5	
22-Nov-11	8.13	2,341	58	1,630	0.18									
15-Dec-11	8.12	3,440	30	2,420	0.05									
25-Jan-12	8.17	4,940	12	4,050	0.05		333	1910	527	116	216	843	19	
17-Feb-12	6.62	1,582	18	1,200	0.7									
30-Mar-12	8.03	4,510	18	3,470	0.05									
27-Apr-12	7.76	3,300	18	2,700	0.3		147	1580	254	166	171	532	18	
24-May-12	7.66	1,066	63	684	0.62									
27-Jun-12	8	4,860	32	3,800	0.14									
27-Jul-12	6.48	2,180	43	2,270	0.25		104	824	232	91	95	331	10	
30-Aug-12	6.83	1,029	62	712	0.26									
25-Sep-12	7.92	2,930	22	1,910	0.05									
25-Oct-12	7.57	728	145	446	0.15		92	138	89	21	22	98	5	
29-Nov-12	7.95	4,950	24	3,270	0.05									
20-Dec-12	6.4	4,480	12	3,040	0.05									
24-Jan-13														Dry
25-Feb-13														No Access
22-Mar-13	7.69	3,430	6	2,530	0.17									
22-Apr-13														No access
17-May-13														No access
21-Jun-13														No access
24-Jul-13	7.87	3,280	19	2,530	0.12		124	1350	228	144	151	477	15	
28-Aug-13	7.74	1,040	5	669	0.29									
17-Sep-13														Dry
22-Oct-13	7.75	1,370	5	742	0.06		160	270	152	25	34	217	6	
14-Nov-13	7.98	5,140	7	3,700	0.05									
11-Dec-13	7.44	1,830	6	1,250	0.13									
24-Jan-14	8.2	8,260	8		0.05									
20-Feb-14	8.42	4,170	29		0.05									
25-Mar-14	7.95	3,910	5		0.06									
30-Apr-14	7.85	4,390	10	3,250	0.05		306	2000	397	199	210	817	22	
28-May-14	7.34	1,752	6		0.11									
26-Jun-14	8	2,790	5		0.05									
28-Jul-14	8.44	5,000	18	3,660	0.05									
31-Aug-14	7.6	2,570	15		0.12									
22-Sep-14	7.3	5,030				8.1								
27-Oct-14	7.6	1,200	9	778	0.76	13.8	124	340	122	26	35	175	5	
21-Nov-14	7.4	1,000				8.8								
22-Dec-14	8	2,640				6.8								

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
29-Jan-15	8.5	2,940	22	2,060	0.04		28							
23-Feb-15	8	2,000					9							
30-Mar-15	7.6	1,100					9.3							
28-Apr-15	7.5	2,350	34	1,740	0.12		59	90	880	170	92	97	280	11
28-May-15	7.5	1,460					58							
24-Jun-15	7.6	2,490					36							
27-Jul-15	7.5	675	6	458	0.3		26							
27-Aug-15	8.3	4,990					12							
28-Sep-15	8	4,980					6.2							
22-Oct-15	7.5	980	25	661	0.06		41.4	96	260	89	35	34	125	6
30-Nov-15	8.1	2,100					7.5							
21-Dec-15	7.8	4,800					23.8							



Site  
WM13      Buttai Creek @ Buchanan Road

Date	pH	Specific Conductance (µS/cm)	Total Suspended Solids (mg/l)	Total Dissolved Solids (mg/l)	Iron (mg/l)	Turbidity (NTU)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Comments
20-Sep-10	7.33	556	5	378	1.54		56	28	120	10	12	81	7	
19-Oct-10	7.36	603	4	320	0.81									
19-Nov-10	6.75	359	13	260	2.17									
21-Dec-10	7.36	525	5	338	2.00									
14-Jan-11	7.17	542	5	320	1.05		86	14	101	11	12	74	5	
22-Feb-11	7.38	495	5	480	0.62									
24-Mar-11	7.63	594	10	416	0.39									
27-Apr-11	6.07	1100	24	766	0.05		5	378	76	39	44	118	8	
26-May-11	6.59	1110	22	880	0.05									
27-Jun-11	7.02	826	10	518	0.28									
25-Jul-11	6.39	413	22	302	0.57		17	35	83	6	8	54	5	
26-Aug-11	7.01	593	35	372	0.76									
21-Sep-11	7.19	868	24	490	0.34									
26-Oct-11	7.84	949	21	554	0.48		55	44	237	15	22	145	6	
22-Nov-11	7.47	1,323	27	860	0.37									
15-Dec-11	8.46	386	74	380	1.03									
25-Jan-12	7.82	906	36	612	0.52		83	113	170	18	24	137	6	
17-Feb-12	6.37	291	50	339	1.06									
30-Mar-12	7.42	966	40	548	0.13									
27-Apr-12	7.3	459	26	384	1.2		51	41	96	11	13	69	5	
24-May-12	7.39	1,044	37	550	0.3									
27-Jun-12	7.44	882	32	526	0.78									
27-Jul-12	6.36	575	50	591	0.78		43	42	150	13	16	85	5	
30-Aug-12	6.89	135	37	788	0.19									
25-Sep-12														Dry
25-Oct-12	7.58	1,573	18	844	0.05		105	91	408	27	37	242	9	
29-Nov-12														Dry
20-Dec-12														Dry
24-Jan-13														Dry
25-Feb-13	6.94	475	35	358	0.62									
22-Mar-13	7.21	1,010	5	574	0.48									
22-Apr-13	6.78	1,600	14	1,020	0.25		22	407	253	51	48	248	11	
17-May-13	7.38	907	38	540	0.05									
21-Jun-13	7.24	1,120	6	646	0.16									
24-Jul-13	7.28	727	11	417	0.46		54	45	151	11	15	105	6	
28-Aug-13	7.53	869	5	443	0.11									
17-Sep-13	7.59	930	6	469	0.06									
22-Oct-13	7.53	1,080	8	541	0.05		74	74	218	19	23	155	9	
14-Nov-13	7.39	1,100	15	577	0.05									
11-Dec-13	6.81	599	18	364	0.56									
24-Jan-14	8.05	941	30		0.05									
20-Feb-14	8.35	957	22		0.05									
25-Mar-14	7.59	849	12		0.05									
30-Apr-14	6.89	282	6	204	0.91		33	21	66	4	6	55	7	
28-May-14	6.63	472	5		0.93									
26-Jun-14	7.65	475	5		0.3									
28-Jul-14	7.32	580	5	384	0.11									
31-Aug-14	7.57	352	13		0.73									
22-Sep-14	7.7	570				41.8								
27-Oct-14	7.4	560	60	337	1.33	15.9	69	10	116	9	12	74	8	
21-Nov-14	7.6	660				18.6								
22-Dec-14	7.5	690				16.4								
29-Jan-15	6.8	240	16	236	1.3	38.5								
23-Feb-15	7.2	560				7.8								
30-Mar-15	7	600				9.3								
28-Apr-15	6.5	274	44	234	3.5	63	41	22	42	11	8.2	25	8.3	Floodwater
28-May-15	7.3	640				33								
24-Jun-15	6.7	620				47								
27-Jul-15	7.6	919	4	542	0.42	9								
27-Aug-15	7.2	1,100				7								
28-Sep-15	7.5	760				9.1								
22-Oct-15	7.1	900	2	533	0.28	5	88	21	210	19	21	120	7.2	
30-Nov-15	7.5	590				10.2								
21-Dec-15	7	640				9.4								

**Table B1 - Discharge Monitoring Results 2015**

DATE	pH	TOTAL SUSPENDED SOLIDS (mg/l)	TOTAL DISSOLVED SOLIDS (mg/l)	SPECIFIC CONDUCTANCE (uS/cm)	IRON (mg/l)	DISCHARGE VOLUME (ML/day)
11-Jan-15	8.4	4	3,920	5,380	<0.01	40
12-Jan-15	8.4	2	4,080	5,610	<0.01	40
19-Jan-15	8.1	10	4,220	5,720	<0.01	30
20-Jan-15	8.2	14	3,990	5,440	0.10	20
27-Jan-15	8.2	17	4,280	5,590	0.01	20
28-Jan-15	8.3	15	3,500	4,770	<0.01	20
29-Jan-15	8.3	23	2,980	4,000	<0.01	10
16-Feb-15	8.0	4	4,290	5,480	<0.01	40
13-Mar-15	8.2	4	4,650	5,650	<0.05	40
14-Mar-15	8.0	2	4,530	5,610	<0.05	40
04-Apr-15	8.2	5	4,300	5,690	<0.05	40
05-Apr-15	8.1	4	4,080	5,550	<0.05	10
08-Apr-15	8.2	6	4,300	5,720	<0.05	30
20-Apr-15	8.0	2	4,340	5,620	<0.01	40
21-Apr-15	8.2	156	2,470	3,450	0.09	40
22-Apr-15	7.5	350	588	953	0.28	40
23-Apr-15	7.5	16	1,630	2,060	<0.01	10
24-Apr-15	7.6	10	1,730	2,160	<0.01	10
25-Apr-15	7.6	11	1,620	2,120	<0.01	10
02-May-15	7.8	25	2,430	2,970	<0.01	10
03-May-15	7.7	12	2,570	2,860	<0.01	10
04-May-15	8.0	6	2,350	2,790	0.02	15
05-May-15	8.0	18	1,930	2,400	0.01	30
17-May-15	8.0	12	3,060	4,240	0.03	40
22-May-15	8.1	14	3,010	4,380	0.02	40
23-May-15	8.1	27	2,570	3,200	<0.01	10
24-May-15	8.1	28	2,600	3,180	<0.01	10
17-Jun-15	8.0	7	3,350	4,830	<0.01	40
18-Jun-15	8.1	2	3,670	4,930	<0.01	40
23-Aug-15	8.0	3	3,710	5,240	<0.01	40
24-Aug-15	7.9	2	3,990	5,620	<0.01	40
25-Aug-15	8.3	2	3,860	5,590	<0.01	40
17-Sep-15	8.0	3	3,530	4,740	0.02	40
18-Sep-15	8.1	2	4,210	5,610	0.01	40
19-Sep-15	8.0	3	3,960	5,410	0.01	40
20-Sep-15	8.1	7	4,080	5,330	0.01	20
21-Sep-15	8.2	7	4,310	5,540	<0.01	10
25-Sep-15	8.1	8	4,420	5,630	<0.01	40
22-Oct-15	8.0	1	4,750	5,560	0.01	40

DATE	pH	TOTAL SUSPENDED SOLIDS (mg/l)	TOTAL DISSOLVED SOLIDS (mg/l)	SPECIFIC CONDUCTANCE (uS/cm)	IRON (mg/l)	DISCHARGE VOLUME (ML/day)
23-Oct-15	8.2	2	4,490	5,470	0.01	40
24-Oct-15	8.2	2	4,390	5,160	0.05	30
04-Nov-15	8.0	2	4,860	5,740	0.01	40
05-Nov-05	7.9	2	3,910	4,930	0.03	30
13-Nov-15	8.0	2	4,220	5,430	<0.01	40
14-Nov-15	7.8	5	2,530	3,520	0.01	30
15-Nov-15	7.8	5	3,120	4,140	0.01	20
10-Dec-15	8.0	3	4,490	5,360	<0.01	40
11-Dec-15	8.0	2	4,390	5,250	<0.01	40
12-Dec-15	8.2	3	4,420	5,300	<0.01	30
17-Dec-15	8.4	4	4,530	5,410	<0.01	40
22-Dec-15	8.0	4	4,690	5,330	<0.01	40
23-Dec-15	8.2	8	4,430	5,050	<0.01	40
27-Dec-15	8.3	6	4,280	5,140	<.01	40
<b>Max</b>	<b>8.4</b>	<b>350</b>	<b>4,860</b>	<b>5,740</b>	<b>0.28</b>	<b>40</b>
<b>Min</b>	<b>7.5</b>	<b>1</b>	<b>588</b>	<b>953</b>	<b>&lt;0.01</b>	<b>10</b>
<b>Average</b>	<b>8.0</b>	<b>17</b>	<b>3,634</b>	<b>4,676</b>	<b>&lt;0.05</b>	<b>31</b>

## **APPENDIX C**

### **GROUNDWATER MONITORING RESULTS**

Bore  
PD2.1

Buttai Reservoir

Date	RL	Depth (m)	pH	EC (uS/cm)	TDS (mg/L)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Iron (mg/L)	Comments
20-Sep-10	22.87	56.33	6.67	5350	3780	569	730	1330	32	74	1150	24	0.29	
19-Oct-10	22.63	56.57	6.72	6000	3100	553	802	1210	34	78	1330	27	2.45	
14-Jan-11	22.84	56.36	6.6	6420	3750	598	718	1260	30	73	1310	28	1.47	
27-Apr-11	22.61	56.59	6.6	6560	3610	483	953	1120	32	90	1200	26	2.14	
25-Jul-11	23.13	56.07	6.64	6320	3810	541	621	1230	30	72	1280	28	1.28	
26-Oct-11	23.64	55.56	7.09	6170	3660	503	506	1290	27	67	1270	29	1.61	
25-Jan-12	24.02	55.18	7.06	5720	3330	430	607	1300	34	56	1180	29	1.39	
27-Apr-12	24.44	54.76	6.64	5270	3490	409	418	1270	36	47	1130	29	1	
27-Jul-12	24.71	54.49	7.32	6120	3830	355	608	1650	134	74	1320	35	0.05	
31-Oct-12	24.64	54.56	6.74	5950	3990	592	874	1240	48	79	1370	33	11.4	
24-Jan-13	24.80	54.40	7.3	6360	4130	590	816	1190	67	78	1320	31	0.85	
22-Apr-13	25.23	53.97	6.81	6080	4170	549	654	1210	54	79	1220	30	0.79	
24-Jul-13	25.00	54.20	7.21	6820	3830	212	450	1700	159	34	1290	37	1.99	
28-Oct-13	24.82	54.38	6.87	6380	3990	622	726	1200	38	80	1310	31	2.06	
02-May-14	25.34	53.86	6.84	6460	3800									
29-Nov-14	25.40	53.80	7.3	6460	3740	560	503	1600	96	53	1220	27	0.05	
24-Feb-15	25.42	53.78												
03-Jun-15	26.72	52.48	6.7	6350	3170									
26-Aug-15	25.87	53.33												
30-Nov-15	25.92	53.28	6.9	5520	3420	350	310	1300	87	33	1300	33	0.05	

Bore  
PD2.2

Buttai Reservoir

Date	RL	Depth (m)	pH	EC (uS/cm)	TDS (mg/L)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Iron (mg/L)	Comments
20-Sep-10	16.29	63.37	6.69	5140	4500	319	1890	695	183	180	943	20	4.22	
19-Oct-10	15.88	63.78	6.79	5780	4300	333	2010	706	185	180	1040	22	8.83	
14-Jan-11	16.38	63.28	6.65	6170	4220	342	2300	728	191	189	1070	24	9.19	
27-Apr-11	15.87	63.79	6.42	6270	4500	288	1890	701	171	206	952	23	7.52	
25-Jul-11	17.12	62.54	6.29	6090	4250	239	1800	806	167	209	972	27	31.1	
26-Oct-11	18.58	61.08	7.03	5960	4320	206	1740	791	157	204	1000	29	6.23	
25-Jan-12	18.81	60.85	7.07	6460	4840	483	1480	1130	100	177	1170	33	0.05	
27-Apr-12	19.23	60.43	6.44	5720	4230	282	1360	1110	106	194	1090	33	23.6	
27-Jul-12	19.21	60.45	6.52	5720	4390	272	1710	1070	97	182	1110	32	30.5	
31-Oct-12	19.23	60.43	6.35	5650	4040	205	1840	892	100	178	1190	33	32.9	
24-Jan-13	19.36	60.30	6.73	5810	4110	241	1820	838	115	203	1140	31	29.1	
22-Apr-13	19.95	59.71	6.4	5480	3990	217	1480	852	76	160	1070	30	32.4	
24-Jul-13	19.53	60.13	6.81	6120	4100	246	1520	899	84	168	1140	32	12.2	
28-Oct-13	19.65	60.01	6.54	6450	4140	271	1490	901	79	154	1160	30	26.4	
02-May-14	19.94	59.72	6.46	6260										
29-Nov-14	19.36	60.30	6.7	5880	3610	302	1440	1010	70	127	1040	24	0.05	
24-Feb-15	20.35	59.31												
03-Jun-15	20.44	59.22	6.7	6110	3050									
26-Aug-15	20.22	59.44												
30-Nov-15	20.16	59.50	6.6	5670	4180	310	1300	890	66	150	1200	34	10	

Bore PD3                      Shamrock Lane

Date	RL	Depth (m)	pH	EC (uS/cm)	TDS (mg/L)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Iron (mg/L)	Comments
20-Sep-10	23.88	7.12	4.1	2660	2090	1	958	220	34	112	374	21	0.09	
19-Oct-10	23.62	7.38	6.37	5890	5120	217	2710	510	262	311	884	27	22.6	
14-Jan-11	23.78	7.22	6.59	6040	4940	168	2890	507	247	300	878	29	0.05	
27-Apr-11	23.27	7.73	6.7	6680	5390	134	2790	545	256	333	863	28	0.05	
25-Jul-11	24.75	6.25	6.24	6520	5280	134	2440	614	247	309	874	30	7.05	
26-Oct-11	23.97	7.03	6.52	6420	5170	120	2780	615	267	328	1010	34	0.05	
25-Jan-12	23.62	7.38	7.03	6580	6640	130	3160	595	273	347	980	33	0.06	
27-Apr-12	24.97	6.03	6.26	6190	5280	185	2670	604	286	331	957	33	0.38	
27-Jul-12	24.29	6.71	6.35	6350	5860	158	3530	622	308	345	985	33	0.61	
25-Oct-12	24.38	6.62	6.54	6820	5880	98	3280	599	362	380	1020	35	0.05	
24-Jan-13	23.70	7.30	6.07	6520	5430	2	3880	484	354	365	977	33	0.11	
22-Apr-13	24.01	6.99	5.74	5800	5340	46	3070	433	210	354	896	34	113	
24-Jul-13	24.61	6.39	5.76	6520	5720	85	3240	448	281	377	915	35	34.2	
22-Oct-13	23.92	7.08	4.63	6660	5480	1	3030	444	241	351	874	35	62.1	
02-May-14	24.48	6.52	6.2	6970										
29-Nov-14	24.17	6.83	3.5	6840	6390	5	3690	547	317	332	870	28	2.97	
24-Feb-15	23.98	7.02												
03-Jun-15	24.36	6.64	5.9	3820	1900									
26-Aug-15	24.27	6.73												
30-Nov-15	23.98	7.02	6.2	5550	5720	110	2700	400	290	330	960	37	71	

Bore  
PD4.1

Product Stockpile Pad

Date	RL	Depth (m)	pH	EC (uS/cm)	TDS (mg/L)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Iron (mg/L)	Comments
20-Sep-10	5.23	21.35	7.17	12600	8200	520	306	3950	190	298	1980	32	0.05	
19-Oct-10	3.61	22.97	7.48	12800	7760	534	309	4390	188	291	2230	35	0.05	
14-Jan-11	2.42	24.16	7.16	13600	8290	548	359	4110	173	276	2180	38	0.05	
27-Apr-11	1.21	25.37	7.18	14800	7750	561	354	4130	178	301	2100	37	0.05	
25-Jul-11	-0.06	26.64	7.15	13700	7840	522	271	4230	176	295	2210	39	0.05	
26-Oct-11	2.36	24.22	7.53	13300	7760	461	387	4210	175	309	2350	43	0.05	
25-Jan-12	2.46	24.12	7.61	13100	8340	502	640	4320	164	331	2240	42	0.21	
27-Apr-12	14.00	12.58	6.24	2420	1890	28	1150	98	127	96	328	12	0.13	
27-Jul-12	22.97	3.61	6.34	6340	1950	27	1240	56	116	97	295	14	0.2	
25-Oct-12	23.98	2.60	6.54	10470	7350	244	2680	2040	198	402	1870	35	14.8	
24-Jan-13	24.13	2.45	6.64	10440	7040	324	2180	2600	189	352	1880	32	9.07	
22-Apr-13	22.89	3.69	6.59	10670	7700	284	1900	2600	191	384	2010	32	6.54	
24-Jul-13	21.35	5.23	6.78	11170	7400	303	1810	2560	209	386	1930	35	5.32	
28-Oct-13	19.88	6.70	7.09	11650	7460	353	1830	2640	192	360	1870	34	0.15	
02-May-14	18.69	7.89	7.06	11300										
29-Nov-14	18.41	8.17	7.2	10800	7610	400	1800	2810	193	321	1760	25	0.05	
24-Feb-15	15.93	10.65												
03-Jun-15	15.96	10.62	6.8	10760	5380									
26-Aug-15	13.18	13.40												
30-Nov-15	13.21	13.37	7.1	9200	7650	390	2000	2800	190	370	2300	39	0.04	



Bore  
PD4.2

Product Stockpile Pad

Date	RL	Depth (m)	pH	EC (uS/cm)	TDS (mg/L)	Alkalinity (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Iron (mg/L)	Comments
20-Sep-10	24.30	2.69	5.63	8390	7870	69	3900	1150	123	424	1500	30	19.5	
19-Oct-10	24.24	2.75	5.59	9060	8630	73	4870	438	163	527	1700	34	45	
14-Jan-11	24.31	2.68	5.4	9970	8880	55	5740	462	134	492	1790	37	36.8	
27-Apr-11	24.33	2.66	5.36	10800	8770	45	5470	398	147	531	1690	37	33	
25-Jul-11	24.99	2	4.32	9440	5990	1	4670	364	179	510	1540	37	0.87	
26-Oct-11	24.96	2.03	5.72	8220	4600	24	4550	358	261	520	1330	34	57.1	
25-Jan-12	24.80	2.19	5.63	7610	8550	7	4370	277	195	482	1180	31	50.6	
27-Apr-12	24.89	2.10	5.35	5890	5710	1	3210	230	168	366	930	26	63.3	
27-Jul-12	25.19	1.80	5.44	5440	6400	12	4260	238	182	415	1030	29	44.1	
25-Oct-12	24.46	2.53	3.82	7210	6780	1	4580	245	286	489	1110	31	65.4	
24-Jan-13	24.48	2.51	5.67	6760	5960	26	4940	176	298	465	1060	27	71	
22-Apr-13	24.98	2.01	5.16	6180	6430	22	4500	156	272	465	1030	26	89.2	
24-Jul-13	24.80	2.19	5.41	7160	6940	26	4410	184	351	475	1010	26	79.4	
28-Oct-13	24.34	2.65	5.7	7650	7390	1	4370	229	326	474	1050	26	77.5	
02-May-14	24.99	2.00	5.75	7100										
29-Nov-14	24.91	2.08	4.2	7300	7260	5	4600	338	410	403	958	21	16.5	
24-Feb-15	25.24	1.75												
03-Jun-15	25.28	1.71	5.5	7780	3870									
26-Aug-15	25.26	1.73												
30-Nov-15	25.29	1.70	5.9	5930	7310	49	4400	270	360	400	1100	31	50	

### South Cut Boundary

[illegible]

## **APPENDIX D**

### **BLAST MONITORING RESULTS**

**BLAST RESULTS 2015**

**EPL No.** 396  
**Licencee:** Bloomfield Collieries Pty Ltd  
**Premises:** Bloomfield Colliery  
 Four Mile Creek Rd  
 Astonfield NSW 2323

**Monitoring Frequency:** Every blast  
**Airblast Overpressure Limit:** 120 dB(Lin Peak)  
**Ground Vibration Limit:** 10 mm/s



Shot No.		Blast Monitor Location											
		EPA ID No. 5 - Elliot's			EPA ID No. 4 - McNaughton's			EPA ID No. 3 - Mt Vincent Rd			EPA ID No. 6 - Richards		
		Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance
6548	13/01/2015 12.07pm	4.93	108.4	763	0.75	107.9	1555	0.2	88.5	3293	0.57	96.8	2099
6549	15/01/2015 10.05am	2.07	107.2	751	Fault *		1610	0.33	87	3316	0.37	89.2	2030
6550	16/01/2015 9.48am	1.48	102.1	811	0.27	102	1680	0.13	85.6	3267	0.24	87.4	1966
6551	21/01/2015 1.53pm	1.16	100.2	883	0.35	96	1655	0.38	90	3176	0.52	102.7	2027
6552	27/01/2015 10.25am	1.86	104.8	951	0.47	99.1	1729	0.27	87.3	3114	0.62	102.7	1967
6553	2/02/2015 10.55am	2.37	99.9	934	0.8	96.2	1891	0.35	94.3	3231	0.94	106.5	1746
6554	4/02/2015 1.40pm	0.81	109.7	934	0.27	108.9	1891	0.21	97.6	3231	0.47	105.8	1746
6555	11/02/2015 1.46pm	0.6	105.4	1153	0.4	101.9	1900	0.21	91.2	2923	0.57	108.3	1868
6556	12/02/2015 1.04pm	2.28	104.5	944	0.53	102.6	1930	0.34	83.1	3255	0.81	104.8	1700
6557	17/02/2015 1.48pm	1.58	106.7	944	0.59	101.9	1930	0.3	94.8	3255	0.85	105.6	1700
6558	18/02/2015 12.54pm	0.39	108.7	1684	0.19	113.3	1922	0.1	96.5	2466	0.12	110.7	2481
6559	20/02/2015 10.48am	DNR	DNR	1678	DNR	DNR	1935	0.11	92.9	2459	0.11	96.6	2451
6560	24/02/2015 1.25pm	DNR	DNR	1725	DNR	DNR	1754	0.06	94.7	2602	0.08	92.5	2779
6561	26/02/2015 1.47pm	DNR	DNR	1205	DNR	DNR	1897	0.03	82.4	2858	0.41	105.3	1919
6562	2/03/2015 1.49pm	DNR	DNR	1678	DNR	DNR	1935	0.09	92	2459	0.14	96.2	2451
6563	3/03/2015 11.39am	0.86	106.1	1196	0.47	101.7	2004	0.03	91.3	2916	0.76	96.2	1745
6564	6/03/2015 12.34pm	DNR	DNR	1436	DNR	DNR	1817	0.08	94.9	2653	0.06	83.8	2297
6565	6/03/2015 12.49pm	DNR	DNR	1233	DNR	DNR	2035	0.31	85.4	2883	1.1	90.2	1728
6566	10/03/2015 1.07pm	0.29	99.7	1701	0.28	103.4	1822	0.11	97.8	2539	0.26	98.5	2650
6567	11/03/2015 11.35am	0.34	110.5	1598	0.24	109.5	1858	0.11	92.7	2542	0.18	109.5	2451
6568	12/03/2015 1.09pm	DNR	DNR	1502	DNR	DNR	1729	0.08	95.1	2667	0.09	96.1	2506
6569	17/03/2015 1.49pm	1.56	99.7	714	0.24	96.2	1489	0.08	83	3339	0.2	97.3	2160
6570	19/03/2015 11.01am	0.79	98.8	714	0.19	96.5	1489	0.05	83	3339	0.16	91	2160
6571	20/03/2015 12.55pm	0.42	105.4	1451	0.3	107.1	1793	0.07	91.4	2655	0.11	93.1	2350
6572	24/03/2015 1.07pm	DNR	DNR	1451	DNR	DNR	1793	0.1	88.7	2655	0.13	93.8	2350
6573	26/03/2015 1.08pm	DNR	DNR	1451	DNR	DNR	1793	0.07	86.1	2655	0.08	92.5	2350
6574	2/04/2015 12.39pm	1.28	106.4	881	0.34	107.4	1634	0.12	89.2	3175	0.25	95.5	2052
6575	14/04/2015 1.11pm	0.65	110.2	947	0.26	104.1	1627	0.07	91.1	3106	0.13	96	2099
6576	17/04/2015 11.29am	0.48	101.6	856	0.18	97.6	1702	0.09	84.3	3220	0.18	97.6	1955
6577	17/04/2015 1.19pm	1.78	103.5	856	0.31	99.1	1702	0.1	91.4	3220	0.29	98.2	1955
6578	28/04/2015 12.36pm	1.2	104.1	867	0.43	106.5	1640	0.11	92.9	3191	0.23	98.5	2039
6579	18/05/2015 1.47pm	DNR	DNR	1314	DNR	DNR	2092	0.13	99.6	2801	0.4	112.1	1715
6580	20/05/2015 1.46pm	DNR	DNR	838	0.08	105	1548	0.03	86	3215	0.06	101.4	2139

**BLAST RESULTS 2015**

**EPL No.** 396  
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**Premises:** Bloomfield Colliery  
 Four Mile Creek Rd  
 Astonfield NSW 2323

**Monitoring Frequency:** Every blast  
**Airblast Overpressure Limit:** 120 dB(Lin Peak)  
**Ground Vibration Limit:** 10 mm/s



Shot No.		Date & Time		Blast Monitor Location											
				EPA ID No. 5 - Elliot's			EPA ID No. 4 - McNaughton's			EPA ID No. 3 - Mt Vincent Rd			EPA ID No. 6 - Richards		
				Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance
6581	25/05/2015 1.39pm	DNR	DNR	776	DNR	DNR	1624	0.04	80.4	3290	0.09	75.5	2022		
6582	26/05/2015 12.47pm	DNR	DNR	776	DNR	DNR	1624	0.02	83.9	3290	0.04	94.3	2022		
6583	28/05/2015 1.36pm	DNR	DNR	776	DNR	DNR	1624	0.04	80.2	3290	0.03	78.7	2022		
6584	3/06/2015 11.48am	DNR	DNR	776	DNR	DNR	1624	0.09	95.6	3290	0.22	98	2022		
6585	11/06/2015 11.21am	DNR	DNR	776	DNR	DNR	1624	0.07	99.9	3290	0.11	103.2	2022		
6586	16/06/2015 11.48am	0.76	108.8	1001	0.26	108.5	1750	0.15	91.8	3061	0.2	93.7	1970		
6587	22/06/2015 1.05pm	0.91	105.2	995	0.27	105.6	1683	0.09	90.2	3058	0.18	93.1	2057		
6588	25/06/2015 12.48pm	DNR	DNR	1688	DNR	DNR	1748	0.06	88.9	2608	0.09	92.7	2732		
6589	29/06/2015 1.06pm	DNR	DNR	1688	DNR	DNR	1748	0.08	87.9	2608	0.06	95.3	2732		
6590	2/07/2015 1.10pm	DNR	DNR	1647	DNR	DNR	1808	0.03	89.8	2561	0.05	91.6	2592		
6591	6/07/2015 1.13pm	DNR	DNR	1505	DNR	DNR	1737	0.06	107.5	2660	0.1	91.7	2497		
6592	7/07/2015 1.10pm	DNR	DNR	1693	DNR	DNR	1940	0.05	94.4	2450	0.08	93.6	2468		
6593	8/07/2015 12.15pm	DNR	DNR	1488	DNR	DNR	1751	0.08	92.1	2659	0.07	95.4	2457		
6594	9/07/2015 9.22am	DNR	DNR	1488	DNR	DNR	1751	0.04	93	2659	0.04	98.4	2457		
6595	10/07/2015 12.41pm	DNR	DNR	1524	DNR	DNR	1856	0.06	89.9	2581	0.05	83.9	2354		
6596	15/07/2015 1.12pm	DNR	DNR	1497	DNR	DNR	1789	0.07	89.4	2631	0.06	90.8	2413		
6597	16/07/2015 12.58pm	DNR	DNR	974	DNR	DNR	1739	0.03	94.8	3090	0.05	85.2	1968		
6598	21/07/2015 1.13pm	DNR	DNR	1531	DNR	DNR	1837	0.03	82.9	2587	0.04	93.6	2390		
6599	22/07/2015 12.24pm	DNR	DNR	950	DNR	DNR	1668	0.03	93.1	3104	0.05	99.8	2048		
6600	27/07/2015 12.42pm	DNR	DNR	1624	DNR	DNR	1886	0.04	83.7	2513	0.05	91.7	2446		
6601	28/07/2015 12.25pm	DNR	DNR	1593	DNR	DNR	1702	0.04	91.8	2661	0.06	98.1	2661		
6602	31/07/2015 12.44pm	DNR	DNR	835	DNR	DNR	1604	0.03	88.8	3220	0.06	94.3	2068		
6603	4/08/2015 12.15pm	DNR	DNR	916	DNR	DNR	1627	0.05	90.7	3137	0.05	91.9	2081		
6604	6/08/2015 1.15pm	DNR	DNR	947	DNR	DNR	1699	0.03	91.5	3112	0.04	86.6	2005		
6605	7/08/2015 1.12pm	DNR	DNR	984	DNR	DNR	1705	0.03	97.7	3072	0.04	88.3	2019		
6606	13/08/2015 1.56pm	3.61	104.9	760	0.46	104.5	1455	0.12	86.1	3297	0.36	88.7	2214		
6607	14/08/2015 12.07pm	3.8	103.1	743	0.62	101.3	1495	0.21	82.8	3310	0.53	88.4	2162		
6608	17/08/2015 11.41am	3.03	108.5	755	0.44	102.8	1560	0.22	80.9	3301	0.38	86.7	2090		
6609	18/08/2015 10.04 am	2.92	101.5	769	0.5	102.5	1608	0.15	87	3294	0.43	87.1	2038		
6610	19/08/2015 10.09am	2.2	104.1	827	0.49	101.1	1525	0.14	85.7	3227	0.57	94.9	2161		
6611	19/08/2015 12.29pm	1.43	111.6	789	0.67	108.3	1657	0.14	89.6	3286	0.31	103.4	1986		
6612	20/08/2015 1.01pm	1.25	101.3	789	0.32	91.7	1657	0.16	80.7	3286	0.32	91.7	1986		
6613	21/08/2015 11.49am	0.98	101.6	869	0.24	103.4	1633	0.17	92.1	3188	0.31	89.6	2048		

**BLAST RESULTS 2015**

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**Airblast Overpressure Limit:** 120 dB(Lin Peak)  
**Ground Vibration Limit:** 10 mm/s



Shot No.		Blast Monitor Location											
		EPA ID No. 5 - Elliot's			EPA ID No. 4 - McNaughton's			EPA ID No. 3 - Mt Vincent Rd			EPA ID No. 6 - Richards		
		Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance
6614	28/08/2015 12.11pm	1.43	109.5	923	0.23	113.3	1647	0.15	91.4	3132	0.41	92	2058
6615	31/08/2015 11.50am	0.93	107.6	950	Fault *		1724	0.2	89.9	3114	0.49	93.2	1974
6616	1/09/2015 12.12pm	1.02	108.3	965	0.29	112.6	1652	0.11	84.4	3089	0.38	90.1	2077
6617	2/09/2015 12.03pm	0.59	108.3	1017	0.14	109.1	1719	0.26	90.3	3038	0.39	98.2	2023
6618	9/09/2015 10.54am	1.08	102	1731	0.76	102.3	1908	0.3	95.6	2461	0.81	86.8	2572
6619	11/09/2015 11.40am	1.41	99.8	1703	0.77	102	1894	0.35	89.8	2479	0.66	96.3	2551
6620	14/09/2015 12.35pm	0.75	98	1704	0.67	99.4	1895	0.21	98.1	2478	0.53	95.1	2551
6621	16/09/2015 1.32pm	1.21	98.5	1654	0.73	99.8	1871	0.45	96.3	2512	0.82	97.4	2513
6622	30/09/2015 10.54am	DNR	DNR	1626	0.6	99.9	1853	0.87	93.7	2535	0.9	93.9	2498
6623	1/10/2015 1.39pm	1.03	100.3	1593	0.84	102.3	1845	0.41	84.3	2553	0.6	94.6	2464
6624	6/10/2015 12.25pm	1.01	99.8	1563	0.71	102	1832	0.38	88.7	2574	0.97	89.5	2441
6625	8/10/2015 11.07am	0.84	99.4	1528	0.8	102.4	1817	0.37	94.9	2600	0.77	98.7	2414
6626	9/10/2015 10.56am	0.69	101	1487	0.78	103.8	1801	0.41	85.5	2630	0.96	91.8	2384
6627	13/10/2015 10.04am	1.36	99.2	1447	1.00	101.9	1787	0.33	94.5	2660	0.68	98.3	2354
6628	14/10/2015 12.27pm	1.9	104	1434	0.67	105.1	1696	0.48	97.4	2717	0.94	99.9	2465
6629	15/10/2015 9.42am	4.52	104	744	0.59	105.3	1443	0.4	91.1	3313	0.35	98.8	2222
6630	16/10/2015 9.46 am	3.81	103.9	749	0.64	104.2	1482	0.22	90.2	3305	0.33	93.1	2179
6631	16/10/2015 1.05 pm	0.43	103.2	1490	0.48	105	1722	0.27	86.5	2676	0.37	95.6	2499
6632	19/10/2015 11.52am	1.32	106	838	0.33	103	1520	0.24	94.3	3217	0.4	98.5	2172
6633	22/10/2015 9.57am	4.16	105	831	0.57	101.6	1542	0.29	80.3	3222	0.53	94.8	2142
6634	30/10/2015 12.03pm	3.74	101.2	862	0.55	98.6	1592	0.25	97.3	3191	0.83	99.9	2096
6635	3/11/2015 11.51am	3.23	104.4	837	0.73	107.1	1619	0.27	92.9	3221	0.75	98.8	2051
6636	9/11/2015 1.16pm	DNR	DNR	993	0.06	103.6	1665	0.2	81.5	3060	0.51	84.5	2079
6637	10/11/2015 12.12pm	0.8	99.8	1604	0.87	100.2	1742	0.3	89.1	2626	0.45	91.4	2623
6638	23/11/2015 1.48pm	1.09	118.6	1044	0.44	115.6	1836	0.24	87.1	3036	0.66	93.6	1878
6639	27/11/2015 10.54am	1.37	108	965	0.33	103.3	1823	0.18	95.9	3135	0.39	104.9	1849
6640	27/11/2015 1.12pm	1.01	104	1051	0.31	101.9	1787	0.33	95.2	3012	0.58	104.1	1953
6641	2/12/2015 10.55am	0.94	106.7	889	0.28	103.9	1796	0.15	95.2	3224	0.39	103.6	1850
6642	7/12/2015 12.22pm	1.03	101.9	919	0.4	105.5	1843	0.17	101.8	3213	0.43	104.3	1802
6643	9/12/2015 1.09pm	0.9	107.6	950	0.28	104	1887	0.21	85	3202	0.36	92.5	1757
6644	14/12/2015 11.40am	DNR	DNR	799	DNR	DNR	1600	0.02	87.6	3260	0.03	86.5	2058
6645	15/12/2015 12.00pm	0.63	105.7	1126	0.30	103.6	1964	0.22	95.7	2992	0.59	103.3	1749
6646	16/12/2015 9.59am	DNR	DNR	799	DNR	DNR	1610	0.02	86.5	3262	0.03	87.1	2046

# BLAST RESULTS 2015

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**Airblast Overpressure Limit:** 120 dB(Lin Peak)  
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Shot No.		Date & Time		Blast Monitor Location											
				EPA ID No. 5 - Elliot's			EPA ID No. 4 - McNaughton's			EPA ID No. 3 - Mt Vincent Rd			EPA ID No. 6 - Richards		
				Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance	Vibration (mm/s)	Airblast (dB)	Distance
6647		18/12/2015	11.46am	0.99	105.7	946	0.32	104	1929	0.21	84.7	3252	0.55	97	1701
6648		22/12/2015	1.58pm	DNR	DNR	895	DNR	DNR	1607	0.02	94.2	3158	0.04	106	2095

DNR - Did not register. Blast too small to trigger monitor.

\* Logger failure

**APPENDIX E**

**COMPLAINTS REGISTER**



**BLOOMFIELD COLLIERY**  
**COMPLAINTS REGISTER**  
**2015**



No.	About *	Time/Date	Location	Details	Action Taken / Findings
15_01	B	13/1/2015 1:05pm	Black Hill	Complaint received via 'Hotline'. Enquiry about blast on the 13th January. Complainant stated that she felt house rumble and not sure what it was. Has contacted Donaldson Coal and local quarry. Enquiring if may have been Bloomfield blast.	Mine Manager phoned complainant. Complainant stated that moved in last June and not felt a blast before. Mine Manager stated that blasting is monitored and was within limits and offered to install a blast monitor at her residence. Offer was not taken up by complainant. Mine Manager commented that she may feel next 2-3 blasts but after that blasts will be moving further away. Blast monitoring within limits.
15_02	N	3/3/2015 12:55am	Buttai	Complaint received via 'Hotline'. Complained about noise from pit during night of 2/3/15.	Mine Manager rang complainant on 3/3/15. Explained that dump trucks had been using a haul road that took them close to southern boundary that afforded little noise protection. Dump trucks to use alternative haul road at night to shield neighbours from noise.
15_03	O	3/9/15 2:50pm	Not provided	Complaint received by EPA. Complaint was forwarded to Bloomfield on 3/9/15 by EPA. Passerby complained of odour from the mine whilst driving along John Renshaw Drive.	Environmental Manager spoke with EPA about issue. Relates to a small heating area in back fill. Continuing with clay capping to seal area.
15_04	D	28/10/15 4:57pm	Ashtonfield	Complaint received via website feedback email. Complained about dust emanating from washery.	Mine Manager rang complainant on 29/10/15. Determined with complainant that dust was due to windy southerly change on afternoon of 26/10/15 just prior to commencement of a rain event. Weather station data showed winds peaked (52 kmh) for 10-20 minute period when change arrived. Rain then started and winds eased.
15_05	D	23/11/15 2:00 pm	Black Hill	Complaint received by phone through switchboard. Complainant was driving along John Renshaw Road immediately after blast and thought she saw smoke emanating from the pit. She stated she has not seen a dust plume from a blast before.	Environmental Manager received the call and advised that she would only have seen the dust plume from the blast and not smoke.

\* D = Dust, N = Noise, B = Blasting, V = Visual, L = Lighting, W = Weeds, O = Other

## **APPENDIX F**

### **2013 REHABILITATION MONITORING**

## Summary

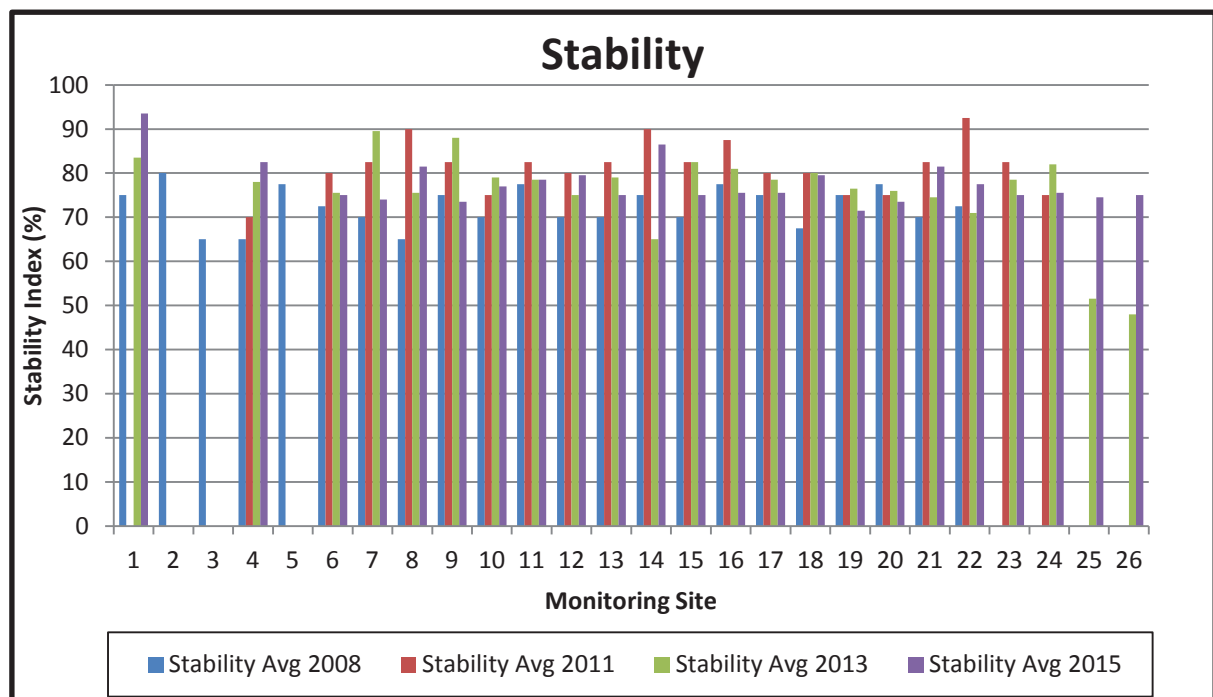
The Bloomfield rehabilitation monitoring program is based on Landscape Function Analysis (LFA) developed by the CSIRO. LFA is the core of the monitoring procedures and uses visually assessed indicators of soil surface processes that gauge how effectively a hillslope is operating as a biophysical system. It is the synthesis of much published material from a variety of sources and is based mainly on processes involved in surface hydrology: rainfall, infiltration, runoff, erosion, plant growth and nutrient cycling.

The data collected by the LFA method has a predictive capacity when regular monitoring provides a time series record of ecosystem change or development. LFA does not automatically classify a site into good, moderate or poor. The significance of a particular numerical value comes from comparing sites over time.

At Bloomfield rehabilitation monitoring is carried every 2 years and did not commence until 2008. Much of the rehabilitated areas were completed before 2008. There are currently 23 established monitoring sites within the rehabilitated areas. Additional sites will be added as rehabilitation progresses. In the following graphs there are 26 sites listed. Three of these sites (2, 3 and 5) have since been removed as that location was used for additional overburden dumping room. Sites 25 and 26 were established in 2013 and were rehabilitated during 2013 which reflects the lower index results.

## **Stability**

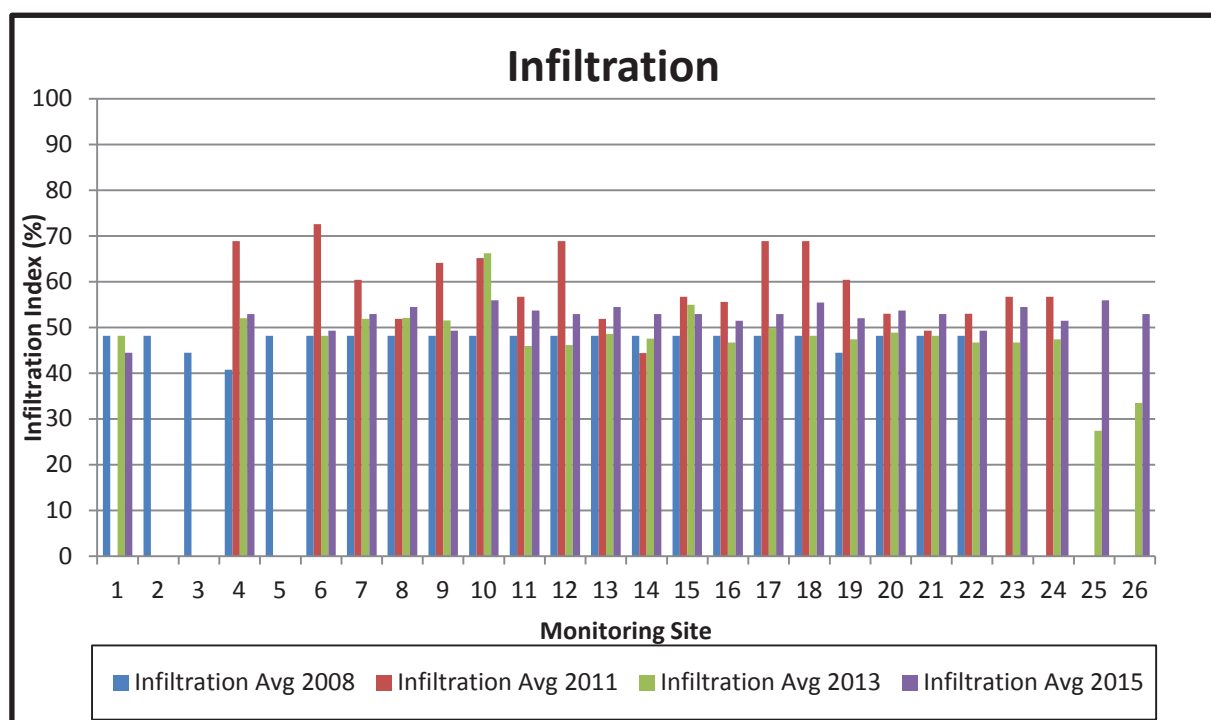
Stability is defined as the ability of the soil to withstand erosive forces, and to reform after disturbance.



The older established sites are fairly consistent and the variation in the stability index can be put down to inconsistent annual rainfall. In 2011 monthly rainfall was above average for most of the year resulting in many sites having a spike in the stability index when compared with other years. The second half of 2013 and 2015 was below average rainfall in the lead up to the rehabilitation monitoring.

## ***Infiltration***

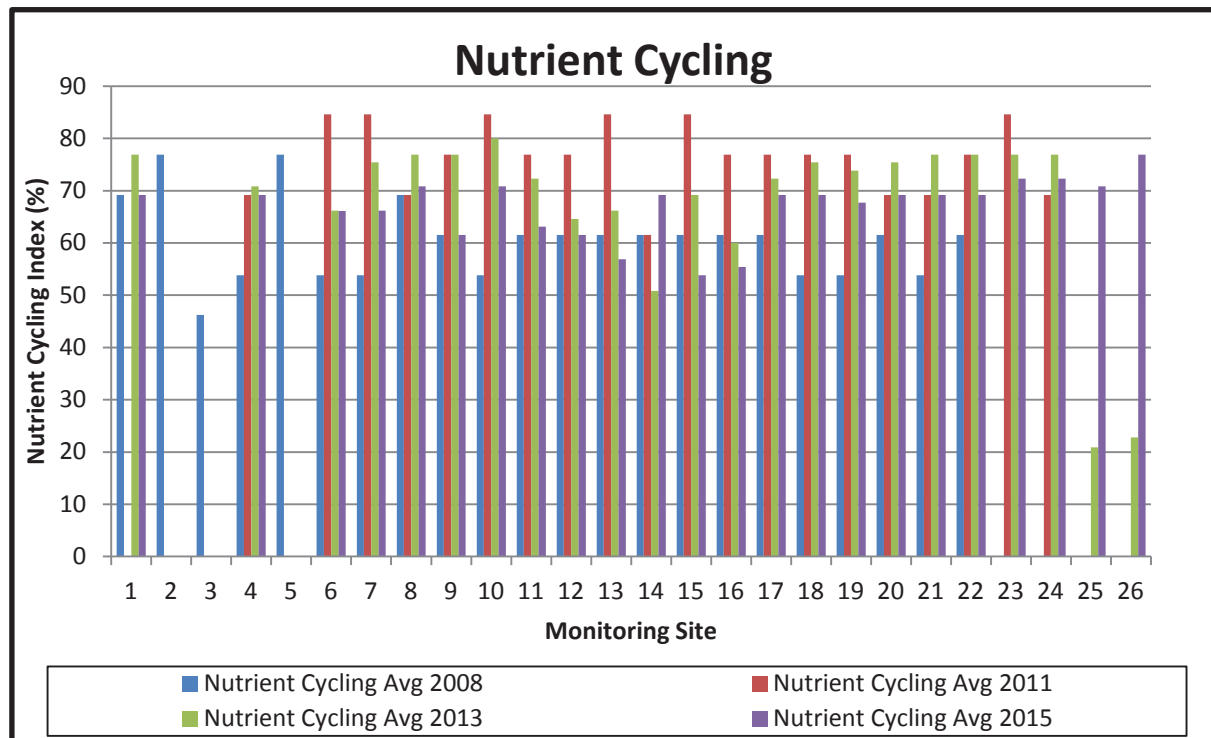
Infiltration is defined as how the soil partitions rainfall into soil-water (water available for plants to use), and runoff water which is lost from the local system, or may also transport materials (soil, nutrients and seed) away.



The index demonstrates the impact of the above average monthly rainfall in 2011 having higher infiltration rates. Alternatively the 2013 and 2015 results are linked with hard surface-setting (crusting) soils following a dryer than average period prior to monitoring.

## Nutrient Cycling

Nutrient cycling is defined as how efficiently organic matter is cycled back into the soil.



For nearly all sites the nutrient cycling index improved between 2008 and 2015, with a spike in 2011 due to the above average monthly rainfall.

The slight variation in results (stability / infiltration / nutrient) from 2011 to 2015 for the established rehabilitation sites shows the resilience of the rehabilitation sites in a drier than average year i.e. if monitoring results dramatically decreased this would indicate the rehabilitation areas are not long-term sustainable due to various factors. The 2015 rehabilitation monitoring validate the linear LFA trends seen since 2008.