THE Bloomfield GROUP

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Bloomfield Colliery

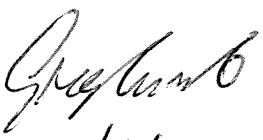
Annual Review Report

2022-2023

Bloomfield Collieries Pty Ltd

Annual Review Report 2022-2023

Table 1: Title Block

Name of Mine	Bloomfield Colliery (including the "Bloomfield Site"		
Project Approval	PA 07_0087 + PA 05_0136 ("Bloomfield Site")		
Name of PA Holder	Bloomfield Collieries Pty Limited		
Titles/Mining Leases	ML1738, CCL761, AMA1001		
Name of leaseholder	Bloomfield Collieries Pty Limited		
Name of Mine Operator	Bloomfield Collieries Pty Limited		
RMP Start Date	2/7/2022	RMP End Date	31/03/2023
Annual Review Commencement Date	1/1/2022	Annual Review End Date	31/03/2023
Water Licence	20AL217062 WAL 41506		
Name of Licence holder	Bloomfield Collieries Pty Limited		
I, Greg Lamb, certify that this audit report is a true and accurate record of the compliance status of Bloomfield Colliery for the period 1/1/22 – 31/03/23 and that I am authorised to make this statement on behalf of Bloomfield Collieries Pty Ltd. *Note.* *a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.* *b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).*			
Name of Authorised Reporting Officer	Greg Lamb		
Title of Authorised Reporting Officer	Environmental Advisor		
Signature of Authorised Reporting Officer			
Date	30/6/23		

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1 STATEMENT OF COMPLIANCE

Table 2: Statement of Compliance

Were all conditions of the relevant approvals complied with?	
PA 07_0087	No
ML 1738, CCL761, AMA1001	Yes

Table 3 below lists the non-compliances identified during the reporting period. For further details regarding the non-compliances identified refer to Section 11.

Table 3: Non-compliances with PA 07_0087 and EPL 396

Condition	**Non-Compliance**	**Risk Level**	**Where addressed in Annual Return**
M2 EPL396	Data logger failure	Low	Section 7.1.3 Section 11
Schedule 3, Condition 18, L1 EPL396	Water from retention basin passively spilling water	Low	Section 7.1.3 Section 11
Schedule 3, Condition 18, L2 EPL396	TSS exceedance during licenced discharge event	Low	Section 7.1.3 Section 11

2 INTRODUCTION

Bloomfield Collieries (Bloomfield) is one of two open cut coal mines which are part of the Bloomfield Group of Companies (TBG). Bloomfield Colliery is located at Ashtonfield, NSW, (Figure 1) and produces approximately 0.6 million tonnes of product coal by open cut methods per year. Coal has been mined within the area since 1850. 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 1966. 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.

This report covers 1 January 2022 to 31 March 2023.

This report is prepared to meet the requirements for the Annual Review, as outlined by the NSW Department of Planning & Environment (DPE) in the *Annual Review Guideline, October 2015*.

2.1 Consents, Leases and Licences

The lease area for ML1738, the PA 07_0087 & PA 05_0136 "Bloomfield Site" boundaries are shown on Plan 1.

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). During 2018 a variation to modify the Project Approval under s75W of the EP&A Act was granted on 16 August 2018 (07_0087_Mod 4).

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. The operational area under the control of Bloomfield Collieries Pty Limited is defined in PA 05_0136 as the "*Bloomfield Site*".

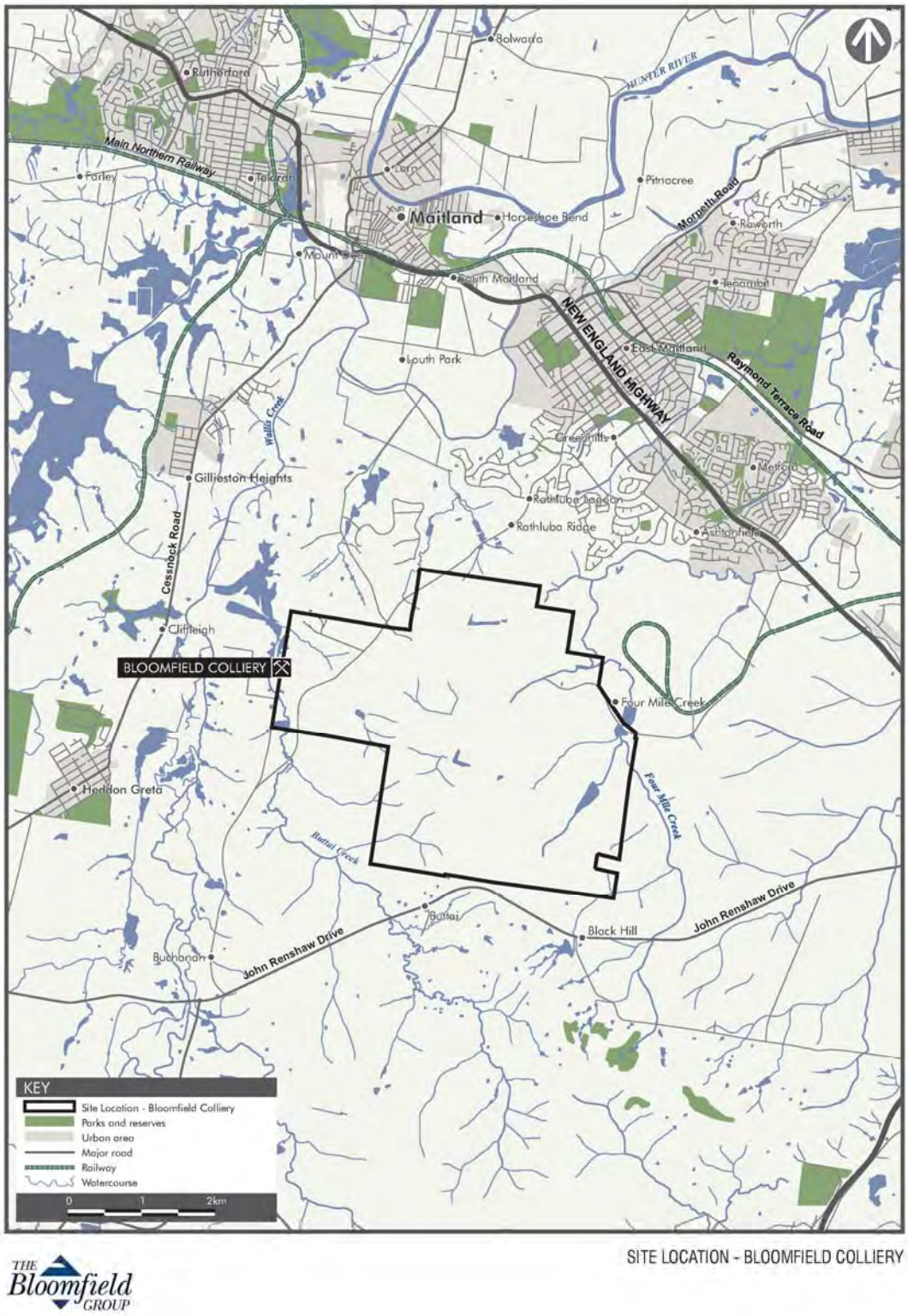
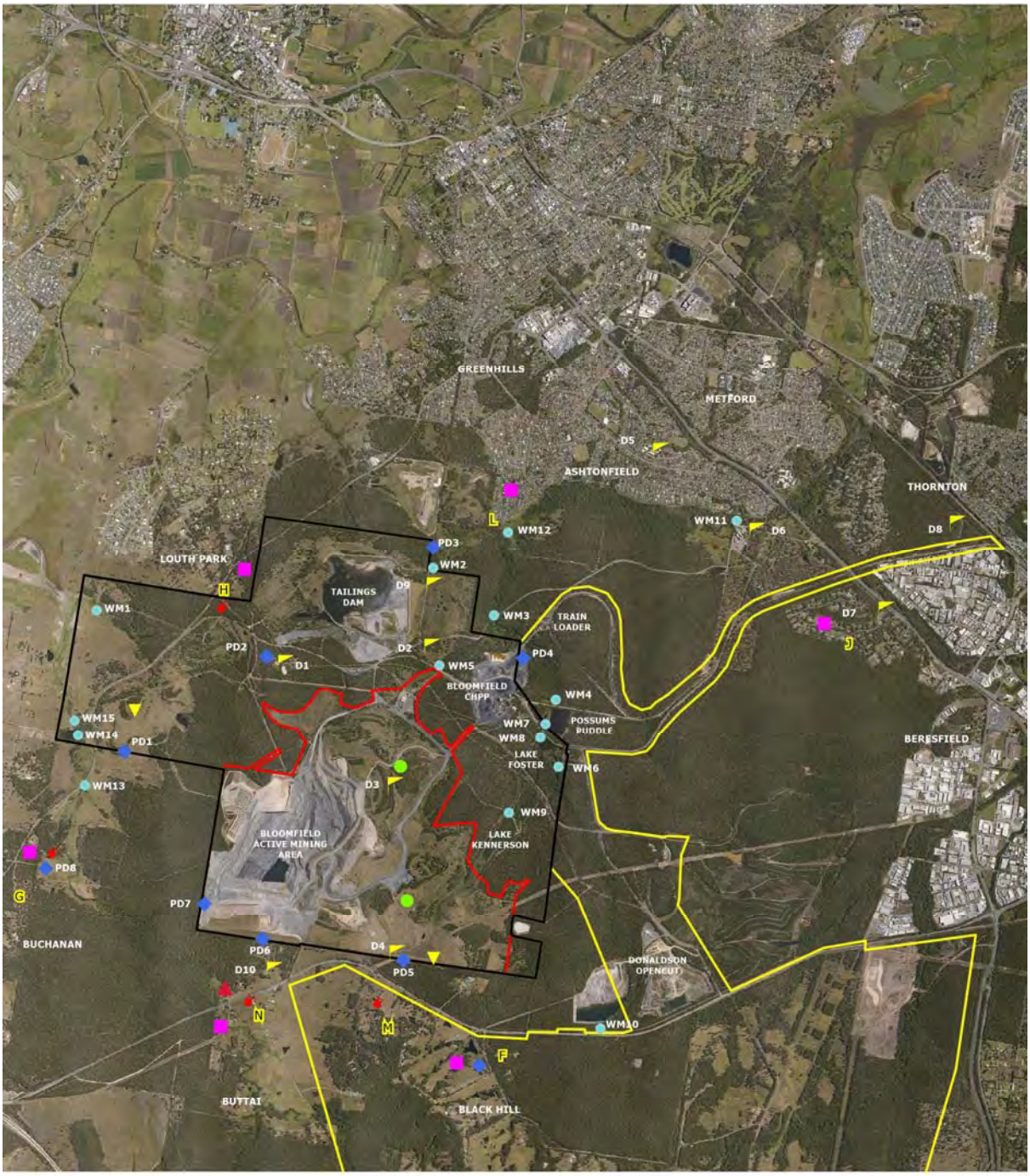


Figure 1: Location of Bloomfield Colliery



LEGEND

0 1 km

N

- Bloomfield Project Area
- Abel Mine Project Area
- Bloomfield Mining Lease
- Weather Station
- Blast Monitor
- Dust Gauge
- High Volume Air Sampler
- Noise Monitor
- Peizometers
- Water Monitoring
- DustTrak

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Bloomfield Colliery

Annual Review 2022-2023

Plan 1 Environmental Monitoring Sites

Scale: 1:33,333	Date: April 2023 Photo: 12 February 2023	Drawing: A3

2.2 Mine Contacts

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

Mr Brad Donoghue	Mine Manager	Tel: 02 4930 2641 Mob: 0418 923 058 bdonoghue@bloomcoll.com.au
Mr Greg Lamb	Environmental Advisor	Tel: 02 4930 2689 Mob: 0457 819 211 glamb@bloomcoll.com.au
Environmental / Community Hotline		24hr: 02 4930 2680

3 APPROVALS

Bloomfield Colliery operates under the following approvals, leases and licenses as presented in Table 4.

Table 4: Approvals, Leases and Licences

Approval/Lease/License	Issue Date	Expiry Date
Project Approval 07_0087	3 September 2009	31 December 2021
Project Approval 07_0087_ Mod 1	16 May 2011	31 December 2021
Project Approval 07_0087_ Mod 2	29 March 2012	31 December 2021
Project Approval 07_0087_ Mod 3	20 February 2013	31 December 2021
Project Approval 07_0087_ Mod 4	16 August 2018	31 December 2030
Mining Lease 1738	29 June 2016	29 June 2037
Ancillary Mining Activity AMA1001	3 August 2018	29 June 2037
Consolidated Coal Lease (CCL) 761	20 October 1991	8 October 2029
Project Approval 05_0136 (Abel Mine)	7 June 2007	31 December 2030
Environmental Protection License 396	31 December 2007	-
Notification of Dangerous Goods NDG028550	5 July 2021	-
Licence No. 20AL217062 WAL 41506	7 June 2016	6 June 2039

4 MINING OPERATIONS DURING THE REPORTING PERIOD

4.1 Exploration

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

4.2 Land Preparation

Approximately 7.5 Ha of land was prepared for mining during the reporting period. This area was to the north-west of Creek Cut. 5 Ha of vegetation was cleared as outlined in Section 6.3. The remaining 2.5 Ha had been cleared of vegetation in previous years. The soil material was stripped and removed to new rehabilitation areas or stockpiled for later use.

4.3 Construction

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

4.4 Mining

During the reporting period, Bloomfield operated 15 shifts a week for 60 weeks employing 93 personnel. Production was 918,000 tonnes of raw coal, 518,000 tonnes of saleable coal and 5.1 million cubic metres of overburden moved primarily using a Hitachi 5500 excavator and Caterpillar rear dump trucks.

Mining operations continued throughout the year generally in accordance with the mining methods described in the Environmental Assessment 2018 (PA 07_0087 MOD 4). During the next reporting period, mining will continue towards the west.

4.5 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 capacity is rated at 1000 tonnes per hour. ROM coal and clean coal volumes are presented in Table 5.

Table 5: Production and Waste Summary

Material	Approved limit	Previous reporting period	This reporting period*	Next reporting period (forecast)
Overburden	N/A	3,707,000	5,141,000	5,340,000
ROM Coal	1,300,000	725,000	918,000	607,000
Coarse reject	N/A	157,000	260,000	134,000
Tailings	N/A	85,000	140,000	72,000
Saleable product	N/A	483,000	518,000	401,000

*Note: This reporting period is 15 months - 1/1/22 – 31/3/23

4.6 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 the 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 5.

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. In 2022-23 a total of 87,000 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^3 bin and collected by licensed waste contractor for disposal. In 2022-23 a total of 3 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 2022-23 a total of 115 tonnes of scrap metal was collected for recycling.

General Waste

General waste is placed in 1.5m^3 and 3m^3 bins and collected by licensed waste contractor for disposal. In 2022-23 a total of 84 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^3 and 3.0m^3 bins and collected by licensed waste contractor for disposal. In 2022-23 a total of 6 tonnes of waste paper and cardboard was collected for recycling.

4.7 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.

4.8 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 removal by a licensed contractor.

A bunded fuel farm, designed in accordance with Australian Standard 1940 (AS1940), is used for bulk distillate storage at the open cut workshop. Spill protected racks are used for small volumes of oil and lubricant storage. Distillate, Nalflote 9840+ and sodium hydroxide used for coal processing in the CHPP are stored in tanks contained in bunded enclosures.

ChemAlert is an online Safety Data Sheet (SDS) database service and is used to provide up to date SDS information. If new chemicals are introduced to site they must comply with requirements and be approved by the Group Safety Manager, the Group Environment Manager and the Mine Manager through a documented workflow system.

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

4.9 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.

4.10 Bushfire

Weather conditions permitting, hazard reduction burns are conducted periodically by the Rural Fire Service (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.

An asset protection zone adjacent to residential areas near Ashtonfield and Buchanan was slashed and maintenance work carried out on a number of tracks to enable access for hazard reduction activities by the RFS.

During 2022-23 there were no hazard reduction burns on Bloomfield controlled land surrounding the Mining Lease or on the Mining Lease.

In consultation with the RFS further areas have been identified for hazard reduction burns on land surrounding the mine in the near future. Hazard reduction burning will continue in consultation with the RFS.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Listed in Table 6 below are the actions required from the review of the 2021 Annual Review. Also listed are the relevant sections of the report that describe the measures taken in response to these actions.

Table 6: Action Required from 2021 Annual Review

Action Required	Requested by	Status	Report Section
None			

6 ENVIRONMENTAL PERFORMANCE

6.1 Meteorological Monitoring

Bloomfield Colliery has installed a continuously operating meteorological station in accordance with Project Approval 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 2022-23 reporting period and annual average data is shown in Figure 2. The total rainfall for the calendar year 2022 was 1587 mm. This was 649 mm above the annual average of 938 mm.

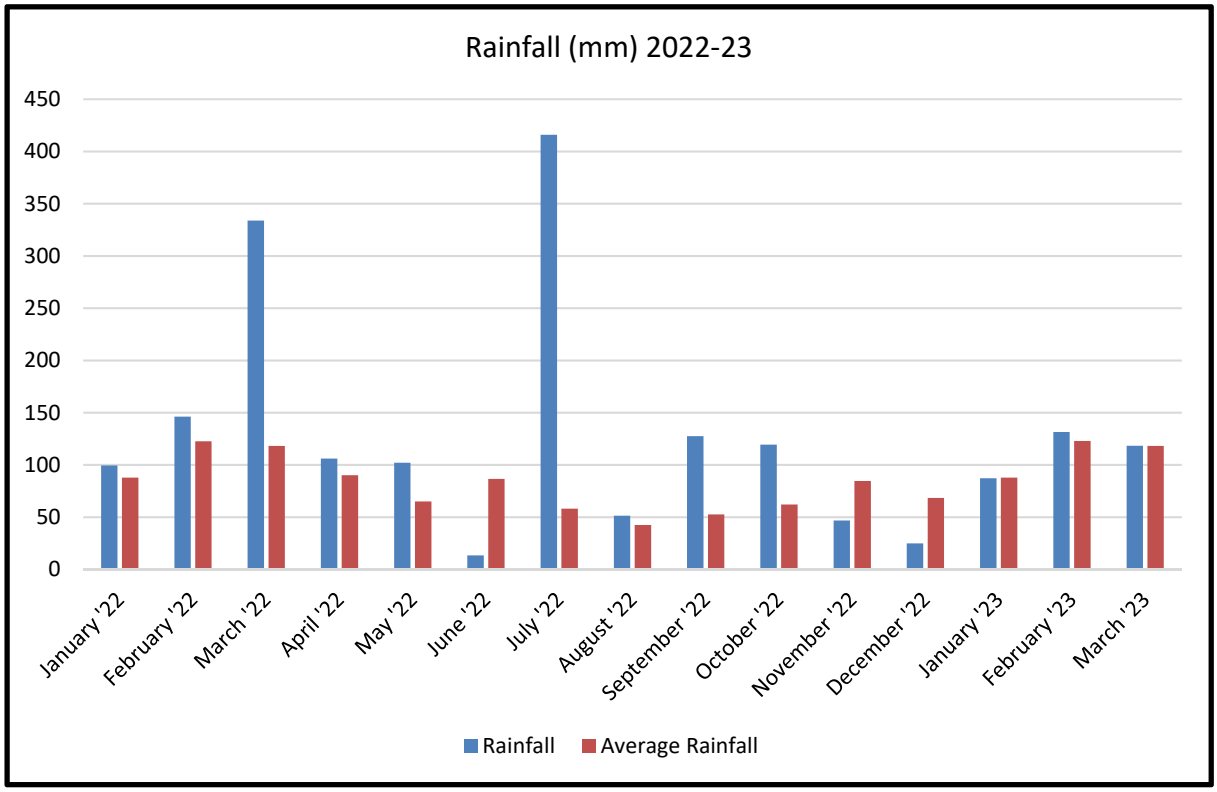


Figure 2: Rainfall 2022-23

A summary of the rainfall data for the past 34 years is presented in Table 7.

Table 7: 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
2016	467	32	48	47	12	89	55	77	69	46	33	67	1041
2017	60	72	216	97	14	126	2	6	12	78	65	48	795
2018	3	108	189	56	5	101	3	28	50	116	89	102	850
2019	28	49	178	44	19	86	28	50	79	15	18	5	600
2020	84	254	110	44	53	76	165	37	36	158	59	162	1238
2021	115	118	326	49	41	59	22	59	27	77	254	70	1217
2022	99	146	334	106	102	13	416	51	127	119	47	25	1587
2023	87	131	118										
Average	**88**	**123**	**118**	**90**	**65**	**87**	**58**	**42**	**53**	**62**	**85**	**68**	**938**

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 3 shows the annual windrose generated for the site for 2022.

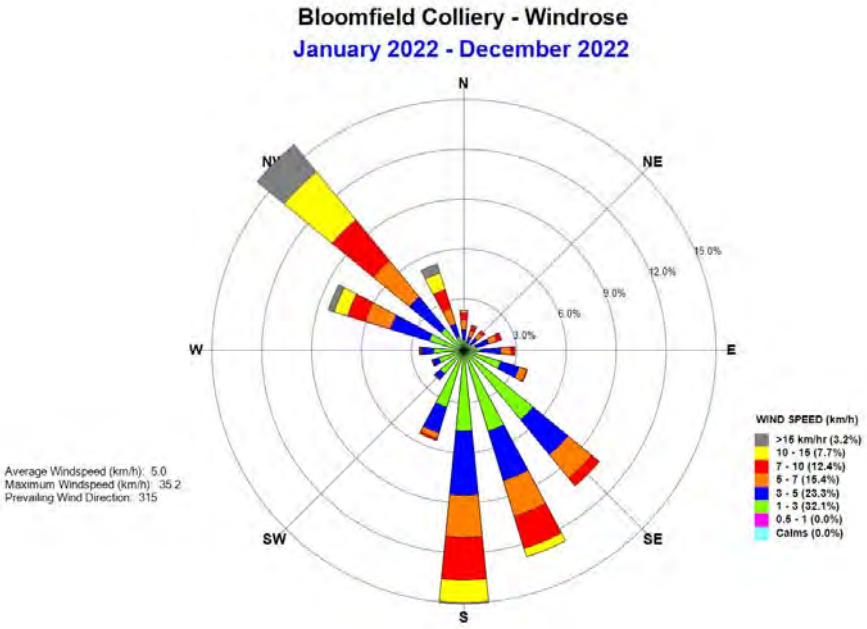


Figure 3: Windrose for Bloomfield Colliery 2022

6.2 Air Quality

6.2.1 Environmental Management

An Air Quality Monitoring Program has been prepared and approved by DPE in accordance with Project Approval 07_0087.

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 modelling 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 High Volume Air Samplers (HVOL) located on and around the mine lease area. The locations are listed in Table 8 and are shown in Plan 1. Samples are collected by independent environmental consultants and analysed by a NATA registered laboratory.

During 2018 the modified Project Approval (07_0087_Mod 4) included a condition to monitor for PM2.5 dust emissions. PM2.5 monitoring commenced in November 2018.

Table 8: Dust Monitoring Sites

Site	Location
On Mining Lease	
D1	Adjacent to Buttai Reservoir
D2	Adjacent to Main Haul Road
D3	Communications Tower
D4	Adjacent John Renshaw Drive
D9	Shamrock Lane
Off Mining 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

6.2.2 Environmental Performance

Dust Deposition

Table 9 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^2/month.

Table 9: Annual Average Dust Deposition

Insoluble Solids (g/m^2/month)										
Site	**D1**	**D2**	**D3**	**D4#**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**
Jan-22	0.6	0.7	1.1	0.9	1.8	1.2	1.1	1.3	3.1	0.4
Feb-22	1.1	0.9	2.7	1.1	1.2	1.5	2.0	1.5	0.7	0.9
Mar-22	0.5	0.6	3.6	0.8	0.8	2.5	2.1	0.7	0.8	0.6
Apr-22	0.6	0.6	1.5	0.9	0.6	0.5	0.8	0.9	0.3	0.4
May-22	0.3	0.4	0.3	0.6	0.5	0.6	0.6	0.3	0.3	0.2
Jun-22	0.2	0.5	0.3	0.5	1.1	0.7	0.9	0.5	0.5	0.3
Jul-22	0.8	0.4	0.6	0.6	0.6	0.5	0.3	0.3	0.7	0.4
Aug-22	0.4	0.3	0.4	0.5	0.8	0.6	0.6	0.6	0.5	0.7
Sep-22	0.6	0.5	0.7	0.8	1.0	0.8	0.5	0.4	0.8	0.7
Oct-22	0.4	0.6	0.4	0.4	0.2	1.2	0.5	0.7	0.4	0.4
Nov-22	1.5	0.9	0.9	0.6	1.6	1.6	1.3	1.4	1.3	0.9
Dec-22	0.4	0.9	1.0	0.9	0.6	0.9	0.8	0.8	0.6	0.6
Jan-23	1.0	0.4	2.4	0.5	0.5	0.8	0.6	0.8	0.3	0.4
Feb-23	0.5	0.3	0.8	0.4	0.3	0.4	0.5	0.4	NR	0.3
Mar-23	0.7	0.6	0.6	0.7	0.2	0.6	0.9	0.8	0.9	1.2
Annual Averages										
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
2016	0.7	1.3	1.1	1.3	1.3	1.5	1.1	1.4	0.8	2.2
2017	0.6	1.4	1.0	1.3	1.4	1.2	1.4	1.9	0.9	1.6
2018	0.9	1.2	1.0	1.3	1.7	1.6	1.5	1.3	0.9	1.6
2019	1.4	1.4	1.8	1.7	1.4	2.0	2.3	1.8	1.4	1.6
2020	1.1	1.2	1.1	1.8	1.9	1.5	1.9	1.4	1.2	1.6
2021	0.6	0.6	1.0	1.0	1.1	1.4	0.8	0.8	0.7	1.9
2022-23	0.6	0.6	1.2	0.7	0.8	1.0	0.9	0.8	0.8	0.6
Overall*	1.5	1.6	1.5	2.4	1.4	2.0	1.6	1.5	1.1	1.8
EPL 396 Limit	**4**									

Notes: ** - Overall annual average since 1997.*
C - Denotes result contaminated with insects, vegetation or bird droppings and considered non standard.
 # - 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.
NR – No Result. Equipment damaged.

All dust deposition gauges recorded annual averages below the 4g/m^2/month limit for 2022-23. The long term average annual dust deposition rates are all below the required impact assessment criteria.

Results are graphically provided in Appendix A. Figure A1 in Appendix A shows yearly results since Project Approval (PA 08_0087). The graph shows a general downward trend over the past 10 years. 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.

PM2.5, PM10 and TSP

Table 10 summarises the PM2.5, PM10 and TSP monitoring results during the reporting period and detailed results are provided in Table A1 in Appendix A.

Table 10: PM2.5, PM10 and TSP Results Summary 2022

	PM2.5 24hr (ug/m^3)	**PM10 24hr (ug/m^3)**	**TSP (ug/m^3)**
Maximum 24hr Average result 2022	10	23	50
Project Approval Impact Assessment Criteria 24hr Average	***25***	***50***	***-***
Annual Average 2022	3	10	21
Project Approval Impact Assessment Criteria Annual Average	***8***	***25***	***90***

Due to the close proximity of John Renshaw Drive to the HVOLs (Plan 1) some impacts from vehicular emissions will affect the monitoring results.

The annual average TSP result recorded was below the 90 ug/m^3 limit for 2022.

The annual average PM10 result recorded was below the 25 ug/m^3 limit for 2022. The maximum PM10 24-hour average result recorded was below the 50 ug/m^3 limit for 2022.

The annual average PM2.5 result recorded was below the 8 ug/m^3 limit for 2022. The maximum PM2.5 24-hour average result recorded was below the 25 ug/m^3 limit for 2022.

Figures A2, A3 and A4 in Appendix A shows yearly results of TSP, PM10 and PM2.5 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.

Dust Predictions

Dust modelling predictions conducted as part of the Environmental Assessment (PA 07_0087 Mod 4) are shown in Table 11. Monitoring during the reporting period indicates that dust results are below 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 to the mine site than Resident N (refer Plan 1) and as a result the dust results are slightly higher. Dust deposit gauge D10 is located adjacent to John Renshaw Drive.

Table 11: Dust Prediction

Resident ID: N	EA Predictions	2022 Actual
Dust Deposition D10 (g/m^2/month)	1.5	0.5
PM2.5 (ug/m^3) (Annual Average)	6	3
PM10 (ug/m^3) (Annual Average)	16	10
TSP (ug/m^3) (Annual Average)	33	21

Greenhouse Gas Emissions and Predictions

For this report, greenhouse gas (GHG) emissions are characterised into two different scopes, including Scope 1 (direct emissions) and Scope 2 (indirect emissions from purchasing electricity). Bloomfield is required to report its GHG emissions in accordance with the requirements of the *National Greenhouse and Energy Reporting Act 2007*.

Greenhouse gas emission predictions conducted as part of the Environmental Assessment (PA 07_0087 Mod 4) are shown in Table 12. NGERS reporting during the reporting period provided in Table 12 shows that greenhouse gas emissions are below predicted levels.

Table 12: Greenhouse Gas Emissions and Predictions

	CO_2-e emissions (t CO_2-e)	
	Scope 1 Emissions	**Scope 2 Emissions**
Annual Prediction (as per EA)	23,079	5,549
Actual Emissions 2021-2022*	20,055	4,868

Note: * NGERS reporting year

6.2.3 Reportable Incidents

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

6.2.4 Further Improvements

The air quality monitoring program will be continued in accordance with Air Quality Monitoring Plan requirements.

Two additional Dust Deposition Gauges are proposed to be established to the south-east and north-west of the operations during 2023-2024 period. The PM2.5 results and location of the HVOL (refer Plan 1) will be reviewed throughout 2023-24 to assess impacts on the results from vehicle traffic along John Renshaw Drive. If impacts are determined from vehicle emissions, a revised location will be sought for approval by DPE via revision to the Air Quality Management Plan and from NSW EPA via variation to the EPL 396.

6.3 Biodiversity

6.3.1 Environmental Management

The Environmental Assessment included potential impacts associated with the clearance of vegetation. Any clearing of vegetation within the project area must be undertaken in accordance with the requirements of the Project Approval, Rehabilitation Management Plan, Mining Operations Plan and Statement of Commitments.

6.3.2 Environmental Performance

Vegetation Clearing

Approximately 5 Ha of vegetation was cleared for Bloomfield mining operations during the reporting period. A qualified ecologist carried out a preclearance habitat tree assessment on the area. Twenty-seven habitat trees/dead stags were identified and marked. Following the assessment, Bloomfield cleared around the identified habitat trees and allowed them to stand for a number of days, encouraging any fauna species present to self-relocate.

The twenty-seven habitat trees identified were felled under the supervision of the same ecologist. All trees were felled using the 'soft-fell' technique. Before commencing, this technique was explained to the excavator operator and positive communication between the operator and ecologist was held throughout soft- felling. For this process, each tree was nudged several times to allow any fauna species to self-relocate before being felled as gently as possible. All hollows and potential habitat fissures were inspected after each tree was soft-felled.

During the tree felling operation, two arboreal mammal species were extracted from natural hollows in one habitat tree. One Common Brushtail Possum and 2 Sugar Gliders were found, and all were relocated to immediately adjacent forest and released. No evidence of injury was observed on each individual found.

Biodiversity Offset Area

A Biodiversity Offset Management Plan has been prepared and approved by DPE in accordance with Project Approval requirements for the operation of the mine. 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 at Congewai adjacent to the Watagan State Forest. The western boundary abuts a part of Watagan State Forest on the eastern side of the Corrabare Range. Figure 4 shows the location of the Biodiversity Offset Area.

Consultation is underway with the NSW Biodiversity Conservation Trust regarding entering into a conservation agreement over the Biodiversity Offset land under Part 4, Division 12 of the *National Parks and Wildlife Act 1974*.

In accordance with the Biodiversity Offset Management Plan a monitoring program has been implemented to assess weeds infestations and feral animals. During 2022-23 a visual

inspection for weeds was undertaken and some broadleaf were present in wet drainage lines. No control was recommended at this stage.

Three motion cameras were installed for a 15 day period to determine the presence of feral animals. No wild dogs or foxes were present during the monitoring period. A Sambar Deer was recorded. The details were compared against the CSIRO guidelines. The abundance score for the deer was Low (2.6%). Emu, Wombats, Brush tailed Possums and Macropods were the only native species recorded.

6.3.3 Reportable Incidents

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

6.3.4 Further Improvements

Further details on progress of the implementation measures of the Biodiversity Offset Area will be provided in the next Annual Review. Further consultation is underway with the NSW Biodiversity Conservation Trust regarding entering into a conservation agreement.

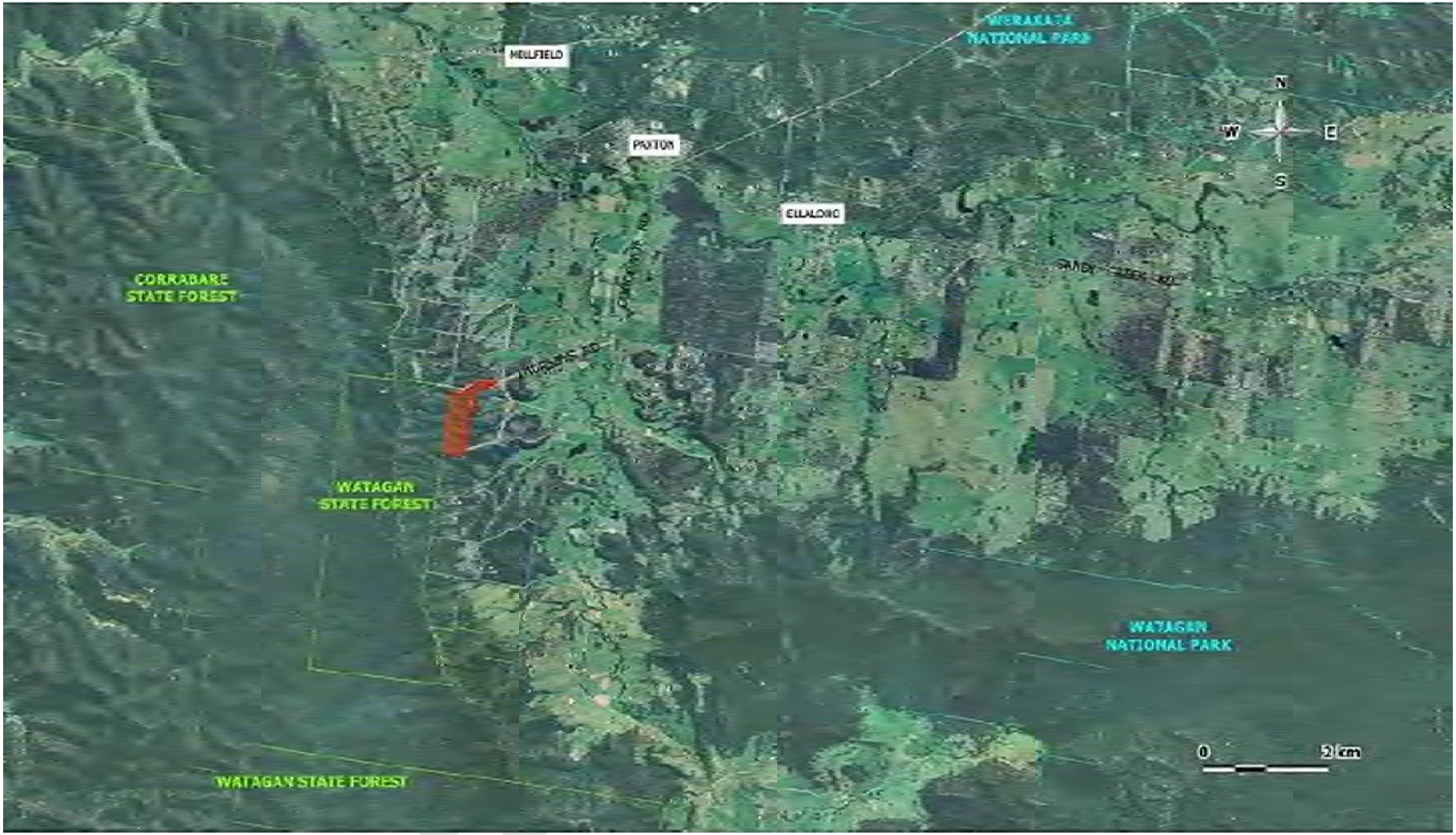


Figure 4: Biodiversity Offset Area

6.4 Blasting

6.4.1 Environmental Management

A Blast Monitoring Plan (BMP) has been prepared and approved by DPE in accordance with Project Approval requirements for the operation of the mine. Blasting activities are licensed under EPL 396. Both the EPL and Project Approval 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 of 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. Ground vibration monitoring is also conducted at the Buttai Reservoir in consultation with Hunter Water.

The use of a predictive meteorological modelling software program (ENVMET) 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.

6.4.2 Environmental Performance

All blast results for the reporting period are included in Appendix B and are summarised in Table 13.

During the reporting period a total of 49 blasts were initiated on the site. No blasts exceeded 115 dB or 120 dB blast overpressure limits. No blasts exceeded the 5mm/sec or 10mm/sec ground vibration limits.

Table 13: Blast Monitoring Summary

Blasting Criteria Limits	Allowable Exceedance[1]	Results 2022-23
Airblast Overpressure Level dB (Lin Peak)		
>115	5 %	0 %
>120	0 %	0 %
Ground Vibration Peak Particle Velocity (mm/s)		
>5	5 %	0 %
>10	0 %	0 %

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

Under the Project Approval blasting must be carried out between 9 am and 5 pm, Monday to Saturday, with no blasting on Sundays and Public Holidays. A maximum of two blasts a day and five blasts a week (averaged over 12 months) are allowed. Appendix B provides the dates and times of all blasts for the reporting year which demonstrates that this Project Approval condition has been met.

Blast modelling predictions conducted as part of the Environmental Assessment (PA 07_0087 Modification 4) are shown in Table 14. The approach of the assessment was to determine the limiting factors to the blast design with the aim of achieving the relevant criteria at all locations. Calculations were conducted using the respective 5% site law equations in order to determine the Maximum Instantaneous Charge (MIC).

For each site law, using statistical analysis of the measured data and assuming a log-normal distribution of data, a 95% confidence line and 50% confidence levels were determined. The ground vibration and airblast criteria cater for the inherent variation in emission levels from a given blast design by allowing a five percent exceedance of a general criterion up to a (never to be exceeded) maximum. Correspondingly, the "5% exceedance" (95% confidence) levels have been used in the blast emission site laws.

The levels of airblast and ground vibration have been predicted using the developed site laws for Bloomfield Colliery. The maximum instantaneous charge (MIC) may exceed (or be less than) the values in Table 14, depending on the location of the area being mined and its relation to the nearest affected receiver.

Table 14: 5% MIC and Blast Predictions

Year	Approximate Distance to Nearest Receiver (m)	MIC Based on Ground Vibration or Airplast (kg)	Blast Emission Prediction Based on MIC	
			Predictive PVS Ground Vibration (mm/s)	Predicted Airblast Level (dB Linear)
2018	1500	280	1.7	115
2021	1200	145	1.4	115
2025	1500	280	1.7	115

Monitoring results summarised in Table 15 for the reporting period indicates that the maximum and mean results are below predicted levels at the nearest receivers.

Table 15: Blast Results Summary

Location	N – Elliotts		M - MacNaughtons		H - Mt Vincent Rd		G - Richards	
	Airblast dBL	Vibration mm/s	Airblast dBL	Vibration mm/s	Airblast dBL	Vibration mm/s	Airblast dBL	Vibration mm/s
Max	111.7	0.9	110.8	0.8	106.4	0.7	110.6	1.1
Mean	103.1	0.3	101.0	0.3	95.7	0.3	93.7	0.3

6.4.3 Reportable Incidents

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

6.4.4 Further Improvements

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

6.5 Operational Noise

6.5.1 Environmental Management

A Noise Monitoring Plan (NMP) has been prepared in accordance with the conditions of the Project Approvals (PA 07_0087 & PA 05_0136 “Bloomfield Site”). The noise monitoring plan has been approved by DPE. Quarterly noise monitoring has been undertaken in accordance with the monitoring plan.

In accordance with the requirements under Schedule 3 Condition 3, the use of a predictive meteorological modelling software program is utilised to assist in planning mine operations. The software incorporates weather models and regional weather station data to predict daily weather events that may exacerbate noise impacts from operations. During 2016 the existing predictive meteorological modelling software program was upgraded to a predictive noise emissions management tool for the mine. In addition to meteorological data it also incorporates terrain data, mining equipment locations and aerial photographs. This predictive model is reviewed on a daily basis and is the main tool for planning noise impacts of daily operations.

During 2022-23 an additional attended noise monitoring location was added to the monitoring program. This is known as location J – Parish Road, Thornton (see Plan 1). The monitoring of location J is in accordance with the requirements under Abel PA 05_0136 “Bloomfield Site” rail spur noise (Sch. 3 Cond. 3). The “Bloomfield Site” Noise Management Plan will be updated to reflect this additional site in accordance with Sch.5 Cond. 5 of the Abel Project Approval.

6.5.2 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 and PA 05_0136 (Abel Mine) at six monitoring locations (see Plan 1). Monitoring results are summarised in Tables 16 and 17. Copies of the noise reports are available upon email request to info@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. Night time sleep disturbance criteria ($LA1_{(1min)}$) were in compliance during all monitoring events.

Table 16: Summary of Attended Noise Monitoring Results

Location	Estimated Bloomfield LAeq(15minute) Contribution			Consent Conditions LAeq(15 minute)			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
March 2022 Quarter Results									
F – Black Hill Road, Black Hill[1]	Inaudible at all times			35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	28	Inaudible	39	42	37	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	<30	28	<25	35	35	35	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	<30	28	<25	40[2]	40[2]	40[2]	Yes	Yes	Yes
M – John Renshaw Drive, Buttai	<35	33	Inaudible	39	39	37	Yes	Yes	Yes
N – Lings Road, Buttai	Inaudible	41	29	42	42	35	Yes	Yes	Yes
June 2022 Quarter Results									
F – Black Hill Road, Black Hill[1]	Inaudible	Inaudible	<25	35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	32	Inaudible	39	42	37	Yes	Yes	Yes
J – Parish Drive. Thornton	Inaudible at all times			55[2]	45[2]	40[2]	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	35	Inaudible	35	35	35	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	35	Inaudible	40[2]	40[2]	40[2]	Yes	Yes	Yes
M – John Renshaw Drive, Buttai	Inaudible	Inaudible	35	39	39	37	Yes	Yes	Yes
N – Lings Road, Buttai	Inaudible at all times			42	42	35	Yes	Yes	Yes
September 2022 Quarter Results									
F – Black Hill Road, Black Hill[1]	Inaudible	Inaudible	<30	35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	39	Inaudible	39	42	37	Yes	Yes	Yes
J – Parish Drive. Thornton	Inaudible at all times			55[2]	45[2]	40[2]	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible at all times			35	35	35	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible at all times			40[2]	40[2]	40[2]	Yes	Yes	Yes
M – John Renshaw Drive, Buttai	Inaudible	Inaudible	31	39	39	37	Yes	Yes	Yes
N – Lings Road, Buttai	Inaudible	35	Inaudible	42	42	35	Yes	Yes	Yes

1 - Mine owned property
2 – Abel Coal Mine (PA 05_0136) noise criteria.

Location	Estimated Bloomfield LAeq(15minute) Contribution			Consent Conditions LAeq(15 minute)			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
December 2022 Quarter Results									
F – Black Hill Road, Black Hill[1]	Inaudible at all times			35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible	Inaudible	30	39	42	37	Yes	Yes	Yes
J – Parish Drive. Thornton	Inaudible at all times			55[2]	45[2]	40[2]	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible at all times			35	35	35	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible at all times			40[2]	40[2]	40[2]	Yes	Yes	Yes
M – John Renshaw Drive, Buttai	Inaudible	Inaudible	33	39	39	37	Yes	Yes	Yes
N – Lings Road, Buttai	<35	<35	Inaudible	42	42	35	Yes	Yes	Yes
March 2023 Quarter Results									
F – Black Hill Road, Black Hill[1]	Inaudible	Inaudible	34	35	35	35	Yes	Yes	Yes
G – Buchanan Road, Buchanan	Inaudible at all times			39	42	37	Yes	Yes	Yes
J – Parish Drive. Thornton	Inaudible at all times			55[2]	45[2]	40[2]	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	33	30	35	35	35	Yes	Yes	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	33	30	40[2]	40[2]	40[2]	Yes	Yes	Yes
M – John Renshaw Drive, Buttai	Inaudible	Inaudible	32	39	39	37	Yes	Yes	Yes
N – Lings Road, Buttai	Inaudible	<35	<25	42	42	35	Yes	Yes	Yes

1 - Mine owned property
2 – Abel Coal Mine (PA 05_0136) noise criteria.

Table 17: Summary of Sleep Disturbance Results

Location	Estimated Bloomfield LA1(1 minute) Contribution	Consent Conditions LA1(1 minute)	Compliance
March 2022 Quarter Results			
F – Black Hill Road, Black Hill[1]	Inaudible	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
L – Kilshanny Ave, Ashtonfield	25	45	Yes
L – Kilshanny Ave, Ashtonfield	25	47[2]	Yes
M – John Renshaw Drive, Buttai	Inaudible	46	Yes
N – Lings Road, Buttai	33	46	Yes

Location	Estimated Bloomfield LA1(1 minute) Contribution	Consent Conditions LA1(1 minute)	Compliance
June 2022 Quarter Results			
F – Black Hill Road, Black Hill[1]	Inaudible	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	45	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	47[2]	Yes
M – John Renshaw Drive, Buttai	44	46	Yes
N – Lings Road, Buttai	Inaudible	46	Yes
September 2022 Quarter Results			
F – Black Hill Road, Black Hill[1]	<30	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
J – Parish Drive, Thornton	Inaudible	45	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	45	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	47[2]	Yes
M – John Renshaw Drive, Buttai	35	46	Yes
N – Lings Road, Buttai	Inaudible	46	Yes
December 2022 Quarter Results			
F – Black Hill Road, Black Hill[1]	<30	45	Yes
G – Buchanan Road, Buchanan	37	45	Yes
J – Parish Drive, Thornton	Inaudible	45	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	45	Yes
L – Kilshanny Ave, Ashtonfield	Inaudible	47[2]	Yes
M – John Renshaw Drive, Buttai	39	46	Yes
N – Lings Road, Buttai	Inaudible	46	Yes

Location	Estimated Bloomfield LA1(1 minute) Contribution	Consent Conditions LA1(1 minute)	Compliance
March 2023 Quarter Results			
F – Black Hill Road, Black Hill[1]	41	45	Yes
G – Buchanan Road, Buchanan	Inaudible	45	Yes
J – Parish Drive, Thornton	Inaudible	45	Yes
L – Kilshanny Ave, Ashtonfield	36	45	Yes
L – Kilshanny Ave, Ashtonfield	36	47[2]	Yes
M – John Renshaw Drive, Buttai	38	46	Yes
N – Lings Road, Buttai	28	46	Yes

1 – Mine owned property
2 – Abel Coal Mine (PA 05_0136) noise criteria.

6.5.3 Reportable Incidents

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

6.5.4 Further Improvements

The noise monitoring program will be continued in accordance with Noise Monitoring Plan requirements.

6.5.5 Noise Complaints

One complaint was received in relation to noise during 2022-23. Further information of the complaints is included in Section 9.

6.6 Aboriginal Heritage

6.6.1 Environmental Management

An Aboriginal Cultural Heritage Management Plan (ACHMP) was prepared in consultation with Mindaribba LALC. The plan was endorsed by OEH and approved by DPE.

6.6.2 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 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. A further 6 artefacts were salvaged and are being stored at Bloomfield Colliery.

In 2016 a further 3 Ha was cleared of vegetation and 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. An additional artefact was salvaged and is being stored at Bloomfield Colliery.

In 2022-23 an additional 5 Ha was cleared of vegetation and 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. An additional two stone artefacts were salvaged and are consistent with those previously identified and salvaged from within the Bloomfield project area. The artefacts are being stored at Bloomfield Colliery.

6.6.3 Reportable Incidents

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

6.6.4 Further Improvements

Any Aboriginal heritage evidence that is identified will be managed in accordance with the ACHMP and reported in the 2023-24 Annual Review. The Aboriginal Cultural Heritage Management Plan (ACHMP) is under review in consultation with Mindaribba LALC and is expected to be finalised in the near future.

6.7 Non-Aboriginal Heritage

6.7.1 Environmental Management

A Historic Heritage Conservation Management Plan for the Buttai No. 1 & 2 Reservoirs and Buttai Cemetery was approved by DPE in December 2021. The plan was prepared in consultation with OEH, Hunter Water and Cessnock Council.

6.7.2 Environmental Performance

Blasting undertaken as part of the mining process at Bloomfield Colliery is the key activity with the potential to adversely impact the Buttai Reservoirs No 1 and No 2 and Buttai Cemetery. Specifically, it is the ground vibration from blasting activities that has the potential to cause superficial and structural damage to these sites.

Buttai Reservoir

A blast monitor at the Buttai Reservoirs No 1 and No 2 has been established and used as the ground vibration monitoring location for comparison against trigger values. Two levels of trigger values for blast monitoring have been determined to be appropriate, as follows:

- Level 1 trigger set at >5mm/ sec ppv; and
- Level 2 trigger set at >10mm/ sec ppv.

During monitoring conducted in 2022-23 the maximum ground vibration recorded at Buttai Reservoir was 1.0 mm/s (average 0.3 mm/s). The blast results demonstrate that neither trigger level has been reached.

Buttai Cemetery

Monitoring of the Buttai Cemetery will consist of an annual visual inspection to identify any damage that may have been caused by blasting operations. An inspection was conducted in December 2022. The inspection compared the current condition of the items in the cemetery against the established baseline conditions outlined in the physical condition reports prepared by AECOM (2018). The inspection indicated the Buttai Cemetery was in an overall good condition with minor deterioration of the site due to recent extreme weather that consisted of dry and wet periods causing ground movement. No observed damage or change to the gravesites could be attributed to Bloomfield operations.

6.7.3 Reportable Incidents

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

6.7.4 Further Improvements

Monitoring of the Buttai No. 1 & 2 Reservoirs and Buttai Cemetery will continue in accordance with the approved Historic Heritage Conservation Management Plan.

7 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. Project Approval (05_0136) for the Abel Mine allows for the transfer of water to Bloomfield Colliery which is transferred to Lake Kennerson.

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 7.2 for details).

During the reporting period, fine coal rejects (tailings) was transferred for disposal to an approved prescribed tailings dam located within 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 18.

Table 18: Stored Water

	Volumes held (ML)		
	Start of Reporting Period	**End of Reporting Period**	**Storage Capacity**
Clean Water	90	90	90
Dirty Water			
Lake Kennerson	80	60	190
Lake Foster	40	30	45
Tailings Dam	190	280	600
S Cut (operational pit)	0	0	-
Creek Cut (operational pit)	0	0	-
Controlled Discharge Water (EPL 396)		2795	
Contaminated Water	NIL	NIL	NIL

Water taken during the water year 1 July 2021 to 30 June 2022 is provided in Table 19.

Table 19: Water Take

Water Licence	Source	Entitlement (ML)	Total (ML)
WAL41506	Sydney Basin – North Coast Groundwater	500	361

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.

Compensatory Water

In accordance with the Water Management Plan (WMP) if it is found that downstream water users have been adversely impacted the landholder will be consulted regarding the provision of an alternative water supply or some other appropriate agreement negotiated between the parties. To date it has not been necessary to provide of any ‘compensatory water’ to other users.

7.1 Surface Water

7.1.1 Environmental Management

A Water Management Plan (WMP) has been prepared and approved by DPE in accordance with Project Approval 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, 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, (EPL Licenced discharge point), 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 20 lists the monitoring sites. During 2021 two additional monitoring sites were included on Buttai Creek (a tributary of Wallis Creek) and are identified as WM14 and WM15.

Table 20: 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
	WM14	Buttai Creek
	WM15	Buttai Creek
On-site water storage	WM8	Lake Foster
	WM9	Lake Kennerson

Table 21 outlines the background surface water analysis program undertaken at Bloomfield Colliery.

Table 21: Background Water Analysis

Analyte	Monthly	Quarterly	6 Monthly
pH	✓	✓	✓
Electrical Conductivity (EC)	✓	✓	✓
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.

Licenced Mine Water Discharge (EPL 396)

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.

7.1.2 Environmental Performance

Background Monitoring Results

The background surface water monitoring results for the reporting period are shown in Figures 5 to 10 below. Figures 5 to 10 provide a graphical presentation of EC and pH which are the main surface water parameters, with the full data set provided in Appendix C.

Figure 5 and 6 shows EC and pH results for the Four Mile Creek sites. Figure 5 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 licenced mine discharges. 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 as historic underground workings.

As outlined later, there were 50 licensed discharges throughout the reporting period. EC levels vary due to rainfall, creek flow volumes and mine discharge therefore monthly and yearly trends cannot be assessed.

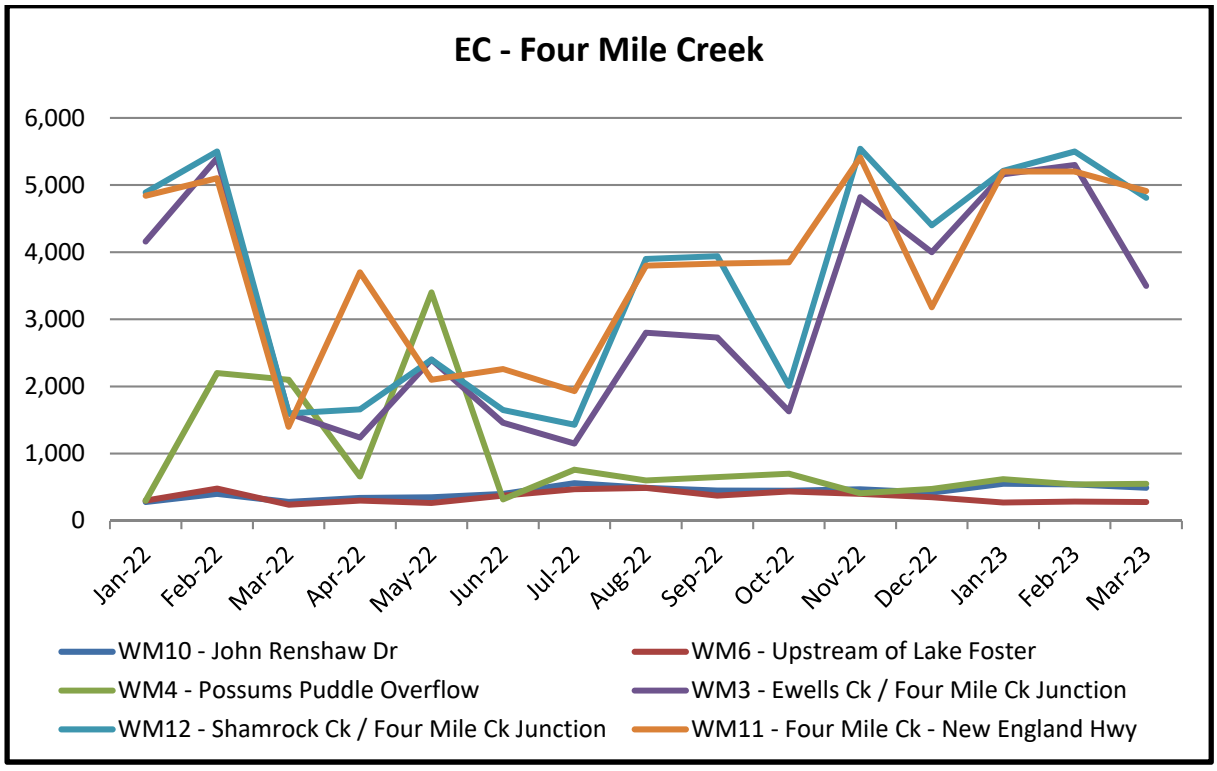


Figure 5: Four Mile Creek Catchment Electrical Conductivity

Figure 6 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.

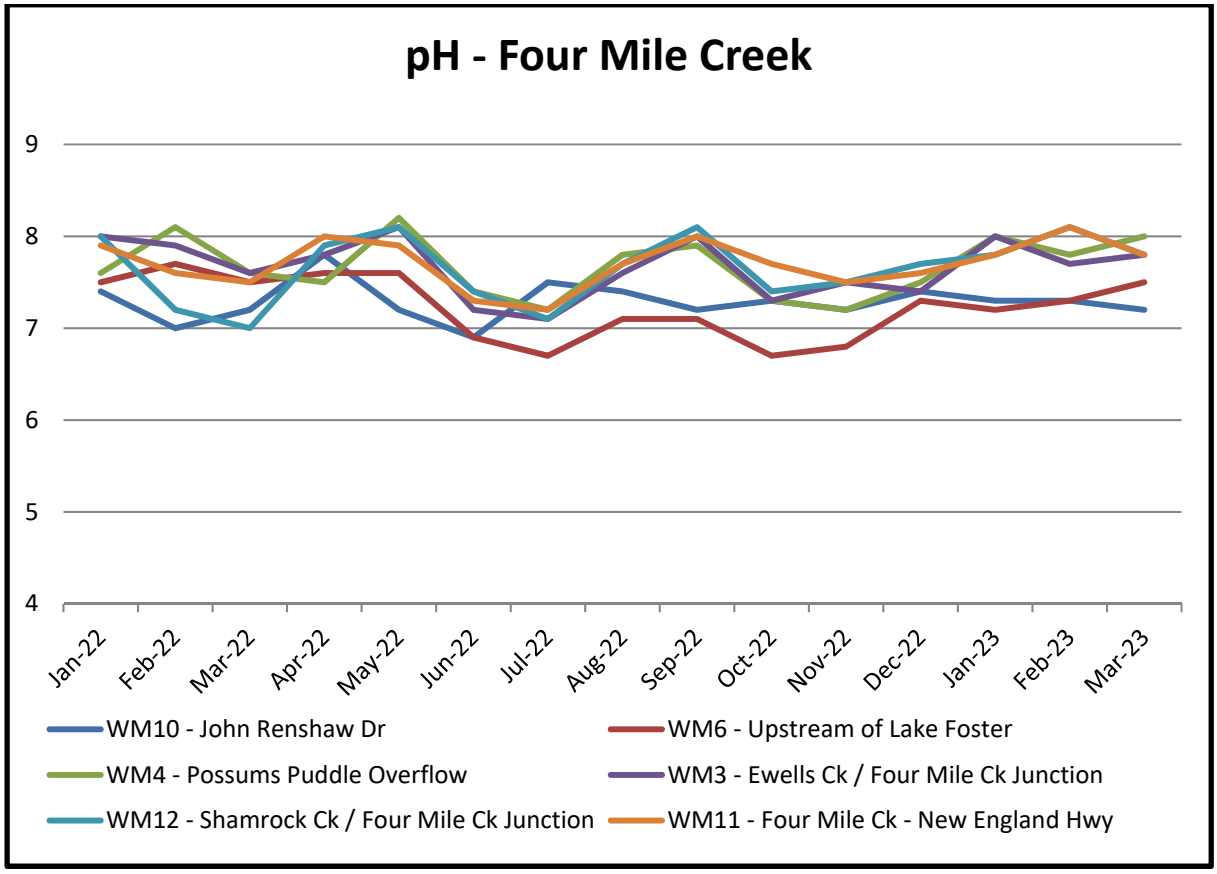


Figure 6: pH of Four Mile Creek

Figure 7 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, transfers from Abel Mine, 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.

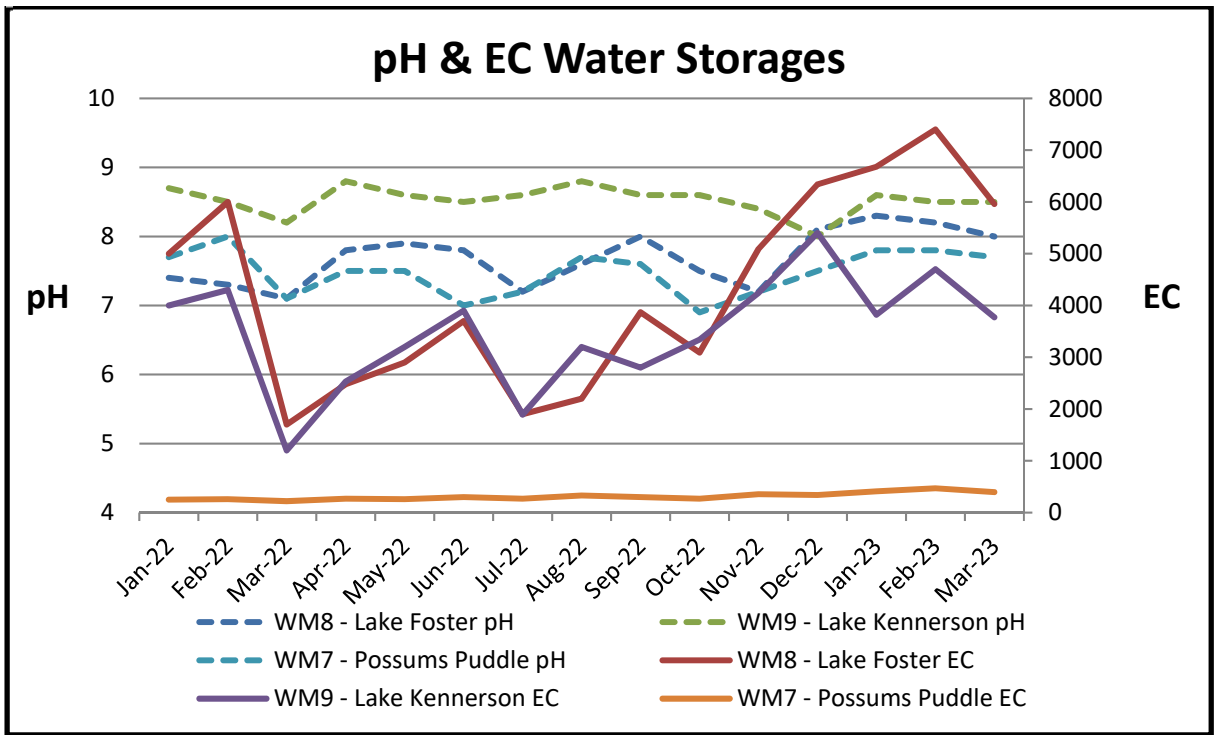


Figure 7: pH and EC in Site Water Storages

Figure 8 shows the pH and salinity levels in two Four Mile Creek tributaries. These tributaries are ephemeral streams and are often dry or not flowing (evaporating) resulting in gaps in the graphed data.

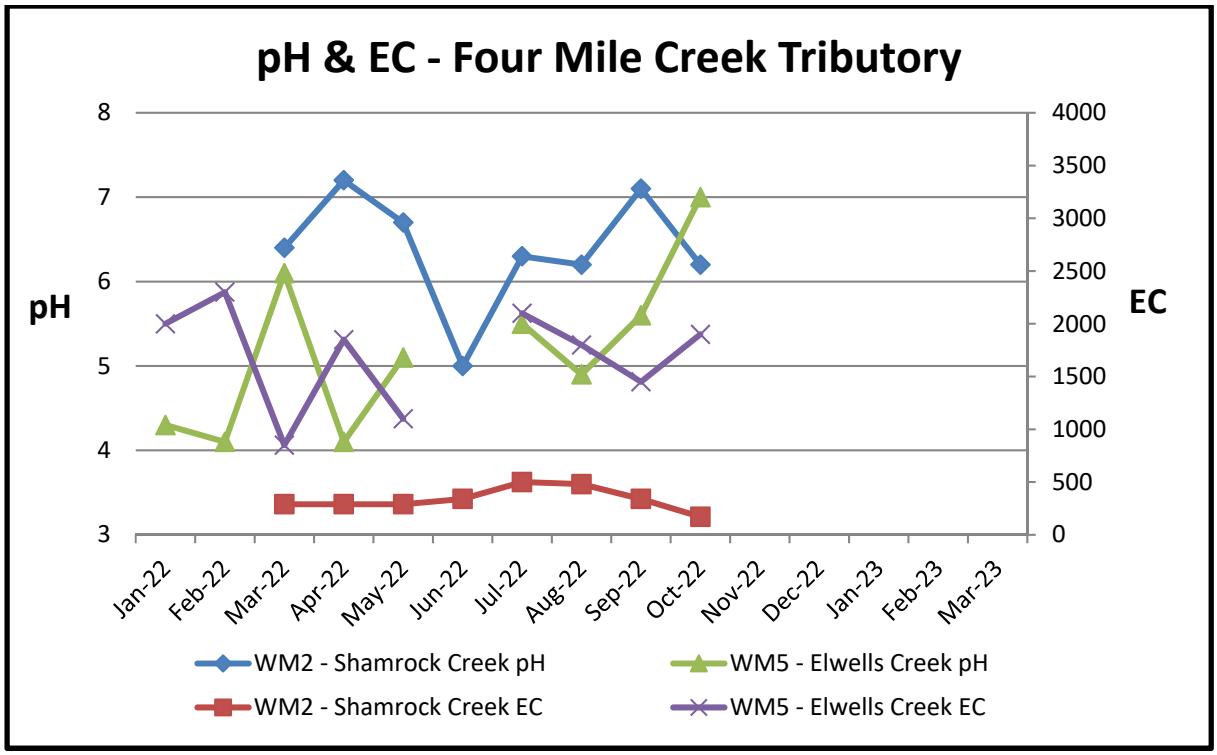


Figure 8: pH and EC in Four Mile Creek Tributary

Figure 9 shows the pH levels in Wallis Creek tributaries are generally consistent with ANZECC water quality guidelines (pH 6.5-8.5).

Previous results indicate that the surface flow adjacent to the old Rathluba pit top (Plan 1 – Location WM1) 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 or evaporating resulting in gaps in the graphed data.

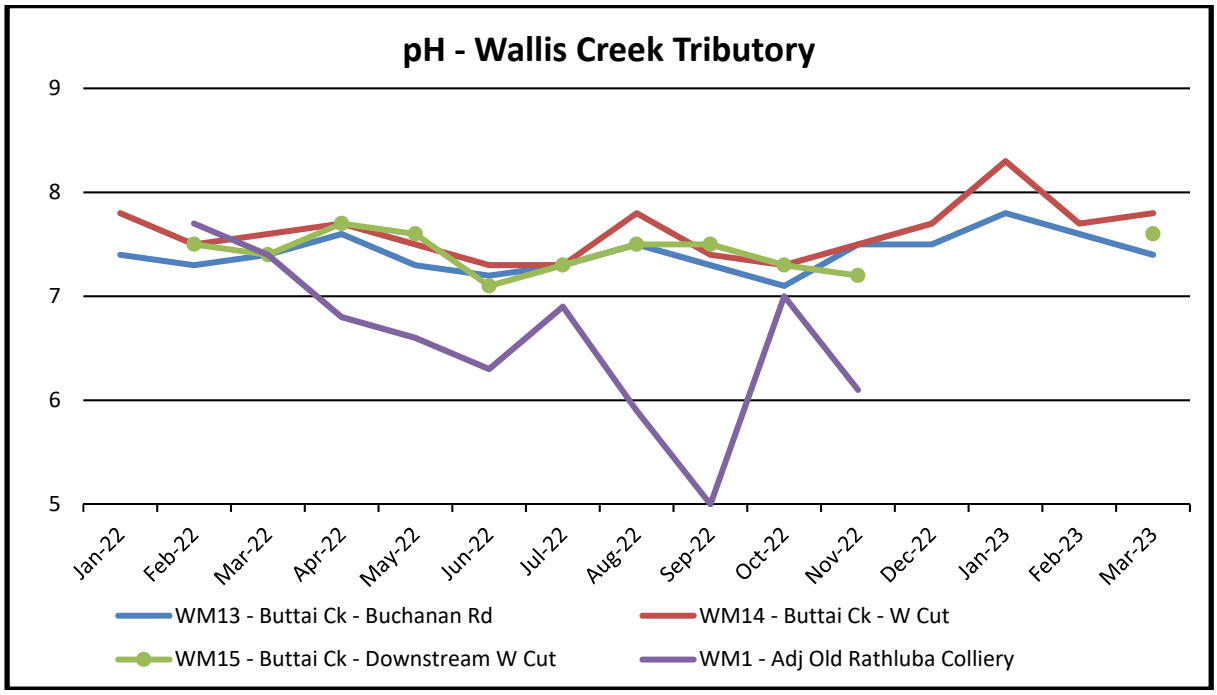


Figure 9: pH in Wallis Creek Tributary

Figure 10 shows the EC levels in Wallis Creek tributaries are generally consistent with ANZECC water quality guidelines (EC 125-2200). These tributaries are ephemeral streams and are often dry or not flowing (evaporating) resulting in gaps in the graphed data.

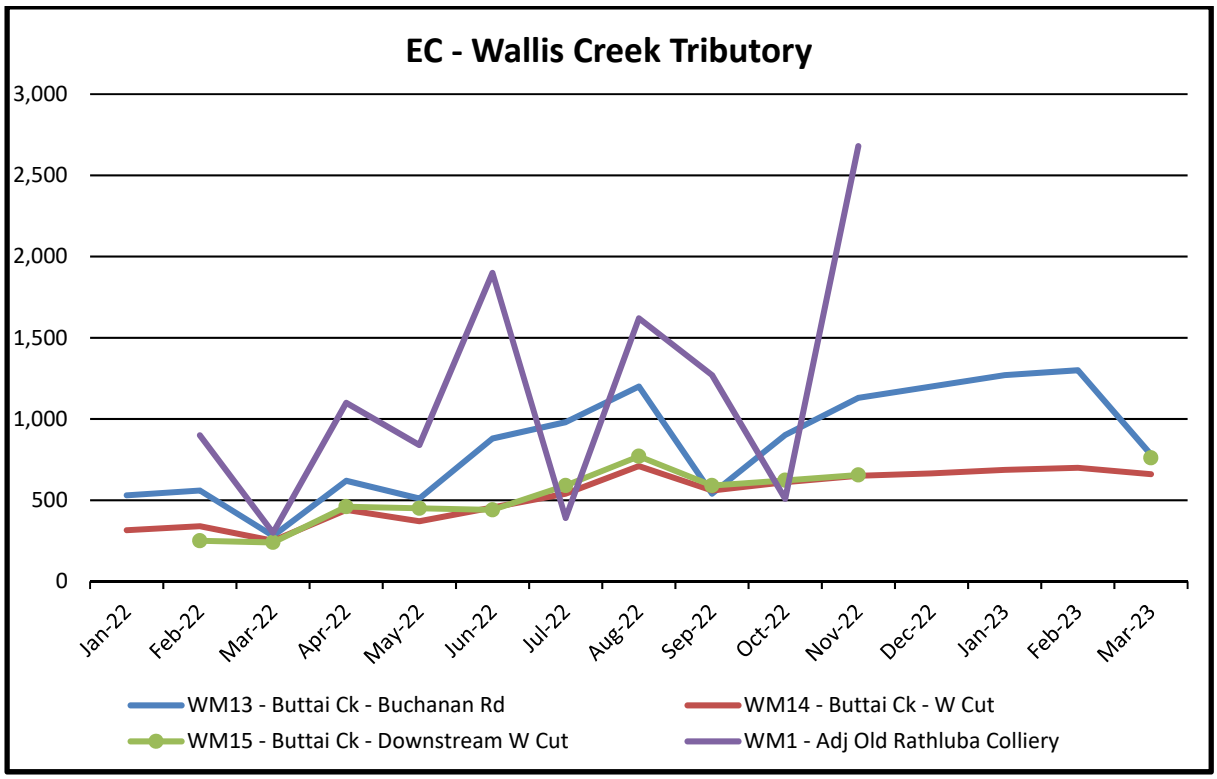


Figure 10: EC in Wallis Creek Tributary

The WMP details water quality trigger values for Buttai Creek (WM13) and Elwells Creek (WM5). Table 22 summarises the results, with the full data set provided in Appendix C. EC results were within either WMP or ANZECC 2000 trigger. The low pH levels at WM5 are attributed to stagnate evaporating pools during drier non-flow periods.

Table 22: Trigger Values

Sampling Site	pH	EC	TSS
WM5 – Elwells Creek	4.1 to 7.0	850 to 2300	5 to 7
WMP Trigger Level	5.2 - 8.0	430 - 4000	4 - 85
WM13 – Buttai Creek	7.1 to 7.8	280 to 1300	6 to 28
WMP Trigger Level	6.4 – 7.8	380 - 1100	5 - 45
ANZECC 2000 Trigger Level	6.5 - 8.5	125 - 2200	50*

* Standard Industry Criterion

Elwells Creek is an ephemeral tributary of Four Mile Creek. Sample site WM5 recorded a result of pH 4.1 in April. These ephemeral streams are often dry or not flowing (evaporating) resulting in gaps in the data.

The next downstream sampling site is WM3 located in Four Mile Creek below the junction with Elwells Creek (Plan 1). In April WM3 recorded a result of pH 7.8 (Figure 6). Throughout the reporting year WM3 pH results ranged from 7.1 to 8.1. This indicates that there is no detrimental impacts downstream of Elwells Creek.

Discharge Monitoring Results

There were 50 licensed discharge events conducted during the reporting period, with a total discharge volume of 2795 ML. Table 23 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 C1 in Appendix C.

Table 23: Discharge Sampling Analytical Results

DATE	pH	TOTAL SUSPENDED SOLIDS (mg/L)	CONDUCTIVITY (uS/cm)	IRON (mg/L)	DISCHARGE VOLUME (ML/day)
EPA Limits	**6.5-8.5**	**30**	**6,000**	**1**	**40**
Average	8.0	9	4,831	<0.05	33
Maximum	8.3	42	5,890	0.38	40
Minimum	6.5	5	628	<0.01	20

7.1.3 Environmental Incidents

There were three reportable surface water incidents during the 2022-23 reporting period. Refer to Section 11 for further details.

Due to a data logger failure the flow volume at EPA Identification No. 2 was unable to be calculated during a licensed discharge on 5 January 2022. The failure was reported to the EPA and Reference Number 9544 was issued. The cause of the failure was battery low power. There was no adverse impacts.

An incident was identified on 5/07/2022 where during the recent heavy rain period, a mine water dam (known as the Overland Dam) was passively spilling water. Two diesel pumps were operational prior to and during the spill, however due to the rainfall intensity and runoff during the event the pumps were unable to keep up with the inflow to the dam. The incident was reported to EPA Pollution Line and Incident no. 14098 was issued. An incident report subsequently provided to DPE, RR and NSW EPA.

On 6/07/2022 a water discharge was undertaken in accordance with EPL 396 conditions. During the discharge the Total Suspended Solids (TSS) exceeded the EPL limits. The incident was reported to the EPA Pollution Line and reference number 14326 was issued.

7.1.4 Further Improvements

Following the data logger failure on 5 January 2022 the monitoring unit was connected to mains power with battery backup to reduce any risk of recurrence of the issue.

Following the passive spill event on 5/7/2022 the constructed size of the Overland Dam was increased from 18.6 megalitres to 49.8 megalitres. Further increase in storage capacity is planned to occur within the 2023 – 2024 reporting period.

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

7.2 Ground Water

7.2.1 Environmental Management

A Water Management Plan (WMP) has been prepared and approved by DPE in accordance with Project Approval requirements for the operation of the mine. The WMP prescribes the process water source and supply requirements, site-water balance, storage, impact management and monitoring of groundwater in the vicinity of the mining operations.

Plan 1 shows the location of the groundwater monitoring sites and Table 24 outlines the groundwater monitoring program undertaken at Bloomfield Colliery.

Table 24: 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			✓

7.2.2 Environmental Performance

A graphical presentation of the groundwater levels for PD1 to PD8 are provided in Appendix D. Groundwater levels show the accumulated effects of long-term mining. Due to the long period of time mining has occurred on the site (170 years), there is no evidence to suggest what pre-mining groundwater levels might have been.

Predicted groundwater heads have been modelled to show groundwater levels and drawdown at the completion of mining in 2025. Drawdown as a result of mining activities are expected to reach a maximum in 2025.

Groundwater in the vicinity of the Mine Lease is saline and of negligible value for beneficial users. The Groundwater Impact Assessment concludes that no adverse impacts on groundwater supply, quality or any groundwater dependent ecosystems are expected as a result of the Project. Recorded EC and pH levels are relatively stable showing no real trend (Figures 11 & 12).

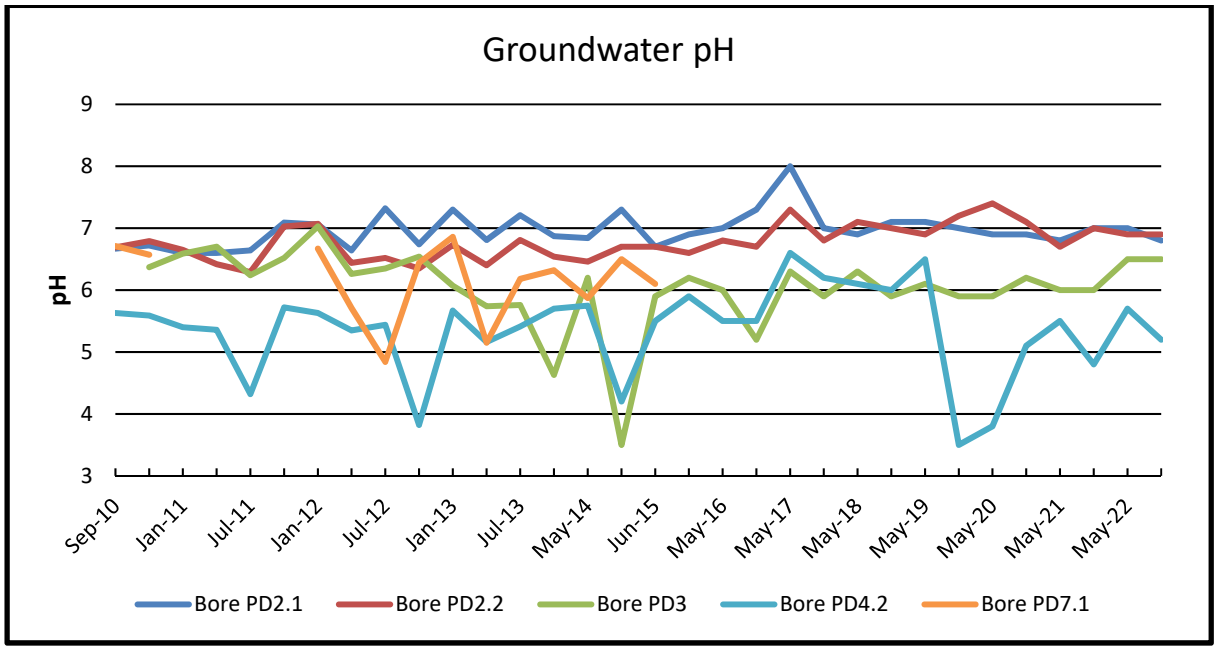


Figure 11: Groundwater pH

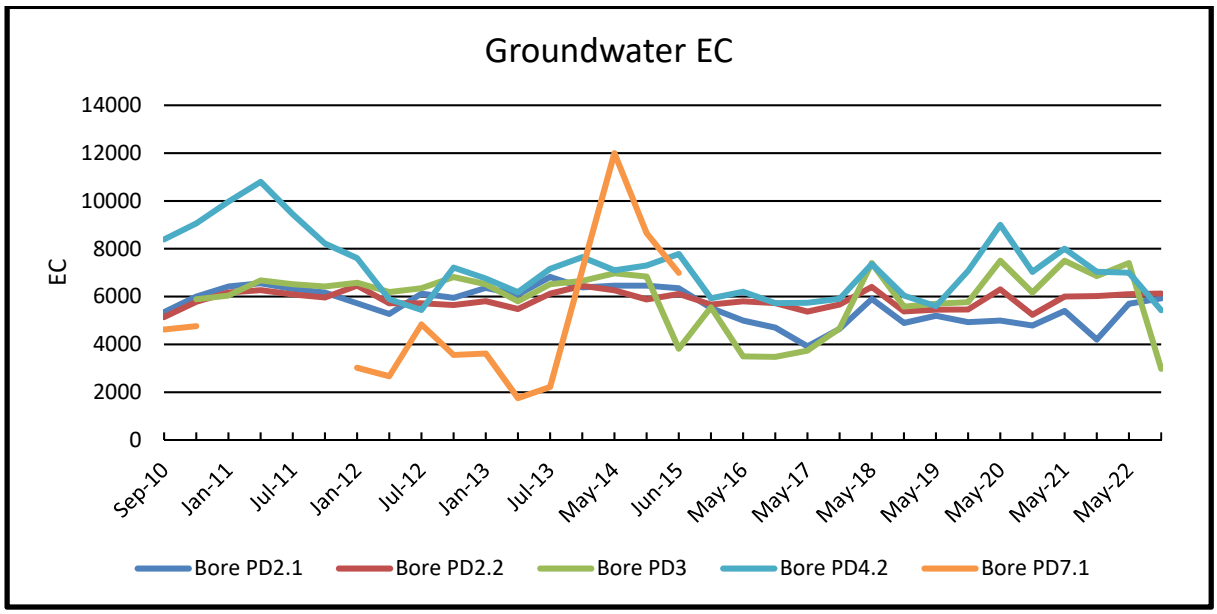


Figure 12: Groundwater EC

Predicted groundwater extractions via mine inflows are expected to peak in the water year 2020/21 at 482 ML. Table 18 shows the actual water take for the water year 2021/22 was 361 ML.

7.2.3 Environmental Incidents

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

7.2.4 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.

8 REHABILITATION

The NSW Resource Regulator has introduced new standard rehabilitation and reporting conditions on all mining leases. These new rehabilitation conditions will replace existing rehabilitation and environmental management conditions on current leases.

Under the new reporting conditions the mine leaseholder must prepare an Annual Rehabilitation Report and Forward Program for the mining area in accordance with the mining lease conditions in the form and way specified by the NSW Resource Regulator.

The Annual Rehabilitation Report and Forward Program must be submitted using the online form on the NSW Resources Regulator Portal.

The Annual Rehabilitation Report and the Forward Program are two separate documents and are provided in Appendix E.

9 COMMUNITY RELATIONS

9.1 Environmental Complaints

Two community complaints were received during the reporting period and a summary is provided below in Table 25. The complaints register for the reporting period is presented in Appendix F.

Table 25: Community Complaints Summary

Date	Issue	Type	Location
20-Jan-22	Blast	Resident	Louth Park
15-Jul-22	Noise	Resident	Ashtonfield

Figure 13 displays a comparison of complaints with previous reporting periods, which demonstrates a decline in the number of complaints received.

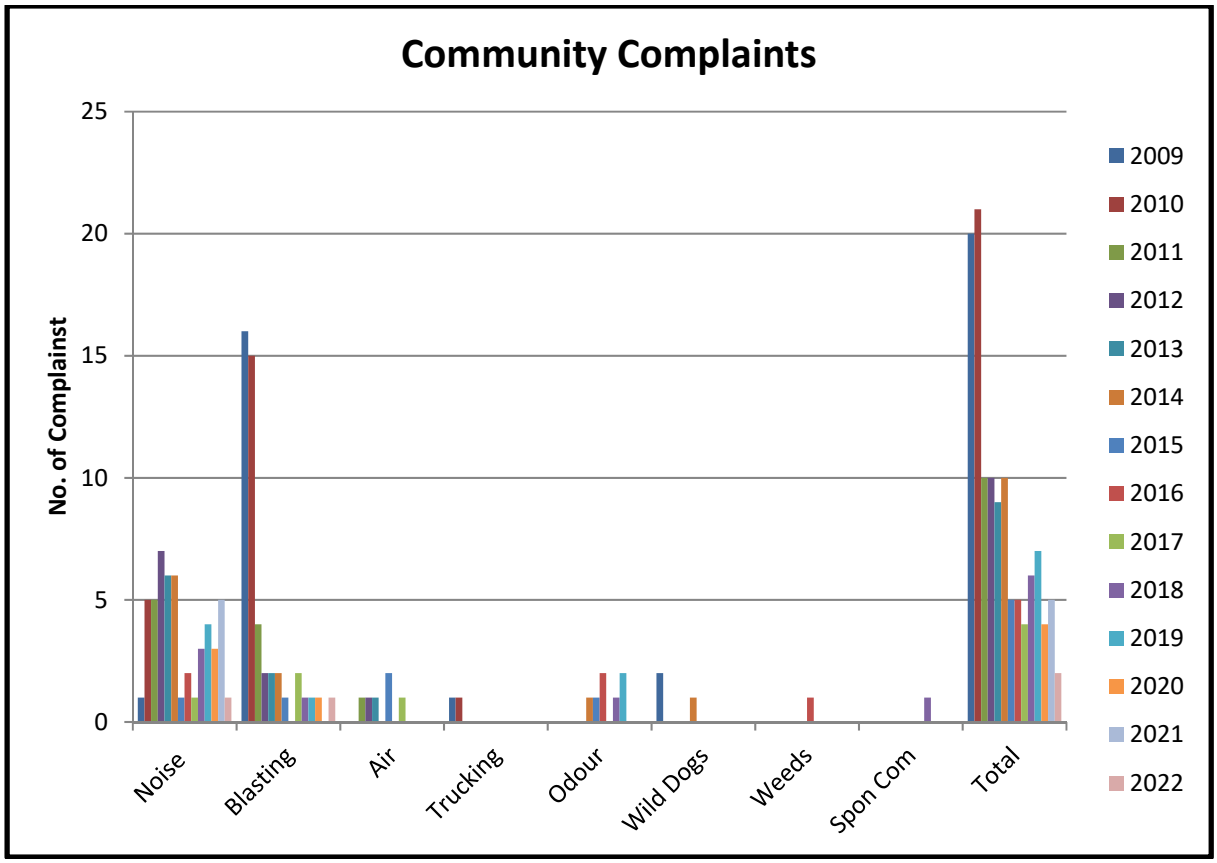


Figure 13: Community Complaints

A 24 hour Blasting and Community Information Line is established and noted on The Bloomfield Group website at https://www.bloomcoll.com.au/

Email: info@bloomcoll.com.au
24 hour phone line: 02 4930 2680

9.2 Community Liaison

9.2.1 Community Consultative Committee

In accordance with the Project Approval, a Community Consultative Committee (CCC) has been established. The CCC meets three times a year. The minutes of the CCC meetings can be viewed on the Bloomfield website.

https://www.bloomcoll.com.au/sustainability/environmental-management/bloomfield-assessments/ccc-minutes

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

9.2.2 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. .

9.2.3 Community Sponsorship

The Bloomfield Group has a commitment to support local community projects and activities. As part of this commitment, during 2022-23 financial sponsorship and donations were provided for the following local community groups, schools, charities and community events:

- Australia for UNHCR
- Australian Red Cross
- Bears of Hope Pregnancy & Infant Loss
- Black Hill Community Uniting Church
- Business Singleton
- CareFlight - Trauma Care Workshops
- Carries Place Domestic Violence and Homelessness Inc
- Darlington Rural Fire Brigade Fire & Emergency Public Fund
- Dress for Success Sydney (Newcastle branch)
- Dungog A&H Assoc
- East Maitland Public School P&C
- GIVIT Listed Ltd
- Hunter Medical Research Institute
- Hunter Melanoma Foundation
- Hunter Valley Boutique Winemakers
- Hunter Young Business Minds
- Legacy Singleton
- Lifeline Direct
- Maitland & Beyond Family History Inc

- Maitland Motor Cross Club
- Maitland Musical Society
- Maitland Polocrosse Club Incorporated
- Maitland Pony Club
- Maitland Regional Museum
- Maitland Rugby Blacks Netball
- Maitland Show
- Mai-Wel
- Mates in Mining
- Metford Primary School
- Motor Neurone Disease Research Australia
- Multiple Sclerosis
- Multiple Sclerosis Research
- NSW Mining
- NSW State Emergency Service (Singleton)
- PCYC Singleton
- Rotary Club of Singleton
- Salvation Army Red Shield Appeal
- Singleton Business Chamber
- Singleton Fire Brigade
- Singleton Golf Club
- Singleton Hospital
- Singleton Mens Shed
- Singleton Neighbourhood Centre
- Singleton Netball Association
- South Cardiff Junior Football Club
- St Johns Ambulance Singleton
- The Samaritans
- University of Newcastle
- Variety - Childrens Charity
- Westpac Helicopter Rescue Service
- Youth off the Streets

In addition to the above, in accordance with Schedule 2 Condition 14 of the Approval a Community Enhancement Fund with a minimum $500,000 was established and to be expended over the ten calendar years 2010-2019. The expenditure of this Fund was completed in 2019.

10 INDEPENDENT AUDIT

In accordance with the Bloomfield Project Approval (PA 07_0087) every three years Bloomfield is required to undertake an Independent Environmental Audit of the project. The last Independent Environmental Audit was conducted in 2021 and further detail was provided in the 2021 Annual Review.

Table 26 outlines the recommendations arising from the 2021 Independent Environmental Audit and an update on progress made in implementing the action plan developed as an outcome of the audit.

The next Independent Environmental Audit of Project Approval 07_0087 will be conducted in 2024.

Table 26: Audit Recommendations

Auditors Conclusions and Recommendations		Bloomfield Response	Timeline
Schedule 2 Condition 15	The revision of management plans going forward will need to consider the outcomes of the required consultation in further detail to ensure compliance with this condition. Further for future revisions of management plans it should be confirmed with Department of Planning, Industry and Environment upfront whether additional consultation is required with listed agencies (in addition to consultation that has occurred for the original versions of the management plans).	When future revisions of management plans are required Bloomfield will confirm with DPI&E upfront whether additional consultation is required with listed agencies.	As and when required.
Schedule 3 Condition 3 (a)	It is recommended a program to monitor the effectiveness of the modelling software (comparing to monitoring data) to be incorporated into the noise monitoring program to ensure the accuracy of the software is maintained.	Noise Monitoring Plan updated. DPE approved 29/6/22	Complete
Schedule 3 Condition 3 (c)	It is recommended the Annual Review detail other noise mitigation measures such as noise suppression equipment to provide a comprehensive overview of the measures implemented at Bloomfield Colliery.	To be included in future Annual Reviews.	Complete
Schedule 3 Condition 16	It recommended Air Quality Monitoring Program to be updated to: • Ensure that the protocol in the Air Quality Monitoring Program provides clarity on how the incremental impact is determined so that compliance with the air quality impact assessment criteria in PA 07_0087 can more easily be evaluated. • include the locations of the two DustTrak monitors and meteorological station. • a description on how extraordinary events are identified.	Air Quality Monitoring Program updated. DPE approved 29/6/22	Complete

Auditors Conclusions and Recommendations		Bloomfield Response	Timeline
Schedule 3 Condition 21	It is recommended that sediment dams be dewatered to the site water management system as required by *Managing Urban Stormwater: Soils and Construction Volume 2E – Mines and Quarries (DECC 2008).*and that this requirement be appropriately documented in the WMP and site EMS.	Noted. A documented process will be developed to record dewatering activities as required.	
Schedule 3 Condition 21	As per the recommendation in the approved Erosion and Sediment Control Plan within the Water Management Plan Bloomfield should build up the toe of the rehabilitated batter on the main ROM haul road to act as armouring against the erosive fast flowing runoff water during intense storm events.	Noted. The area is adjacent to a main haul road and is used for the catchment of dirty water from the road surface The area will be shaped and rehabilitated during mine closure.	
Schedule 3 Condition 23 (f)	It is recommended that the Groundwater Management Plan be revised to include procedures for the verification of the groundwater model as required.	As required under Schedule 5 Condition 4 all management plans will be reviewed and, if necessary, revised to the satisfaction of the Secretary.	November 2023
Schedule 3 Condition 23 (f)	It is recommended to ensure consistency that reference to Bore IDs in the Groundwater Management Plan and Annual Reviews be updated correctly for future reporting.	As required under Schedule 5 Condition 4 all management plans will be reviewed and, if necessary, revised to the satisfaction of the Secretary.	November 2023
Schedule 3 Condition 25	It is noted that the performance indicators / completion criteria are different in the Mine Operations Plan, Rehabilitation Management Plan and Closure Plan for the site. The performance indicators and completion criteria are to be included in revised versions of the documents which are to be developed in accordance regulators authorities as required by the respective Project Approval Conditions.	The Rehabilitation Management Plan and Mine Closure Plan as required under MP 07_0087 have been updated. DPE approved 29/6/22.	Complete

Auditors Conclusions and Recommendations		Bloomfield Response	Timeline
Schedule 3 Condition 25	As noted in Section 7.1 of the Mine Operations Plan, the development and finalisation of the capping design for the U Cut tailings dam is in progress and due for completion by end December 2021. The outcomes of the capping strategy are to be included in an updated Mine Operations Plan to be prepared for the site following the completion of the additional studies scheduled for completion during December 2021, as detailed in Section 8.2.2 of the Mine Operations Plan.	The Resource Regulator has introduced new standard rehabilitation and reporting conditions on all mining leases. These new conditions will replace existing rehabilitation conditions and replaces current Mining Operations Plans. Bloomfield has engaged consultants GHD to assist in preparation of the Rehabilitation Management Plan as required under the reforms implemented by the Resource Regulator.	Completed
Schedule 3 Condition 25A	It is recommended to develop a rehabilitation plan for the remediation of the gullying observed to the east of U Cut Tailings Dam.	Gully observed in existing rehabilitation scheduled to be repaired as part of 2023-24 rehabilitation program.	2023-24
Schedule 3 Condition 25A	Undertake and complete the Landform and Rehabilitation Assessment as committed in the Mine Operations Plan. This assessment includes an objective of confirming if the historical and current landform is consistent with the approved operations. The outcomes of this assessment are to be included in a revised Mine Operations Plan to assist in the determination of whether the constructed landform is consistent with approved operations.	Landform and Rehabilitation Assessment in progress. The Resource Regulator has introduced new standard rehabilitation and reporting conditions on all mining leases. These new conditions will replace existing rehabilitation conditions and replaces current Mining Operations Plans. Bloomfield has engaged consultants GHD to assist in preparation of the targeted Rehabilitation Management Plan as required under the reforms implemented by the Resource Regulator.	Completed
Schedule 3 Condition 25A	In conjunction with the completion of the proposed mitigation measures as detailed Table 20 (Section 9.2) of the Mine Operations Plan, it is recommended Bloomfield align the material balances of production and rehabilitation scheduling in the Mine Operations Plan (which are no longer current due to changes in mine planning, rates of mining and earlier completion of mining) to the new planned production and rehabilitation schedules to achieve the final landform.	The Resource Regulator has introduced new standard rehabilitation and reporting conditions on all mining leases. These new conditions will replace existing rehabilitation conditions and replaces current Mining Operations Plans. Bloomfield has engaged consultants GHD to assist in preparation of the targeted Rehabilitation Management Plan as required under the reforms implemented by the Resource Regulator.	Completed
Schedule 3 Condition 26	It is recommended the Landscape Management Plan to be revised in consultation with Office of Environment and Heritage, DoI and Council.	As required under Schedule 5 Condition 4 all management plans will be reviewed and, if necessary, revised to the satisfaction of the Secretary.	Completed

Auditors Conclusions and Recommendations		Bloomfield Response	Timeline
Schedule 3 Condition 27	It is recommended that site capping material balances are reviewed following the finalisation of the tailings dam capping strategy. The topsoil balance is also to be reviewed to confirm whether adequate topsoil material is available for the completion of rehabilitation works onsite. If adequate topsoil is not available to achieve the nominated 100 mm placement of topsoil across remaining rehabilitation areas, identify priority utilisation areas or strategies to achieve successful rehabilitation relinquishment utilising the reduced topsoil volumes.	Soil balances to be reviewed when annual aerial photo and Lidar data capture is completed.	Completed
Schedule 3 Condition 27	Topsoil and capping materials are to be demarcated and signposted in the field, with the volumes and quality of the material to be recorded as part of the site data management system.	Soil balances to be reviewed when annual aerial photo and Lidar data capture is completed.	Completed
Schedule 3 Condition 27	It is noted that the performance indicators / completion criteria are different in the Mine Operations Plan, Rehabilitation Management Plan and Closure Plan for the site. The performance indicators and completion criteria are to be included in revised versions of the documents which are to be developed in accordance with regulatory authorities as required by the respective Project Approval Conditions.	The Rehabilitation Management Plan and Mine Closure Plan required under MP 07_0087 have been updated. DPE approved 29/6/22.	Completed
Schedule 3 Condition 27	It is recommended that Bloomfield undertake a review of the appropriateness of the existing analogue sites to support performance indicators and comparisons for rehabilitation criteria and recommend additional sites as necessary	Two additional analogue sites (one pasture, one forest) have been established as part of a review of the rehabilitation monitoring program.	Completed
Schedule 3 Condition 28	It is recommended the location of final void in the Mine Operations Plan and Final Void Management Plan is reviewed to confirm a consistent void location is identified in each plan.	Final Void Management Plan updated. DPE approved 29/6/22.	Completed
Schedule 3 Condition 29	The Mine Closure Plan is required to be developed in consultation with DRG and Council. The rehabilitation objectives, performance indicators and completion criteria included in the Mine Closure Plan are also required to be updated to ensure they are consistent with other documents including the Mine Operations Plan and Rehabilitation Management Plan.	Mine Closure Plan updated. DPE approved 29/6/22.	Completed

Auditors Conclusions and Recommendations		Bloomfield Response	Timeline
Schedule 3 Condition 29	The Mine Closure Plan is required to be updated to reflect the outcomes of the Closure Execution Plan as defined in Section 8.2.2 of the Mine Operations Plan, which is due to be completed December 2021 as defined in the Mine Operations Plan.	Mine Closure Plan updated in accordance with Schedule 3, Condition 29. DPE approved 29/6/22.	Completed
Schedule 3 Condition 29A	It is recommended that Bloomfield finalise the process of securing management of the site under Part 4, Division 12 of the National Parks and Wildlife Act 1974 with Biodiversity Conservation Trust.	Consultation with the NSW Biodiversity Conservation Trust (BCT) is ongoing. Bloomfield will contact BCT to progress site meeting proposed in BCT's last correspondence.	In progress. Site meeting completed.
Schedule 3 Condition 29C	It is recommended that Bloomfield finalise the Biodiversity Stewardship Agreement for the offset site with Biodiversity Conservation Trust.	Consultation with the NSW Biodiversity Conservation Trust (BCT) is ongoing. Bloomfield will contact BCT to progress site meeting proposed in BCT's last correspondence.	In progress. Site meeting completed.
Schedule 3 Condition 31	It is recommended Bloomfield Colliery review and update the Aboriginal Cultural Heritage Management Plan in consultation with the Mindaribba Land Council and Office of Environment and Heritage as required and submit the plan to the Secretary for approval. As part of this review it is recommended Bloomfield consult with Abel to discuss the status of the regional monitoring network for Aboriginal heritage across the Abel mining area (including Bloomfield) as described in the plan and ensure annual monitoring is being conducted as outlined in the Aboriginal and Cultural Management Plan or make revisions as appropriate to account for current operations.	Updated draft Aboriginal Cultural Heritage Management Plan forwarded to Mindaribba Land Council for consultation. As required under Schedule 5 Condition 4 all management plans will be reviewed and, if necessary, revised to the satisfaction of the Secretary.	Ongoing
Schedule 3 Condition 31A	It is recommended that Bloomfield seek confirmation from the Secretary that the Condition Assessments completed as per the requirements of this condition have been completed to their satisfaction.	The condition surveys of the Buttai Reservoir and Buttai Cemetery were submitted to the Department on 18 October 2018. Bloomfield will contact the Department to enquire about progress on the review of the surveys.	Completed

Auditors Conclusions and Recommendations		Bloomfield Response	Timeline
Schedule 3 Condition 33	It is recommended that the Energy Savings Action Plan should be reviewed and revised in accordance with the requirements of this condition and submitted to the Secretary for approval. The revised plan should consider energy use by mobile equipment and include a details of a program to monitor the effectiveness of energy saving measures to reduce energy use on site.	As required under Schedule 5 Condition 4 all management plans will be reviewed and, if necessary, revised to the satisfaction of the Secretary.	February 2024
Schedule 5 Condition 4	It is recommended Bloomfield develop and implement an appropriate review tracking system to monitor and track plans and document reviews to demonstrate compliance with the requirements of this condition.	In 2021 Bloomfield implemented a compliance database (INX) to ensure that all requirements are adequately addressed.	Completed
Schedule 5 Condition 6	It is recommended that Bloomfield notify the Department and Resource Regulator of the TSS exceedances that occurred on 21/22 March 2021 against the EPL for the Project.	The TSS exceedance was reported to the EPA on 23 March 2021 and EPA reference number C04379-2021 was issued. This was a non-compliant discharge under Bloomfield EPL 396 and not an exceedance of the Project Criteria and therefore not required to be reported. Bloomfield believes that the event did not constitute environmental harm and therefore not reportable to the Department or Resource Regulator.	Complete
Noise Monitoring Program	It is recommended that Bloomfield's Noise Monitoring Program be subject to review and revision to ensure that noise monitoring covers Bloomfield operations within the Bloomfield Infrastructure Site in order to demonstrate compliance with applicable criteria (including rail criteria).	Noise Monitoring Plan updated. DPE approved 29/6/22	Completed
Air Quality Monitoring Program	It is recommended that Bloomfield's Air Quality Monitoring Program be subject to review and revision to ensure that air quality monitoring covers Bloomfield operations within the Bloomfield Infrastructure Site in order to demonstrate compliance with applicable criteria.	Air Quality Monitoring Program updated. DPE approved 29/6/22.	Completed

Auditors Conclusions and Recommendations		Bloomfield Response	Timeline
Water Management Plan	It is recommended that Bloomfield seek to engage with DPE and have the revised WMP reviewed and approved so that it can be implemented. The revisions in the revised plan were made to ensure that water management covers Bloomfield operations within the Bloomfield Infrastructure Site	Revised Water Management Plan submitted via Portal on 12 August 2021. Notification of commencement of detailed assessment of the Plan made by Department on 24 November 2021. DPE approved 23/8/22.	Completed
Rehabilitation	The rehabilitation maintenance inspection and works program is to be detailed in the Mine Operations Plan, with clarification of how the outcomes of the site inspection undertaken by site personnel will be utilised in the development of rehabilitation maintenance programs. The Mine Operations Plan update is also to include how the outcomes of the biennial rehabilitation monitoring will be utilised to determine whether there are any rehabilitation maintenance works required to be competed at site.	The Resource Regulator has introduced new standard rehabilitation and reporting conditions on all mining leases. These new conditions will replace existing rehabilitation conditions and replaces current Mining Operations Plans. Bloomfield has engaged consultants GHD to assist in preparation of the targeted Rehabilitation Management Plan as required under the reforms implemented by the Resource Regulator.	Completed
Water Management	It is recommended that the Overland Dam be resized appropriately to account for the large area of catchment that reports to it and ensure its design capacity prevents future uncontrolled discharges.	Works have commenced on increasing pump capacity, desilting and enlarging the Overland Dam.	Completed
Water Management	It is recommended Bloomfield incorporate requirement to monitoring in accordance with Approved methods for sampling and analysis of water pollutants in NSW (NSW EPA, 2021 version currently in draft format) into the Water Management Plan and confirm that their sampling procedures and the laboratory analysis undertaken is in accordance with the document.	As required under Schedule 5 Condition 4 all management plans will be reviewed and, if necessary, revised to the satisfaction of the Secretary.	November 2023

11 INCIDENTS AND NON-COMPLIANCE

As mentioned in Section 1 and Section 7.1.3, three reportable environmental incidents occurred at Bloomfield Colliery during the 2022-23 reporting period. A brief summary of the reportable incidents are presented below. The incident reports with further details of the events are provided in Appendix G.

11.1 Data Logger Failure – 8 January 2022

EPL 396 requires flow volume in Four Mile Creek to be measured at EPA Identification No. 2 using an in-stream data logger. Due to a data logger failure the flow volume at EPA Identification No. 2 was unable to be calculated during a licensed discharge on 5 January 2022. The failure was reported to the EPA and Reference Number 9544 was issued.

The cause of the failure was battery low power. There was no adverse impacts. Failure of the logger does not result in any environmental impacts. The licenced discharge water quality was within licence conditions. A warning letter was issued by the EPA for the incident for a breach of EPL 396. The solar powered logger has been wired into mains power to prevent a repeat of the failure.

11.2 Passive spilling from dam – 5 July 2022

An incident was identified on 5 July 2022 where during the recent heavy rain period, a mine water dam (known as the Overland Dam) was passively spilling of water. Two diesel pumps were operational prior to and during the spill, however due to the rainfall intensity and runoff during the event the pumps were unable to keep up with the inflow to the dam. The incident was reported to EPA Pollution Line and Incident no. EPA 14098 was issued. The full report is provided in Appendix G. The Overland Dam has been expanded in size to prevent recurrence.

11.3 Discharge (TSS) Exceedance – 6 July 2022

On 6 July 2022 a water discharge was undertaken in accordance with EPL 396 conditions. During the discharge the Total Suspended Solids (TSS) exceeded the EPL limits. The incident was reported to the EPA Pollution Line and reference number 14326 was issued. The reporting of the incident to the EPA is provided in Appendix G.

12 ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

The site activities for the ensuing year will generally be in accordance with the rehabilitation and landscape management strategy outlined in the Environmental Assessment and the Rehabilitation Management Plan and Forward Program. Environmental activities proposed for the next Annual Review period have been previously reported within relevant sections of this document.

APPENDIX A

DUST MONITORING RESULTS

Table A1: PM2.5, PM10 and TSP Results 2022

Date	TSP Concentration (ug/m^3)	PM_{10} Concentration (ug/m^3)	$PM_{2.5}$ Concentration (ug/m^3)
4/01/2022	18	8	2.2
10/01/2022	37	17	5.5
16/01/2022	40	18	7.2
22/01/2022	17	8	2.1
28/01/2022	22	10	4.4
3/02/2022	33	15	8.0
9/02/2022	30	14	7.4
15/02/2022	35	16	5.3
21/02/2022	34	16	-
27/02/2022	18	8	3.2
5/03/2022	22	10	-
11/03/2022	28	13	5.3
17/03/2022	-	-	-
23/03/2022	40	18	7.3
29/03/2022	16	7	2.4
31/03/2022	21	10	2.2
4/04/2022	26	12	4.9
10/04/2022	20	9	-
16/04/2022	12	6	-
22/04/2022	10	5	-
28/04/2022	9	4	-
4/05/2022	26	12	-
10/05/2022	10	5	-
16/05/2022	13	6	-
22/05/2022	-	-	-
28/05/2022	-	-	7.3
3/06/2022	19	9	1.7
9/06/2022	9	4	-
10/06/2022	-	-	0.5
15/06/2022	24	11	2.9
17/06/2022	14	6	1.8
21/06/2022	21	10	3.6
27/06/2022	25	11	3.5
30/06/2022	-	-	2.9
3/07/2022	11	5	1.1
5/07/2022	-	-	2.2
7/07/2022	-	-	0.1
9/07/2022	7	3	0.4
12/07/2022	-	-	1.0
15/07/2022	5	2	0.6
19/07/2022	-	-	0.1
21/07/2022	11	5	0.2
23/07/2022	-	-	0.1
27/07/2022	10	5	0.1
29/07/2022	-	-	1.9
2/08/2022	22	10	3.2
8/08/2022	9	4	0.8
11/08/2022	-	-	2.0
14/08/2022	4	2	0.7

20/08/2022	10	5	0.1
26/08/2022	7	3	0.7
1/09/2022	20	9	2.9
7/09/2022	16	7	2.6
13/09/2022	-	-	2.3
19/09/2022	24	11	2.2
25/09/2022	12	6	2.0
29/09/2022	21	10	-
1/10/2022	-	-	1.5
7/10/2022	10	5	1.0
13/10/2022	16	7	0.0
19/10/2022	26	12	7.2
25/10/2022	19	9	3.4
27/10/2022	16	7	-
31/10/2022	23	11	2.0
6/11/2022	16	7	1.9
12/11/2022	29	13	6.9
18/11/2022	24	11	3.0
24/11/2022	34	16	4.5
30/11/2022	42	19	3.7
6/12/2022	50	23	9.6
12/12/2022	35	16	3.8
18/12/2022	19	9	1.6
24/12/2022	-	-	5.5
30/12/2022	40	18	4.4
Maximum 24 hr Average	50	23	9.6
EPA Limit 24hr Average	-	**50**	**25**
Annual Average	21	10	3
EPA Limit Annual Average	**90**	**25**	**8**

Figure A1

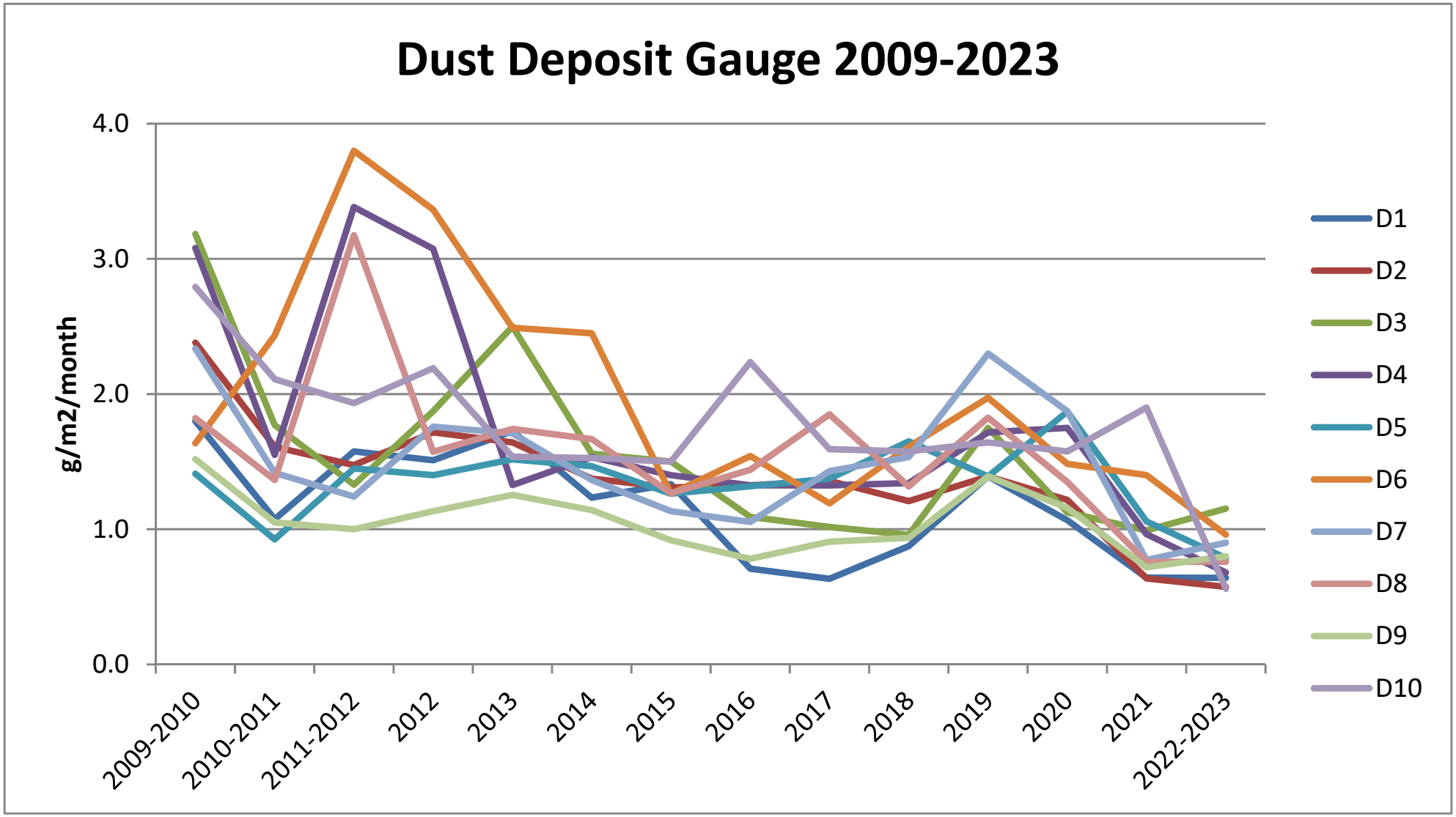
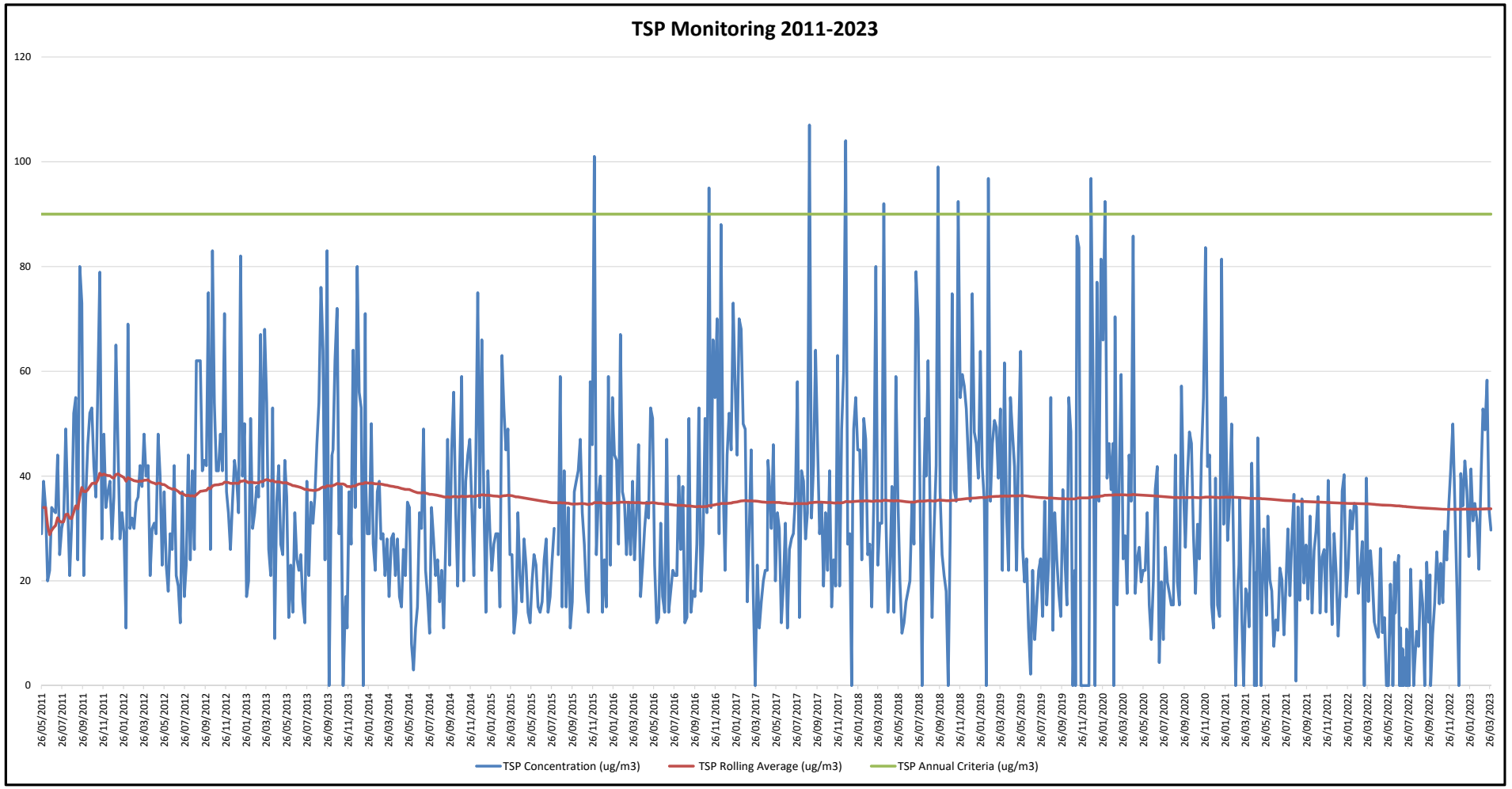

Dust Deposit Gauge 2009-2023
g/m2/month
4.0
3.0
2.0
1.0
0.0
2009-2010
2010-2011
2011-2012
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022-2023
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10

Figure A2


TSP Monitoring 2011-2023
120
100
80
60
40
20
0
26/05/2011
26/07/2011
26/09/2011
26/11/2011
26/01/2012
26/03/2012
26/05/2012
26/07/2012
26/09/2012
26/11/2012
26/01/2013
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26/03/2022
26/05/2022
26/07/2022
26/09/2022
26/11/2022
26/01/2023
26/03/2023
TSP Concentration (ug/m3)
TSP Rolling Average (ug/m3)
TSP Annual Criteria (ug/m3)

Figure A3

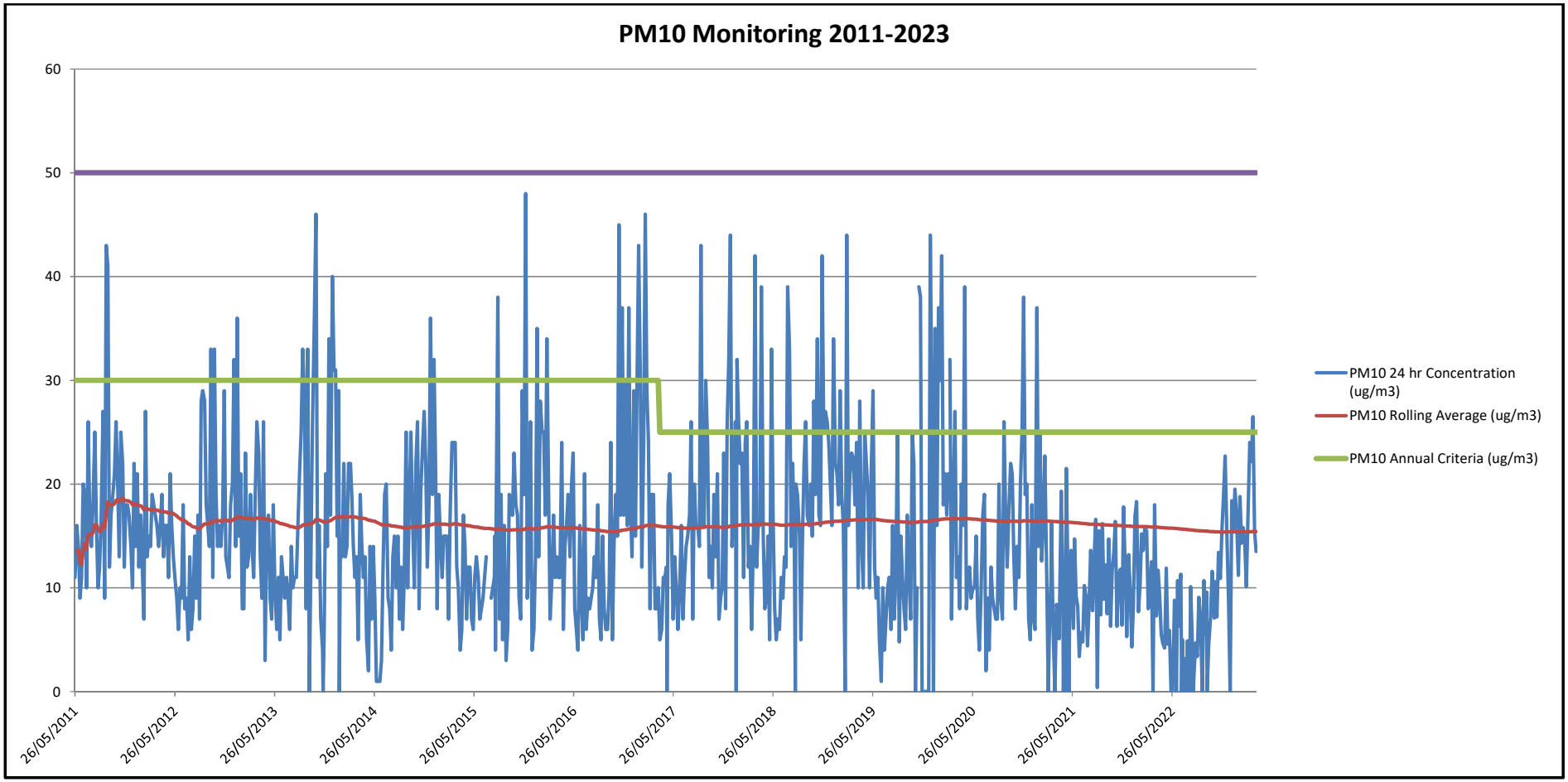
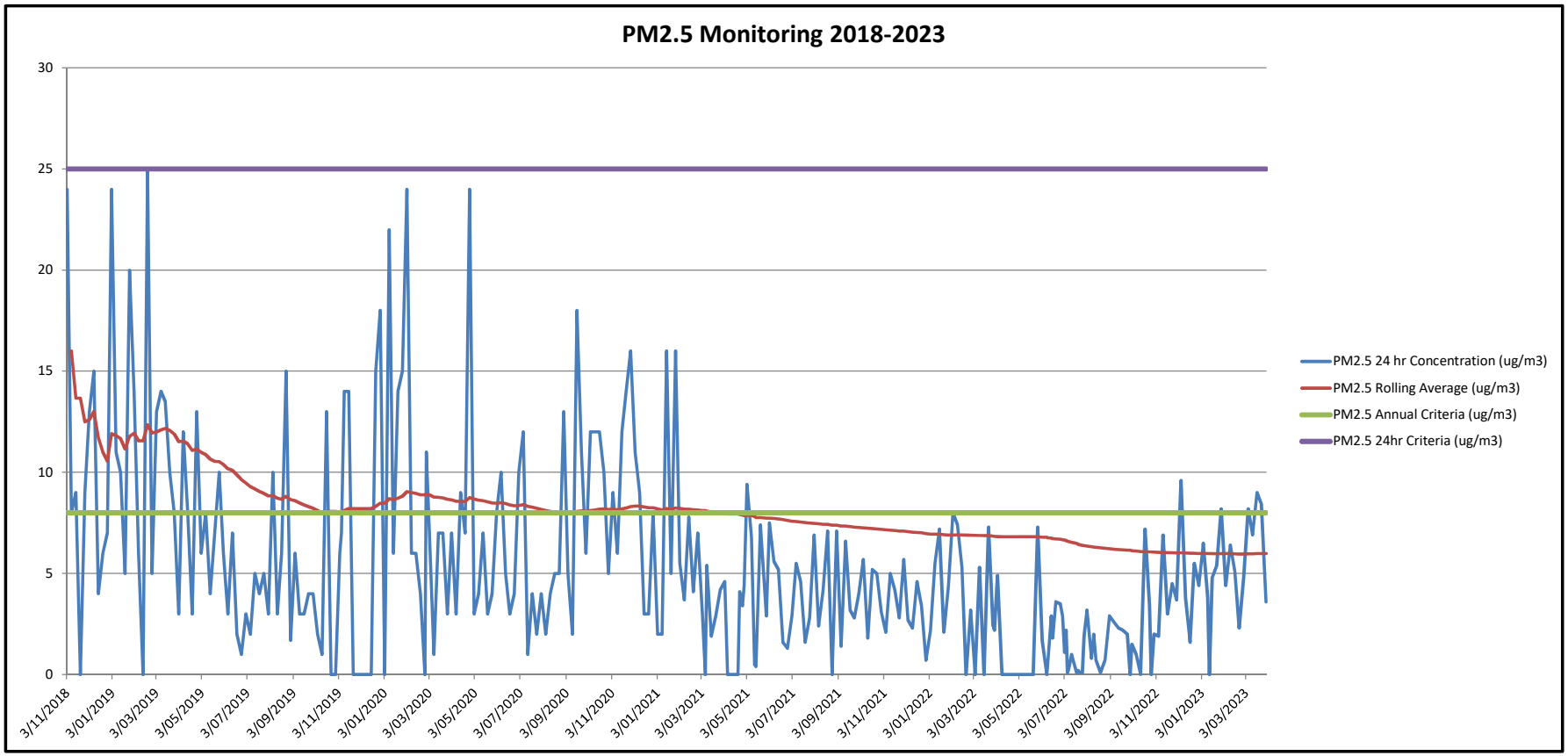

PM10 Monitoring 2011-2023
60
50
40
30
20
10
0
26/05/2011
26/05/2012
26/05/2013
26/05/2014
26/05/2015
26/05/2016
26/05/2017
26/05/2018
26/05/2019
26/05/2020
26/05/2021
26/05/2022
PM10 24 hr Concentration (ug/m3)
PM10 Rolling Average (ug/m3)
PM10 Annual Criteria (ug/m3)

Figure A4


PM2.5 Monitoring 2018-2023
30
25
20
15
10
5
0
3/11/2018
3/01/2019
3/03/2019
3/05/2019
3/07/2019
3/09/2019
3/11/2019
3/01/2020
3/03/2020
3/05/2020
3/07/2020
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3/11/2021
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3/03/2022
3/05/2022
3/07/2022
3/09/2022
3/11/2022
3/01/2023
3/03/2023
PM2.5 24 hr Concentration (ug/m3)
PM2.5 Rolling Average (ug/m3)
PM2.5 Annual Criteria (ug/m3)
PM2.5 24hr Criteria (ug/m3)

APPENDIX B

BLAST MONITORING RESULTS

BLAST RESULTS 2022

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

		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		
Shot No.	Date & Time	Vibration (mm/s)	Airblast (dB)	Distance (m)	Vibration (mm/s)	Airblast (dB)	Distance (m)	Vibration (mm/s)	Airblast (dB)	Distance (m)	Vibration (mm/s)	Airblast (dB)	Distance (m)
6968	20/01/2022 1:58pm	0.26	105.6	1989	0.21	109.7	2204	0.17	106.4	2164	0.25	106.4	2537
6969	27/01/2022 1:58pm	0.31	103.7	1607	0.27	102.8	1970	0.29	103.4	2479	0.22	108.5	2295
6970	28/01/2022 1:58pm	0.17	97.3	1737	0.17	92	2017	0.16	96.2	2383	0.17	98.3	2416
6971	17/02/2022 2:30pm	0.19	102.4	1700	0.18	100.3	2077	0.2	92.3	2375	0.21	89	2263
6972	18/02/2022 2:16pm	0.16	100	1765	0.13	96.8	2121	0.16	93.6	2316	0.23	99.6	2293
6973	21/02/2022 2:01pm	0.09	94.3	1865	0.12	94.2	2097	0.05	95.5	2280	0.05	92.3	2497
6974	11/03/2022 1:55pm	0.25	99.2	1823	0.14	97.9	2148	0.17	99.2	2269	0.19	95.7	2343
6975	17/03/2022 2:00pm	0.11	102.1	1971	0.11	104.1	2186	0.07	102.7	2182	0.06	84.4	2535
6976	18/03/2022 2:02pm	0.04	93.9	2110	0.04	90.1	2300	0.05	100	2060	0.03	86.9	2599
6977	23/03/2022 11:19am	0.05	94.3	1816	0.05	89.7	2104	0.05	92	2295	0.05	86.5	2404
6978	23/03/2022 11:26am	0.05	91.6	2181	0.04	92.8	2384	0.05	103.2	1976	0.04	96.7	2592
6979	5/04/2022 2:04pm	0.17	102.8	1721	0.13	100.8	2019	0.08	95.9	2390	0.1	85.4	2389
6980	11/04/2022 2:02pm	0.12	102.2	1585	0.11	89.1	1952	0.08	93.1	2500	0.09	79.8	2292
6981	6/05/2022 2:00pm	0.71	105.4	1787	0.76	99.8	2052	0.68	88.3	2339	0.96	74.4	2441
6982	19/05/2022 2:00pm	0.12	105.6	1763	0.08	98	2118	0.16	98	2318	0.1	85.6	2296
6983	25/05/2022 1:56pm	0.41	105.6	1681	0.53	99.1	1989	0.51	92.3	2426	0.8	89.5	2374
6984	27/05/2022 1:53pm	0.08	105.8	1770	0.08	102.4	2173	0.14	93.6	2294	0.11	82.1	2215
6985	2/06/2022 2:21pm	0.11	109.6	1660	0.07	105.7	2094	0.08	93.3	2401	0.08	74.7	2172
6986	8/06/2022 11:04am	0.12	103.6	1300	0.07	103.7	1886	0.05	102.9	2752	0.07	77.9	2033
6987	9/06/2022 1:57pm	0.08	104.1	1377	0.05	105	1948	0.04	89	2676	0.06	73.8	2025
6988	16/06/2022 2:02pm	0.1	107.8	1437	0.07	102.9	1904	0.06	91.4	2625	0.09	76.5	2168
6989	20/06/2022 1:56pm	0.11	99.5	1469	0.07	95.7	1995	0.05	98.5	2584	0.07	94.3	2065
6990	27/06/2022 1:59pm	0.7	101.4	1286	0.58	104.5	1867	0.6	96.5	2767	0.69	98.3	2047
6991	30/06/2022 2:04pm	0.74	107.3	1394	0.38	102.2	1911	0.53	91.4	2661	0.64	101.4	2103
6992	8/07/2022 11:51am	0.36	109.7	1424	0.31	107.7	1904	0.48	88	2636	0.58	87.3	2150
6993	15/07/2022 1:54pm	0.66	106.8	1412	0.4	105.8	1958	0.4	90	2641	0.5	95	2051
6994	22/07/2022 11:18am	0.08	100.8	1555	0.06	97.9	2005	0.05	98.4	2506	0.07	105.6	2164
6995	29/07/2022 1:54pm	0.78	104.8	1569	0.48	101.6	1919	0.51	96.9	2525	1.06	99.8	2320
6996	4/08/2022 12:50pm	0.62	111.4	1519	0.36	106.3	1927	0.68	98.5	2555	0.66	92.3	2239
6997	8/08/2022 10:05am	0.34	99.8	1573	0.24	97.6	1974	0.36	94.7	2500	0.38	91.9	2240
6998	9/08/2022 9:55am	0.51	102.6	1604	0.31	97.8	2049	0.57	92.4	2457	0.64	95.9	2164
6999	12/09/2022 1:57pm	0.14	101.1	1575	0.24	100.7	1907	0.17	93.3	2527	0.18	96.3	2347

BLAST RESULTS 2022

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

		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		
Shot No.	Date & Time	Vibration (mm/s)	Airblast (dB)	Distance (m)	Vibration (mm/s)	Airblast (dB)	Distance (m)	Vibration (mm/s)	Airblast (dB)	Distance (m)	Vibration (mm/s)	Airblast (dB)	Distance (m)
7000	16/09/2022 10:01am	0.3	109.8	1503	0.23	108	1922	0.39	96.1	2569	0.3	94.6	2226
7001	27/09/2022 9:54am	0.35	110.1	1472	0.19	110.8	1963	0.23	95.8	2585	0.36	103.7	2119
7002	5/10/2022 10:01am	0.23	102	1377	0.19	95.7	1902	0.08	90	2678	0.18	103	2097
7003	18/10/2022 1:59pm	0.34	102.8	1257	0.25	102	1852	0.1	93.9	2796	0.22	103.2	2040
7004	25/10/2022 11:02am	0.25	104.2	1315	0.14	102.8	1856	0.09	88.4	2740	0.2	96.5	2096
7005	28/10/2022 10:02am	0.09	105.9	1552	0.12	102.9	1881	0.1	97.3	2553	0.14	94.6	2353
7006	15/11/2022 2:02pm	0.13	109.2	1517	0.14	108.5	1923	0.13	101.9	2558	0.14	102.5	2243
7007	22/11/2022 1:51pm	0.13	108.5	1512	0.11	108.9	1987	0.1	98.4	2546	0.12	95.6	2136
7008	28/11/2022 9:07am	0.37	97.3	1558	0.35	95.7	1880	0.28	91.5	2550	0.52	93.4	2363
7009	2/12/2022 1:57pm	0.39	80.3	1519	0.52	95.1	1913	0.32	105.5	2560	0.55	103.9	2261
7010	7/12/2022 1:59pm	0.54	108.1	1520	0.41	104.3	1982	0.37	85.8	2540	0.52	88.6	2153

BLAST RESULTS 2023

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

		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		
Shot No.	Date & Time	Vibration (mm/s)	Airblast (dB)	Distance (m)	Vibration (mm/s)	Airblast (dB)	Distance (m)	Vibration (mm/s)	Airblast (dB)	Distance (m)	Vibration (mm/s)	Airblast (dB)	Distance (m)
7011	25/01/2023 11:06am	0.87	100.8	1378	0.76	101.3	1872	0.28	91.5	2682	0.69	96.1	2144
7012	8/02/2023 1:59pm	0.61	104.8	1761	0.4	102.4	2103	0.57	97.7	2326	0.84	103.1	2318
7013	16/02/2023 2:00pm	0.63	107.4	1517	0.33	104.8	1974	0.32	101.5	2544	0.4	110.6	2162
7014	28/02/2023 2:02pm	0.76	99.3	1695	0.58	101.2	2103	0.62	98	2371	0.81	101.8	2212
7015	23/03/2023 2:00pm	0.21	106.2	1919	0.19	105.7	2198	0.28	101.4	2193	0.27	103.7	2422
7016	31/03/2023 2:02pm	0.81	111.7	1881	0.51	105.1	2286	0.56	94.8	2179	0.66	96.4	2206

APPENDIX C

WATER MONITORING RESULTS

Site **WM1** **Adjacent Rathluba Colliery**

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														Dry
13-Oct-09														Dry
03-Nov-09														Dry
13-Dec-09														Dry
13-Jan-10														Dry
09-Feb-10														Dry
04-Mar-10														Dry
08-Apr-10														Dry
14-May-10														Dry
10-Jun-10														Dry
07-Jul-10														Dry
25-Aug-10														Dry
20-Sep-10	4.22	4,820	18	3,940	0.38		1	1710	837	195	186	788	15	
19-Oct-10														Dry
19-Nov-10	4.61	1,990	4	1,360	0.06									
21-Dec-10														Dry
14-Jan-11														Dry
22-Feb-11														Dry
24-Mar-11														Dry
27-Apr-11														Dry
26-May-11														Dry
27-Jun-11	5.00	1,980	18	1,330	0.15									Dry
25-Jul-11	5.76	952	16	650	0.16		5	254	85	36	28	85	8	
26-Aug-11	5.41	1,820	5	1,220	0.06									
21-Sep-11	5.68	2224	16	1540	0.09									
26-Oct-11	6.24	2002	17	1350	0.28		2	544	256	79	68	247	9	
22-Nov-11	5.75	1508	12	1050	0.4									
15-Dec-11														Dry
25-Jan-12														Dry
17-Feb-12														Dry
30-Mar-12	6.58	1490	12	1010	0.05									
02-May-12	6.17	1,440	5	1,030	0.05		1	443	178	66	53	181	7	
24-May-12														Dry
27-Jun-12	6.67	1351	38	908	0.17									
27-Jul-12	5.82	1516	78	1140	0.1		16	580	183	79	62	214	7	
30-Aug-12														Dry
25-Sep-12														Dry
25-Oct-12														Dry
29-Nov-12														Dry
20-Dec-12														Dry
24-Jan-13														Dry
25-Feb-13	7.73	2530	52	1590	0.15									
22-Mar-13	7.39	900	56	582	4.44									
22-Apr-13	6.64	1580	17	1080	0.25		18	424	208	50	48	219	11	
17-May-13														Dry
21-Jun-13														Dry
24-Jul-13														Dry
28-Aug-13														Dry
17-Sep-13	7.71	1340	8	831	0.13									
22-Oct-13														Dry
14-Nov-13														Dry
11-Dec-13														Dry
24-Jan-14														Dry
20-Feb-14														Dry
25-Mar-14														Dry
30-Apr-14														Dry
28-May-14														Dry
26-Jun-14														Dry
28-Jul-14														Dry
31-Aug-14	7.14	336	12		2.3									
22-Sep-14														Dry
27-Oct-14														Dry
21-Nov-14														Dry
22-Dec-14														Dry

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	6.4	730	9	530	0.09	14.5								
23-Feb-15														Dry
30-Mar-15														Dry
28-Apr-15	6.4	116	79	86	0.62	190	17	12	17	2.7	2.8	14	6	Floodwater
28-May-15	6	1500				4								Floodwater
24-Jun-15	5.9	1900				4								
29-Jul-15														Dry
27-Aug-15														Dry
28-Sep-15	6.7	2300				4								
22-Oct-15														Dry
30-Nov-15														Dry
21-Dec-15														Dry
29-Jan-16	5.6	1450	2	1050	0.01	2								
26-Feb-16														Dry
31-Mar-16														Dry
28-Apr-16														Dry
26-May-16														Dry
29-Jun-16														Dry
19-Jul-16														Dry
23-Aug-16	6.2	1700				13								Not flowing
28-Sep-16	6.3	1800				8								Not flowing
20-Oct-16														Dry
24-Nov-16														Dry
21-Dec-16														Dry
31-Jan-17														Dry
27-Feb-17														Dry
31-Mar-17	6.3	900				6								Not flowing
26-Apr-17														Dry
30-May-17														Dry
28-Jun-17	5	1380				4								Not flowing
26-Jul-17														Dry
30-Aug-17														Dry
28-Sep-17														Dry
24-Oct-17														Dry
28-Nov-17														Dry
13-Dec-17														Dry
29-Jan-18														Dry
22-Feb-18														Dry
29-Mar-18	6.1	1200				7								
26-Apr-18														Dry
21-May-18														Dry
26-Jun-18														Dry
25-Jul-18														Dry
29-Aug-18														Dry
28-Sep-18														Dry
24-Oct-18														Dry
29-Nov-18														Dry
18-Dec-18	6.1	560				18								
31-Jan-19														Dry
28-Feb-19														Dry
28-Mar-19														Dry
10-Apr-19	6.5	519	53	360	0.25	87	30	150	39	20	15	50	11	
27-May-19														Dry
28-Jun-19														Dry
30-Jul-19														Dry
29-Aug-19														Dry
24-Sep-19	6.5	540				46								
29-Oct-19														Dry
27-Nov-19														Dry
23-Dec-19														Dry
29-Jan-20														Dry
25-Feb-20	6.8	850				25								
31-Mar-20	7.7	810				39								
29-Apr-20														Dry
28-May-20														Dry

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-Jun-20														Dry
24-Jul-20														Dry
21-Aug-20	6.1	1250				13								
28-Sep-20														Dry
23-Oct-20														Dry
26-Nov-20														Dry
21-Dec-20	7.4	480				32								
27-Jan-21														Dry
24-Feb-21	6.8	420				12								
30-Mar-21	6.9	190												Flooded
27-Apr-21	6.1	1960	21	1650	0.03		30	680	250	74	78	260	11	
25-May-21	7.7	2900				12								
24-Jun-21	7.2	2900				22								
28-Jul-21														Dry
23-Aug-21														Dry
29-Sep-21														Dry
25-Oct-21														Dry
25-Nov-21	6.2	1100				4								
22-Dec-21														Dry
25-Jan-22														Dry
25-Feb-22	7.7	900												
31-Mar-22	7.4	300												Flooded
26-Apr-22	6.8	1100	5	786	0.01	8	30	380	110	41	36	120	6.2	
24-May-22	6.6	840				19								
28-Jun-22	6.3	1900				5								
27-Jul-22	6.9	390	120	304	0.94	99								
29-Aug-22	5.9	1620				6								
26-Sep-22	5	1270				6								
25-Oct-22	7	508	36	340	0.54	56	48	48	77	13	11	57	4	Flooded
21-Nov-22	6.1	2680				31								
16-Dec-22														Dry
16-Jan-23														Dry
15-Feb-23														Dry
20-Mar-23														Dry

Site WM2 **Shamrock Creek @ Shamrock Hill Lane**

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	7.50	1,900			0.55	90								
13-Oct-09														
03-Nov-09	7.70	5,900	14	510	0.63	70								
13-Dec-09														
13-Jan-10														
09-Feb-10	5.50	1,900			0.07	19								
04-Mar-10														
08-Apr-10														
14-May-10														
10-Jun-10	6.90	282	109	330	0.29	209								
07-Jul-10	7.10	333	56	204	0.30	196	5		27	7	10	32	6	
25-Aug-10	7.80	408	8	294	0.18	47								
20-Sep-10	6.54	448	20	350	0.27		21	123	33	11	17	43	7	
19-Oct-10	7.24	522	41	316	0.05									
19-Nov-10	6.19	290	59	250	0.36									
21-Dec-10	7.46	2,740	5	1,980	0.08									
14-Jan-11	7.36	3,860	8	2,880	0.05		160	1410	290	152	164	529	22	
22-Feb-11	7.65	4,120	5	3,470	0.05									
24-Mar-11	7.45	4,820	24	3,980	0.05									
27-Apr-11	6.57	1,160	16	760	0.05		13	398	72	42	47	113	15	
26-May-11	6.26	931	40	786	0.05									
27-Jun-11	6.02	562	16	482	0.21									
25-Jul-11	5.66	343	52	330	0.40		3	102	16	10	12	27	6	
26-Aug-11	6.36	650	10	400	0.05									
21-Sep-11	7.75	243	8	448	0.05									
26-Oct-11	7.36	555	16	390	0.27		10	184	26	17	22	47	9	
22-Nov-11	6.34	878	19	612	0.20									
15-Dec-11	7.86	439	79	334	0.30									
25-Jan-12	7.93	658	14	510	0.19		39	230	30	22	30	64	9	
17-Feb-12	5.84	439	137	320	0.71									
30-Mar-12	6.74	514	20	390	0.63									
27-Apr-12	6.35	561	30	296	0.62		13	164	20	18	21	32	8	
24-May-12	7.92	528	6	282	0.18									
27-Jun-12	8.09	365	46	282	0.34									
27-Jul-12	7.69	549	5	376	0.09		4	201	28	24	28	37	6	
30-Aug-12	4.82	647	292	436	0.34									
25-Sep-12	4.96	2,860	118	2,080	1.32									
25-Oct-12														Dry
29-Nov-12														Dry
20-Dec-12														Dry
24-Jan-13														Dry
25-Feb-13	8.41	5,020	54	3,270	0.05									
22-Mar-13	6.78	415	38	266	1.24									
22-Apr-13	8.23	4,170	51	2,870	0.05		284	1380	431	107	148	756	15	
17-May-13														Dry
21-Jun-13	5.42	556	5	361	0.02									
24-Jul-13	5.46	486	14	318	0.3		1	174	27	19	21	39	7	
28-Aug-13	5.03	574	33	338	5.18									
17-Sep-13														Dry
22-Oct-13														Dry
14-Nov-13														Dry
11-Dec-13	6.37	330	5	247	1.03									
24-Jan-14														Dry
20-Feb-14														Dry
25-Mar-14														Dry
30-Apr-14	6.35	277	28	263	0.92		4	102	14	14	14	24	12	
28-May-14	5.76	295	29		0.52									
26-Jun-14														Dry
28-Jul-14														Dry
31-Aug-14	6.73	330	35		0.44									
22-Sep-14	5.9	330				63								
27-Oct-14	5.5	340	40	220	0.05	39.7	5	130	20	13	13	21	8	
21-Nov-14														Dry
22-Dec-14														Dry

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								
29-Jan-16	6.2	276	47	238	1.1	69								
26-Feb-16	6.7	260				23								
31-Mar-16	7.3	640				161								
28-Apr-16														Dry
26-May-16														Dry
29-Jun-16	6	440				24								
19-Jul-16	5.5	450	4	341	0.17	7								
22-Aug-16	6.7	350				31								
28-Sep-16	7.5	390				11								
20-Oct-16	5	480	10	347	0.09	15	5	180	17	19	21	35	9	
24-Nov-16														Dry
21-Dec-16														Dry
30-Jan-17														Dry
27-Feb-17														Dry
30-Mar-17	5	370				86								Not flowing
26-Apr-17	6.2	270	21	256	3.2	94	16	94	18	12	13	17	9	Not flowing
30-May-17	5.6	460				44								Not flowing
28-Jun-17	5.6	395				27								Not flowing
27-Jul-17														Dry
30-Aug-17														Dry
28-Sep-17														Dry
24-Oct-17	6.4	5,560	10	5,620	0.05	22	150	3100	410	330	330	920	36	
28-Nov-17														Dry
13-Dec-17														Dry
29-Jan-18														Dry
22-Feb-18														Dry
29-Mar-18	5.1	470				26								
26-Apr-18	5	2,630	54	2,290	0.14	30	30	1100	140	110	130	380	24	
21-May-18														Dry
25-Jun-18	4.5	750				7								
25-Jul-18														Dry
29-Aug-18														Dry
29-Sep-18														Dry
24-Oct-18	4.5	830	15	604	0.48	17	30	330	26	38	35	64	14	
29-Nov-18														Dry
18-Dec-18	4.1	700				14								
31-Jan-19														Dry
28-Feb-19														Dry
28-Mar-19														Dry
10-Apr-19	4	458	13	309	0.89	19	30	160	12	20	17	13	11	
27-May-19														Dry
28-Jun-19														Dry
30-Jul-19														Dry
29-Aug-19														Dry
24-Sep-19	4.9	570				9								
29-Oct-19														Dry
27-Nov-19														Dry
23-Dec-19														Dry
29-Jan-20														Dry
25-Feb-20	6	300				32								
31-Mar-20														Dry
29-Apr-20														Dry
28-May-20														Dry

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-Jun-20														Dry
24-Jul-20														Dry
21-Aug-20	5.5	360				5								
28-Sep-20														Dry
23-Oct-20														Dry
26-Nov-20														Dry
21-Dec-20	5.5	315				87								
27-Jan-21														Dry
24-Feb-21														No flow
30-Mar-21	6.5	310												
27-Apr-21														Dry
25-May-21														Dry
24-Jun-21														Dry
28-Jul-21														Dry
23-Aug-21														Dry
29-Sep-21														Dry
25-Oct-21														Dry
25-Nov-21	6.4	225				32								
22-Dec-21														Dry
25-Jan-22														Dry
25-Feb-22														Dry
31-Mar-22	6.4	290												
26-Apr-22	7.2	290	21	209	1.8	49	30	63	18	6.4	7.6	15	7.8	
24-May-22	6.7	290				105								
28-Jun-22	5	340				10								
27-Jul-22	6.3	500	9	432	1.2									
29-Aug-22	6.2	480				15								
26-Sep-22	7.1	340				20								
25-Oct-22	6.2	171	10	240	3.6	42	30	28	9	5.6	5.7	16	5.6	
21-Nov-22														Dry
16-Dec-22														Dry
16-Jan-23														Dry
15-Feb-23														Dry
20-Mar-23														Dry

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								
29-Jan-16	7.4	1290	28	942	0.37	73								
26-Feb-16	7.1	1300				45								
31-Mar-16	8.1	5000				14								
28-Apr-16	7.5	1400	8	992	0.01	14	195	440	97	39	46	210	6	
26-May-16	7.5	670				51								
29-Jun-16	6.7	2400				18								
19-Jul-16	7.1	1100	7	812	0.27	20								
22-Aug-16	7.2	960				27								
28-Sep-16	8.1	4320				11								
20-Oct-16	8.3	3100	7	2460	0.02	14	240	1100	200	92	140	640	11	
28-Nov-16	8.1	3900				22								
21-Dec-16	8	5300				6								
30-Jan-17	8.2	4490	4	3860	0.01	5								
27-Feb-17	7.5	5320				7								
30-Mar-17	7.2	2100				12								
26-Apr-17	7.5	738	10	567	0.45	19	79	210	85	28	29	110	5	
30-May-17	7.4	1420				17								
28-Jun-17	7.1	923				30								
27-Jul-17	7.1	481	8	312	0.61	23								
30-Aug-17	7	1400				8								Not flowing
28-Sep-17	8.2	3790				6								Not flowing
24-Oct-17	8.2	5510	7	5210	0.01	9	410	2300	390	200	290	1200	22	
28-Nov-17	7.4	3100				3								Not flowing
13-Dec-17	7.9	3100				4								Not flowing
29-Jan-18														Dry
22-Feb-18	7.5	1030				108								Stagnant pool
29-Mar-18	7.5	1300				32								
26-Apr-18	7.4	3300	14	2770	0.01	14	220	1200	210	150	150	550	12	
21-May-18	7.4	2600				12								
25-Jun-18	7.6	2250				11								
25-Jul-18	7.1	713	6	512	0.14	17								
29-Aug-18	7.9	4500				7								
28-Sep-18	7.5	2700				7								
24-Oct-18	7.5	2280	3	1660	0.02	10	160	760	180	76	82	400	7.8	
29-Nov-18	8	4150				10								Discharging
29-Jan-18														Dry
31-Jan-19	7.9	1930	7	1170	0.03	10								No flow
28-Feb-19	8.1	5400				8								No flow
28-Mar-19	6.9	910				11								
10-Apr-19	7.6	3050	4	2810	0.01	6	220	1400	240	130	140	560	13	
27-May-19	7.8	5000				6								No flow
28-Jun-19	7.6	4100				7								
30-Jul-19	7.7	2660	4	2460	0.01	27								
29-Aug-19	8.5	3600				6								No flow
24-Sep-19	7	990				8								
29-Oct-19	7.8	2040	3	1620	0.01	4	160	770	200	89	97	300	9.3	
27-Nov-19														Dry
23-Dec-19														Dry
29-Jan-20														Dry
25-Feb-20	7.4	3900				13								
31-Mar-20	7.7	4670				10								
29-Apr-20	8.2	5710	5	4580	0.02	5	470	2200	390	170	240	960	14	
28-May-20	8.5	4700				2								

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-Jun-20	7.8	860				5								
24-Jul-20	7.4	1390	8	920	0.01	4								
21-Aug-20	7.3	930				24								
28-Sep-20	7.7	5570				21								
23-Oct-20	8	5250	4	4340	0.02	5	310	2100	320	150	210	870	14	
26-Nov-20	7.4	5300				16								
21-Dec-20	7.8	4850				3								
27-Jan-21	7.7	3690	2	2890	0.02	6								
24-Feb-21	7.3	1650				8								
30-Mar-21	7.3	1160				10								
27-Apr-21	7.3	2370	6	1940	0.41		170	890	160	83	100	340	6.4	
25-May-21	7.5	2700				35								
24-Jun-21	7.8	2700				14								
28-Jul-21	7.4	2430	10	1950	0.01	11								
23-Aug-21	7.7	2700				1								
29-Sep-21	8	5000				44								
25-Oct-21	7.6	1930	8	1460	0.1	14	140	690	130	65	88	280	12	
25-Nov-21	7.5	2910				7								
22-Dec-21	7.7	1850												
25-Jan-22	8	4160	5	3350	0.02									
25-Feb-22	7.9	5400												
31-Mar-22	7.6	1600												Discharging
26-Apr-22	7.8	1240	7	895	0.85	23	75	410	84	40	47	150	6.5	
24-May-22	8.1	2400				30								Discharging
28-Jun-22	7.2	1460				30								
27-Jul-22	7.1	1150	8	904	0.63	35								
29-Aug-22	7.6	2800				15								
26-Sep-22	8	2730				9								
25-Oct-22	7.3	1630	10	1160	0.36	19	86	550	97	54	66	210	7.2	
21-Nov-22	7.5	4820				14								
16-Dec-22	7.4	4000				11								
16-Jan-23	8	5160	17	4240	0.01	10								
15-Feb-23	7.7	5300				18								No flow
20-Mar-23	7.8	3500				12								

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								
29-Jan-16	7.2	680	10	491	0.48	35.2								
26-Feb-16	7	210				10								
31-Mar-16	8.2	4950				12								
28-Apr-16	7.3	320	5	232	0.53		49	64	33	11	10	40	4	
26-May-16	7.9	240				15								
29-Jun-16	7.4	390				13								
19-Jul-16	7.3	230	4	178	0.41	10								
22-Aug-16	7.6	200				11								
28-Sep-16	7.8	760				6								
20-Nov-16	8	200	1	147	0.21	3	40	28	22	12	6	24	3	
24-Nov-16	8.1	190				4								
21-Dec-16	7	220				4								
30-Jan-17	8.4	322	2	146	0.08	5								
27-Feb-17	8.3	5380				3								Discharging
30-Mar-17	7.3	350				6								
26-Apr-17	7.8	330	5	221	0.73	11	46	71	50	12	10	45	5	
30-May-17														No access
28-Jun-17	7.4	500				21								
27-Jul-17	7.3	228	4	159	0.7	17								
30-Aug-17	7.3	250				22								
28-Sep-17	8.3	240				15								
24-Oct-17	8.3	5100	4	4770	0.01	7	340	2200	360	190	260	1000	20	Discharging
28-Nov-17	6.9	270				9								
13-Dec-17	7.8	310				11								Not flowing
29-Jan-18														Dry
22-Feb-18	7.5	1400				99								Stagnant pool
29-Mar-18	7.3	360				28								
26-Apr-18	7.9	560	12	439	0.31	18	52	140	53	16	16	95	4	
21-May-18	7.8	220				15								
25-Jun-18	7.8	540				14								
25-Jul-18	7.7	214	3	157	0.29	15								
29-Aug-18	7.8	4500				7								
28-Sep-18	7.6	220				8								
24-Oct-18	8.3	350	5	221	0.28	7	31	71	37	11	8.8	48	3.4	
29-Nov-18	8	4500				12								Discharging
18-Dec-18	7	300				25								
31-Jan-19	7.3	280	5	146	0.11	9								No flow
28-Feb-19	8.1	5000				3								No flow
28-Mar-19	6.7	190				11								
10-Apr-19	8	663	3	431	0.12	4	65	170	54	24	20	86	4	
27-May-19	7	680				7								No flow
28-Jun-19	7.9	1000				7								
30-Jul-19	8	250	2	155	0.28	7								
29-Aug-19	7.8	220				7								
24-Sep-19	7	310				5								
29-Oct-19	7.5	284	2	164	0.04	1	49	29	37	11	7.1	34	3.4	
27-Nov-19														Dry
23-Dec-19														Dry
29-Jan-20														Dry
25-Feb-20	7.5	340				19								
31-Mar-20	7.1	290				7								
27-Apr-20	8.5	4800	5	3620	0.04	4	390	1700	320	140	190	930	12	
28-May-20	7.8	4800				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-Jun-20	7.9	390				5								
24-Jul-20	7.6	260	4	181	0.36	7								
21-Aug-20	7.7	330				5								
28-Sep-20	8.1	430				12								
23-Oct-20	8.3	4140	4	3250	0.02	6	300	1500	250	97	150	690	11	
26-Nov-20	7.5	270				8								
21-Dec-20	7.5	2000				6								
27-Jan-21	7.8	270	5	180	0.77	11								
24-Feb-21	7.2	740				4								
30-Mar-21	7.4	950				3								
27-Apr-21	7.4	242	3	243	1.4		30	20	59	6.9	5.9	28	4.2	
25-May-21	7.6	300				32								
24-Jun-21	7.7	300				27								
28-Jul-21	7.8	275	5	217	1.5	11								
23-Aug-21	7.9	260				12								
29-Sep-21	8	300				8								
25-Oct-21	7.8	251	5	175	1.3	3	31	24	38	8.5	6.3	32	4	
25-Nov-21	7.6	700				4								
22-Dec-21	7.5	300												
25-Jan-22	7.6	300	5	181	0.45									
25-Feb-22	8.1	2200												
31-Mar-22	7.6	2100												Discharging
26-Apr-22	7.5	660	21	448	0.97	25	45	170	55	19	21	73	5.3	
24-May-22	8.2	3400				20								Discharging
28-Jun-22	7.4	320				30								
27-Jul-22	7.2	760	5	660	0.51	40								
29-Aug-22	7.8	600				24								
26-Sep-22	7.9	650				15								
25-Oct-22	7.3	702	5	510	0.87	17	43	170	54	21	25	75	5	
21-Nov-22	7.2	410				12								
16-Dec-22	7.5	475				9								
16-Jan-23	8	620	5	390	0.43	10								
15-Feb-23	7.8	540				6								No flow
20-Mar-23	8	550				7								

Site WM5 **Elwells Creek @ Haul 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
24-Sep-09	6.40	1,500			0.77	101								
13-Oct-09	8.20	250			0.31	114	54		20	1	9	21	2	
03-Nov-09														Dry
13-Dec-09														Dry
13-Jan-10														Dry
09-Feb-10														Dry
04-Mar-10														Dry
08-Apr-10														Dry
14-May-10														Dry
10-Jun-10														Dry
07-Jul-10														Dry
25-Aug-10														Dry
20-Sep-10														Dry
19-Oct-10														Dry
19-Nov-10	6.66	1,420	58	930	0.11									
21-Dec-10														Dry
14-Jan-11														Dry
22-Feb-11														Dry
24-Mar-11														Dry
27-Apr-11														Dry
26-May-11	6.14	1,640	53	1,280	0.11									
27-Jun-11	7.38	272	22	214	0.31									
25-Jul-11	6.64	1,950	46	1,330	0.47		70	626	116	94	83	175	9	
26-Aug-11	6.88	2,000	86	1,410	0.40									
21-Sep-11														Dry
26-Oct-11	7.90	1,552	276	1,110	0.88		34	591	86	81	69	162	8	
22-Nov-11	7.31	1,080	152	842	0.34									
15-Dec-11														Dry
25-Jan-12														Dry
17-Feb-12	6.96	1,503	58	1,230	0.33									
30-Mar-12														Dry
27-Apr-12														Dry
24-May-12														Dry
27-Jun-12														Dry
27-Jul-12														Dry
30-Aug-12														Dry
25-Sep-12														Dry
25-Oct-12														Dry
29-Nov-12														Dry
20-Dec-12														Dry
24-Jan-13														Dry
25-Feb-13	7.96	2,460	66	1,570	0.1									
22-Mar-13														Dry
22-Apr-13														Dry
17-May-13														Dry
21-Jun-13														Dry
24-Jul-13	7.55	323	157	205	0.08		40	68	17	17	10	29	2	
28-Aug-13														Dry
17-Sep-13	7.48	1,700	118	1,180	0.05									
22-Oct-13														Dry
14-Nov-13														Dry
11-Dec-13														Dry
24-Jan-14														Dry
20-Feb-14	7.89	2,810	160		0.08									
25-Mar-14														Dry
30-Apr-14														No access
28-May-14														Dry
26-Jun-14														Dry
28-Jul-14	7.62	633	9	471	0.05									
31-Aug-14	8.27	964	46		0.11									
22-Sep-14	7.20	1,030				22								
27-Oct-14	7.20	900	9	640	0.06	18.9	54	356	58	42	37	94	5	
21-Nov-14														Dry
22-Dec-14														Dry

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	6.90	1,300	19	1,020	0.05	35.7								
20-Feb-15	6.80	1,700				5								
30-Mar-15														Dry
28-Apr-15	5.20	2,240	13	1,890	0.03	8	5	1190	77	160	135	185	10	
28-May-15	6.60	1,730				6								
24-Jun-15	7.20	1,400				4								
29-Jul-15	7.10	768	5	550	0.05	8.2								
27-Aug-15	6.60	1,500				5								
28-Sep-15	7.70	1,920				4.5								
22-Oct-15	6.30	2,600	10	2,380	0.04	10.7	10	1400	110	205	160	220	12	
30-Nov-15														Dry
21-Dec-15														Dry
29-Jan-16	6.40	1,760	9	1,280	0.04	12.7								
26-Feb-16														Dry
31-Mar-16	7.00	2,300				12.5								
28-Apr-16														Dry
26-May-16														Dry
29-Jun-16	6.60	1,730				4								
19-Jul-16	6.30	1,900	8	1,540	0.09	12								
22-Aug-16	6.20	2,010				31								Not flowing
28-Sep-16	7.20	1,560				6								Not flowing
20-Nov-16														Dry
24-Nov-16														Dry
21-Dec-16	6.60	2,300				15								Not flowing
30-Jan-17														Dry
27-Feb-17	4.20	3,050				3								Not flowing
30-Mar-17	5.20	2,000				17								Not flowing
26-Apr-17	4.40	1,820	20	1,900	0.22	33	5	1100	89	120	130	200	9	Not flowing
30-May-17														Dry
28-Jun-17	4.50	1,110				2								
27-Jul-17	5.50	1,190	36	978	0.13	11								Not flowing
30-Aug-17														Dry
28-Sep-17														Dry
24-Oct-17	3.70	2,130	4	1,880	5.4	6	5	1200	71	130	130	180	7	Not flowing
28-Nov-17														Not flowing
13-Dec-17														Dry
29-Jan-18														Dry
22-Feb-18														Dry
29-Mar-18	5.00	2,300				4								
26-Apr-18	3.20	2,630	2	2,320	8.7	7	30	1500	62	140	170	160	6	
21-May-18														No flow
25-Jun-18	5.00	1,350				5								
25-Jul-18														Dry
29-Aug-18	7.40	450				11								
28-Sep-18														No flow
24-Oct-18	4.00	1,980	19	1,680	2.6	40	30	970	84	100	110	200	8	
29-Nov-18	4.00	1,350				62								
18-Dec-18	4.60	1,400				5								
31-Jan-19														Dry
28-Feb-19														No flow
28-Mar-19	5.50	1,200				9								
10-Apr-19	3.60	1,470	5	1,220	1.3	7	30	740	51	87	81	100	5	
27-May-19														No flow
28-Jun-19	4.20	1,700				20								
30-Jul-19	6.10	1,930	48	2,010	0.01	10								
29-Aug-19														Dry
24-Sep-19	4.90	2,000				14								
29-Oct-19														Dry
27-Nov-19														Dry
23-Dec-19														Dry
29-Jan-20														Dry
25-Feb-20	4.90	2,400				7								
31-Mar-20	4.90	3,000				3								
27-Apr-20	4.20	3,120	4	2,590	1.7	4	30	1600	110	190	190	260	8	
28-May-20	4.80	2,600				1								

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-Jun-20	5.40	2,500				6								
24-Jul-20														No flow
21-Aug-20	5.50	2,300				2								
28-Sep-20														Dry
23-Oct-20														Dry
26-Nov-20														Dry
21-Dec-20	4.90	1,280				3								
27-Jan-21	5.20	2,650	113	2,370	0.01	3								
24-Feb-21	4.80	2,200				2								
30-Mar-21	4.80	2,600												
27-Apr-21														No flow
25-May-21														No flow
24-Jun-21														No flow
28-Jul-21														Dry
23-Aug-21														Dry
29-Sep-21														Dry
25-Oct-21														Dry
25-Nov-21	4.60	1,600				3								
22-Dec-21														Dry
25-Jan-22	4.30	2,000	5	1,680	0.51									
25-Feb-22	4.10	2,300												
31-Mar-22	6.10	850												
26-Apr-22	4.10	1,850	7	1,530	1.5	9	30	1000	71	97	99	140	7	
24-May-22	5.10	1,100				12								
28-Jun-22														Dry
27-Jul-22	5.50	2,100	5	1,930	0.02	21								
29-Aug-22	4.90	1,800				11								
26-Sep-22	5.60	1,450				7								
25-Oct-22	7.00	1,900	6	1,530	0.14	8	30	910	65	93	97	160	8	
21-Nov-22														No flow
16-Dec-22														Dry
16-Jan-23														Dry
15-Feb-23														Dry
20-Mar-23														No flow

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								
29-Jan-16	6.8	220	12	176	1	37.3								
26-Feb-16	7	190				11.8								
31-Mar-16	7.1	140				9								
28-Apr-16	7.1	120	6	98	0.41	13	39	8	14	12	4	9	2	
26-May-16	7.6	120				18								
29-Jun-16	7.5	130				44								
19-Jul-16	7.4	120	13	107	0.14	37								
22-Aug-16	7.9	140				21								
28-Sep-16	8	120				18								
20-Nov-16	7.7	130	6	104	0.26	6	43	8	16	15	3	10	1	
24-Nov-16	7.5	120				11								
21-Dec-16	6.7	150				5								
30-Jan-17	7.2	174	2	104	0.02	3								
27-Feb-17	7.4	130				4								
31-Mar-17	7.6	300				62								
26-Apr-17	7.1	195	5	168	0.77	9	39	15	38	12	5	20	3	
30-May-17	7.3	250				8								
28-Jun-17	6.8	285				15								
27-Jul-17	6.8	124	4	35	0.13	9								
30-Aug-17	7.1	150				11								
28-Sep-17	7.7	225				7								
24-Oct-17	6.7	241	2	133	0.04	3	32	49	18	21	5	14	1	
28-Nov-17	7.1	180				5								
13-Dec-17	7.6	210				5								
29-Jan-18	7	214	4	126	0.49	7								
22-Feb-18	7.5	200				4								No flow
29-Mar-18	7.2	320				19								
26-Apr-18	7.6	260	5	178	0.72	6	41	32	39	14	5.5	27	3.1	
21-May-18	8.2	230				7								
25-Jun-18	7.7	200				60								
25-Jul-18	6.8	124	3	74	0.04	6								
29-Aug-18	7.9	150				5								
28-Sep-18	7.4	190				6								
24-Oct-18	7.3	190	12	122	0.37	17	30	23	22	7.9	3.8	17	1.5	
29-Nov-18	7.3	140				89								
18-Dec-18	7	150				64								
31-Jan-19	7	280	9	175	0.38	13								
28-Feb-19	7.5	280				9								
28-Mar-19	6.9	190				12								
10-May-19	6.8	186	7	151	0.39	21	36	17	23	11	3.7	15	2.3	
27-May-19	7.7	180				6								
28-Jun-19	7.6	200				24								
30-Jul-19	7	224	3	119	0.02	10								
29-Aug-19	7.3	220				4								
24-Sep-19	6.6	200				60								
29-Oct-19	6.8	186	2	119	0.3	8	42	9	31	9.5	4	20	2.1	
27-Nov-19	7.2	250				7								
23-Dec-19														Dry
29-Jan-20														Dry
25-Feb-20	6.3	400				48								
31-Mar-20	6.9	330				30								
27-Apr-20	7.4	300	14	146	0.76	20	56	10	34	16	6.2	27	3.9	
28-May-20	7.5	250				25								

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-Jun-20	7.9	495				9								
24-Jul-20	6.8	191	23	131	0.17	26								
21-Aug-20	7.2	470				26								
28-Sep-20	7.8	350				12								
23-Oct-20	6.9	310	14	183	0.4	23	53	5	41	9.4	5.1	34	3.5	
26-Nov-20	7.7	320				9								
21-Dec-20	7.3	370				27								
27-Jan-21	6.6	253	4	170	1	11								
24-Feb-21	6.8	220				21								
30-Mar-21	7.2	350				14								
27-Apr-21	6.8	346	9	250	1.7		48	20	120	9.8	8.2	41	4.7	
25-May-21	7.6	370				15								
24-Jun-21	8	350				7								
28-Jul-21	6.9	222	5	139	0.17	16								
23-Aug-21	7.9	250				1								
29-Sep-21	7.6	220				6								
25-Oct-21	6.7	165	8	101	0.61	2	39	9	18	10	4	13	2	
25-Nov-21	7.5	280				21								
22-Dec-21	7.1	310												
25-Jan-22	7.5	300	31	164	0.94									
25-Feb-22	7.7	480												
31-Mar-22	7.5	240												
26-Apr-22	7.6	300	19	220	1.3	45	41	17	51	7.1	6.2	28	5	
24-May-22	7.6	265				101								
28-Jun-22	6.9	375				20								
27-Jul-22	6.7	470	15	350	0.73	49								
29-Aug-22	7.1	490				21								
26-Sep-22	7.1	375				39								
25-Oct-22	6.7	436	15	290	1.1	28	48	21	76	10	8.5	54	4	
21-Nov-22	6.8	400												
16-Dec-22	7.3	350				12								
16-Jan-23	7.2	272	6	160	0.45	14								
15-Feb-23	7.3	287				17								
20-Mar-23	7.5	280				15								

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								
29-Jan-16	6.8	210	23	173	0.86	45.2								
26-Feb-16	7.5	220				9.4								
31-Mar-16	7	210				7								
28-Apr-16	7	250	5	206	0.46	9	41	47	28	11	7	32	3	
26-May-16	8	260				10								
29-Jun-16	7.4	220				14								
19-Jul-16	7.2	220	4	153	0.41	12								
22-Aug-16	7.7	190				9								
28-Sep-16	7.5	200				5								
20-Oct-16	7.8	200	3	153	0.19	10	39	28	23	12	5	19	3	
24-Nov-16	7.7	190				8								
21-Dec-16	6.7	200				4								
30-Jan-17	7.8	227	2	139	0.08	2								
27-Feb-17	7.6	200				5								
31-Mar-17	7.3	210				9								
26-Apr-17	7.2	230	5	181	0.66	10	28	30	41	9	6	29	4	
30-May-17	7	300				11								
28-Jun-17	7.2	235				22								
27-Jul-17	6.9	228	6	152	0.62	17								
30-Aug-17	6.9	200				17								
28-Sep-17	7.9	235				8								
24-Oct-17	7.2	246	3	182	0.22	7	29	33	33	11	5	28	3	
28-Nov-17	6.5	220				6								
13-Dec-17	7.9	240				4								
29-Jan-18	7.8	289	5	168	0.09	4								
22-Feb-18	7.6	270				6								
29-Mar-18	7.2	170				25								
26-Apr-18	7.9	210	4	174	0.46	11	30	25	29	6.8	4.4	26	2.8	
21-May-18	7.5	210				12								
25-Jun-18	7.6	212				14								
25-Jul-18	7	210	4	140	0.33	13								
29-Aug-18	7.8	200				11								
28-Sep-18	7.3	210				5								
24-Oct-18	7.7	200	6	120	0.3	6	30	29	27	8.8	4.4	20	3	
29-Nov-18	7.6	210				14								
18-Dec-18	7	200				23								
31-Jan-19	7.5	228	7	126	0.28	10								
28-Feb-19	8.2	225				16								
28-Mar-19	6.7	160				14								
10-Apr-19	7.3	200	6	126	0.14	4	32	19	26	12	4.2	15	2.9	
27-May-19	7	230				6								
28-Jun-19	7.6	190				7								
30-Jul-19	7.3	207	2	128	0.29	6								
29-Aug-19	7.8	200				6								
24-Sep-19	7	220				9								
29-Oct-19	8.2	221	3	123	0.09	8	34	22	26	11	4.8	21	3.3	
27-Nov-19	7.9	250				8								
23-Dec-19	8.2	380				7								
29-Jan-20	7.8	238	3	138	0.06	7								
25-Feb-20	7.2	250				11								
31-Mar-20	8.4	250				8								
27-Apr-20	7.7	260	7	135	0.63	12	30	21	30	9.6	5.2	24	4.6	
28-May-20	7.8	260				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-Jun-20	7.8	398				4								
24-Jul-20	7	219	4	145	0.37	9								
21-Aug-20	7.8	270				24								
28-Sep-20	7.6	280				10								
23-Oct-20	7.2	286	9	160	0.63	5	30	20	39	7.8	5.1	31	4	
26-Nov-20	7.6	260				4								
21-Dec-20	7.2	260				6								
27-Jan-21	7.1	260	4	173	0.73	3								
24-Feb-21	7.2	270				3								
30-Mar-21	7.3	260				4								
27-Apr-21	6.7	228	6	23	1.5		30	14	34	6.6	5.5	27	4.3	
25-May-21	7.6	270				23								
24-Jun-21	8	250				13								
28-Jul-21	7.2	243	5	190	1.6	5								
23-Aug-21	7.8	250				7								
29-Sep-21	7.8	290				7								
25-Oct-21	7.5	240	5	168	1.3	4	31	20	37	8.2	5.9	31	4	
25-Nov-21	7.7	240				10								
22-Dec-21	7.3	270												
25-Jan-22	7.7	250	5	171	0.44									
25-Feb-22	8	260												
31-Mar-22	7.1	220												
26-Apr-22	7.5	270	18	202	1.3	28	30	16	44	5.9	5.1	24	4	
24-May-22	7.5	260				35								
28-Jun-22	7	300				27								
27-Jul-22	7.2	270	6	278	0.75	47								
29-Aug-22	7.7	330				24								
26-Sep-22	7.6	300				17								
25-Oct-22	6.9	268	7	230	1.4	19	31	15	43	6.1	5.4	35	4	
21-Nov-22	7.2	356				11								
16-Dec-22	7.5	340				7								
16-Jan-23	7.8	410	5	270	0.59	4								
15-Feb-23	7.8	470				6								
20-Mar-23	7.7	395				8								

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								
29-Jan-16	5.9	1650	5	1230	0.06	10.5								
26-Feb-16	7.5	5030				7.2								
31-Mar-16	8.1	5210				11								
28-Apr-16	8	5210	3	5510	0.01	4	160	3000	385	300	300	865	30	
26-May-16	8.3	4600				3.5								
29-Jun-16	7.6	4840				2								
19-Jul-16	7.8	5000	1	4460	0.01	4								
22-Aug-16	8.1	3850				4								
28-Sep-16	8.4	4900				2								
20-Oct-16	7.8	5900	2	5490	0.01	1	240	2800	370	260	300	1000	28	
24-Nov-16	8	3950				48								
21-Dec-16	8.2	5800				4								
30-Jan-17	8.4	5230	4	5890	0.01	4								
27-Feb-17	8.4	5360				3								
31-Mar-17	7.8	2750				7								
26-Apr-17	7.3	3120	10	3030	0.01	4	44	1600	210	170	190	510	14	
30-May-17														Too low to sample
28-Jun-17	5.5	2720				5								
27-Jul-17	7.9	4870	2	4890	0.01	5								
30-Aug-17	8.3	6200				5								
28-Sep-17														Too low to sample
24-Oct-17	7.5	6280	6	6290	0.01	7	170	3200	420	320	350	1200	34	
28-Nov-17	8.2	5800				8								
13-Dec-17	8.3	6100				3								
29-Jan-18	8.3	5470	6	5830	0.01	5								
22-Feb-18	7.9	6300				4								
29-Mar-18	7.3	1720				8								
26-Apr-18	8.1	3380	2	2740	0.01	3	170	1200	210	120	140	610	14	
21-May-18	8.5	5500				4								
25-Jun-18	8.1	4400				3								
25-Jul-18	8.2	5840	2	5730	0.01	4								
29-Aug-18	7.9	6300				4								
28-Sep-18	7.8	6520				3								
24-Oct-18	8.1	4850	3	5010	0.01	4	120	2800	360	230	260	670	25	
29-Nov-18	7.8	5400				26								
18-Dec-18	6.4	3600				13								
31-Jan-19	8.1	4850	3	5930	0.01	4								
28-Feb-19	8.2	6400				5								
28-Mar-19	6.5	4650				6								
10-Apr-19	4.3	3960	4	4190	0.15	7	30	2400	240	240	240	610	20	
27-May-19	7.6	6600				5								
28-Jun-19	6.7	5000				5								
30-Jul-19	7.8	4600	2	6080	0.01	5								
29-Aug-19	7.9	6400				6								
24-Sep-19	4.8	3200				9								
29-Oct-19	8.5	4140	2	4110	0.01	4	190	2100	340	180	230	870	19	
27-Nov-19	8.2	7500				6								
23-Dec-19	8.1	7400				6								
29-Jan-20	8.4	8400	7	8140	0.01	6								
25-Feb-20	7.2	3630				7								
31-Mar-20	6.9	5100				6								
27-Apr-20	8.1	5500	2	4870	0.01	1	63	2700	330	290	280	830	22	
28-May-20	5.8	5800				11								

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-Jun-20	7.8	6000				1								
24-Jul-20	6	5000	4	4630	0.22	1								
21-Aug-20	6.8	2800				7								
28-Sep-20	7.4	5400				6								
23-Oct-20	7.6	5920	10	5580	0.01	7	80	2900	310	290	290	820	25	
26-Nov-20	8	4160				0								
21-Dec-20	7.3	5300				1								
27-Jan-21	6.1	4410	4	4130	0.04	2								
24-Feb-21	4.9	5200				4								
30-Mar-21	6.2	1750												
27-Apr-21	5.9	3240	4	3040	0.05		30	1700	170	180	170	390	13	
25-May-21	7.8	4700				2								
24-Jun-21	8	4900				2								
28-Jul-21	8.2	5730	5	5950	0.03	4								
23-Aug-21	8.2	5900				1								
29-Sep-21	8.3	6100				3								
25-Oct-21	7.8	5250	5	5120	0.01	5	86	2900	300	260	320	870	33	
25-Nov-21	7.7	3300				3								
22-Dec-21	7.3	3750												
25-Jan-22	7.4	5000	5	4580	0.01									
25-Feb-22	7.3	6000												
31-Mar-22	7.1	1700												
26-Apr-22	7.8	2480	5	1960	0.01	5	35	1100	140	100	100	290	11	
24-May-22	7.9	2900				18								
28-Jun-22	7.8	3700				3								
27-Jul-22	7.2	1900	5	1520	0.04	10								
29-Aug-22	7.6	2200				5								
26-Sep-22	8	3870				3								
25-Oct-22	7.5	3090	5	2590	0.01	8	99	1300	180	130	140	390	13	
21-Nov-22	7.2	5090				8								
16-Dec-22	8.1	6340				8								
16-Jan-23	8.3	6680	9	6230	0.01	4								
15-Feb-23	8.2	7400				5								
20-Mar-23	8	5960				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								
29-Jan-16	8.2	1,530	20	1,020	0.02	38.9								
26-Feb-16	7.5	5,800				12								
31-Mar-16	8.3	5,010				15.1								
28-Apr-16	8.1	4,640	4	4,570	0.01	5	415	2360	320	190	230	910	17	
26-May-16	8.2	5,600				4								
29-Jun-16	7.8	3,450				4								
19-Jul-16	7.8	5,170	1	4,230	0.01	2								
22-Aug-16	8.2	5,490				4								
28-Sep-16	8.7	4,710				5								
20-Oct-16	8.5	5,900	1	5,100	0.02	2	360	2500	360	170	280	1100	20	
28-Nov-16	8	5,800				11								
21-Dec-16	8	5,700				11								
30-Jan-17	7.9	4,810	13	4,440	0.01	15								
27-Feb-17	8	5,400				3								
31-Mar-17	7.7	4,600				3								
26-Apr-17	8.4	3,590	4	3,250	0.01	3	370	1500	290	150	160	780	15	
30-May-17	8.4	5,160				4								
28-Jun-17	8.6	3,540				9								
27-Jul-17	8.4	4,300	4	4,030	0.01	6								
30-Aug-17	8.6	5,400				2								
28-Sep-17	8.5	5,900				3								
24-Oct-17	8	5,450	4	5,210	0.02	6	430	2300	370	220	290	1100	23	
28-Nov-17	7.8	6,400				5								
13-Dec-17	8.2	6,200				4								
29-Jan-18	8.8	4,440	17	3,770	0.01	19								
22-Feb-18	8.3	5,100				4								
29-Mar-18	8	1,520				19								
26-Apr-18	8.6	3,390	7	2,190	0.01	11	760	390	360	28	31	880	6.7	
21-May-18	8.5	4,450				6								
25-Jun-18	8.3	4,000				5								
25-Jul-18	8.4	4,340	2	3,400	0.01	4								
29-Aug-18	8.2	4,200				5								
28-Sep-18	8.3	4,510				5								
24-Oct-18	8.5	3,660	3	2,300	0.01	5	500	820	380	42	75	860	9.2	
29-Nov-18	8.2	4,300				8								
18-Dec-18	7.7	1,350				46								
31-Jan-19	8.1	2,910	3	2,900	0.01	3								
28-Feb-19	8.5	3,900				9								
28-Mar-19	8	6,100				9								
10-Apr-19	8.6	3,090	35	2,230	0.01	30	30	750	360	48	71	720	8.9	
27-May-19	7.9	4,800				6								
28-Jun-19	8.4	3,100				26								
30-Jul-19	9	3,310	6	2,460	0.01	7								
29-Aug-19	9.1	3,800				5								
24-Sep-19	8.7	1,700				38								
29-Oct-19	9.3	2,830	6	2,180	0.01	9	260	980	280	42	100	610	12	
27-Nov-19	8.5	5,400				12								
23-Dec-19	8.2	5,500				7								
29-Jan-20	8.6	5,760	5	4,190	0.01	8								
25-Feb-20	8.5	4,570				22								
31-Mar-20	8.9	3,460				14								
27-Apr-20	9	3,700	7	2,240	0.01	3	520	740	380	34	79	780	7.2	
28-May-20	8.5	4,750				1								

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-Jun-20	8.9	4,260				1								
24-Jul-20	8.7	3,560	2	2,230	0.01	1								
21-Aug-20	8.5	2,850				4								
28-Sep-20	8.3	4,500				5								
23-Oct-20	8.7	4,680	2	3,520	0.01	4	380	1600	310	78	160	860	11	
26-Nov-20	8.4	4,200				0								
21-Dec-20	7.7	5,900				1								
27-Jan-21	8.4	3,700	5	2,560	0.01	0								
24-Feb-21	8.1	4,250				2								
30-Mar-21	7.6	830												
27-Apr-21	8.3	1,880	3	1,350	0.01		250	540	140	59	56	290	6.8	
25-May-21	8.1	3,300				8								
24-Jun-21	8.2	3,200				9								
28-Jul-21	8.6	3,140	6	2,310	0.01	7								
23-Aug-21	8.5	3,500				3								
29-Sep-21	9	3,100				9								
25-Oct-21	9.3	3,130	18	2,010	0.01	4	490	590	380	18	74	750	11	
25-Nov-21	8.7	2,380				2								
22-Dec-21	8.5	3,470												
25-Jan-22	8.7	4,000	10	2,670	0.01									
25-Feb-22	8.5	4,300												
31-Mar-22	8.2	1,200												Discharging
26-Apr-22	8.8	2,530	18	1,770	0.01	11	250	800	190	60	86	400	8.4	
24-May-22	8.6	3,200				2								Discharging
28-Jun-22	8.5	3,900				4								
27-Jul-22	8.6	1,890	5	1,270	0.01	6								
29-Aug-22	8.8	3,200				2								
26-Sep-22	8.6	2,800				5								
25-Oct-22	8.6	3,340	5	2,360	0.01	3	30	820	290	66	97	590	9	
21-Nov-22	8.4	4,240				6								
16-Dec-22	8	5,400				5								
16-Jan-23	8.6	3,820	11	2,360	0.01	5								
15-Feb-23	8.5	4,700				9								
20-Mar-23	8.5	3,770				10								

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								
29-Jan-16	6.9	210	14	190	1.4	34.3								
26-Feb-16	6.8	260				22								
31-Mar-16	7.2	220				36								
28-Apr-16	7.3	230	5	220	3.6	36	62	7	26	9	8	20	7	
26-May-16	6.8	190				58								
29-Jun-16	6.8	120				65								
19-Jul-16	7.3	150	8	176	1.1	43								
23-Aug-16	7	120				66								
28-Sep-16	7.3	160				40								
20-Oct-16	7.5	170	8	179	4.3	30	72	3	19	9	7	18	5	
28-Nov-16	7.2	190				14								
21-Dec-16	7.1	180				14								
30-Jan-17	6.9	177	19	147	0.77	23								
27-Feb-17	7.2	110				45								
30-Mar-17	7.3	180				22								
26-Apr-17	7.2	280	10	236	3.5	18	48	11	64	9	9	43	7	
30-May-17	6.7	295				25								
28-Jun-17	6.9	310				27								
27-Jul-17	7.1	383	4	232	2.3	28								
30-Aug-17	6.8	330				23								
28-Sep-17	7.5	380				15								
24-Oct-17	7.1	265	12	233	1.1	28	65	20	26	12	7	32	3	
28-Nov-17	6.9	190				37								
13-Dec-17	7.7	220				34								
29-Jan-18														Dry
22-Feb-18	7	165												Stagnant
29-Mar-18	6.9	230				28								
26-Apr-18	6.8	280	5	263	6.1	23	55	11	46	8.7	7.3	39	6.3	
21-May-18	7.7	330				32								
26-Jun-18	7.3	215				45								
25-Jul-18	7.2	253	4	316	0.49	35								
29-Aug-18	7.5	120				124								
28-Sep-18	7.5	210				30								
24-Oct-18	7	400	4	300	1.2	25	40	23	77	10	8.5	61	5.8	
29-Nov-18	7.5	180				77								
18-Dec-18	7	240				32								
31-Jan-19	7	350	38	211	1.3	134								No flow
28-Feb-19														Dry
28-Mar-19	6.7	150				31								
10-Apr-19	7	182	7	145	1.3	20	43	13	16	8.3	4.8	15	4.6	
27-May-19														Dry
28-Jun-19	7.3	150				77								
30-Jul-19	7	173	8	218	0.54	60								
29-Aug-19														Dry
24-Sep-19	6.6	180				63								
29-Oct-19	7	217	17	241	0.64	43	68	4	23	12	6	21	6.1	
27-Nov-19														Dry
23-Dec-19														Dry
29-Jan-20	6.5	198	125	201	0.54	174								
25-Feb-20	6.8	290				10								
31-Mar-20	7	330				11								
27-Apr-20	7.4	325	12	230	2.9	8	90	3	32	16	9.8	32	6.7	
28-May-20	7.6	240				37								

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-Jun-20	7.2	440				69								
24-Jul-20	7	201	13	142	0.34	43								
21-Aug-20	7.3	320				17								
28-Sep-20	7.5	270				15								
23-Oct-20	6.9	207	13	167	0.69	34	46	6	20	6.3	4.4	20	4.5	
26-Nov-20	7	380				10								
21-Dec-20	7.3	270				35								
27-Jan-21	6.9	271	16	221	2.6	18								
24-Feb-21	7	350				14								
30-Mar-21	7	330												
27-Apr-21	7	357	2	280	2.2		58	13	66	8	8.6	44	5.7	
25-May-21	7.4	410				15								
24-Jun-21	7.6	320				18								
28-Jul-21	7.2	291	5	206	1.1	33								
23-Aug-21	7.6	300				14								
29-Sep-21	7.5	250				8								
25-Oct-21	7.1	201	5	202	1.6	17	71	8	14	13	6.8	16	4	
25-Nov-21	7.6	360				24								
22-Dec-21	7.3	360												
25-Jan-22	7.4	280	11	216	2.4									
25-Feb-22	7	400												
31-Mar-22	7.2	280												
26-Apr-22	7.8	340	7	259	1.3	33	49	9	61	5.6	6.2	35	5.8	
24-May-22	7.2	350				18								
28-Jun-22	6.9	400				13								
27-Jul-22	7.5	560	15	324	0.78	31								
29-Aug-22	7.4	490				18								
26-Sep-22	7.2	450				19								
25-Oct-22	7.3	449	10	340	1.1	34	64	13	76	6.5	7.7	62	5.3	
21-Nov-22	7.2	470				40								
16-Dec-22	7.4	420				31								
16-Jan-23	7.3	550	9	420	10	15								
15-Feb-23	7.3	540				16								
20-Mar-23	7.2	490				17								
25-Jan-22	7.4	280	11	216	2.4									

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								
29-Jan-16	7.50	3,510	12	2,810	0.11	19.7								
26-Feb-16	7.50	4,200				36.7								
31-Mar-16	8.30	4,900				10								
28-Apr-16	7.80	3,620	39	3,000	0.01	40	28	1380	265	110	130	510	12	
26-May-16	7.50	1,600				27								
29-Jun-16	7.30	4,000				19								
19-Jul-16	7.70	4,100	14	3,460	0.01	23								
22-Aug-16	7.60	1,800				33								
28-Sep-16	8.10	4,580				11								
20-Oct-16	8.40	4,300	24	3,520	0.01	33	330	1700	310	130	190	880	15	
28-Nov-16	8.20	4,300				72								
21-Dec-16	7.60	4,300				41								
30-Jan-17	8.00	4,240	46	3,680	<0.01	16								
27-Feb-17	8.10	5,100				4								
30-Mar-17	7.40	3,900				12								
26-Apr-17	7.70	1,300	12	1,050	0.23	16	150	390	150	48	53	240	8	
30-May-17	8.00	3,550				13								
28-Jun-17	7.50	2,516				13								
27-Jul-17	7.40	720	22	879	0.32	32								
30-Aug-17	6.60	1,730				37								Not flowing
28-Sep-17	7.80	5,150				68								
24-Oct-17	8.10	5,080	22	4,520	0.01	21	360	1700	290	160	250	1000	19	
28-Nov-17	7.50	3,150				42								Not flowing
13-Dec-17	7.80	3,540				48								Not flowing
29-Jan-18	7.80	1,670	50	1,320	0.06	67								Not flowing
22-Feb-18	5.60	1,280				19								Ashtonfield runoff
29-Mar-18	6.50	2,000				29								
26-Apr-18	7.60	3,560	8	2,810	0.01	15	240	1200	250	110	140	670	13	
21-May-18	7.60	2,600				16								
25-Jun-18	7.70	3,400				13								
25-Jul-18	7.40	866	7	541	0.07	17								
29-Aug-18	7.80	4,800				9								
28-Sep-18	7.50	3,400				17								
24-Oct-18	7.60	2,400	26	1,310	0.01	36	210	720	210	67	77	460	9.6	
29-Nov-18	7.80	3,900				23								Discharging
18-Dec-18	6.70	550				27								
31-Jan-19	7.90	1,350	56			33								No flow
28-Feb-19	7.60	5,400				23								
28-Mar-19	6.90	890				28								
10-Apr-19	7.70	3,590	11	3,400	0.01	17	230	1900	310	160	190	690	16	
27-May-19	7.80	2,900				29								No flow
28-Jun-19	7.80	4,400				6								
30-Jul-19	7.80	3,110	20	3,020	0.01	28								
29-Aug-19	8.00	3,800				25								No flow
24-Sep-19	7.10	1,100				26								
29-Oct-19	7.60	1,250	18	801	0.09	22	190	210	170	35	39	180	7.4	
27-Nov-19	8.00	1,850				22								
23-Dec-19	8.00	1,900				26								
29-Jan-20	4.10	2,170	9	1,740	0.41	11								Stagnant pool
25-Feb-20	7.20	3,680				13								
31-Mar-20	7.90	4,570				9								
27-Apr-20	7.90	5,750	8	5,380	0.03	6	400	2400	370	200	250	870	16	
28-May-20	8.40	5,090				3								

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-Jun-20	7.30	1,300				5								
24-Jul-20	7.80	3,220	2	2,500	0.01	1								
21-Aug-20	7.70	1,830				18								
28-Sep-20	7.60	5,450				13								
23-Oct-20	7.90	5,060	8	4,110	0.01	11	290	2000	310	150	200	850	15	
26-Nov-20	7.60	3,600				36								
21-Dec-20	7.70	5,300				10								
27-Jan-21	7.60	4,330	16	3,490	0.01	20								
24-Feb-21	7.20	2,900				4								
30-Mar-21	7.20	1,630				10								
27-Apr-21	7.60	3,810	17	3,240	0.01		270	1500	290	140	170	550	11	
25-May-21	7.80	4,000				11								
24-Jun-21	7.50	3,600				4								
28-Jul-21	7.60	2,690	20	2,150	0.01	26								
23-Aug-21	7.60	2,500				53								
29-Sep-21	7.70	5,000				33								
25-Oct-21	7.80	4,450	20	3,950	0.02	20	270	2000	310	170	240	760	26	
25-Nov-21	7.50	3,000				7								
22-Dec-21	7.50	2,660												
25-Jan-22	7.9	4,840	26	3,930	0.01									
25-Feb-22	7.6	5,100												
31-Mar-22	7.5	1,400												Discharging
26-Apr-22	8.0	3,700	8	3,200	0.02	10	190	1700	200	150	180	600	14	
24-May-22	7.9	2,100				30								Discharging
28-Jun-22	7.3	2,260				13								
27-Jul-22	7.2	1,930	7	1,300	0.35	30								
29-Aug-22	7.7	3,800				10								
26-Sep-22	8.0	3,830				8								
25-Oct-22	7.7	3,850	8	3,330	0.01	8	210	1600	210	150	190	520	15	
21-Nov-22	7.5	5,410				38								
16-Dec-22	7.6	3,180				44								
16-Jan-23	7.8	5,200	27	4,180	0.01	19								
15-Feb-23	8.1	5,200				17								
20-Mar-23	7.8	4,910				20								

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								
29-Jan-16	7.5	3,070	16	2,470	0.15	39.8								
26-Feb-16	7.3	3,500				43								
31-Mar-16	8.2	4,850				11								
28-Apr-16	7.5	1,730	12	1,210	0.17	16	155	560	115	51	60	260	7	
26-May-16	7.6	750				56								
29-Jun-16	7.2	3,120				7								
19-Jul-16	7.2	1,300	7	927	0.24	20								
22-Aug-16	7.3	1,100				25								
28-Sep-16	8.2	4,520				8								
20-Oct-16	8.5	4,700	3	4,100	0.02	7	350	2000	320	140	220	990	16	
28-Nov-16	8.2	4,500				16								
21-Dec-16	7.9	5,300				10								
30-Jan-17	8.2	4,500	9	3,930	0.01	11								
27-Feb-17	8	5,330				8								
30-Mar-17	7.3	4,000				8								
26-Apr-17	7.6	1,038	8	854	0.33	19	110	320	110	41	42	170	7	
30-May-17	7.6	1,630				13								
28-Jun-17	7.4	1,921				23								
27-Jul-17	7.2	566	7	405	0.51	31								
30-Aug-17	6.8	1,300				6								Not flowing
28-Sep-17	7.9	4,520				4								
24-Oct-17	8.3	5,490	8	5,100	0.01	9	410	1900	310	190	280	1100	22	
28-Nov-17	7.5	4,500				5								Not flowing
13-Dec-17														Dry
29-Jan-18														Dry
22-Feb-18														Dry
29-Mar-18	7.1	1,900				38								
26-Apr-18	7.6	3,860	8	3,040	0.01	13	350	1200	280	120	130	770	13	
21-May-18	7.7	3,000				8								
25-Jun-18	7.5	3,500				4								
25-Jul-18	7.3	626	13	425	0.14	20								
29-Aug-18	8.1	4,520				7								
28-Sep-18	7.2	2,800				5								Not flowing
24-Oct-18	7.7	2,340	2	1,840	0.01	5	180	790	180	77	85	420	8.9	
29-Nov-18	7.6	4,100				6								Discharging
18-Dec-18	6.7	500				19								
31-Jan-19														Dry
28-Feb-19	7.8	5,400				10								
28-Mar-19	6.9	900				7								
10-Apr-19	7.8	3,630	6	3,700	0.01	7	190	2000	290	180	190	690	17	
27-May-19	8	6,000												No flow
28-Jun-19	8.1	4,500				4								
30-Jul-19	7.9	2,610	2	2,530	0.01	3								
29-Aug-19														Dry
24-Sep-19	7.1	1,080				9								
29-Oct-19														Dry
27-Nov-19														Dry
23-Dec-19														Dry
29-Jan-20														Dry
25-Feb-20	7.3	4,120				9								
31-Mar-20	7.9	4,900				6								
27-Apr-20	8	5,730	6	6,790	0.04	4	470	2200	390	170	230	890	14	
28-May-20	8.3	4,790				2								

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-Jun-20	7.4	1,010				6								
24-Jul-20	7.6	1,820	5	1,300	0.01	1								
21-Aug-20	7.3	1,200				24								
28-Sep-20	7.2	5,700				8								
23-Oct-20	7.9	5,240	2	4,330	0.01	5	310	2100	320	150	210	860	15	
26-Nov-20	7.4	5,200				1								
21-Dec-20	7.7	5,500				5								
27-Jan-21	7.7	4,130	5	3,340	0.01	0								
24-Feb-21	7.5	2,000				4								
30-Mar-21	7.3	1,370				10								
27-Apr-21	7.5	3,070	9	2,610	0.03		230	1200	200	110	130	420	9.9	
25-May-21	7.7	3,300				16								
24-Jun-21	7.5	3,150				33								
28-Jul-21	7.5	2,740	6	2,310	0.03	10								
23-Aug-21														Dry
29-Sep-21	7.7	5,100				8								
25-Oct-21	7.7	2,510	8	1,980	0.02	8	180	950	160	85	120	390	16	
25-Nov-21	7.5	3,500				9								
22-Dec-21	7.6	2,240												
25-Jan-22	8	4,890	5	4,020	0.01									
25-Feb-22	7.2	5,500												
31-Mar-22	7	1,600												Discharging
26-Apr-22	7.9	1,660	10	1,210	0.59	21	97	590	99	55	67	200	7.6	
24-May-22	8.1	2,400				29								Discharging
28-Jun-22	7.4	1,650				22								
27-Jul-22	7.1	1,430	7	986	0.54	36								
29-Aug-22	7.7	3,900				11								
26-Sep-22	8.1	3,940				9								
25-Oct-22	7.4	2,010	12	1,540	0.22	18	110	710	120	66	81	270	8.3	
21-Nov-22	7.5	5,540				21								
16-Dec-22	7.7	4,400				7								
16-Jan-23	7.8	5,210	12	4,190	0.01	10								
15-Feb-23	8.1	5,500				5								
20-Mar-23	7.8	4,810				12								

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								

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-16	7	640	11	383	0.94	12.5								
26-Feb-16	6.9	840				7								
31-Mar-16	7.1	450				13								
28-Apr-16	8	930	3	524	0.04	4	115	14	210	19	21	130	6	
26-May-16	7.6	960				19								
29-Jun-16	6.9	1,200				5								
19-Jul-16	7.8	1,180	8	757	0.01	7								Stagnant
22-Aug-16	7.5	790				13								Stagnant
28-Sep-16	7.5	800				5								
20-Oct-16	7.6	860	2	536	0.35	3	97	81	150	25	24	130	13	
28-Nov-16	7.6	940				11								Stagnant
21-Dec-16	7.7	960				9								Stagnant
30-Jan-17	8	1,060	8	623	0.02	8								
27-Feb-17	8.1	1,100				270								Cattle
30-Mar-17	7.4	390				41								
26-Apr-17	7.3	454	8	356	2.1	10	65	26	110	13	13	72	8	
30-May-17	7.1	580				7								
28-Jun-17	6.7	510				28								
27-Jul-17	7.2	547	4	364	1	12								
30-Aug-17	7.6	590				6								Not flowing
28-Sep-17	7.9	695				6								Not flowing
24-Oct-17	7.5	711	2	428	0.19	6	77	53	120	16	16	110	8	
28-Nov-17	7.5	630				8								Not flowing
13-Dec-17	7.7	670				8								Not flowing
29-Jan-18	7.8	779	22	489	0.08	29								Not flowing
22-Feb-18	8	800				39								Stagnant - cattle
29-Mar-18	7	500				18								Cattle
26-Apr-18	6.5	560	6	367	2	12	64	31	110	13	13	84	7.3	Cattle
21-May-18	8	610				8								
26-Jun-18	7.7	500				19								
25-Jul-18	7.6	536	2	334	1.1	6								
29-Aug-18	7.7	520				6								
28-Sep-18	8.1	550				5								Not flowing
24-Oct-18	7.1	450	13	486	1.6	13	57	22	83	8.5	9.4	71	7	
29-Nov-18	8.3	480				13								
18-Dec-18	6.4	250				40								
31-Jan-19	7.4	410	6	222	1.8	8								No flow
28-Feb-19	8	450				16								
28-Mar-19	7	280				38								
10-Apr-19	7.1	364	11	251	1.1	18	40	17	65	7.6	7.5	48	7.6	
27-May-19	7.7	544				19								
28-Jun-19	7.4	380				15								
30-Jul-19	7.4	405	15	206	0.06	20								
29-Aug-19	8.1	560				18								
24-Sep-19	6.7	270				69								
29-Oct-19	7.7	323	14	206	1.1	19	50	12	54	7.8	6.9	43	5.9	
27-Nov-19	7.4	390				16								
23-Dec-19	7.5	490				55								
29-Jan-20														Muddy pool - cattle
25-Feb-20	6.9	357				11								
31-Mar-20	7.3	320				9								
27-Apr-20	7.7	395	5	257	3.9	5	77	8	55	12	10	46	8.2	
28-May-20	7.7	280				13								
29-Jun-20	7.3	560				15								
24-Jul-20	7.1	409	11	285	0.87	9								
21-Aug-20	6.9	550				9								
28-Sep-20	7.6	630				6								
23-Oct-20	7.7	650	9	182	0.31	6	72	13	120	12	13	73	6.4	
26-Nov-20	7.2	420				7								
21-Dec-20	7.4	482				22								
21-Jul-21	7	434	10	242	1.8	15								
24-Feb-21	7.3	300				10								
30-Mar-21	7	650												
27-Apr-21	7	603	5	404	0.66		71	28	120	12	14	71	5.8	
25-May-21	7.7	850				25								

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-Jun-21	7.4	870				4								
28-Jul-21	7.4	840	5	475	0.14	27								
23-Aug-21	7.7	820				6								
29-Sep-21	7.9	550				7								
25-Oct-21	7.1	512	6	297	0.74	9	68	18	98	11	12	67	6.7	
25-Nov-21	7.3	310				15								
22-Dec-21	7.5	540												
25-Jan-22	7.4	530	20	321	1.2									
25-Feb-22	7.3	560												
31-Mar-22	7.4	280												
26-Apr-22	7.6	620	28	376	1	24	67	19	120	11	13	87	5.3	
24-May-22	7.3	510				29								
28-Jun-22	7.2	880				12								
27-Jul-22	7.3	980	6	532	0.31	19								
29-Aug-22	7.5	1,200				10								
26-Sep-22	7.3	540				11								
25-Oct-22	7.1	902	12	1,540	0.51	22	81	28	180	16	19	120	5	
21-Nov-22	7.5	1,130				10								
16-Dec-22	7.5	1,200				12								
16-Jan-23	7.8	1,270	11	680	0.07									Evaporating
15-Feb-23	7.6	1,300				14								
20-Mar-23	7.4	780				13								

Site WM14 **Buttai Creek @ W Cut**

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
28-Jul-21	7.2	413	5	268	0.14	10								
23-Aug-21	7.6	400				11								
29-Sep-21	7.7	460				4								
25-Oct-21	7.8	455	5	269	0.91	9	39	24	92	9	10	62	7	
25-Nov-21	7.5	260				37								
22-Dec-21	7.7	320												
25-Jan-22	7.8	315	9	224	0.93									
25-Feb-22	7.5	340												
31-Mar-22	7.6	250												
26-Apr-22	7.7	440	21	285	1.10	25	46	19	90	8	9	64	5	
24-May-22	7.5	370				45								
28-Jun-22	7.3	455				21								
27-Jul-22	7.3	540	11	332	0.53	35								
29-Aug-22	7.8	710				14								
26-Sep-22	7.4	560				28								
25-Oct-22	7.3	611	10	360	0.77	21	59	22	120	11	13	84	4	
21-Nov-22	7.5	650				10								
16-Dec-22	7.7	665				7								
16-Jan-23	8.3	687	6	380	0.39	8								
15-Feb-23	7.7	700				9								
20-Mar-23	7.8	660				12								

Site WM15 **Buttai Creek – Downstream W Cut**

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
25-Nov-21	7.6	250				41								
22-Dec-21	7.6	320												
25-Jan-22														Dry
25-Feb-22	7.5	250												
31-Mar-22	7.4	240												
26-Apr-22	7.7	460	18	291	1.10	22	46	19	90	8	9	63	5	
24-May-22	7.6	450				42								
28-Jun-22	7.1	440				22								
27-Jul-22	7.3	590	14	334	0.49	39								
29-Aug-22	7.5	770				17								
26-Sep-22	7.5	590				31								
25-Oct-22	7.3	622	20	370	0.76	24	60	22	120	11	13	85	4	
21-Nov-22	7.2	655				15								
16-Dec-22														Dry
16-Jan-23														Dry
15-Feb-23														Dry
20-Mar-23	7.6	760				7								

Table C1 - Discharge Monitoring Results 2022-23

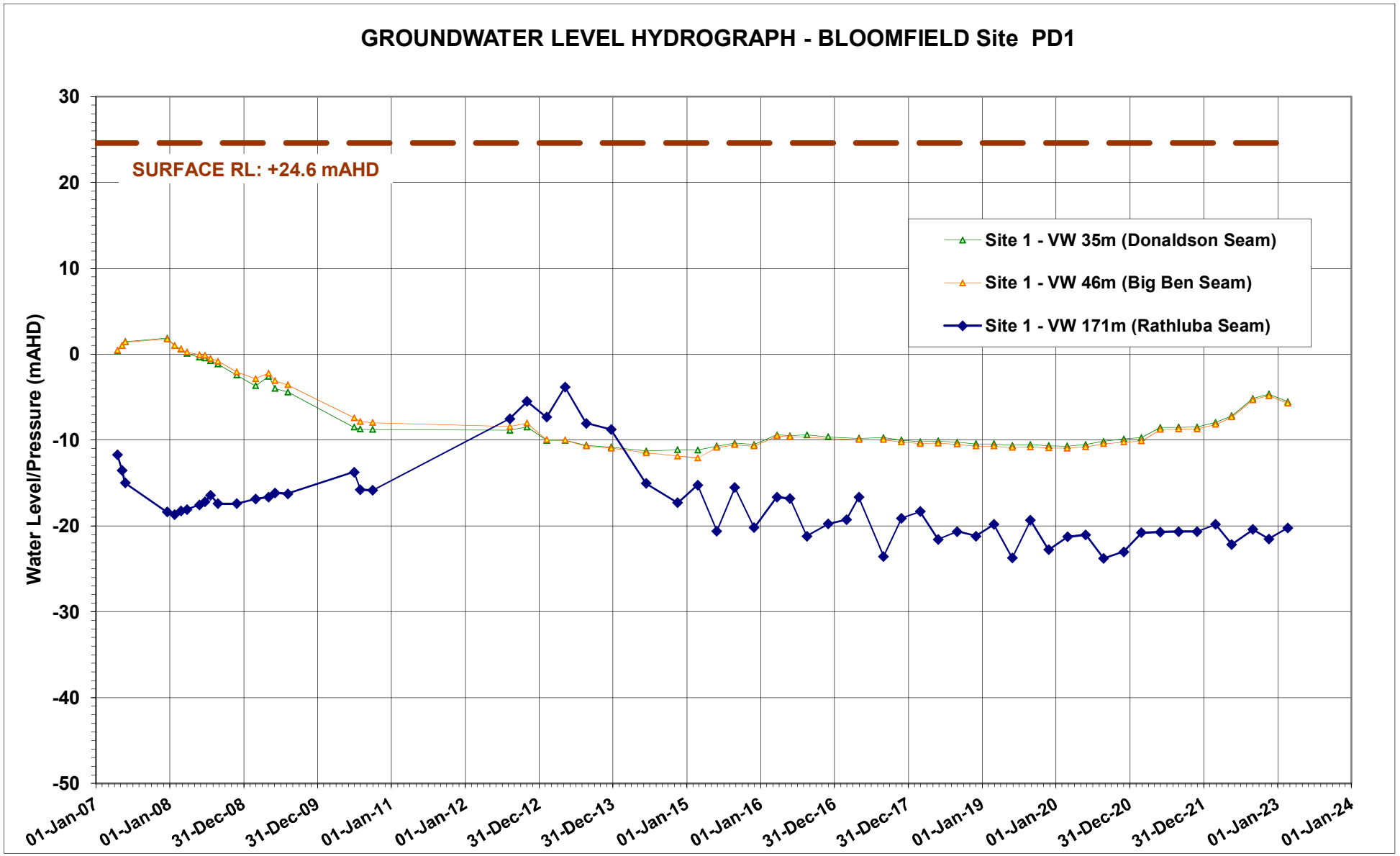
DATE	pH	TOTAL SUSPENDED SOLIDS (mg/l)	SPECIFIC CONDUCTANCE (uS/cm)	IRON (mg/l)	DISCHARGE VOLUME (ML/day)
05-Jan-22	8.0	5	5,440	<0.01	40
08-Jan-22	7.9	5	5,500	<0.01	30
09-Jan-22	7.9	5	5,110	<0.01	20
10-Jan-22	7.9	5	5,040	<0.01	20
19-Jan-22	8.2	6	5,790	<0.01	40
20-Jan-22	8.1	5	5,720	<0.01	40
21-Jan-22	8.2	7	5,100	<0.01	20
02-Feb-22	8.0	5	5,790	<0.01	40
03-Feb-22	8.0	8	5,860	0.38	40
04-Feb-22	8.1	6	5,220	<0.01	30
12-Feb-22	8.0	6	5,890	<0.01	40
18-Feb-22	8.0	6	5,850	<0.01	40
19-Feb-22	8.1	5	5,520	<0.01	30
20-Feb-22	8.1	5	5,540	<0.01	20
23-Feb-22	8.1	6	5,820	<0.01	20
01-Mar-22	8.1	5	5,580	<0.01	20
02-Mar-22	8.0	6	5,700	<0.01	20
03-Mar-22	8.1	5	5,360	<0.01	20
04-Mar-22	8.2	17	4,210	<0.01	20
05-Mar-22	8.1	16	4,210	<0.01	20
06-Mar-22	8.2	13	4,050	<0.01	20
08-Mar-22	8.1	9	4,200	<0.01	20
09-Mar-22	8.1	15	4,430	<0.01	20
10-Mar-22	8.0	21	3,760	0.01	20
11-Mar-22	8.0	16	3,910	0.01	20
24-Mar-22	8.0	8	5,640	<0.01	40
25-Mar-22	8.1	12	5,500	<0.01	40
26-Mar-22	8.1	11	5,260	<0.01	20
27-Mar-22	8.0	19	4,760	<0.01	20
28-Mar-22	7.9	19	3,930	0.02	20
30-Mar-22	7.8	18	4,880	0.02	20
31-Mar-22	8.0	20	3,680	0.01	20
01-Apr-22	8.1	14	3,150	0.02	20
08-Apr-22	7.9	6	5,500	<0.01	40
09-Apr-22	7.9	6	5,230	<0.01	40
10-Apr-22	7.9	6	5,160	<0.01	30
13-Apr-22	8.1	6	5,110	0.01	30
22-Apr-22	8.0	6	5,110	<0.01	40

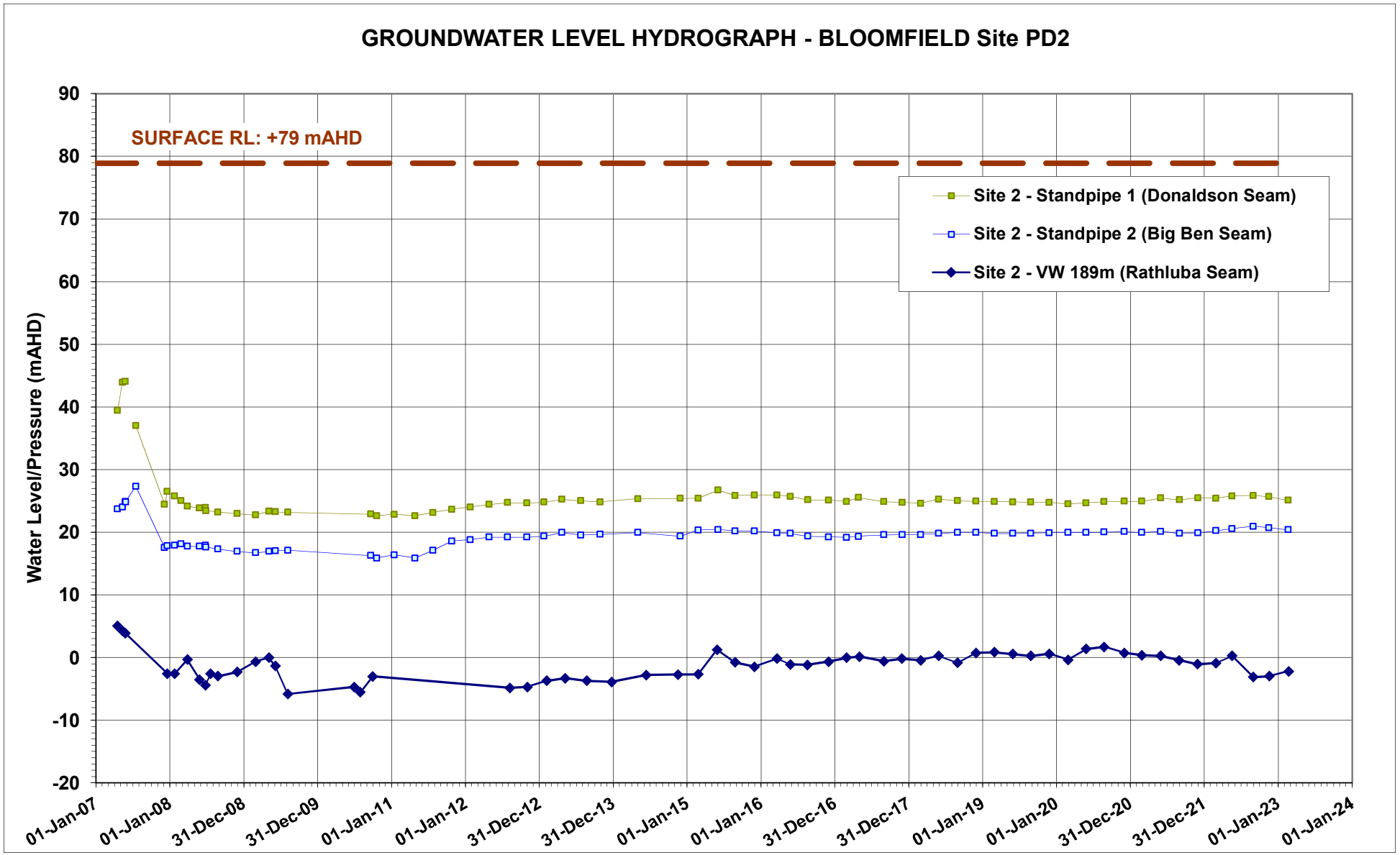
DATE	pH	TOTAL SUSPENDED SOLIDS (mg/l)	SPECIFIC CONDUCTANCE (uS/cm)	IRON (mg/l)	DISCHARGE VOLUME (ML/day)
24-Apr-22	8.0	6	4,730	<0.01	30
13-May-22	7.9	5	5,530	<0.01	40
22-May-22	7.7	5	5,490	<0.01	40
23-May-22	8.1	5	4,610	<0.01	40
24-May-22	8.2	5	3,680	<0.01	40
25-May-22	8.2	5	3,850	0.03	30
03-Jul-22	8.1	5	5,170	<0.01	40
04-Jul-22	8.1	6	5,170	0.08	40
05-Jul-22	8.3	10	3,950	<0.01	40
06-Jul-22	7.5	35	1,170	0.02	40
07-Jul-22	7.5	42	1,140	0.16	40
08-Jul-22	6.5	25	628	0.16	40
09-Jul-22	7.5	14	1,910	0.01	40
10-Jul-22	7.5	15	2,020	0.01	30
11-Jul-22	7.4	14	2,060	0.01	30
12-Jul-22	7.9	5	2,460	0.02	30
05-Aug-22	7.9	5	4,570	<0.01	40
06-Aug-22	8.0	5	4,290	<0.01	40
24-Aug-22	8.0	5	5,340	<0.01	40
25-Aug-22	8.0	5	4,540	<0.01	40
03-Sep-22	8.0	5	5,230	<0.01	40
04-Sep-22	8.1	5	5,010	<0.01	40
05-Sep-22	8.2	5	4,120	<0.01	30
16-Sep-22	8.0	5	5,770	<0.01	40
17-Sep-22	8.0	5	5,540	<0.01	40
22-Sep-22	7.9	5	5,470	<0.01	40
23-Sep-22	7.9	5	5,490	<0.01	40
24-Sep-22	8.1	5	4,880	<0.01	30
30-Sep-22	8.0	5	5,750	0.01	40
01-Oct-22	8.1	5	5,440	<0.01	40
06-Oct-22	8.1	5	5,450	<0.01	40
07-Oct-22	8.1	5	5,100	<0.01	40
08-Oct-22	8.3	5	4,210	<0.01	30
09-Oct-22	8.2	5	4,000	<0.01	30
10-Oct-22	8.2	9	3,340	0.02	30
11-Oct-22	8.2	5	4,000	0.02	30
20-Oct-22	8.1	5	5,670	<0.01	40
21-Oct-22	8.1	5	5,430	<0.01	40
14-Nov-22	8.1	5	5,370	<0.02	40
15-Nov-22	8.1	5	5,440	<0.01	40

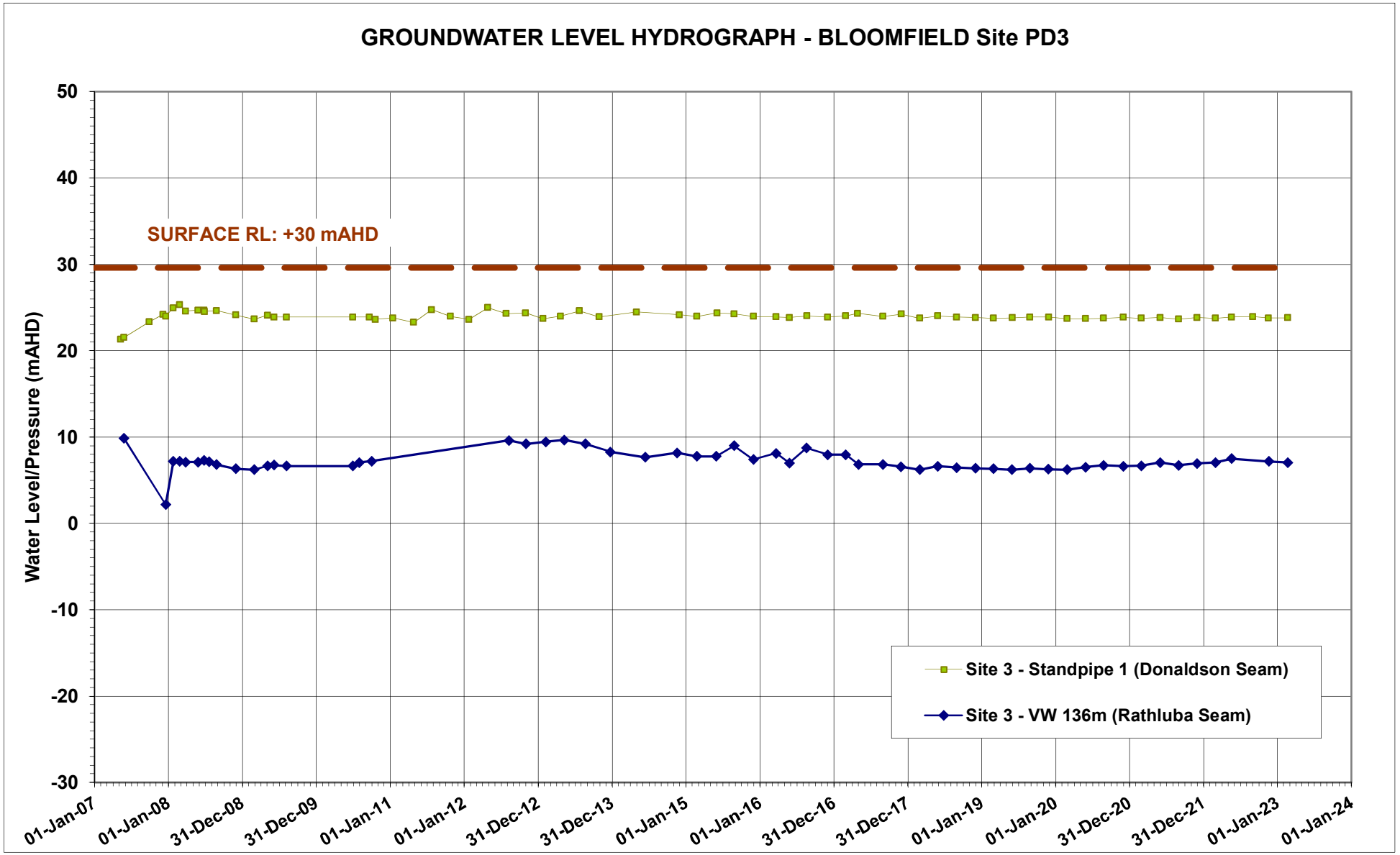
DATE	pH	TOTAL SUSPENDED SOLIDS (mg/l)	SPECIFIC CONDUCTANCE (uS/cm)	IRON (mg/l)	DISCHARGE VOLUME (ML/day)
16-Nov-22	8.0	5	5,620	<0.01	30
25-Dec-22	8.1	5	5,750	<0.01	40
05-Jan-23	8.1	5	5,760	<0.01	40
07-Jan-23	8.3	8	5,680	<0.01	40
08-Jan-23	8.2	8	5,500	<0.01	30
09-Jan-23	8.3	8	5,530	<0.01	20
22-Jan-23	8.2	7	5,720	<0.01	40
30-Jan-23	8.1	7	5,860	<0.01	40
31-Jan-23	8.2	8	5,090	<0.01	35
22-Feb-23	7.9	6	5,780	<0.01	40
23-Feb-23	8.1	13	5,220	<0.01	40
24-Feb-23	8.0	5	4,790	<0.01	40
14-Mar-23	8.1	10	5,530	0.02	40
15-Mar-23	8.0	11	5,610	<0.01	40
16-Mar-23	8.1	8	4,680	0.01	30
24-Mar-23	8.0	8	5,590	<0.01	40
25-Mar-23	8.1	6	5,450	<0.01	40
26-Mar-23	8.1	10	5,220	<0.01	30
28-Mar-23	8.0	18	5,570	<0.01	30
29-Mar-23	8.2	22	4,960	<0.01	20
Max	8.3	42	5890	0.38	40
Min	6.5	5	628	<0.01	5
Average	8.0	9	4831	<0.05	27

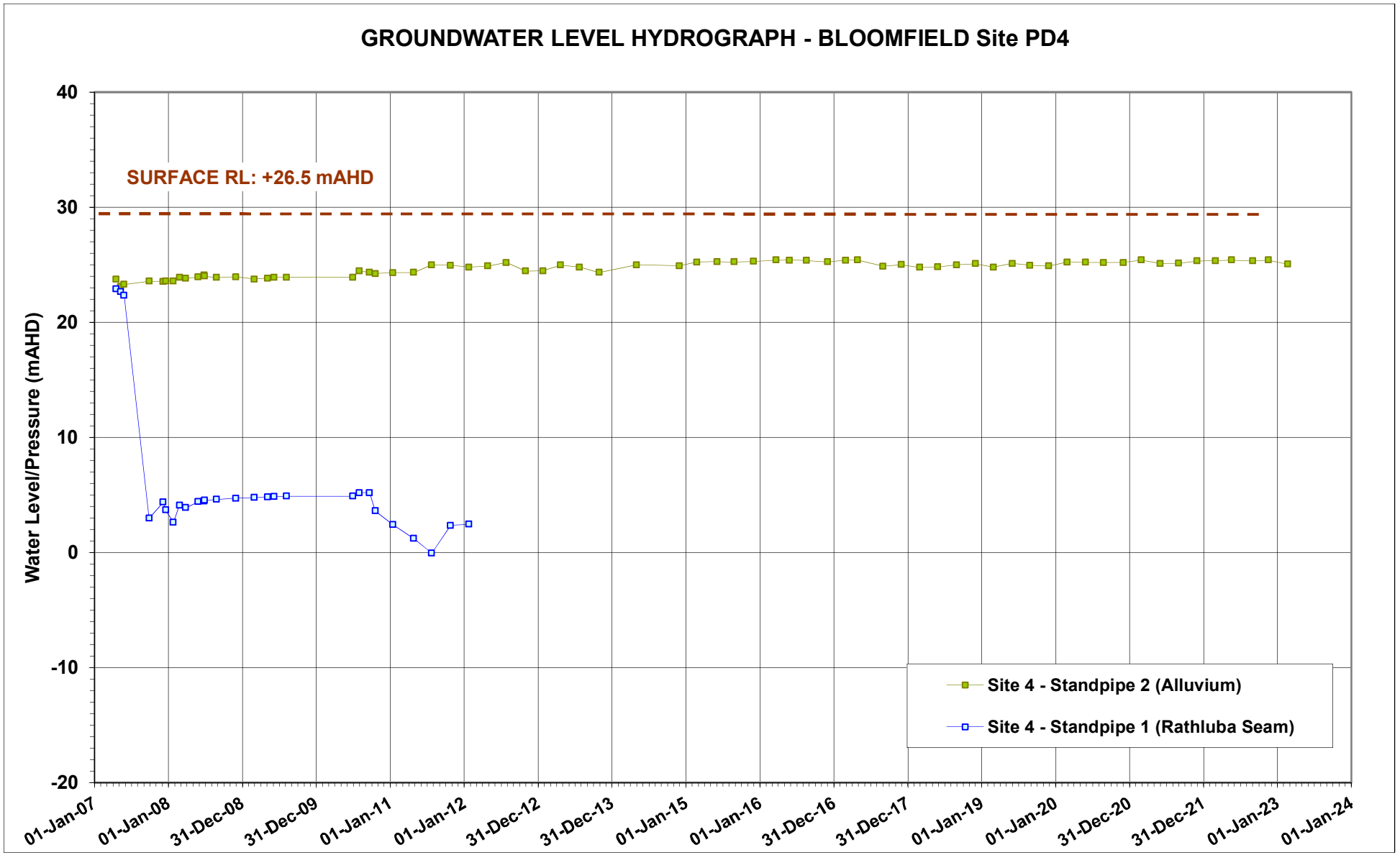
APPENDIX D

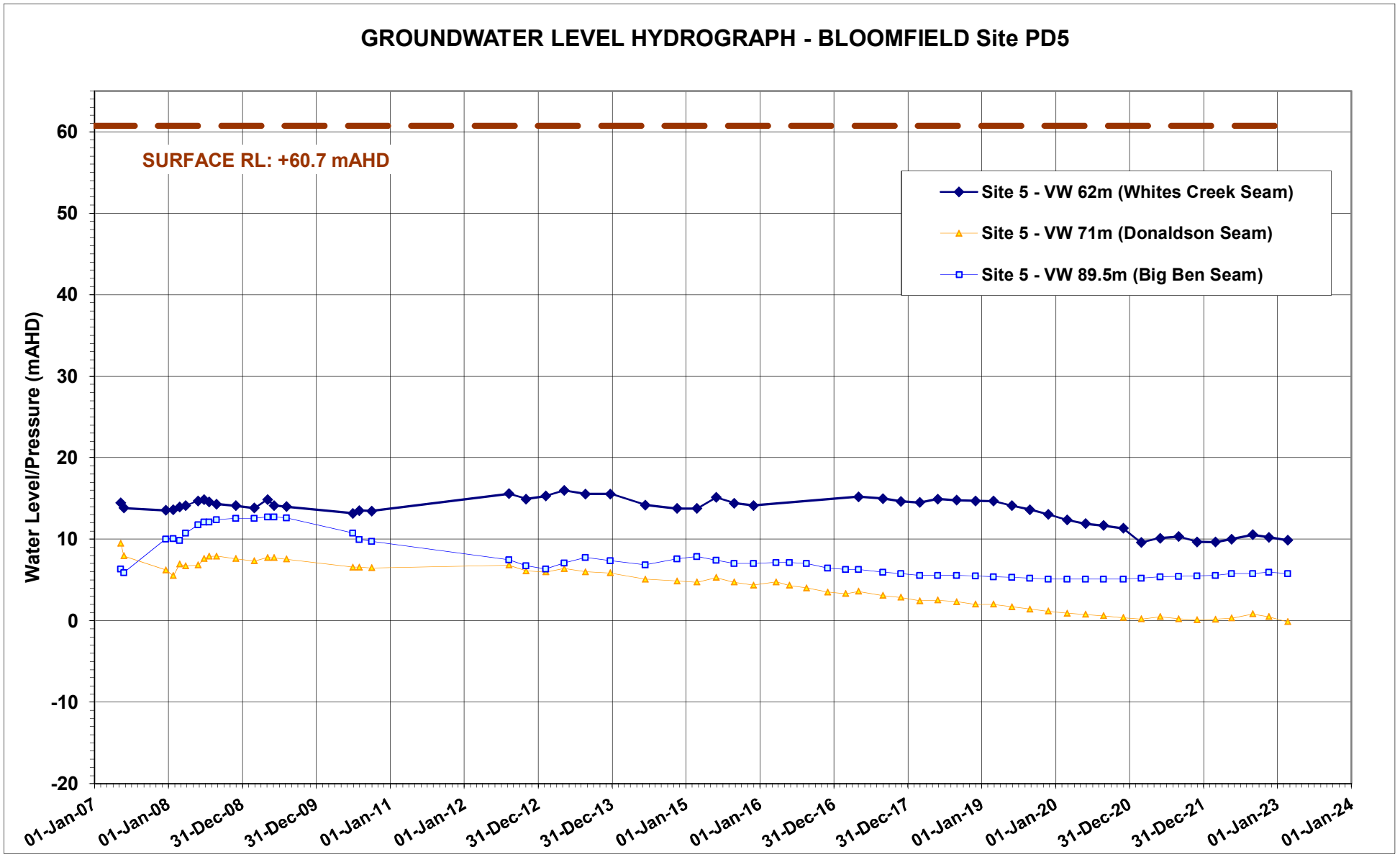
GROUNDWATER MONITORING RESULTS

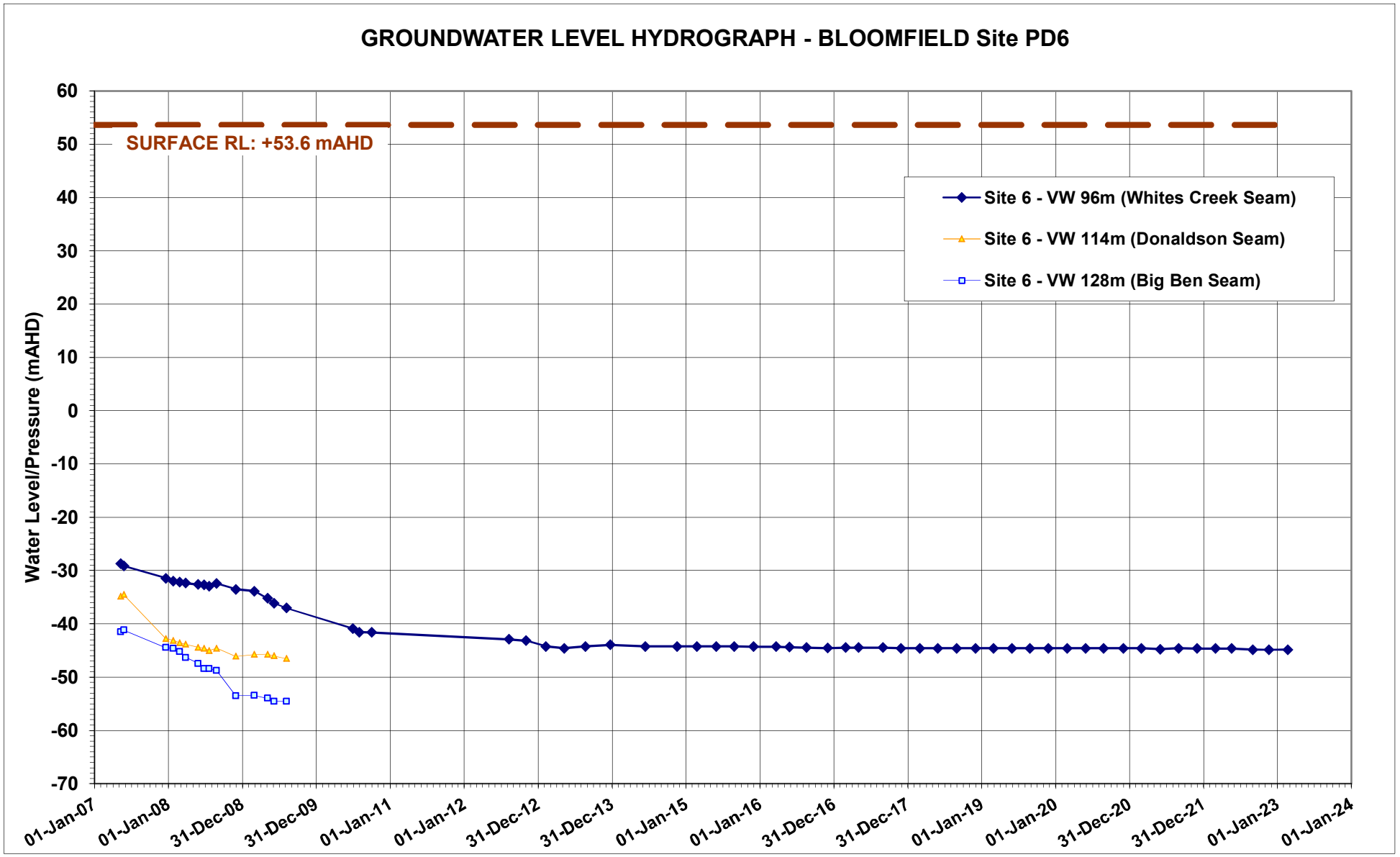

GROUNDWATER LEVEL HYDROGRAPH - BLOOMFIELD Site PD1
SURFACE RL: +24.6 mAHD
Site 1 - VW 35m (Donaldson Seam)
Site 1 - VW 46m (Big Ben Seam)
Site 1 - VW 171m (Rathluba Seam)
Water Level/Pressure (mAHD)
30
20
10
0
-10
-20
-30
-40
-50
01-Jan-07
01-Jan-08
31-Dec-08
31-Dec-09
01-Jan-11
01-Jan-12
31-Dec-12
31-Dec-13
01-Jan-15
01-Jan-16
31-Dec-16
31-Dec-17
01-Jan-19
01-Jan-20
31-Dec-20
31-Dec-21
01-Jan-23
01-Jan-24

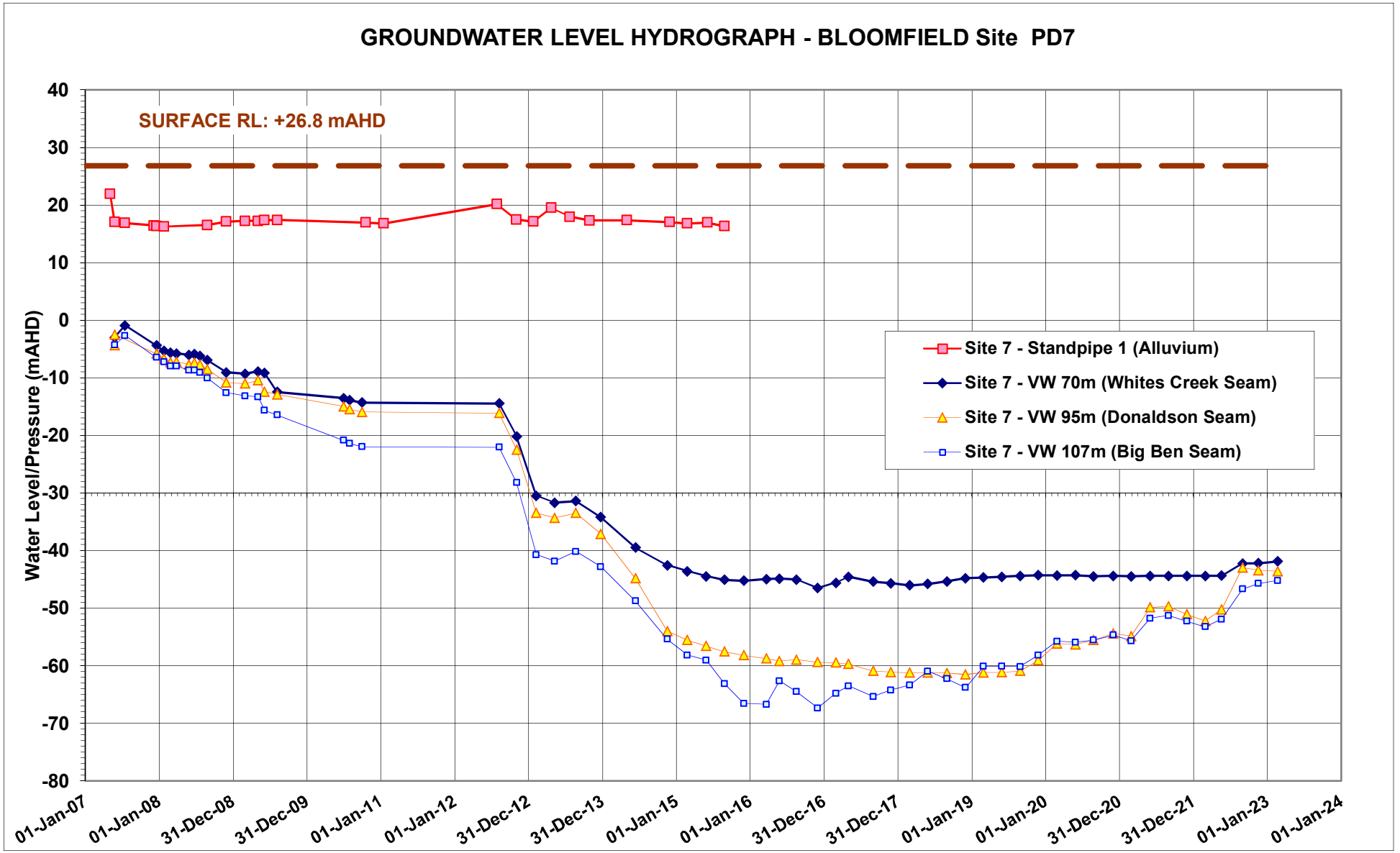

GROUNDWATER LEVEL HYDROGRAPH - BLOOMFIELD Site PD2
SURFACE RL: +79 mAHD
Site 2 - Standpipe 1 (Donaldson Seam)
Site 2 - Standpipe 2 (Big Ben Seam)
Site 2 - VW 189m (Rathluba Seam)
Water Level/Pressure (mAHD)
90
80
70
60
50
40
30
20
10
0
-10
-20
01-Jan-07
01-Jan-08
31-Dec-08
31-Dec-09
01-Jan-11
01-Jan-12
31-Dec-12
31-Dec-13
01-Jan-15
01-Jan-16
31-Dec-16
31-Dec-17
01-Jan-19
01-Jan-20
31-Dec-20
31-Dec-21
01-Jan-23
01-Jan-24

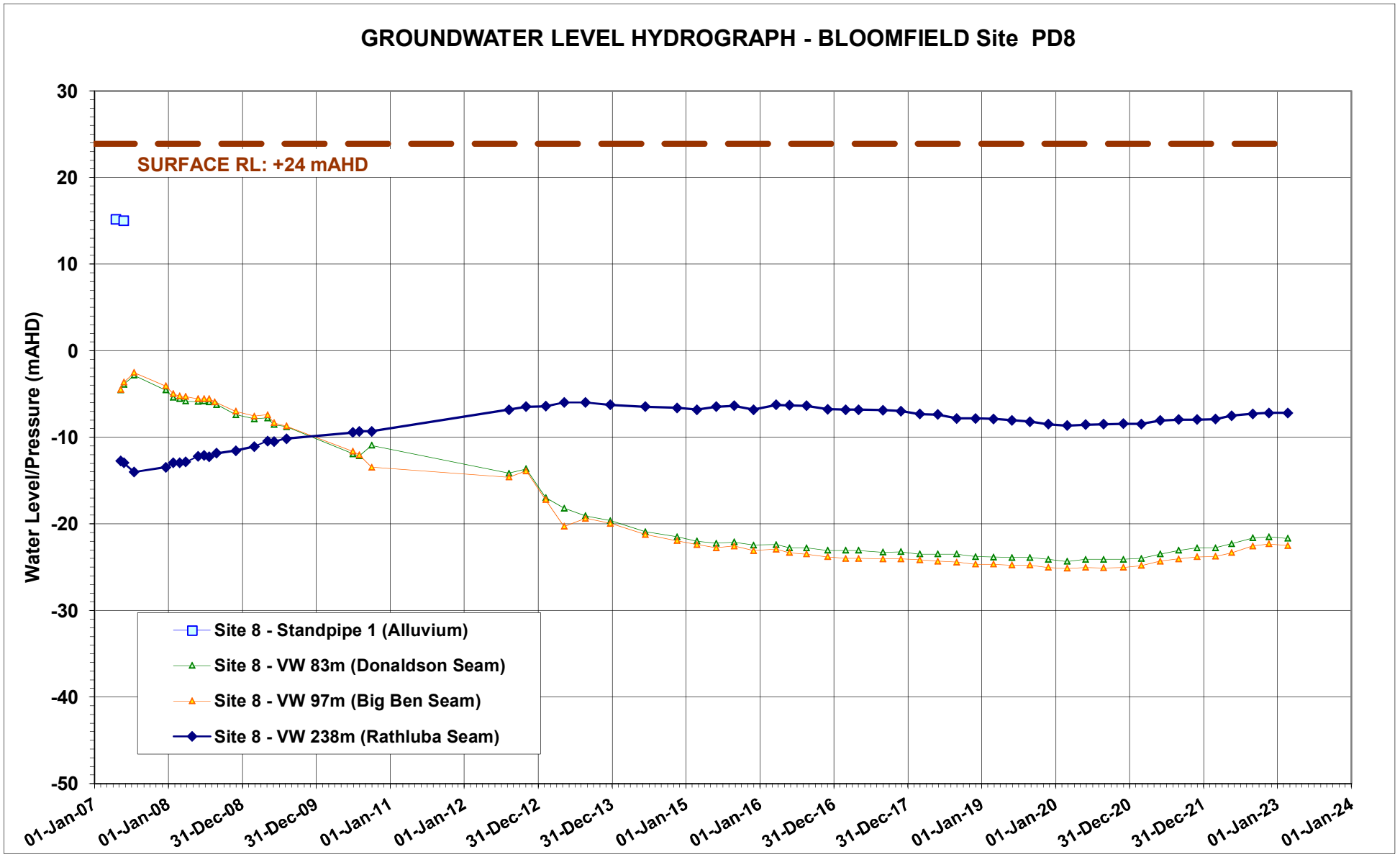

GROUNDWATER LEVEL HYDROGRAPH - BLOOMFIELD Site PD3
SURFACE RL: +30 mAHD
Water Level/Pressure (mAHD)
50
40
30
20
10
0
-10
-20
-30
01-Jan-07
01-Jan-08
31-Dec-08
31-Dec-09
01-Jan-11
01-Jan-12
31-Dec-12
31-Dec-13
01-Jan-15
01-Jan-16
31-Dec-16
31-Dec-17
01-Jan-19
01-Jan-20
31-Dec-20
31-Dec-21
01-Jan-23
01-Jan-24
Site 3 - Standpipe 1 (Donaldson Seam)
Site 3 - VW 136m (Rathluba Seam)


GROUNDWATER LEVEL HYDROGRAPH - BLOOMFIELD Site PD4
SURFACE RL: +26.5 mAHD
Water Level/Pressure (mAHD)
40
30
20
10
0
-10
-20
01-Jan-07
01-Jan-08
31-Dec-08
31-Dec-09
01-Jan-11
01-Jan-12
31-Dec-12
31-Dec-13
01-Jan-15
01-Jan-16
31-Dec-16
31-Dec-17
01-Jan-19
01-Jan-20
31-Dec-20
31-Dec-21
01-Jan-23
01-Jan-24
Site 4 - Standpipe 2 (Alluvium)
Site 4 - Standpipe 1 (Rathluba Seam)


GROUNDWATER LEVEL HYDROGRAPH - BLOOMFIELD Site PD5
SURFACE RL: +60.7 mAHD
Site 5 - VW 62m (Whites Creek Seam)
Site 5 - VW 71m (Donaldson Seam)
Site 5 - VW 89.5m (Big Ben Seam)
Water Level/Pressure (mAHD)
60
50
40
30
20
10
0
-10
-20
01-Jan-07
01-Jan-08
31-Dec-08
31-Dec-09
01-Jan-11
01-Jan-12
31-Dec-12
31-Dec-13
01-Jan-15
01-Jan-16
31-Dec-16
31-Dec-17
01-Jan-19
01-Jan-20
31-Dec-20
31-Dec-21
01-Jan-23
01-Jan-24


GROUNDWATER LEVEL HYDROGRAPH - BLOOMFIELD Site PD6
SURFACE RL: +53.6 mAHD
Site 6 - VW 96m (Whites Creek Seam)
Site 6 - VW 114m (Donaldson Seam)
Site 6 - VW 128m (Big Ben Seam)
Water Level/Pressure (mAHD)
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
01-Jan-07
01-Jan-08
31-Dec-08
31-Dec-09
01-Jan-11
01-Jan-12
31-Dec-12
31-Dec-13
01-Jan-15
01-Jan-16
31-Dec-16
31-Dec-17
01-Jan-19
01-Jan-20
31-Dec-20
31-Dec-21
01-Jan-23
01-Jan-24


GROUNDWATER LEVEL HYDROGRAPH - BLOOMFIELD Site PD7
SURFACE RL: +26.8 mAHD
Water Level/Pressure (mAHD)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
01-Jan-07
01-Jan-08
31-Dec-08
31-Dec-09
01-Jan-11
01-Jan-12
31-Dec-12
31-Dec-13
01-Jan-15
01-Jan-16
31-Dec-16
31-Dec-17
01-Jan-19
01-Jan-20
31-Dec-20
31-Dec-21
01-Jan-23
01-Jan-24
Site 7 - Standpipe 1 (Alluvium)
Site 7 - VW 70m (Whites Creek Seam)
Site 7 - VW 95m (Donaldson Seam)
Site 7 - VW 107m (Big Ben Seam)


GROUNDWATER LEVEL HYDROGRAPH - BLOOMFIELD Site PD8
SURFACE RL: +24 mAHD
Water Level/Pressure (mAHD)
30
20
10
0
-10
-20
-30
-40
-50
01-Jan-07
01-Jan-08
31-Dec-08
31-Dec-09
01-Jan-11
01-Jan-12
31-Dec-12
31-Dec-13
01-Jan-15
01-Jan-16
31-Dec-16
31-Dec-17
01-Jan-19
01-Jan-20
31-Dec-20
31-Dec-21
01-Jan-23
01-Jan-24
Site 8 - Standpipe 1 (Alluvium)
Site 8 - VW 83m (Donaldson Seam)
Site 8 - VW 97m (Big Ben Seam)
Site 8 - VW 238m (Rathluba Seam)

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)
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
21-Mar-16	25.92	53.28											
25-May-16	25.70	53.50	7	5000	2600								
19-Aug-16	25.17	54.03											
30-Nov-16	25.12	54.08	7.3	4700	3010	330	220	1200	120	16	1100	29	0.01
27-Feb-17	24.89	54.31											
01-May-17	25.54	53.66	8	3920	2513								
31-Aug-17	24.86	54.34											
29-Nov-17	24.74	54.46	7	4650	3020	280	400	1200	72	25	1100	24	0.02
28-Feb-18	24.61	54.59											
29-May-18	25.28	53.92	6.9	5900	3770								
30-Aug-18	25.02	54.18											
30-Nov-18	24.94	54.26	7.1	4900	3490	440	600	1200	120	170	590	24	0.01
27-Feb-19	24.90	54.30											
31-May-19	24.82	54.38	7.1	5200	3600								
27-Aug-19	24.78	54.42											
27-Nov-19	24.76	54.44	7	4930	3640	540	770	1200	48	70	1200	31	0.01
27-Feb-20	24.50	54.70											
27-May-20	24.70	54.50	6.9	5000	2500								
24-Aug-20	24.87	54.33											
30-Nov-20	24.95	54.25	6.9	4790	3250	370	570	1100	42	43	1000	22	0.87

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)
26-Feb-21	24.95	54.25											
31-May-21	25.47	53.73	6.8	5400	4320								
31-Aug-21	25.17	54.03											
30-Nov-21	25.50	53.70	7	4200	2460	120	240	1100	43	9.1	950	20	0.01
28-Feb-22	25.42	53.78											
19-May-22	25.78	53.42	7	5700	3990								
31-Aug-22	25.86	53.34											
16-Nov-22	25.68	53.52	6.8	5930	3750	520	690	1100	32	70	1000	27	0.01
20-Feb-23	25.09	54.11											

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)
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
21-Mar-16	19.90	59.76											
25-May-16	19.79	59.87	6.8	5800									
19-Aug-16	19.36	60.30											
30-Nov-16	19.24	60.42	6.7	5730	5510	400	2100	690	280	230	1200	25	1.9
27-Feb-17	19.18	60.48											
01-May-17	19.32	60.34	7.3	5370	3447								
31-Aug-17	19.60	60.06											
29-Nov-17	19.63	60.03	6.8	5670	4030	360	1300	1100	55	120	1400	28	0.01
28-Feb-18	19.62	60.04											
29-May-18	19.82	59.84	7.1	6400	4050								
30-Aug-18	19.99	59.67											
30-Nov-18	19.99	59.67	7	5380	4170	420	1300	1100	50	110	1000	27	0.01
27-Feb-19	19.80	59.86											
31-May-19	19.79	59.87	6.9	5450	4200								
27-Aug-19	19.83	59.83											
27-Nov-19	19.91	59.75	7.2	5460	4130	400	1300	1100	60	130	1200	31	0.01
27-Feb-20	19.97	59.69											
27-May-20	19.96	59.70	7.4	6300	3200								
24-Aug-20	20.04	59.62											
30-Nov-20	20.09	59.57	7.1	5240	3810	410	1200	1000	48	100	1100	23	0.01

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)
26-Feb-21	19.95	59.71											
31-May-21	20.15	59.51	6.7	6000	4800								
31-Aug-21	19.80	59.86											
30-Nov-21	19.88	59.78	7	6020	4180	420	1100	960	54	110	1100	25	0.01
28-Feb-22	20.26	59.40											
19-May-22	20.56	59.10	6.9	6100	4270								
31-Aug-22	20.93	58.73											
16-Nov-22	20.72	58.94	6.9	6130	4060	530	1000	1000	56	110	1100	27	0.01
20-Feb-23	20.38	59.28											

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)
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
21-Mar-16	23.93	7.07											
25-May-16	23.84	7.16	6	3500	1800								
19-Aug-16	24.02	6.98											
30-Nov-16	23.89	7.11	5.2	3480	3190	15	1500	220	130	170	640	24	0.01
27-Feb-17	24.03	6.97											
01-May-17	24.33	6.67	6.3	3740	2399								
31-Aug-17	23.97	7.03											
29-Nov-17	24.24	6.76	5.9	4670	4660	28	2600	390	240	270	990	29	17
28-Feb-18	23.75	7.25											
29-May-18	24.03	6.97	6.3	7400	4750								
30-Aug-18	23.89	7.11											
30-Nov-18	23.83	7.17	5.9	5580	6920	34	3600	550	320	360	890	33	34
27-Feb-19	23.75	7.25											
31-May-19	23.80	7.20	6.1	5700	4600								
27-Aug-19	23.88	7.12											
27-Nov-19	23.88	7.12	5.9	5770	6930	57	3800	530	370	410	1100	38	18
27-Feb-20	23.70	7.30											
27-May-20	23.68	7.32	5.9	7500	3750								
24-Aug-20	23.77	7.23											
30-Nov-20	23.86	7.14	6.2	6170	6620	100	3900	540	330	360	1000	30	53

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)
26-Feb-21	23.76	7.24											
31-May-21	23.83	7.17	6	7500	6000								
31-Aug-21	23.64	7.36											
30-Nov-21	23.83	7.17	6	6860	7100	48	3400	560	330	380	1000	32	0.9
28-Feb-22	23.76	7.24											
19-May-22	23.88	7.12	6.5	7400	5180								
31-Aug-22	23.95	7.05											
16-Nov-22	23.78	7.22	6.5	2980	2540	41	1200	180	95	110	380	19	0.12
20-Feb-23	23.80	7.20											

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)
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
21-Mar-16	13.31	13.27											
25-May-16	14.62	11.96	5.9	2020	1010								
19-Aug-16	14.00	12.58											
30-Nov-16	14.08	12.50	6.7	4030	3200	130	980	720	150	160	780	20	0.14
27-Feb-17	13.32	13.26											
01-May-17	13.37	13.21	7.1	2580	1638								
31-Aug-17	12.64	13.94											
29-Nov-17	12.70	13.88	6.7	4650	3660	150	1200	1000	160	180	930	21	0.07
28-Feb-18	11.81	14.77											
29-May-18	11.87	14.71	6.7	10500	6690								
30-Aug-18	10.43	16.15											

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)
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
21-Mar-16	25.41	1.58											
25-May-16	25.39	1.60	5.5	6200	3400								
19-Aug-16	25.38	1.61											
30-Nov-16	25.26	1.73	5.5	5730	6640	25	3900	230	360	360	1000	25	0.06
27-Feb-17	25.40	1.59											
01-May-17	25.41	1.58	6.6	5740	3681								
31-Aug-17	24.88	2.11											
29-Nov-17	25.02	1.97	6.2	5910	7420	49	4500	220	440	390	1200	26	36
28-Feb-18	24.78	2.21											
29-May-18	24.81	2.18	6.1	7360	4720								
30-Aug-18	25.00	1.99											
30-Nov-18	25.10	1.89	6	6040	9970	47	5900	130	490	530	990	24	140
27-Feb-19	24.79	2.20											
31-May-19	25.12	1.87	6.5	5600	4000								
27-Aug-19	24.95	2.04											
27-Nov-19	24.89	2.10	3.5	7080	9720	30	6600	110	480	680	1100	28	110
27-Feb-20	25.23	1.76											
27-May-20	25.22	1.77	3.8	9000	4500								
24-Aug-20	25.19	1.80											
30-Nov-20	25.19	1.80	5.1	7030	11200	30	7400	87	370	710	760	20	670

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)
26-Feb-21	25.41	1.58											
31-May-21	25.12	1.87	5.5	8000	6400								
31-Aug-21	25.13	1.86											
30-Nov-21	25.34	1.65	4.8	7040	10200	30	5900	84	390	660	750	19	560
28-Feb-22	25.36	1.63											
19-May-22	25.42	1.57	5.7	7000	4900								
31-Aug-22	25.34	1.65											
16-Nov-22	25.42	1.57	5.2	5430	6760	30	5500	75	310	400	530	15	450
20-Feb-23	25.05	1.94											

Bore PD7.1 **South Cut Boundary**

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	17.13	10.37	6.71	4620										
19-Oct-10	16.94	10.56	6.57	4760	2640	418	477	1020	160	124	731	14	8.66	
14-Jan-11	16.78	10.72												No access
27-Apr-11														No access
25-Jul-11														No access
26-Oct-11														No access
25-Jan-12	17.65	9.85	6.67	3020	1720	508	99	693	73	69	455	14	0.74	
27-Apr-12	19.08	8.42	5.71	2670	1850	30	434	571	75	77	408	11	13.9	
27-Jul-12	20.14	7.36	4.84	4840	1540	2	290	741	40	58	415	10	22.7	
31-Oct-12	17.48	10.02	6.44	3560	2340	211	507	848	132	110	587	14	32	
24-Jan-13	17.11	10.39	6.86	3620	2340	234	559	756	125	104	557	14	13.4	
22-Apr-13	19.52	7.98	5.15	1754	1210	7	243	446	25	36	340	7	0.27	
24-Jul-13	17.96	9.54	6.18	2220	1240	74	289	475	45	46	376	9	1.91	
28-Oct-13	17.31	10.19	6.32	7120	4680	95	444	1810	208	217	904	21	28.1	
02-May-14	17.36	10.14	5.87	12000										
29-Nov-14	17.05	10.45	6.5	8650	6420	187	562	2870	237	270	1130	19	31.3	
24-Feb-15	16.80	10.70												
03-Jun-15	16.95	10.55	6.1	6990	3480									
26-Aug-15	16.33	11.17												
30-Nov-15														Dry
21-Mar-16														Dry
25-May-16														Dry
19-Aug-16														Dry
30-Nov-16														Dry
27-Feb-17														Dry
01-May-17														Dry
31-Aug-17														Dry
29-Nov-17														Dry

APPENDIX E

ANNUAL REHABILITATION REPORT
AND
FORWARD PROGRAM

NSW GOVERNMENT

NSW Resources Regulator

ARR0001081

BLOOMFIELD MINE ANNUAL REHABILITATION REPORT

Friday 1 April 2022 to Friday 31 March 2023

Contents

Summary table

DETAIL	
Mine	Bloomfield Mine
Reference	ARR0001081
Annual report period commencement date	Friday 1 April 2022
Annual report period end date	Friday 31 March 2023
Forward program	FWP0001019
Mining leases	ML 1738 (1992), CCL 761 (1973)
Lease holder(s)	BLOOMFIELD COLLIERIES PTY LTD
Contact	Steven Vickers
Date of submission	

Important

The department may make the information in your report and any supporting information available for inspection by members of the public, including by publication on its website or by displaying the information at any of its offices. If you consider any part of your report to be confidential, please communicate this to the department via the message function on this submission within the NSW Resources Regulator Portal.

Mine details

Project description

The Colliery operates in accordance with Project Approval (PA) 07_0087 with approved production levels of 1.3 Mtpa of Run of Mine (ROM) coal. Mining operations may take place until 31 December 2030. The Coal Handling and Processing Plant (CHPP), associated infrastructure and tailings dam are approved under the Abel Coal Project (PA 05_0136).

The Colliery is a multi-seam, multi bench system, mining up to 13 seams or splits. Heavy earth moving equipment delivers the ROM coal to the onsite CHPP via internal haul roads. Processing includes size reduction, washing and screening.

Product coal is stockpiled adjacent to the CHPP before being loaded into rail wagons at the rail loading facility and transported by rail to the Port of Newcastle. The Colliery has approval to operate 24 hours per day, seven days per week, and employs approximately 60 personnel across its operations.

Areas have been progressively rehabilitated with approximately 497 hectares of disturbed land rehabilitated to date.

Life of mine

3 years

Current development consents, leases and licences

Development consents granted under the *Environmental Planning and Assessment Act 1979*

Authorisations covering the mining area granted under the *Mining Act 1992*

ML 1738 (1992), CCL 761 (1973)

Any other approvals, licences, or authorities issued by government agencies that are relevant to the progress of mining operation and rehabilitation activities

Ancillary Mining Activity AMA1001
EPL396

Summary of the scope and/or purpose of the new applications or modifications to existing approvals (if applicable)

NA

Changes to land ownership and land use

During the reporting period there has been no changes to the land ownership and land use related to the land. Ashtonfields Pty Ltd owns most of the land at the Colliery covered by ML1738 and CCL761.

Surface disturbance and rehabilitation activities during the reporting period

Surface disturbance and rehabilitation activities that were conducted and an analysis of the progress against the rehabilitation schedule

In the previous Forward Program 5.5 Ha of vegetation was to be cleared for mining operations during this reporting period (ie Year 1). During this reporting period 5.5 Ha of vegetation was cleared for Bloomfield mining operations as approved under PA 07_0087 Mod 4.

A qualified ecologist carried out a habitat tree assessment and threatened bird survey in the area. Habitat trees were identified and marked and later felled under the supervision of the ecologist. All hollows and potential habitat fissures were inspected after each tree was felled. Fauna were safely relocated into the adjacent bushland.

The vegetation was mulched and was removed during topsoil stripping operations. The topsoil and subsoil was removed and placed directly on shaped areas as part of the rehabilitation program or stockpiled.

In the previous Forward Program 5.9 Ha to the west of the current active pit was to be prepared for rehabilitation during this reporting period (ie Year 1). During this reporting period the 5.9 Ha to the west of the current pit was prepared for rehabilitation.

In addition, a further 6 Ha to the south of the current active pit was prepared for rehabilitation during the reporting period (refer Plan 1). The additional area was not shown in the previous Forward Program and had previously been earmarked as a future tailings disposal area. Due to mine planning changes the area was no longer needed which created the opportunity for additional rehabilitation.

Rehabilitation planning activities that were conducted, including any specialist studies

Gaps in knowledge were identified as part of the detailed closure planning process and specialist studies were initiated in late 2021 to further inform the detailed closure plan. The following key deliverables were completed during the reporting period:

- Completion of specialist closure studies;
- Development of a detailed closure plan, based on the learnings from the specialist studies.

Following completion of the specialist studies a forward works program was developed during the reporting period. The works will involve studies / works in the following specialist areas that are to be carried out over the remaining mine life and final closure:

- Contamination;
- Erosion;
- Geochemical;
- Surface water;
- Ground water;
- Underground mining;
- Ecological;
- Final landform – Safety and Stability;
- Stakeholder engagement and social impact; and
- Project Management and Execution.

Overview of subsidence repair and/or remediation works undertaken

None undertaken.

Overview of rehabilitation management and maintenance activities

During the reporting period rehabilitation maintenance activities involved weed control activities. Contract weed-sprayers are employed in addition to mechanical support from a slasher when required. Weed control works included rehabilitation areas and remnant vegetation within the Project Area as well as land outside the project area under the control of Bloomfield. No Class 1 or Class 2 declared weeds were identified onsite.

Details of any rehabilitation actions taken as required by any letters, notices or directions issued by government agencies, including the NSW Resources Regulator

None undertaken.

Details of any rehabilitation areas that have achieved the final land use

NA

Key production milestones

MATERIAL	UNIT	FWP0001019 YEAR 1	THIS REPORT
Stripped topsoil (if applicable)	(m^3)	6,000	95,000
Rock/overburden	(m^3)	5,000,000	4,364,000
Ore	(Mt)	0.7	0.73
Reject material[1]	(Mt)	0.2	0.3
Product	(Mt)	0.5	0.43

[1] This includes coarse rejects, tailings and any other wastes resulting from beneficiation.

Disturbance and rehabilitation statistics

Current disturbance and rehabilitation progression

	ELEMENT	UNIT	FWP0001019 YEAR 1	THIS REPORT
A	**Total surface disturbance footprint**	(ha)	934.71	934.71
B	**Total active disturbance**	(ha)	437.43	422.58
C	**Land prepared for rehabilitation**	(ha)	5.95	11.84
D	**Ecosystem and land use establishment**	(ha)	11.07	0
E	**Ecosystem and land use development**	(ha)	N/A	474.56
F	**Rehabilitation completion**	(ha)	N/A	25.73

Rehabilitation key performance indicators (KPIs)

	ELEMENT	UNIT	FWP0001019 YEAR 1	THIS REPORT
G	**Total new active disturbance area**	(ha)	5.54	0
H	**New rehabilitation commenced during annual reporting period**	(ha)	5.95	5.02
J	**Annual rehabilitation to disturbance ratio**	%	1.07	0
I	**Established rehabilitation**	(ha)	N/A	500.29
K	**Rehabilitated land to total mine footprint**	%	N/A	53.52

Progressive achievement of established rehabilitation

	ELEMENT	UNIT	THIS REPORT
L	**Established rehabilitation - agricultural final land uses**	%	97.73
M	**Established rehabilitation - native ecosystem final land uses**	%	0
N	**Established rehabilitation - other/non-vegetated final land uses**	%	2.27

Variation to the rehabilitation schedule

Identify the components of the most recent forward program that were not achieved

Rehabilitation KPI's reported in this report are consistent with the life of mine rehabilitation schedule in the Rehabilitation Management Plan and the rehabilitation schedule for Year 1 of the previous Forward Program.

Key factors that delayed progressive rehabilitation

NA

Outline actions that will be included in the forward program and carried out to minimise disturbance and undertake progressive rehabilitation as far as reasonably practical

NA

Rehabilitation monitoring and research findings

Rehabilitation monitoring

The rehabilitation monitoring carried out in the annual reporting period

As stated, this reporting period was not one of the monitoring years therefore no rehabilitation monitoring results are reported. The next round of monitoring will be presented in the next report. However, key findings of the 2021 monitoring program include:

- Landscape function yielded excellent results in terms of stability, and good results for infiltration and nutrient cycling indices. Reference sites experienced a trajectory similar to the rehabilitated sites, which indicates a trend towards landscape scale recovery after the prolonged drought.
- Species diversity has increased overall and remains on an upward trajectory since the monitoring commenced.
- The majority of sites with mid and upper storeys appeared to be in good health and exhibited signs of natural regeneration and recovery from dieback in previous years. Most dieback observed is from Acacia species approaching the end of their lifecycle and is not reflective of management practices.
- Some minor areas of weed infestation were identified.
- Almost all sites displayed excellent soil characteristics in terms of topsoil cover, soil acidity, salinity, and sodicity. Soil dispersion benchmarks were not achieved at all sites however this does not appear to have had an impact on vegetative performance.
- Land and soil capability were generally very good across rehabilitated areas. Rehabilitated sites performed similar to, or better than reference sites.
- A majority of completion criteria were met across all sites

Status of performance against rehabilitation objectives and rehabilitation completion criteria

The monitoring program that has been implemented

The monitoring program is based on the Landscape Function Analysis (LFA) tool 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 mainly based on processes involved in surface hydrology: rainfall, infiltration, runoff, erosion, plant growth and nutrient cycling. In addition to LFA monitoring, the monitoring program also assesses the performance of rehabilitated lands in terms of ground

cover protection, erosion, vegetation community composition and structure, soil properties and pasture productivity.

Are all rehabilitation areas in Landform Establishment phase or higher represented in the monitoring program to assess performance against the rehabilitation objectives and approved or, if not yet approved rehabilitation completion criteria and final landform and rehabilitation plan?

NO

Year rehabilitation areas will be included as part of the monitoring program

N/A

An appraisal of whether rehabilitation is moving towards achieving the proposed rehabilitation objectives, approved or, if not yet approved, rehabilitation completion criteria and final landform and rehabilitation plan as soon as reasonably practicable.

The 2022-23 reporting period was not one of the monitoring years therefore no rehabilitation monitoring results are reported in this Annual Rehabilitation Report. The next round of monitoring will be conducted in 2023-24 reporting period and the results will be presented in the 2023-24 Annual Rehabilitation Report. However, key findings of previous rehabilitation monitoring, and results from grazing trials to date, indicate that completion criteria are being met across the site.

Appraisal description

Rehabilitation is moving towards achieving the final land use as soon as reasonably practicable.

Rehabilitation monitoring program findings

Rehabilitation monitoring at Bloomfield is undertaken in accordance with the Rehabilitation Management Plan, which was developed to satisfy the requirements of the Project Approval for the operation.

The monitoring program is based on the Landscape Function Analysis (LFA) tool 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 mainly based on processes involved in surface hydrology: rainfall, infiltration, runoff, erosion, plant growth and nutrient cycling. In addition to LFA monitoring, the monitoring program also assesses the performance of rehabilitated lands in terms of ground cover protection, erosion, vegetation community composition and structure, soil properties and pasture productivity.

Rehabilitation monitoring at Bloomfield is carried on a biennial basis (i.e. every 2 years) and did not commence until 2008, at the time where much of the existing rehabilitated areas were

already established. Monitoring events were subsequently conducted in 2011, 2013, 2015, 2017, 2019 and 2021. The monitoring program currently includes a total of 30 monitoring sites, comprised of 28 sites within the rehabilitated areas plus two analogue sites.

The 2022-23 reporting period was not one of the monitoring years therefore no monitoring results are reported in this Annual Rehabilitation Report. The next round of monitoring will be conducted in 2023-24 reporting period and the results will be presented in the 2023-24 Annual Rehabilitation Report.

Performance issues and their causes including identification of any knowledge gaps that must be addressed

Nil

Outcomes of rehabilitation research and trials

RRT NUMBER	PROJECT/TRIAL NAME	OBJECTIVE OF TRIAL/PROJECT	METHODOLOGY	EXPECTED DATE OF COMPLETION	UPDATED DATE OF COMPLETION	STATUS	ON TRACK?	ON TRACK UPDATE
RRT0001095	Grazing Land Monitoring Trial	Monitoring the productivity of rehabilitated pasture through grazing	Measurements of soil sustainability and productivity (and to determine soil amelioration and fertiliser requirements). Measurements and indicators of the health and productivity of vegetation/pasture growth on the land. Develop some key indicators of and best management practices for pastures on rehabilitated land. Provide recommendations for best management practices for future grazing. Provide a comparison of the grazing potential of the rehabilitated land and the adjacent analogue pastures.	31 Dec 2030	31 Dec 2030	Ongoing	31 Dec 2030	31 Dec 2030

Outcomes of completed trials and research

N/A

Attachment 1 – Reporting Definitions

REPORTING CATEGORY		DEFINITION
A1	Total disturbance footprint – surface disturbance	All areas within a mining lease that either have at some point in time or continue to pose a rehabilitation liability due to surface disturbance activities. The total disturbance footprint is the sum of the total active disturbance, decommissioning, landform establishment, growth medium development, ecosystem and land use establishment, ecosystem and land use development and rehabilitation completion (see definitions below). Underground mining operations should not include the footprint of underground mining areas/subsidence management areas in the total disturbance footprint.
A2	Underground Mining Area	Underground mining operations areas/subsidence management areas.
B	Total active disturbance	Includes on-lease exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste rock emplacements (active/unshaped/in or out-of-pit), tailings dams (active/unshaped/uncapped) and temporary stabilised areas (e.g. areas sown with temporary cover crops for dust mitigation and temporary rehabilitation).
C	Rehabilitation – land preparation	Includes the sum of all disturbed land within a mining lease that have commenced any, or all, of the following phases of rehabilitation– decommissioning, landform establishment and growth medium development. Refer to the glossary of terms in this document for the definition of these phases of rehabilitation.

REPORTING CATEGORY		DEFINITION
D	Ecosystem and land use establishment	Includes the area which has been seeded/planted with the target vegetation species for the intended final land use. However, vegetation has not matured to a stage where it can be demonstrated that it will be sustainable for the long term and or require only a maintenance regime consistent with target reference/analogue sites. Typically, rehabilitation areas would be in this phase for at least two years (and usually more) before rehabilitation can be classified as being in the ecosystem and land use development phase. This phase does not apply to infrastructure areas that are being retained as part of final land use for the site.
E	Ecosystem and Land Use Development	Rehabilitation has matured to a level where target revegetation outcomes are on a trajectory towards meeting the final rehabilitation objectives and rehabilitation completion criteria (as verified by monitoring). This phase includes infrastructure areas that are to be retained for an approved post mining land use, following completion of all necessary measures to render the infrastructure fit for this purpose (for example structural integrity).
F	Rehabilitation Completion	The NSW Resources Regulator has determined in writing that the mining area has achieved the approved rehabilitation objectives and approved rehabilitation completion criteria and final landform and rehabilitation plan following the submission of *Form: ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate and/or notification of mine or petroleum site closure.*
G	New active disturbance area	The area of any new active disturbance that has been created during the annual reporting period (definition A1 in Table 5).
H	New rehabilitation commenced during annual reporting period	The sum of any new rehabilitation commenced in the annual reporting period. These areas may be in the rehabilitation land preparation phase or the ecosystem & land use establishment phase (definitions C and D in Table 5).
I	Established rehabilitation (hectares)	The total area of land that is verified to be within either the ecosystem and land use development phase or the rehabilitation completion phase (definitions E & F in Table 5).

REPORTING CATEGORY		DEFINITION
J	Annual rehabilitation to disturbance ratio	The rehabilitation to disturbance ratio (H/G) indicates how many hectares of new rehabilitation are undertaken for each hectare of land disturbed during the year. A ratio of 1/1 indicates that the area of new rehabilitation and disturbance in that year are the same.
K	% Rehabilitated land to total mine footprint	The proportion of the total mine footprint (area of land that has been disturbed by past or present surface disturbance activities) that has established rehabilitation (I/A1 x 100). For open cut mining, the proportion of the total mine footprint verified to be "established rehabilitation" should substantially increase as an operation progresses towards mine closure.
L	Established rehabilitation for agricultural final land uses (hectares)	The percentage of total area of land that is verified to be within either the ecosystem and land use development phase or the rehabilitation completion phase (definitions E & F in Table 5) that have been returned to an agricultural final land use.
M	Established rehabilitation for native ecosystem final land uses (hectares)	The percentage of total area of land that is verified to be within either the ecosystem and land use development phase or rehabilitation completion phase (definitions E & F in Table 5) that have been returned to native ecosystem final land use.
N	Established rehabilitation for other/non-vegetated final land uses (hectares)	The percentage of total area of land that is verified to be within either the ecosystem and land use development phase or the rehabilitation completion phase (definitions E & F in Table 5) that have been returned to other/non-vegetated final land use.

Attachment 2 – Definitions

WORD	DEFINITION
Active	In the context of rehabilitation, land associated with mining domains is considered 'active' for the period following disturbance until the commencement of rehabilitation.
Active mining phase of rehabilitation	In the context of rehabilitation, the active mining phase of rehabilitation constitutes the rehabilitation activities undertaken during mining operations such as salvaging and managing soil resources, salvaging habitat resources, and native seed collection. This phase also includes management actions taken during operations to manage risks to rehabilitation and enhance rehabilitation outcomes such as selective handling of waste rock and management of tailings emplacements.
Analogue site	In the context of rehabilitation, an analogue site is a 'reference site' that represents an example of the defining characteristics (such as vegetation composition and structure or agricultural productivity) of the final land use. Characteristics of analogue sites can be assessed to develop the rehabilitation objectives and completion criteria for final land use domains.
Annual rehabilitation report and forward program	As described in the Mining Regulation 2016.
Annual reporting period	As defined in the Mining Regulation 2016.
Closure	A whole-of-mine-life process, which typically culminates in the relinquishment of the mining lease. It includes decommissioning and rehabilitation to achieve the approved final land use(s).
Decommissioning	The process of removing mining infrastructure and removing contaminants and hazardous materials.
Decommissioning Phase of Rehabilitation	Activities associated with the removal of mining infrastructure and removal and/or remediation of contaminants and hazardous materials. In the context of the rehabilitation management plan this phase of rehabilitation may also include studies and assessments associated with decommissioning and demolition of infrastructure or works carried out to make safe or 'fit for purpose' built infrastructure to be retained for future use(s) following lease relinquishment.

WORD	DEFINITION
Department	The Department of Regional NSW.
Disturbance	See Surface Disturbance.
Disturbance area	An area that has been disturbed and that requires rehabilitation. This may include areas such as on-licence exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste emplacements (active/unshaped/in or out-of-pit), tailings dams (active/unshaped/uncapped), and areas requiring rehabilitation that are temporarily stabilised (i.e. managed to minimise dust generation and/or erosion).
Domain	An area (or areas) of the land that has been disturbed by mining and has a specific operational use (mining domain) or specific final land use (final land use domain). Land within a domain typically has similar geochemical and/or geophysical characteristics and therefore requires specific rehabilitation activities to achieve the associated final land use.
Ecosystem and Land Use Development	This phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving the approved rehabilitation objectives and completion criteria. For vegetated land uses this phase may include processes to develop characteristics of functional self-sustaining ecosystems, such as nutrient recycling, vegetation flowering and reproduction, and increasing habitat complexity, and development of a productive, self-sustaining soil profile. This phase of rehabilitation may include specific vegetation management strategies and maintenance such as tree thinning, supplementary plantings and weed management.
Ecosystem and Land Use Establishment	This phase of rehabilitation consists of the processes to establish the approved final land use following construction of the final landform. For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community and implementing land management activities such as weed control. This phase of rehabilitation may also include habitat augmentation such as installation of nest boxes.
Exploration	Has the same meaning as that term under the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

WORD	DEFINITION
Final landform and rehabilitation plan	As defined in the Mining Regulation 2016.
Final land use	As defined in the Mining Regulation 2016.
Form and way	Means the form and way approved by the Secretary. Approved form and way documents are available on the Department's website.
Growth Medium Development	This phase of rehabilitation consists of activities required to establish the physical, chemical and biological components of the substrate required to establish the desired vegetation community (including short lived pioneer species. This phase may include spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes, applying soil ameliorants to enhance the physical, chemical and biological characteristics of the growth media, and actions to minimise loss of growth media due to erosion.
Habitat	Has the same meaning as that term under the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994* (as relevant).
Indicator	An attribute of the biophysical environment (e.g. pH, topsoil depth, biomass) that can be used to approximate the progression of a biophysical process. It can be measured and audited to demonstrate (and track) the progress of an aspect of rehabilitation towards a desired completion criterion (i.e. defined end point). It may be aligned to an established protocol and used to evaluate changes in a system.
Land	As defined in the *Mining Act 1992.*
Landform Establishment	This phase of rehabilitation consists of the processes and activities required to construct the final landform. In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features, encapsulate problematic materials such as tailings, and prepare a substrate with the desired physical and chemical characteristics (e.g. rock raking or ameliorating sodic materials).
Large mine	As defined in the Mining Regulation 2016.
Lease holder	The holder of a mining lease.

WORD	DEFINITION
Life of mine	The timeframe of how long a mine is approved to mine, from commencement to closure.
Mine rehabilitation portal	Means the NSW Resources Regulator's online portal that lease holders must use (via a registered account) to: ■ upload rehabilitation geographical information system (GIS) spatial data ■ develop rehabilitation GIS spatial data (using online tracing functions) ■ generate rehabilitation plans and rehabilitation statistics using the map viewer and Rehabilitation Key Performance Indicator functionalities. Data submitted to the mine rehabilitation portal is collated in a centralised geodatabase for use by the NSW Resources Regulator to regulate rehabilitation performance of lease holders.
Mining area	As defined in the *Mining Act 1992*.
Mining domain	A land management unit with a discrete operational function (e.g. overburden emplacement), and therefore similar geophysical characteristics, that will require specific rehabilitation treatments to achieve the final land use(s).
Mining land	As defined in the *Mining Act 1992.*
Native vegetation	Has the same meaning as that term under section 60B of the *Local Land Services Act 2013.*
Overburden	Material overlying coal or a mineral deposit.
Performance indicator	An attribute of the biophysical environment (for example pH, slope, topsoil depth, biomass) that can be used to demonstrate achievement of a rehabilitation objective. It can be measured and audited to demonstrate (and track) the progress of an aspect of rehabilitation towards a desired completion criterion, that is, a defined end point. It may be aligned to an established protocol and used to evaluate changes in a system.

WORD	DEFINITION
Phases of rehabilitation	The stages and sequences of actions required to rehabilitate disturbed land to achieve the final land use. The phases of rehabilitation are: ■ active mining ■ decommissioning ■ landform Establishment ■ growth medium development ■ ecosystem and land use establishment ■ ecosystem and land use development.
Progressive rehabilitation	The progress of rehabilitation towards achieving the approved rehabilitation completion criteria. This may be described in terms of domains, phases, performance indicators and rehabilitation completion criteria.
Rehabilitation Completion	The final phase of rehabilitation when a rehabilitation area has achieved the approved rehabilitation objectives and rehabilitation completion criteria for the final land use. Rehabilitation areas may be classified as complete when the NSW Resources Regulator has determined in writing that the relevant rehabilitation obligations have been fulfilled following submission of *Form ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate* application by the lease holder.
Rehabilitation Completion criteria	As defined in the Mining Regulation 2016.
Rehabilitation cost estimate	As defined in the Mining Regulation 2016.
Rehabilitation management plan	As defined in the Mining Regulation 2016.
Rehabilitation objectives	As defined in the Mining Regulation 2016.
Rehabilitation risk assessment	As defined in the Mining Regulation 2016.
Rehabilitation schedule	The defined timeframes for progressive rehabilitation set out in the forward program.

WORD	DEFINITION
Relevant stakeholders	Means any persons or bodies who may be affected by the mining operations, including rehabilitation, carried out on the lease land, and includes: ■ the relevant development consent authority ■ the local council ■ the relevant landholder(s) ■ community consultative committee (if required under the development consent) or equivalent consultative group ■ affected land holder(s) ■ government agencies relevant to the final land use ■ affected infrastructure authorities (electricity, telecommunications, water, pipeline, road, rail authorities) ■ local Aboriginal communities, and ■ any other person or body determined by the Minister to be a relevant stakeholder in relation to a mining lease.
Risk	The effect of uncertainty on objectives. It is measured in terms of consequences and likelihood (AS/NZS ISO 31000:2009).
Secretary	The Secretary of the Department.
Security deposit	An amount that a mining lease holder is required to provide and maintain under a mining lease condition, to secure funding for the fulfilment of obligations under the lease (including obligations that may arise in the future).
Surface disturbance	Includes activities that disturb the surface of the mining area, including mining operations, ancillary mining activities and exploration.
Tailings	A combination of the fine-grained solid material remaining after the recoverable metals and minerals have been extracted from the mined ore, and any process water[2].
Waste	Has the same meaning as that term under the *Protection of the Environment Operations Act 1997*.

[2] Commonwealth of Australia (DITR), 2007. *Tailings Management.*

Attachment 2 – Rehabilitation Complaints

DATE	COMPLAINANT	COMPLAINT DETAILS	RESPONSE DETAILS	STATUS OF RESPONSE	DATE RESPONSE COMPLETED (IF APPLICABLE)

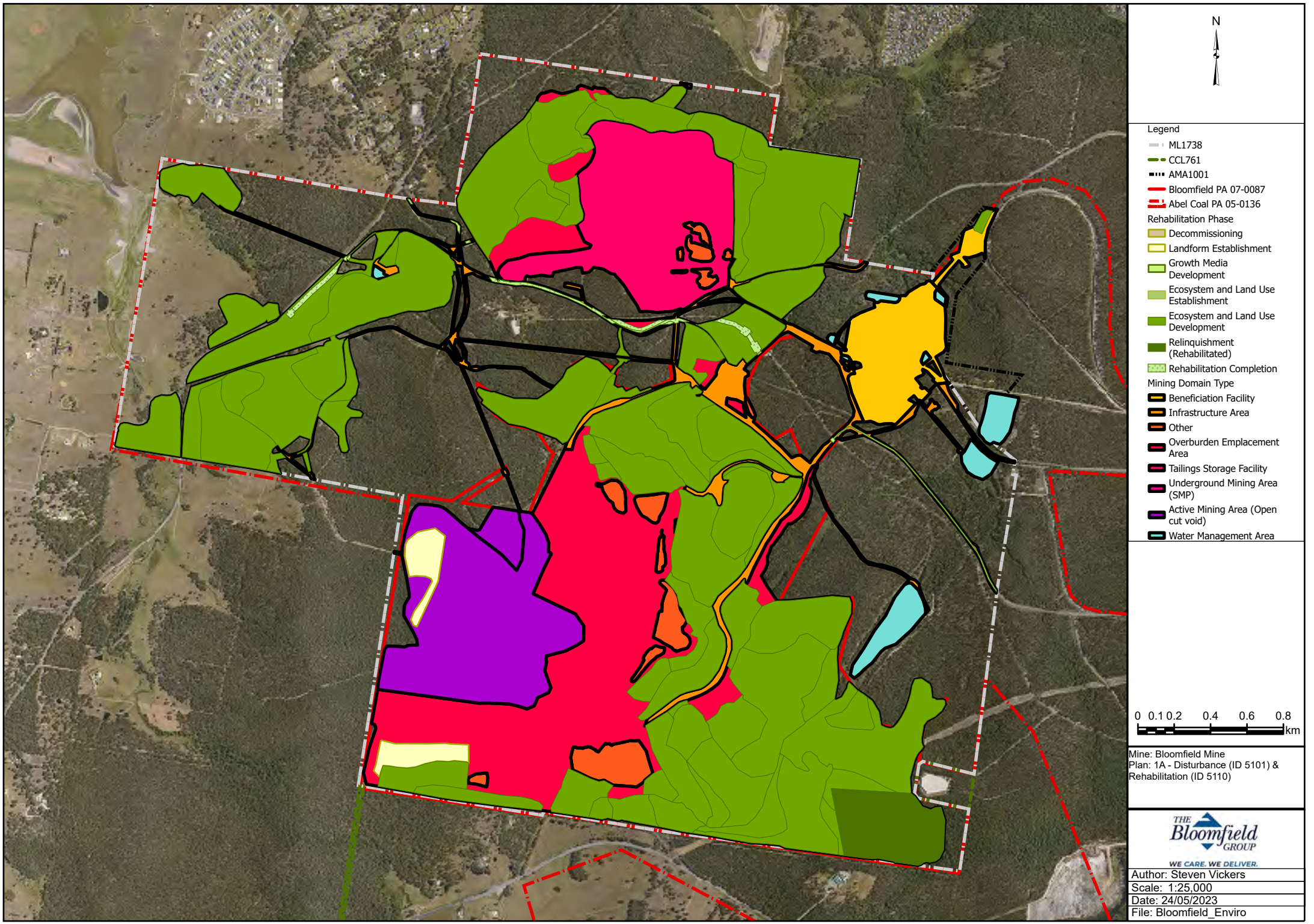
Attachment 3 – Stakeholder consultation

DATE	STAKEHOLDER	CONSULTATION ACTIVITIES AND FORMS	MATTERS SUBJECT TO CONSULTATION	ACTIONS TAKEN
27 May 2022	Community Consultation Committee	On site meeting and site inspection (multiple 27/5/22, 1/8/22, 17/10/22, 20/3/23)	Rehabilitation Management Plan; progress update on mine closure specialist studies; rehabilitation inspection.	Refer minutes CCC meetings on Bloomfield website
9 Mar 2023	NSW Resource Regulator	On site meeting and site inspection	Rehabilitation Management Plan; progress update on mine closure specialist studies; rehabilitation inspection and forward program compliance.	No actions required

Attachment 4 – Plans

2023 Plan 1A.pdf

2023 Plan 1B.pdf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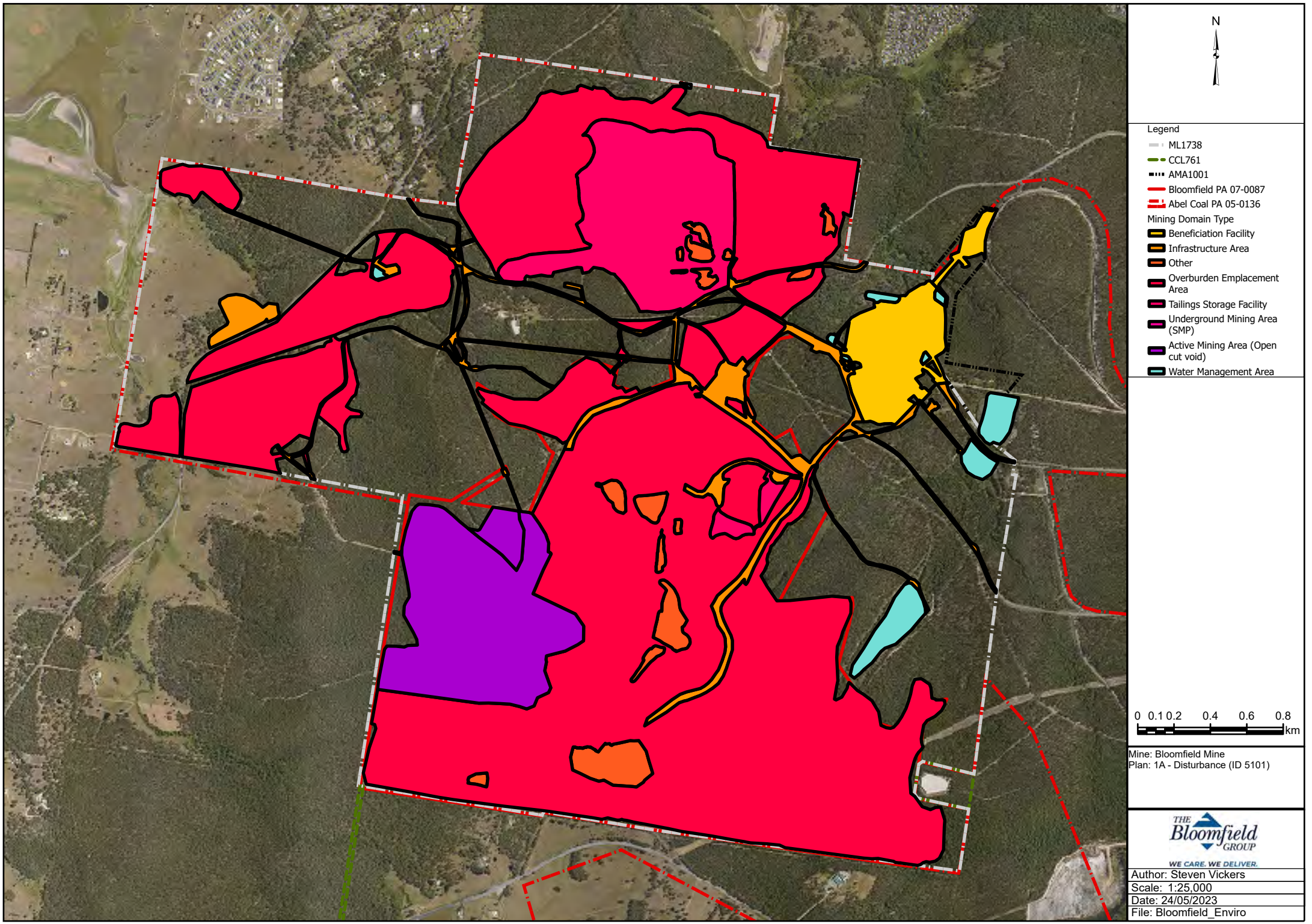
Legend
ML1738
CCL761
AMA1001
Bloomfield PA 07-0087
Abel Coal PA 05-0136
Rehabilitation Phase
Decommissioning
Landform Establishment
Growth Media Development
Ecosystem and Land Use Establishment
Ecosystem and Land Use Development
Relinquishment (Rehabilitated)
Rehabilitation Completion
Mining Domain Type
Beneficiation Facility
Infrastructure Area
Other
Overburden Emplacement Area
Tailings Storage Facility
Underground Mining Area (SMP)
Active Mining Area (Open cut void)
Water Management Area
0 0.1 0.2 0.4 0.6 0.8
km
Mine: Bloomfield Mine
Plan: 1A - Disturbance (ID 5101) & Rehabilitation (ID 5110)
THE Bloomfield GROUP
WE CARE. WE DELIVER.
Author: Steven Vickers
Scale: 1:25,000
Date: 24/05/2023
File: Bloomfield_Enviro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Legend
ML1738
CCL761
AMA1001
Bloomfield PA 07-0087
Abel Coal PA 05-0136
Mining Domain Type
Beneficiation Facility
Infrastructure Area
Other
Overburden Emplacement Area
Tailings Storage Facility
Underground Mining Area (SMP)
Active Mining Area (Open cut void)
Water Management Area
0 0.1 0.2 0.4 0.6 0.8
km
Mine: Bloomfield Mine
Plan: 1A - Disturbance (ID 5101)
THE Bloomfield GROUP
WE CARE. WE DELIVER.
Author: Steven Vickers
Scale: 1:25,000
Date: 24/05/2023
File: Bloomfield_Enviro


N
Legend
ML1738
CCL761
AMA1001
Bloomfield PA 07-0087
Abel Coal PA 05-0136
Rehabilitation Phase
Decommissioning
Landform Establishment
Growth Media Development
Ecosystem and Land Use Establishment
Ecosystem and Land Use Development
Relinquishment (Rehabilitated)
Rehabilitation Completion
0 0.1 0.2 0.4 0.6 0.8
km
Mine: Bloomfield Mine
Plan: 1A - Rehabilitation (ID 5110)
THE Bloomfield GROUP
WE CARE. WE DELIVER.
Author: Steven Vickers
Scale: 1:25,000
Date: 24/05/2023
File: Bloomfield_Enviro


N
Legend
ML1738
CCL761
AMA1001
Bloomfield PA 07-0087
Abel Coal PA 05-0136
Current_Landform_Contour
0 0.1 0.2 0.4 0.6 0.8
km
Mine: Bloomfield Mine
Plan: 1B - Current Landform Contours
(ID 5105)
THE Bloomfield GROUP
WE CARE. WE DELIVER.
Author: Steven Vickers
Scale: 1:25,000
Date: 24/05/2023
File: Bloomfield_Enviro

NSW GOVERNMENT

NSW Resources Regulator

FWP0001185

BLOOMFIELD MINE FORWARD PROGRAM

Friday 1 April 2022 to Monday 31 March 2025

Contents

Summary

DETAIL	
Mine	Bloomfield Mine
Reference	FWP0001185
Forward program commencement date	Friday 1 April 2022
Forward program end date	Monday 31 March 2025
Forward program revision (if applicable)	
Contact	Steven Vickers
Mining leases	ML 1738 (1992), CCL 761 (1973)
Project location	BLOOMFIELD COLLIERIES PTY LTD
Date of submission	Thursday 25 May 2023

Important

The department may make the information in your program and any supporting information available for inspection by members of the public, including by publication on its website or by displaying the information at any of its offices. If you consider any part of your program to be confidential, please communicate this to the department via the message function on this submission within the NSW Resources Regulator Portal.

Three-year forecast – surface disturbance activities

Project description

The Colliery operates in accordance with Project Approval (PA) 07_0087 with approved production levels of 1.3 Mtpa of Run of Mine (ROM) coal. Mining operations may take place until 31 December 2030. The Coal Handling and Processing Plant (CHPP), associated infrastructure and tailings dam are approved under the Abel Coal Project (PA 05_0136).

The Colliery is a multi-seam, multi bench system, mining up to 13 seams or splits. Heavy earth moving equipment delivers the ROM coal to the onsite CHPP via internal haul roads. Processing includes size reduction, washing and screening.

Product coal is stockpiled adjacent to the CHPP before being loaded into rail wagons at the rail loading facility and transported by rail to the Port of Newcastle. The Colliery has approval to operate 24 hours per day, seven days per week, and employs approximately 60 personnel across its operations.

Areas have been progressively rehabilitated with approximately 497 hectares of disturbed land rehabilitated to date.

Description of surface disturbance activities

Exploration activities

No further exploration activities are planned for the Colliery.

Construction activities

No further exploration activities are planned for the Colliery outside of those detailed in the mining and rehabilitation activities.

Mining schedule

Mining development method and sequencing and general mine features.

Mining is to continue within the combined Creek cut and S cut area over the duration of the forward plan to the Big Ben seam.

In Year 1, mining will continue within the combined Creek cut and S cut area. An area of 5.9 Ha to the west of the current active pit will remain prepared for rehabilitation with the landform established pending outcome of potential Development Consent (PA07_0087) modification. An area of 5.9 Ha to the south of the current active pit will progress to ecosystem and land use establishment with the application of ameliorants and seeding.

In Year 2, mining will continue within the combined Creek cut and S cut area. The 5.9 Ha area to the west of the current pit will remain prepared for rehabilitation with the landform established. An area of 3.4 Ha on the southern section of the U cut Tailings Storage Facility will progress to ecosystem and land use establishment with the application of ameliorants and seeding. An area of 8.0 Ha of land on the southern section of S cut and mining lease will be shaped in preparation for rehabilitation.

In Year 3, mining will continue within the combined Creek cut and S cut area. The 8.0 Ha of land on the southern section of the S cut and mining lease will progress to ecosystem and land use establishment with the application of ameliorants and seeding. An area of 5.8 Ha on the western section of the U cut Tailings Storage Facility will be shaped in preparation for rehabilitation.

Areas identified for emplacements, the sequencing of emplacements, construction, and management.

Waste rock mined in S Cut and Creek Cut will continue to be placed in pit behind active mining. Following blasting the overburden materials will be loaded by excavator into 180t and 220t capacity haul trucks and transported to the nominated in-pit emplacement area. Load and haul placement of the overburden material will be supplemented by throw blasting and dozer push wherever possible. Backfilled areas are shaped for rehabilitation when filling reaches final landform design.

Processing infrastructure activities and the location of tailings facilities and schedule for emplacement

The Bloomfield Coal Handling and Preparation Plant (CHPP) will continue to operate as installed. Heavy earth moving equipment delivers the ROM coal to the onsite CHPP via internal haul roads. ROM coal is processed at the CHPP. Processing includes size reduction, washing and screening.

Product coal is stockpiled adjacent to the CHPP before being loaded into rail wagons at the Bloomfield rail loading facility and transported by rail to the Port Waratah Coal Services terminal at the Port of Newcastle.

The CHPP coarse reject is currently mixed with overburden material and placed back into open cut pits. This process will continue throughout the forward program which assists in filling voids in preparation for surface rehabilitation.

Fine tailings emplacement will continue at the U cut tailings facility, which has sufficient capacity for the forward program. Tailings deposition lines will continue to be repositioned to suit the progressive tailings capping and rehabilitation program, with secondary flocculation continued to be used as required.

Waste disposal and materials handling operations.

General waste minimisation principles (i.e., reduce, re-use and recycling) are currently implemented at the Colliery to minimise the quantity of wastes that require off-site disposal. Key waste streams currently being produced at the Colliery include:

- Waste Oil and oil filters: Stored in specific receptacles and collected periodically by licensed waste contractors.
- Waste metal: The Colliery has a scrap metal program which has a high rate of onsite re-use of steel. If steel is deemed not suitable for re-use, scrap metal is stored in specific receptacles and sold for recycling.
- Waste tyres: up to 50 tonnes of used tyres can be disposed in the mine void. In accordance with EPL requirements, waste tyres will be covered by at least 20 m of inert material beneath rehabilitated surfaces. Disposal volumes reported annually to the EPA.
- Hydrocarbon contaminated soils: Hydrocarbon contaminated soils will be treated on-site and tested in a land farm facility as per the Rehabilitation Action Plan (RAP) before disposal in open cut pit.
- General waste: General waste is placed in 1.5m3 and 3m3 bins and collected by licensed waste contractor for disposal.
- Wastepaper and cardboard: Recycling bins are provided for wastepaper and cardboard. These are regularly serviced by a licensed waste contractor.

All general domestic waste and general recyclable products will continue to be collected by an appropriately licensed contractor.

Key production milestones

MATERIAL	UNIT	YEAR 1	YEAR 2	YEAR 3
Stripped topsoil (if applicable)	(m^3)	15,000	0	0
Rock/overburden	(m^3)	4,200,000	4,000,000	4,000,000
Ore	(Mt)	0.6	0.6	0.6
Reject material[1]	(Mt)	0.2	0.2	0.2
Product	(Mt)	0.4	0.4	0.4

[1] This includes coarse rejects, tailings and any other wastes resulting from beneficiation.

Three-year rehabilitation forecast

Rehabilitation planning schedule

Rehabilitation planning schedule

Rehabilitation Schedule Year 1:

Completion of rehabilitation located south of the active mining area.

Rehabilitation Schedule Year 2:

Completion of rehabilitation located southern section of the Tailings Storage Facility and an area on the southern section of the active mining area will be shaped in preparation for rehabilitation.

Rehabilitation Schedule Year 3:

Completion of rehabilitation located south of the active mining are and an area on the western area of the Tailings Storage Facility will be shaped in preparation for rehabilitation.

Stakeholder consultation

- Community Consultative Committee – 6 monthly meetings.
- Workforce consultation – in particular regarding mine life.
- Government departments (Resource Regulator, Department of Planning and Environment, EPA, other) – closure planning, as required

Rehabilitation studies, risk assessments and/or design work

Detailed closure studies were undertaken to fill in knowledge gaps identified as part of the detailed rehabilitation risk assessment process. Some recommendations require further studies to be carried out over the Forward Program:

- Soil erosion modelling requires additional testing to determine the effectiveness of ameliorated on soil stability by end of Year 1.
- Update landform design for areas where rehabilitation has not been completed (ie final void and slopes around final void) to utilise the stable slope parameters developed by end of Year 1.
- To assist finalising final landform design of the Tailings Storage Facility undertake investigation of permeability of the capping material in the capping design process by the end of Year 1.

Rehabilitation research and trials

RRT NUMBER	PROJECT/TRIAL NAME	OBJECTIVE OF TRIAL/PROJECT	METHODOLOGY	EXPECTED DATE OF COMPLETION	STATUS
FWP0001185					

Rehabilitation maintenance and corrective actions

Rehabilitation monitoring is undertaken in accordance with the Rehabilitation Management Plan. The monitoring program is based on the Landscape Function Analysis (LFA) tool developed by the CSIRO and is carried out on a biennial basis. The next program is scheduled for late 2023.

In addition, a monitoring program is undertaken to assess progress in achieving a long term sustainable agricultural land use of the rehabilitated land. These areas of rehabilitated mined lands have been grazed with beef cattle. The program is carried out on a biennial basis and is run over a full year on a quarterly basis to provide data covering summer, autumn, winter and spring conditions.

Maintenance activities to be conducted during the forward program includes ongoing weed treatment across disturbed and undisturbed areas of the Mining Lease. Also, the annual feral dog baiting program will continue in consultation with large land holders in the area and Local Land Services.

It is envisaged that this monitoring / inspection program will be continued as required until it can be demonstrated that the rehabilitation has satisfied the closure criteria. Specific maintenance and corrective actions to be progressed in the next three years and progress of current actions will be included in Annual Rehabilitation Reports.

Rehabilitation schedule

Under current approvals, mining activities at the Colliery are expected to continue until late 2026, with progressive rehabilitation undertaken during the active mining phase. Following cessation of production, priority will be given to the completion of rehabilitation along the southern boundary of the site.

The timing of key activities associated with the rehabilitation schedule are provided in the Rehabilitation Management Plan.

Subsidence remediation for underground operations

Sink holes associated with shallow workings occur infrequently in the rehabilitated areas on the western side of the Mining Lease. Operations currently being undertaken at the Colliery do not include underground mining, and therefore risk of subsidence is not increased.

If subsidence potholes are identified, the standard management procedure is to flag off and isolate the depression from access, back fill and monitor the area for further subsidence. Once deemed stable, the area will then be rehabilitated, and periodic inspections will continue.

Waste emplacement areas are monitored for signs of uneven or excessive displacement that may alter drainage patterns or present a safety risk. If excessive displacement is identified, then repair works will be carried out.

Progressive mining and rehabilitation statistics

Three-yearly forecast cumulative disturbance and rehabilitation progression

	FORECAST	UNIT	YEAR 1	YEAR 2	YEAR 3
A	**Total surface disturbance footprint**	(ha)	934.71	934.71	934.71
B	**Total active disturbance**	(ha)	410.73	399.32	393.49
C	**Land prepared for rehabilitation**	(ha)	11.84	23.26	29.09
D	**Ecosystem and land use establishment**	(ha)	0	0	0

Rehabilitation key performance indicators (KPIs)

	FORECAST	UNIT	YEAR 1	YEAR 2	YEAR 3
O	**Total new active disturbance area**	(ha)			
P	**Area proposed for active rehabilitation**	(ha)	11.84	11.41	5.83
Q	**Annual rehabilitation to disturbance ratio**				

Attachment 1 – Reporting Definitions

REPORTING CATEGORY		DEFINITION
A	Total disturbance footprint – surface disturbance	All areas within a mining lease that either have at some point in time or continue to pose a rehabilitation liability due to surface disturbance activities. The total disturbance footprint is the sum of the total active disturbance, decommissioning, landform establishment, growth medium development, ecosystem and land use establishment, ecosystem and land use development and rehabilitation completion (see definitions below). Underground mining operations should not include the footprint of underground mining areas/subsidence management areas in the total disturbance footprint.
B	Total active disturbance	Includes on-lease exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste rock emplacements (active/unshaped/in or out-of-pit), tailings dams (active/unshaped/uncapped) and temporary stabilised areas (e.g. areas sown with temporary cover crops for dust mitigation and temporary rehabilitation).
C	Rehabilitation – land preparation	Includes the sum of all disturbed land within a mining lease that have commenced any, or all, of the following phases of rehabilitation– decommissioning, landform establishment and growth medium development. Refer to the glossary of terms in this document for the definition of these phases of rehabilitation.
D	Ecosystem and land use establishment	Includes the area which has been seeded/planted with the target vegetation species for the intended final land use. However, vegetation has not matured to a stage where it can be demonstrated that it will be sustainable for the long term and or require only a maintenance regime consistent with target reference/analogue sites. Typically, rehabilitation areas would be in this phase for at least two years (and usually more) before rehabilitation can be classified as being in the ecosystem and land use development phase. This phase does not apply to infrastructure areas that are being retained as part of final land use for the site.

REPORTING CATEGORY	DEFINITION
O	The area of any new active disturbance that will be created during the next three years, as defined under definition A1 (definition A1 Table 5).
P	The sum of any new rehabilitation to be commenced in the next three years. These areas may be in the phases "Rehabilitation - Land Preparation" or the "Ecosystem & Land Use Establishment" (definitions C & D in Table 5).
Q	The rehabilitation to disturbance ratio (S / R) indicates how many hectares of new rehabilitation are undertaken for each hectare of land disturbed during the three years. A ratio of 1/1 indicates that the area of new rehabilitation and disturbance in that period are the same.

Attachment 2 – Definitions

WORD	DEFINITION
Active	In the context of rehabilitation, land associated with mining domains is considered 'active' for the period following disturbance until the commencement of rehabilitation.
Active mining phase of rehabilitation	In the context of rehabilitation, the active mining phase of rehabilitation constitutes the rehabilitation activities undertaken during mining operations such as salvaging and managing soil resources, salvaging habitat resources, and native seed collection. This phase also includes management actions taken during operations to manage risks to rehabilitation and enhance rehabilitation outcomes such as selective handling of waste rock and management of tailings emplacements.
Analogue site	In the context of rehabilitation, an analogue site is a 'reference site' that represents an example of the defining characteristics (such as vegetation composition and structure or agricultural productivity) of the final land use. Characteristics of analogue sites can be assessed to develop the rehabilitation objectives and completion criteria for final land use domains.
Annual rehabilitation report and forward program	As described in the Mining Regulation 2016.
Annual reporting period	As defined in the Mining Regulation 2016.
Closure	A whole-of-mine-life process, which typically culminates in the relinquishment of the mining lease. It includes decommissioning and rehabilitation to achieve the approved final land use(s).
Decommissioning	The process of removing mining infrastructure and removing contaminants and hazardous materials.
Decommissioning Phase of Rehabilitation	Activities associated with the removal of mining infrastructure and removal and/or remediation of contaminants and hazardous materials. In the context of the rehabilitation management plan this phase of rehabilitation may also include studies and assessments associated with decommissioning and demolition of infrastructure or works carried out to make safe or 'fit for purpose' built infrastructure to be retained for future use(s) following lease relinquishment.

WORD	DEFINITION
Department	The Department of Regional NSW.
Disturbance	See Surface Disturbance.
Disturbance area	An area that has been disturbed and that requires rehabilitation. This may include areas such as on-licence exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste emplacements (active/unshaped/in or out-of-pit), tailings dams (active/unshaped/uncapped), and areas requiring rehabilitation that are temporarily stabilised (i.e. managed to minimise dust generation and/or erosion).
Domain	An area (or areas) of the land that has been disturbed by mining and has a specific operational use (mining domain) or specific final land use (final land use domain). Land within a domain typically has similar geochemical and/or geophysical characteristics and therefore requires specific rehabilitation activities to achieve the associated final land use.
Ecosystem and Land Use Development	This phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving the approved rehabilitation objectives and completion criteria. For vegetated land uses this phase may include processes to develop characteristics of functional self-sustaining ecosystems, such as nutrient recycling, vegetation flowering and reproduction, and increasing habitat complexity, and development of a productive, self-sustaining soil profile. This phase of rehabilitation may include specific vegetation management strategies and maintenance such as tree thinning, supplementary plantings and weed management.
Ecosystem and Land Use Establishment	This phase of rehabilitation consists of the processes to establish the approved final land use following construction of the final landform. For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community and implementing land management activities such as weed control. This phase of rehabilitation may also include habitat augmentation such as installation of nest boxes.
Exploration	Has the same meaning as that term under the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

WORD	DEFINITION
Final landform and rehabilitation plan	As defined in the Mining Regulation 2016.
Final land use	As defined in the Mining Regulation 2016.
Form and way	Means the form and way approved by the Secretary. Approved form and way documents are available on the Department's website.
Growth Medium Development	This phase of rehabilitation consists of activities required to establish the physical, chemical and biological components of the substrate required to establish the desired vegetation community (including short lived pioneer species. This phase may include spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes, applying soil ameliorants to enhance the physical, chemical and biological characteristics of the growth media, and actions to minimise loss of growth media due to erosion.
Habitat	Has the same meaning as that term under the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994* (as relevant).
Indicator	An attribute of the biophysical environment (e.g. pH, topsoil depth, biomass) that can be used to approximate the progression of a biophysical process. It can be measured and audited to demonstrate (and track) the progress of an aspect of rehabilitation towards a desired completion criterion (i.e. defined end point). It may be aligned to an established protocol and used to evaluate changes in a system.
Land	As defined in the *Mining Act 1992.*
Landform Establishment	This phase of rehabilitation consists of the processes and activities required to construct the final landform. In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features, encapsulate problematic materials such as tailings, and prepare a substrate with the desired physical and chemical characteristics (e.g. rock raking or ameliorating sodic materials).
Large mine	As defined in the Mining Regulation 2016.
Lease holder	The holder of a mining lease.

WORD	DEFINITION
Life of mine	The timeframe of how long a mine is approved to mine, from commencement to closure.
Mine rehabilitation portal	Means the NSW Resources Regulator's online portal that lease holders must use (via a registered account) to: ■ upload rehabilitation geographical information system (GIS) spatial data ■ develop rehabilitation GIS spatial data (using online tracing functions) ■ generate rehabilitation plans and rehabilitation statistics using the map viewer and Rehabilitation Key Performance Indicator functionalities. Data submitted to the mine rehabilitation portal is collated in a centralised geodatabase for use by the NSW Resources Regulator to regulate rehabilitation performance of lease holders.
Mining area	As defined in the *Mining Act 1992*.
Mining domain	A land management unit with a discrete operational function (e.g. overburden emplacement), and therefore similar geophysical characteristics, that will require specific rehabilitation treatments to achieve the final land use(s).
Mining land	As defined in the *Mining Act 1992.*
Native vegetation	Has the same meaning as that term under section 60B of the *Local Land Services Act 2013.*
Overburden	Material overlying coal or a mineral deposit.
Performance indicator	An attribute of the biophysical environment (for example pH, slope, topsoil depth, biomass) that can be used to demonstrate achievement of a rehabilitation objective. It can be measured and audited to demonstrate (and track) the progress of an aspect of rehabilitation towards a desired completion criterion, that is, a defined end point. It may be aligned to an established protocol and used to evaluate changes in a system.

WORD	DEFINITION
Phases of rehabilitation	The stages and sequences of actions required to rehabilitate disturbed land to achieve the final land use. The phases of rehabilitation are: ■ active mining ■ decommissioning ■ landform Establishment ■ growth medium development ■ ecosystem and land use establishment ■ ecosystem and land use development.
Progressive rehabilitation	The progress of rehabilitation towards achieving the approved rehabilitation completion criteria. This may be described in terms of domains, phases, performance indicators and rehabilitation completion criteria.
Rehabilitation Completion	The final phase of rehabilitation when a rehabilitation area has achieved the approved rehabilitation objectives and rehabilitation completion criteria for the final land use. Rehabilitation areas may be classified as complete when the NSW Resources Regulator has determined in writing that the relevant rehabilitation obligations have been fulfilled following submission of *Form ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate* application by the lease holder.
Rehabilitation Completion criteria	As defined in the Mining Regulation 2016.
Rehabilitation cost estimate	As defined in the Mining Regulation 2016.
Rehabilitation management plan	As defined in the Mining Regulation 2016.
Rehabilitation objectives	As defined in the Mining Regulation 2016.
Rehabilitation risk assessment	As defined in the Mining Regulation 2016.
Rehabilitation schedule	The defined timeframes for progressive rehabilitation set out in the forward program.

WORD	DEFINITION
Relevant stakeholders	Means any persons or bodies who may be affected by the mining operations, including rehabilitation, carried out on the lease land, and includes: ■ the relevant development consent authority ■ the local council ■ the relevant landholder(s) ■ community consultative committee (if required under the development consent) or equivalent consultative group ■ affected land holder(s) ■ government agencies relevant to the final land use ■ affected infrastructure authorities (electricity, telecommunications, water, pipeline, road, rail authorities) ■ local Aboriginal communities, and ■ any other person or body determined by the Minister to be a relevant stakeholder in relation to a mining lease.
Risk	The effect of uncertainty on objectives. It is measured in terms of consequences and likelihood (AS/NZS ISO 31000:2009).
Secretary	The Secretary of the Department.
Security deposit	An amount that a mining lease holder is required to provide and maintain under a mining lease condition, to secure funding for the fulfilment of obligations under the lease (including obligations that may arise in the future).
Surface disturbance	Includes activities that disturb the surface of the mining area, including mining operations, ancillary mining activities and exploration.
Tailings	A combination of the fine-grained solid material remaining after the recoverable metals and minerals have been extracted from the mined ore, and any process water[2].
Waste	Has the same meaning as that term under the *Protection of the Environment Operations Act 1997*.

[2] Commonwealth of Australia (DITR), 2007. *Tailings Management.*

Attachment 3 – Plans

2023 Plan 2A Year 1.pdf

2023 Plan 2B Year 2.pdf

2023 Plan 2C Year 3.pdf


N
Legend
ML1738
CCL761
AMA1001
Bloomfield PA 07-0087
Abel Coal PA 05-0136
Forcast Area
Forecast Disturbance
Forecast Land Prepared for Rehabilitation
Ecosystem and Land Use Establishment
0 0.1 0.2 0.4 0.6 0.8
km
Mine: Bloomfield Mine
Plan: 2A - Year 1 (YEM24 ID 5135)
THE Bloomfield GROUP
WE CARE. WE DELIVER.
Author: Steven Vickers
Scale: 1:25,000
Date: 25/05/2023
File: Bloomfield_Enviro


N
Legend
ML1738
CCL761
AMA1001
Bloomfield PA 07-0087
Abel Coal PA 05-0136
Forcast Area
Forecast Disturbance
Forecast Land Prepared for Rehabilitation
Ecosystem and Land Use Establishment
0 0.1 0.2 0.4 0.6 0.8
km
Mine: Bloomfield Mine
Plan: 2B - Year 2 (YEM25 ID 5136)
THE Bloomfield GROUP
WE CARE. WE DELIVER.
Author: Steven Vickers
Scale: 1:25,000
Date: 25/05/2023
File: Bloomfield_Enviro


N
Legend
ML1738
CCL761
AMA1001
Bloomfield PA 07-0087
Abel Coal PA 05-0136
Forcast Area
Forecast Disturbance
Forecast Land Prepared for Rehabilitation
Ecosystem and Land Use Establishment
0 0.1 0.2 0.4 0.6 0.8
km
Mine: Bloomfield Mine
Plan: 2C - Year 3 (YEM26 ID 5137)
THE Bloomfield GROUP
WE CARE. WE DELIVER.
Author: Steven Vickers
Scale: 1:25,000
Date: 25/05/2023
File: Bloomfield_Enviro

APPENDIX F

COMPLAINTS REGISTER

BLOOMFIELD COLLIERY

COMPLAINTS REGISTER

2022

No.	About *	Time/Date	Location	Details	Action Taken / Findings
22_01	B	20/1/22 2:10pm	Louth Park	Complaint via 'Hotline'. Complaint about blast on 20/1/22.	Environmental Advisor rang complainant on 20/1/22 to discuss complaint. Complainant said house shook. Blast monitoring within limits. Nearest monitors: Mt Vincent Rd 0.17 mm/s, 106.4 dBL; Richards 0.25 mm/s, 106.4 dBL. Wind 13 km/h, 160 deg.
22_02	N	15/07/22 1:53pm	Ashtonfield	Complaint via email. Complaint about noise and blasting.	Community Relations Manager responded to complainant via email on 18/7/22. Explained that blast schedule is available on Bloomfield website and advised of the community hotline number. Also explained that a predictive noise model is incorporated into daily operations planning.

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

BLOOMFIELD COLLIERY

COMPLAINTS REGISTER

2023

No.	About *	Time/Date	Location	Details	Action Taken / Findings

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

APPENDIX G

INCIDENT REPORTS

ABN 76 000 106 972

PO Box 4
East Maitland NSW 2323

Four Mile Creek Road
Ashtonfield NSW 2323
AUSTRALIA

TEL +61 2 4930 2600
FAX+61 2 49338940

12 July 2022

The Regional Manager
NSW Environment Protection Authority
PO Box 488G
NEWCASTLE NSW 2300

Dear Sir/Madam,

RE: EPA Pollution Line Reference No. EPA14098 - ref:_00D7F6iTix._5007F1JaxXl:ref

This letter is submitted in compliance with EPL396 Condition R2.2 which requires that we provide written details of the verbal notification referred to above.

Background

At 10:30 am on 5 July 2022, water was observed passively spilling to Four Mile Creek from the Overland Dam (a mine water dam) located below the Coal Stockpile area. See Photo 1.

The dam was empty prior to the rain event that commenced 3 July 2022 (refer Photo 2). Two diesel pumps were operational prior to and during the spill, however due to the rainfall intensity and runoff during the event the pumps were unable to keep up with the inflow to the dam.

Mine personnel notified the event to the Mine Manager.

The incident was reported to the EPA Environment Line at 1:48 pm on 5 July 2022. The verbal notification was logged and the initial Reference Number EPA 14098 issued. Subsequent notification in accordance with the requirements of the PIRMP was provided to the NSW Department of Planning and Environment- Compliance, the Resources Regulator and Maitland Council.

Photo 1 – Passive release from overland dam 5/7/2022 11:00

Photo 2 – Overland Dam showing completed desilting works dated 28 June 2022

Passive Spill of Overland Dam

An investigation into the incident is summarised as follows:

- During the recent rainfall event of 3-7 July 2022 Bloomfield Colliery received a total of 369 mm of rain.
- Bloomfield Colliery received 189 mm of rain between 3 July and 10.00 am on 5 July 2022.
- A further 139 mm of rain was received between 10.00 am on 5 July and 10.00 am on 6 July 2022.

- At 10:30 am on 5 July 2022 water was observed passively spilling to Four Mile Creek from the Overland Dam.
- A further 41 mm of rain was received between 10.00 am on 6 July and the end of the rain event (5.00 am on 7 July).
- Run-off water from the CHPP is collected in the Overland Dam and is pumped back to site to be included in the raw water system and used in the Coal Handling Preparation Plant (CHPP) and for dust suppression.
- At 11:50 am on 7 July 2022 it was observed that the water was no longer passively spilling from the dam and the pumps were still in operation demonstrating that the pump had caught up with inflows and were drawing the dam down.
- Sampling of the Overland Dam, including samples from Four Mile Creek upstream and downstream of the Overland Dam, was commenced immediately following the observation of the dam spilling on 5 July 2022 and conducted over the next several days. Sampling locations are shown on Figure 1. (WM6 - Upstream, Overland Dam and EPL ID 2 – Downstream)
- Sampling results indicate that there was no downstream deterioration in water quality. See Tables 1-4.
- The catchment area of the Overland Dam is 40 Ha.
- The dam had been desilted prior to the rain event commencing and was empty.
- The pumps had been running throughout the rain event and have a combined capacity of approximately 19 ML per day. See Photo 3.

Photo 3 – One of the diesel pumps pumping water from the overland dam.

- Dam storage capacity is approximately 33 ML.
- From the time of the spill observation it is estimated that 33 ML of water flowed from the Overland Dam to the environment.
- Over the same time period of the spill it was estimated 1100 ML of non-mine water flowed down Four Mile Creek below the Overland Dam at EPL ID 2 instream logger.
- The spill volume represents approximately 3% of the total flow during the spill event.

- At the time of the spill a licensed water discharge to Four Mile Creek was being undertaken in accordance with EPL 396 water discharge conditions via EPL ID 1 (Figure 1).

Sample Results

Water sampling was undertaken at the spill point of the Overland Dam which is representative of the water which discharged offsite. Sampling was also undertaken upstream and downstream of the dam along Four Mile Creek. The results for the water sampling is outlined in Table 1-4 and locations are shown on Figure 1.

Table 1 – 5/7/22 Sample Results

5/7/22	Upstream (WM6)	Overland Dam	Downstream (EPL ID. 2)
Total Suspended Solids (mg/L)	120	44	50
pH	6.3	4.7	6.9
EC (uS/cm)	89	890	612
Iron (mg/L)	-	NYA	-

NYA – Not yet available

Table 2 – 6/7/22 Sample Results

6/7/22	Upstream (WM6)	Overland Dam	Downstream (EPL ID. 2)
Total Suspended Solids (mg/L)	120	55	61
pH	6.6	4.9	6.9
EC (uS/cm)	166	964	308
Iron (mg/L)	-	NYA	-

NYA – Not yet available

Table 3 – 7/7/22 Sample Results

7/7/22	Upstream (WM6)	Overland Dam	Downstream (EPL ID. 2)
Total Suspended Solids (mg/L)	65	10	40
pH	6.4	4.2	6.6
EC (uS/cm)	114	851	380
Iron (mg/L)	-	NYA	-

NYA – Not yet available

Table 4 – 8/7/22 Sample Results

8/7/22	Upstream (WM6)	Overland Dam	Downstream (EPL ID. 2)
Total Suspended Solids (mg/L)	41	No flow	43
pH	6.5	No flow	6.8
EC (uS/cm)	188	No flow	676

LEGEND

0 — 1 km

- ML 1738
- AMA 1001
- EPL 396
- Catchment Area
- Water Sampling

N

THE Bloomfield GROUP

Bloomfield Colliery

Figure 1

	Date: July 2022 Photo: January 2021	Drawing: A3

Bloomfield Colliery holds a license in accordance with EPL 396 to discharge waters into the Four Mile Creek watercourse from Lake Kennerson / Lake Forster Mine Water dams. At the time of the spill a licensed water discharge to Four Mile Creek was being undertaken in accordance with EPL 396 conditions. The analytes in Table 1 & 3 are the pollutants listed in EPL 396 required to be tested during a licenced discharge event. It shows that the results are similar to qualities that are permitted to be discharged under EPL 396 with the exception of pH (limit 6.5-8.5) and TSS (limit 30mg/L). However, downstream results show no deterioration in pH or TSS levels. EC results were within EPL396 limits of 6000 uS/cm.

Water sample analysis upstream and downstream was similar and indicates dilution of the spill by other inflows to the creek. When considering the amount of rainfall and flooding experience within the region (Photo 4) the environmental impacts of the spill is considered negligible.

Photo 4 – Aerial photo showing regional flooding in Maitland area 6 July 2022

Outcome / Follow Up

As an outcome of the incident the following works will be implemented to reduce the risk for a repeat of the incident:

- A hydrological engineer had been engaged before the rain event to undertake a review of the stockpile dam system, including sizing and operational requirements (pumping), with the report expected during July 2022. Any reasonable and feasible recommendations required to improve the system will be implemented.
- Removal and reduction of the coal stockpile area had commenced before the rain event and further works will continue during 2022 and ongoing as part of mine closure.

If you require any further information in regard to this matter please contact me at this office.

Yours faithfully
BLOOMFIELD COLLIERIES PTY LIMITED

Greg Lamb
Environmental Advisor

☎ **(02) 49302689**
✉ **glamb@bloomcoll.com.au**

Greg Lamb

From: Greg Lamb
Sent: Friday, 8 July 2022 4:38 PM
To: info@epa.nsw.gov.au
Cc: Chris Knight; Brad Donoghoe
Subject: Bloomfield Colliery EPL396 - exceedance of TSS criteria

Dear NSW EPA,
Please receive written notification that an exceedance of discharge criteria (Total Suspended Solids) occurred during a licenced discharge event at Bloomfield Colliery – EPL 396 on 6/7/2022 and 7/7/2022.

On 6/7/2022 a decision was made to release water under a licenced discharge event however the TSS was noted at 35 mg/l which is above a licenced criteria of 30 mg/l. The decision to release water was made due to safety concerns of Lake Kennerson overtopping the spillway in an uncontrolled manner due to recent heavy rainfall and forecast for further heavy rain in the Hunter Region. A decision to discharge was also made on 7/7/2022 for the same reason with TSS noted at 42 mg/l which is above a licenced criteria of 30 mg/l.

Upstream , EPL Point 1 and EPL Point 2 (Downstream) are presented below in Table 1.

Table 1.

6/7/22	Upstream	EPL Point 1	Downstream (EPL ID. 2)
Total Suspended Solids	120	**35**	49
pH	6.6	7.5	6.9
EC	166	1170	317

7/7/22	Upstream	EPL Point 1	Downstream (EPL ID. 2)
Total Suspended Solids	65	**42**	30
pH	6.4	7.5	6.8
EC	114	1140	379

Please note that on both occasions the TSS value upstream was considerably higher than the discharge TSS value.

Please advise if you require any further information on the above TSS criteria exceedances from the licenced discharge event.

Regards,

THE Bloomfield GROUP
WE CARE. WE DELIVER.

Greg Lamb
Environmental Advisor
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PO Box 4, East Maitland, NSW 2323
Four Mile Creek Road, Ashtonfield NSW 2323 Australia