Annual Environmental Management Report

2013-2014

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Name of mine	Moolarben Coal Mines
Titles/Mining Leases	EL 6288, 7073, 7074 ML 1605, 1606, 1628, 1691
MOP Commencement Date	July 2014
MOP Completion Date	December 2015
AEMR Commencement Date	01/09/2013
AEMR Completion Date	31/12/2014
Name of Leaseholder	Moolarben Coal Mines Pty Limited
Name of Operator (if different)	Moolarben Coal Operations Pty Ltd
Reporting Officer	Steve Archinal
Title	General Manager
Date:	31st March 2015
Signature:	

DISTRIBUTION

NSW Department of Planning and Environment
NSW Department of Resources and Energy
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Mid-Western Regional Council
Moolarben Coal Operations Community Consultative Committee Members
Moolarben Coal Operations Environment and Community Manager
Moolarben Coal Operations Environmental Coordinator
Moolarben Coal Operations General Manager
Moolarben Coal Operations Website
Yancoal Australia

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ACRONYMS

AEMR	Annual Environmental Management Report
CCC	Community Consultative Committee
DP&E	Department of Planning and Infrastructure
DRE	Department of Resources and Energy
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation Act
OEH	Office of Environment and Heritage
MWRC	Mid-Western Regional Council
NOW	NSW Office of Water

1.0 INTRODUCTION

The Moolarben Coal Project (MCP) is located in the Western Coalfields of New South Wales, east of Ulan and approximately 40 km northeast of Mudgee, in the Mid-Western Regional local government area, and is adjacent to the Ulan and Wilpinjong coal mines. The MCP is operated by Moolarben Coal Operations Pty Ltd (MCO).

This Annual Environmental Management Report (AEMR) fulfils the reporting requirements for the MCO development consent as modified, EPBC approval conditions of mining leases, water licences and the Environmental Protection licence held by MCO.

1.1 STRUCTURE OF THIS REPORT

The structure of this report is based on the superseded NSW Department of Trade and Investment EDG03 Guidelines to the Mining, Rehabilitation and Environmental Management Process and the NSW Department of Planning and Infrastructure Draft Guideline for Preparation of Annual Environmental Management Review (AEMR) December 2012.and incorporates the reporting requirements stipulated in the Moolarben Project Approval, specifically Schedule 5, Condition 4. The reporting requirements in Condition 10 of MCO's Environment Protection and Biodiversity Conservation Act (EPBC) approval and the reporting requirements in Conditions 4 and 5 of Mining Leases 1605, 1606, 1628 and 1691 which include the requirement to report against compliance with the Mining Operations Plan.

This Annual Environmental Management Report (AEMR) provides a summary of activities, environmental management and performance at MCO for a sixteen (16) month period from 1st September 2013 to 31st December 2014 (herein referred to as the 'reporting period').The period aligns with revised reporting periods,

Copies of this AEMR will be made available to:

- Department of Planning and Environment (DP&E);
- Department of Resources and Energy (DRE);
- Environment Protection Authority (EPA);
- Office of Environment and Heritage (OEH);
- Department of Primary Industries – NSW Office of Water (NOW);
- Mid-Western Regional Council (MWRC); and
- MCO Community Consultative Committee (CCC).

In accordance with condition 10 of the EPBC approval a copy of the report will be supplied to Department of Environment.

Table 1: Compliance Quick Reference Guide

Environmental performance condition	AEMR Section reference Compliance with Project Approval conditions and MOP
Meteorological monitoring	3.2
Air quality	3.3
Erosion and sediment control	3.5
Surface water	3.6
Ground water	3.7
Flora and Fauna	3.10
Blasting and vibration	3.13

Environmental performance condition	AEMR Section reference Compliance with Project Approval conditions and MOP
Noise	3.14
Visual amenity	3.15
Aboriginal and European heritage	3.16 and 3.17
Bushfire	3.19
Waste	3.8
Rehabilitation	5.0

During the reporting period there were five reportable events related to fume. These events are further discussed in section 3.24.

1.2 APPROVALS, LEASES AND LICENCES

Project approval 05_0117 was granted by DP&E in September 2007 for the operation of Moolarben Coal Mine. This approval covers Stage 1 of the project. Stage 1 includes the construction and operation of three separate open cut mines (OC1, OC2 and OC3), an underground mine (UG4), the coal handling and preparation plant (CHPP) and infrastructure area.

Stage 1 has approval to extract up to 8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal from the open cut mines and up to 4 Mtpa ROM coal from the underground mine. It can produce up to 10 Mtpa of product coal, which can only be transported from the site by rail. Stage 1 is approved to operate until 31st December 2038.

Since gaining approval for Stage 1, MCO has made nine separate applications under S75W of the EP&A Act to modify the Minister's approval for the project. These applications and their approval are detailed in Table 2 below.

During the reporting period a variation was made to MCO's Environmental Protection Licence (EPL12932). This variation updated the licenced discharge points to include OC2.

During the reporting period the Mining Operations Plan (MOP) was updated to cover the mining in Open Cut 1, 2 and the MOD 9 extension areas. This MOP was approved by NSW Trade and Investment (Division of Resources and Energy) on 2nd July 2014. The period of the MOP is 1 July 2014 to 31 December 2015. A subsequent modification to the MOP was requested during the reporting period to extend mining in Open Cut 2. This modification was approval in January 2015.

In September 2013 an application was made by MCO to DTI to allow for the drilling of 21 exploration borehole within the Underground 1 area of EL6288. A Review of Environmental Factors accompanied this application. This application was approved in November 2013.

In January 2014 an application was made by MCO to DTI to allow for 22 chip holes within EL6288. This application was approved in February 2014.

In April 2014 an application was made by MCO to DTI to allow for 18 partially cored HQ drill holes within the Open Cut 4 area of EL6288. This application was approved in April 2014.

In May 2014 MCO submitted a Surface Disturbance Notice (SDN) to DTI to allow for the drilling of 22 partially or fully cored boreholes and 9 LOX lines within EL6288. Approval for this application was received in June 2014.

In November 2014 MCO submitted an application to DTI for the drilling of 33 exploration boreholes within EL7073. A Review of Environmental Factors accompanied this application. Approval was received in November 2014.

Table 3 presents a summary of the relevant approvals, leases and licences currently held by MCO.

Table 2: Summary of Modifications to 05_0117 per S75W of the EP&A Act as at 31 December 2014

Application Date	Application	Details	Date Approved
August 2008	05_0117 MOD 1	Application was made to DP&EDP&E to make administrative changes and to rearrange specific items of approved infrastructure so as to improve operational efficiency and provide improved conservation outcomes	26 November 2008
December 2008	05_0117 MOD 2	Application was made to the DP&EDP&E to allow preliminary construction activities to commence prior to completion of required mine access road works.	18 December 2008
February 2009	05_0117 MOD 3	Application was made to the DP&E to allow Stage 1 to receive and process run-of-mine (ROM) coal from the proposed Stage 2 project; increase throughput of processing, handling and rail loading to 17 Mtpa ROM coal and 13 Mtpa product coals; increase off-site transport of product coal to 13 Mtpa; and extend the approved operating life of Stage 1 infrastructure so that Stages 1 and 2 of the MCP will be fully integrated	Not approved during period
April 2009	05_0117 MOD 4	Application was made to the DP&E to relocate the ROM coal facility and develop a water sharing pipeline from the Ulan coal mine.	5 October 2009
June 2009	05_0117 MOD 5	Application was made to the DP&E to relocate the ROM coal facility and develop a water sharing pipeline from the Ulan coal mine.	5 October 2009
December 2009	05_0117 MOD 6	an application was made to the DP&E to make a minor adjustment to the location of the rejects bin and to increase its throughput.	11 January 2010
March 2010	05_0117 MOD 7	Application was made to the DP&E to enable the development and operation of a dewatering and water supply borefield. The application also made amendments to the Stage 1 Vegetation Offset Strategy.	3 February 2011
April 2010	05_0117 MOD 8	Application was made to the DP&E to allow for a 100,000 tonne ROM stockpile at the approved ROM coal facility.	27 May 2010
May 2013	05_0117 MOD 9	an application was made to the DP&E to optimise the disturbance limit and extend the area of approved mining into land adjacent to Open Cut 1 and 2, to allow the construction and operation of additional water management infrastructure and to make minor changes to the rehabilitation sequencing and final landform. The modification also requests an extension of the Stage 1 approval from 2028 to 2033.	16 June 2014

Table 3: Relevant Leases, Licences and Approvals as at 31 December 2014

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
Exploration Licences						
EL	Exploration Licence (Mining Act 1992)	6288	NSW Department Resources and Energy	Covers area surrounding Stage 1	02/12/2009	22/08/2017.
EL	Exploration Licence (Mining Act 1992)	7074	NSW Department Resources and Energy	35ha in 2 parcels of land	17/06/2013	12/05/2015. Renewal lodged in February 2015
EL	Exploration Licence (Mining Act 1992)	7073	NSW Department Resources and Energy	1,110ha to the south of OC3 adjacent to the southern boundary of EL6288	17/06/2013	12/05/2015. Renewal lodged in February 2015
Mining Leases						
ML	Mining Lease (Mining Act 1992)	1605	NSW Department Resources and Energy	Underground 4 and CHPP infrastructure area	20/12/2007	20/12/2038
ML	Mining Lease (Mining Act 1992)	1606	NSW Department Resources and Energy	OC1 and associated infrastructure area	20/12/2007	20/12/2038
ML	Mining Lease (Mining Act 1992)	1628	NSW Department Resources and Energy	260.5ha	24/02/2009	24/02/2030
ML	Mining Lease (Mining Act 1992)	1691	NSW Department Resources and Energy	900.6ha	23/09/2013	23/09/2034

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
MOP						
MOP	Moolarben Coal Mines MOP		NSW Department Resources and Energy	Addresses mining within Open Cut 1, 2	July 2013	Dec-15
Project Approvals						
DC	Project Approval (Section 75J)	05_0117	NSW Department of Planning and Infrastructure	Construction and operation of an open-cut and underground coal mining operation and associated infrastructure. Development of Stage 1 - OC 1-3 and UG 4 and associated infrastructure.	06/09/2007	20/12/2028
DC	Project Approval (Section 75W)	05-0117 (M1)	NSW Department of Planning and Infrastructure	This proposal involves amending the layout of the main infrastructure area and modifying Condition 12 of Schedule 2 and Conditions 42(b) and 56 of Schedule 3 of the project approval.	26/11/2008	20/12/2028
DC	Project Approval (Section 75W)	05-0117 (M2)	NSW Department of Planning and Infrastructure	The application seeks to modify Condition 51(a) of Schedule 3 of the project approval to allow minor preliminary construction activities to commence on site.	18/12/2008	20/12/2028
DC	Project Approval (Section 75W)	05-0117 (M4)	NSW Department of Planning and Infrastructure	Balloon Loop Modification to Stage 1 of the Moolarben Coal Project	30/06/2009	20/12/2028

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
DC	Project Approval (Section 75W)	05-0117 (M5)	NSW Department of Planning and Infrastructure	Constructing and operating a pipeline to facilitate water sharing with the Ulan Coal Mine; - relocating the run-of-mine coal dump hopper and associated facilities; - increasing construction hours to 24 hours a day; - regularising mining lease boundary fence line clearing and other minor site and administrative adjustments.	05/10/2009	20/12/2028
DC	Project Approval (Section 75W)	05-0117 (M6)	NSW Department of Planning and Infrastructure	Relocating the rejects bin to a preferred location about 250m northwest of its approved location.	11/01/2010	20/12/2028
DC	Project Approval (Section 75W)	05-0117 (M7)	NSW Department of Planning and Infrastructure	Development and operation of a dewatering and water supply borefield and amendments to the Stage 1 Vegetation Offset Strategy.	03/02/2011	20/12/2028
DC	Project Approval (Section 75W)	05-0117 (M8)	NSW Department of Planning and Infrastructure	Establishing a 100,000 tonne ROM coal stockpile adjacent to the ROM coal dump hopper, at the ROM coal facility.	27/05/2010	20/12/2028
DC	Project Approval (Section 75W)	05-0117 (M9)	NSW Department of Planning and Infrastructure	Extend the area of approved mining into land adjacent to Open Cut 1 and 2, to allow the construction and operation of additional water management infrastructure and to make minor changes to the rehabilitation sequencing and final landform.	16/06/14	20/12/2098

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
EPBC	EPBC Act Approval	2007/ 3297	Department of Sustainability, Environment, Water, Populations and Communities	Establishment of a coal mine and associated infrastructure as per the EPBC Referral dated 16/02/2007	24/10/2007	31/12/2027
EPBC	EPBC Act Approval	2013/ 6926	Department of Environment	To Modify and extend the Moolarben Coal Project.	13/11/2014	31/12/2064
LIC	Environmental Protection Licence	12932	NSW Environment Protection Authority	Licence authorising the carrying out of coal mining scheduled activity	18/08/2008	Not applicable
Water Licence Summary						
WL	Bore Licence Certificate (Water Act 1912)	20BL168 749	Department of Primary Industries	Irrigation	08/05/2013	07/05/2018
WL	Bore Licence Certificate (Water Act 1912)	20BL168 455	Department of Primary Industries	Irrigation	25/11/2009	24/11/2019
WL	Bore Licence Certificate (Water Act 1912)	20BL169 899	Department of Primary Industries	Monitoring	08/11/2005	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171 922	Department of Primary Industries	Test Bore	14/07/2008	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171 923	Department of Primary Industries	Monitoring	14/07/2008	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171 924	Department of Primary Industries	Monitoring	14/07/2008	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171 925	Department of Primary Industries	Monitoring	14/07/2008	Perpetuity

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
WL	Bore Licence Certificate (Water Act 1912)	20BL171926	Department of Primary Industries	Monitoring	14/07/2008	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171927	Department of Primary Industries	Monitoring	14/07/2008	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171928	Department of Primary Industries	Monitoring	14/07/2008	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171959	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171960	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171961	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171962	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171963	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171964	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171965	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171966	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171967	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
WL	Bore Licence Certificate (Water Act 1912)	20BL171968	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171969	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171970	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171971	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171972	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171973	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171974	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171975	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171976	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171977	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171978	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171979	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
WL	Bore Licence Certificate (Water Act 1912)	20BL171980	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171981	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171982	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171983	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171984	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171985	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171986	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171987	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171988	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171989	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171990	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171991	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
WL	Bore Licence Certificate (Water Act 1912)	20BL171992	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171993	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171994	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL171998	Department of Primary Industries	Mining – 150ML/year extraction	27/01/2009	26/01/2019
WL	Bore Licence Certificate (Water Act 1912)	20BL171999	Department of Primary Industries	Mining – 1,200ML/year extraction	27/11/2009	26/11/2019
WL	Bore Licence Certificate (Water Act 1912)	20BL172000	Department of Primary Industries	Mining – 150ML/year extraction	27/01/2009	26/01/2019
WL	Bore Licence Certificate (Water Act 1912)	20BL172001	Department of Primary Industries	Mining – 450ML/year extraction	20/04/2009	19/04/2019
WL	Bore Licence Certificate (Water Act 1912)	20BL172002	Department of Primary Industries	Mining – 750ML/year extraction	27/11/2009	26/11/2019
WL	Bore Licence Certificate (Water Act 1912)	20BL172003	Department of Primary Industries	Excavation	06/05/2009	05/05/2019
WL	Bore Licence Certificate (Water Act 1912)	20BL172106	Department of Primary Industries	Monitoring	20/03/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172167	Department of Primary Industries	Monitoring	20/04/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172168	Department of Primary Industries	Monitoring	20/04/2009	Perpetuity

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
WL	Bore Licence Certificate (Water Act 1912)	20BL172169	Department of Primary Industries	Monitoring	20/04/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172189	Department of Primary Industries	Test Bore	05/05/2009	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172299	Department of Primary Industries	Excavation	03/06/2011	02/06/2016
WL	Bore Licence Certificate (Water Act 1912)	20BL172300	Department of Primary Industries	Dewatering (Groundwater) – 150ML/year extraction	16/02/2010	15/02/2015
WL	Bore Licence Certificate (Water Act 1912)	20BL172743	Department of Primary Industries	Monitoring	22/03/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172744	Department of Primary Industries	Monitoring	22/03/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172837	Department of Primary Industries	Monitoring	06/06/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172838	Department of Primary Industries	Monitoring	06/06/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172839	Department of Primary Industries	Monitoring	06/06/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172840	Department of Primary Industries	Monitoring	06/06/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172842	Department of Primary Industries	Monitoring	06/06/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172843	Department of Primary Industries	Monitoring	06/06/2011	Perpetuity

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
WL	Bore Licence Certificate (Water Act 1912)	20BL172893	Department of Primary Industries	Monitoring	14/07/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172894	Department of Primary Industries	Monitoring	14/07/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172895	Department of Primary Industries	Monitoring	14/07/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172896	Department of Primary Industries	Monitoring	14/07/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172897	Department of Primary Industries	Monitoring	14/07/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172898	Department of Primary Industries	Monitoring	14/07/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172899	Department of Primary Industries	Monitoring	14/07/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172900	Department of Primary Industries	Monitoring	14/07/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172901	Department of Primary Industries	Monitoring	14/07/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172953	Department of Primary Industries	Monitoring	15/08/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172954	Department of Primary Industries	Monitoring	15/08/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL172955	Department of Primary Industries	Monitoring	15/08/2011	Perpetuity

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
WL	Bore Licence Certificate (Water Act 1912)	20BL172956	Department of Primary Industries	Monitoring	15/08/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173006	Department of Primary Industries	Monitoring	24/10/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173039	Department of Primary Industries	Monitoring	15/11/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173041	Department of Primary Industries	Monitoring	15/11/2011	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173167	Department of Primary Industries	Monitoring	30/04/2012	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173168	Department of Primary Industries	Monitoring	30/04/2012	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173169	Department of Primary Industries	Monitoring	30/04/2012	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173170	Department of Primary Industries	Monitoring	30/04/2012	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173171	Department of Primary Industries	Monitoring	30/04/2012	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173339	Department of Primary Industries	Monitoring	05/10/2012	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173341	Department of Primary Industries	Monitoring	05/10/2012	Perpetuity
WL	Bore Licence Certificate (Water Act 1912)	20BL173340	Department of Primary Industries	Monitoring	05/10/2012	Perpetuity

Type	Approval	Number	Approval Authority	General Description	Date Granted	Expiry/Renewal Date
WL	Bore Licence Certificate (Water Act 1912)	20BL173342	Department of Primary Industries	Monitoring	05/10/2012	Perpetuity
WA	Water Access Licence (Water Management Act 2000)	WAL36430	Department of Primary Industries	Wollar Creek Water Source	02/01/2014	Current
WL	Water Supply Works Approval (Water Management Act 2000)	20WA210797	Department of Primary Industries	Splitters Hollow dam works licence.	01/08/2009	03/09/2022

1.2.1 Environmental Management Plans

MCO has developed a range of environmental management plans to meet the requirements of Project Approval 05_0117 and these are required to be reviewed and maintained regularly. A summary of the status of the management plans is provided in Table 4. These plans are published on http://www.moolarbencoal.com.au.

Table 4: Status of environmental management plans as at 31 December 2014

Environmental management plan	Approval date
Aboriginal Cultural Heritage Management Plan	Approved – 2015
Air Quality	Approved – 2013
Blast Management Plan	Approved – 2015
Blast Fume Management Strategy	Approved – 2015
Environmental Management Strategy	Approved – 2013
Heritage Management Plan	Approved – 2013
Landscape Management Plan	Approved – 2013
Pollution Incident Response Management Plan	Approved – 2012
Noise Management Plan	Approved – 2013
Waste Management Plan	Approved – 2013
Water Management Plan*	Approved – 2013
Biodiversity Offset Management Plan	Approved – 2015

**Includes Surface, Groundwater, Erosion and Sediment, site water balance and response plan*

1.3 MINE CONTACTS

Table 5: Mine Contacts for Environmental Matters

Area of Responsibility	Name	Contact Number(s)
General Manager	Steve Archinal	02 6376 1518 0437 066 995
Environment and Community Manager	Graham Chase	02 6376 1407 0447 348 736
Environmental Coordinator	Klay Marchant	02 6376 1507 0400 239 291
Environmental Coordinator	Trent Cini	02 6376 1436 0408 312 269
Community Relations Coordinator	Scott Fittler	02 6376 1587 0428 083 449
Environmental Contact Line	**1800 556 484**	
Address	Locked Bag 2003, Mudgee, NSW, 2850	

1.4 ACTIONS REQUIRED FROM PREVIOUS AEMR REVIEW

On the 17th of December 2013 representatives from DRE and EPA visited the site for a meeting regarding the 2012-2013 AEMR and to conduct their annual inspection of MCO's operations. DP&E, NOW and MWRC were invited to attend this meeting, however, were unable to attend due to other commitments. This visit and inspection was positive with neither DRE nor EPA providing formal comments on the 2012-2013 AEMR.

2.0 ACTIVITIES DURING THE REPORTING PERIOD

2.1 EXPLORATION

During the reporting period Exploration activities continued in EL6288 and EL7073. A total of 112 exploration holes were drilled during the period. Drilling was focused within the OC4 and UG1 areas of EL6288. With several holes drilled within the OC1, OC2 and OC1 modification areas. Ten holes were drilled in the Underground 4 area ranging in depth from 21.65m to 180m.

All drilling programs use existing tracks to access sites were possible, when existing tracks are unavailable a 4m wide track is created using a slasher if possible. Drill sites are generally 50m x50m to allow suitable room to safely undertake drilling activities.

During the reporting period a REF was prepared for drilling in EL7073. Approval of the 33 drill site program was received in November 2014. This program will be undertaken during the next reporting period. The Ground Disturbance Permit Process (see Section 2.2 for more information) is followed for each exploration program.

2.2 LAND PREPARATION

An additional 121.2ha of land was disturbed this reporting period for Open Cut mining operations (in OC1, OC2 and OC1 extension). 47.5ha of disturbed land was rehabilitated during the reporting period in OC1 and OC2 Bund. The areas disturbed this reporting period are shown in **Figure 1**.

Before any land is disturbed at MCO a Ground Disturbance Permit (GDP) needs to be authorised by a member of the Environment and Community Department. The GDP ensures heritage, flora, fauna, erosion and sediment control, topsoil, land ownership and disturbance extents are managed in accordance with relevant management plans.

Approved areas are demarcated by survey and necessary pre-clearance surveys undertaken. Trees not identified as potential habitat trees are cleared first with potential habitat trees left for at least 24 hours then gently felled under supervision. Vegetation is mulched or relocated for use in rehabilitation areas. Where identified, habitat trees with salvageable hollows are relocated to final rehabilitation locations or stockpiled for future use.

Topsoil is salvaged during the clearing process, along with the mulch that is generated during the vegetation clearing process, and is used directly on rehabilitation areas or stockpiled for future use. Topsoil stockpiles were seeded where not for imminent reuse. Topsoil placed on rehabilitation was sampled and ameliorated accordingly.

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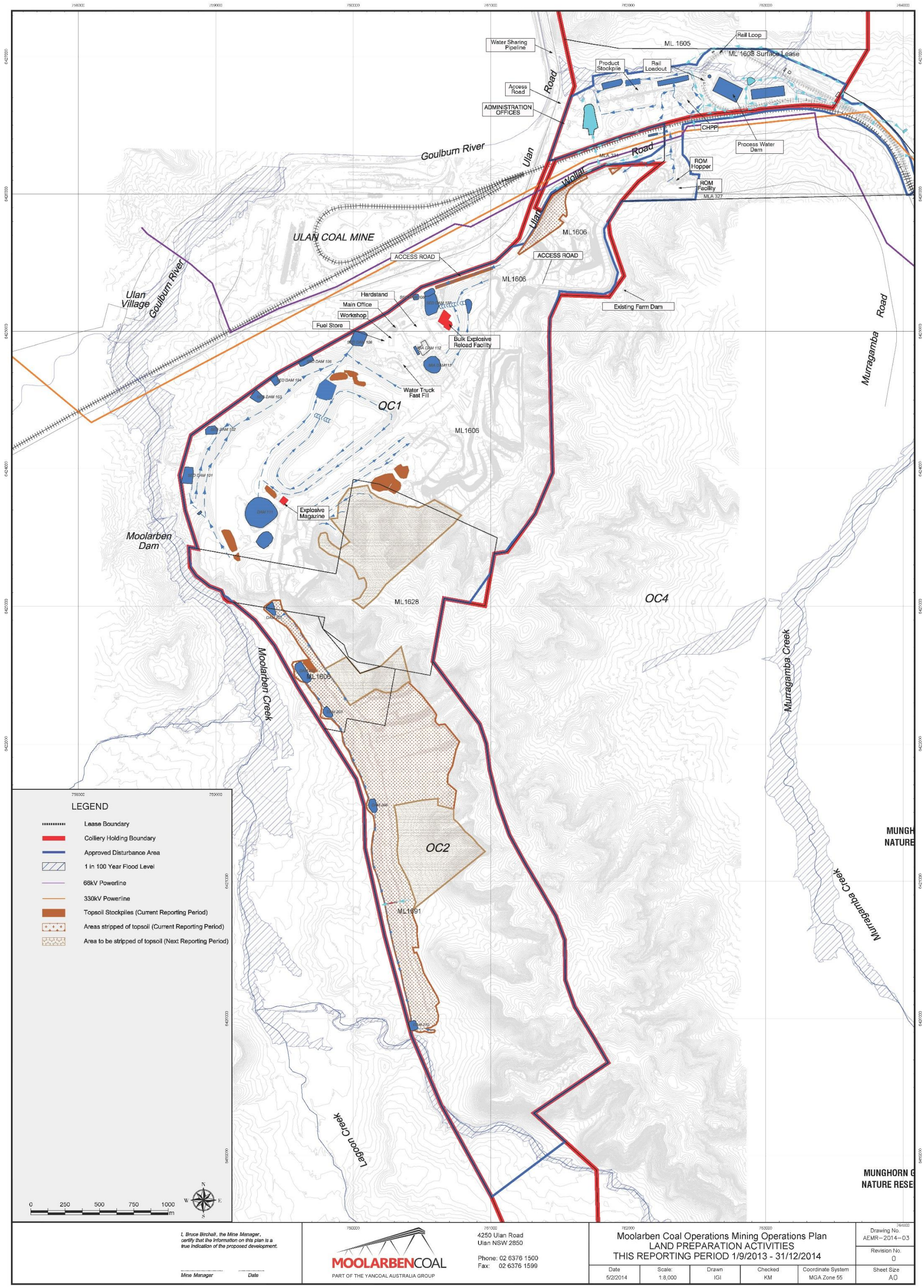


Figure 1: Land Preparation Activities This Reporting Period

2.3 CONSTRUCTION

During the reporting period there were no material variations from the MOP related to construction works on site

2.4 MINING

During the September 2013 to December 2014 reporting period, mining activities continued in Open Cut 1. In January 2014, operations in Open Cut 2 commenced with coal removal commencing in May 2014. Mining operations at MCO were undertaken generally in accordance with the Mining Operations Plan and the relevant planning approvals. Mining at MCO occurred in the Ulan Seam. The stratigraphy of the coal seam mined at MCO is shown in Plate 1. All mining activities occurred 24 hours a day, seven days a week.

In correspondence from Moolarben to the Department of Planning dated 3 July 2014, 26 August 2014, 15 October 2014 and 30 October 2014, Moolarben confirmed that it would adopt a 16-month reporting period for its 2014 AEMR (1 Sept 2013 to 31 Dec 2014), as required by condition 6 of Schedule 2 and Condition 4 of Schedule 5 in Project Approval 05_0117.

Consistent with that approach, for the current 16-month AEMR reporting period (1 September 2013 to 31 December 2014), approximately 10.95 Mt of run-of-mine (ROM) coal was mined and a total of 1.94 Mt of rejects was produced and co-disposed with overburden in the OC1 pit.

The status of the mining activities at the end of the reporting period is shown in **Figure 2**.

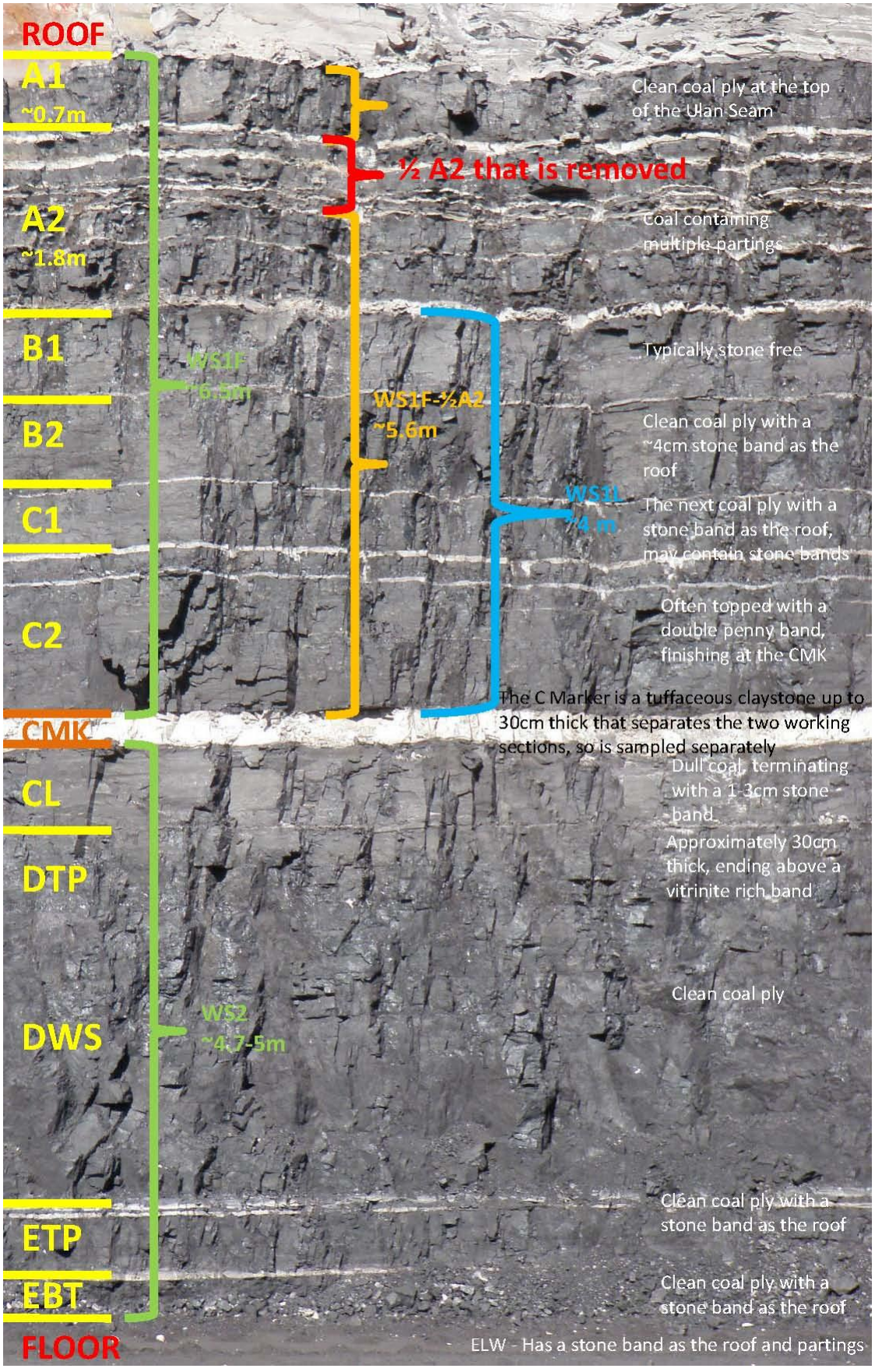


Plate 1: Coal Stratigraphy

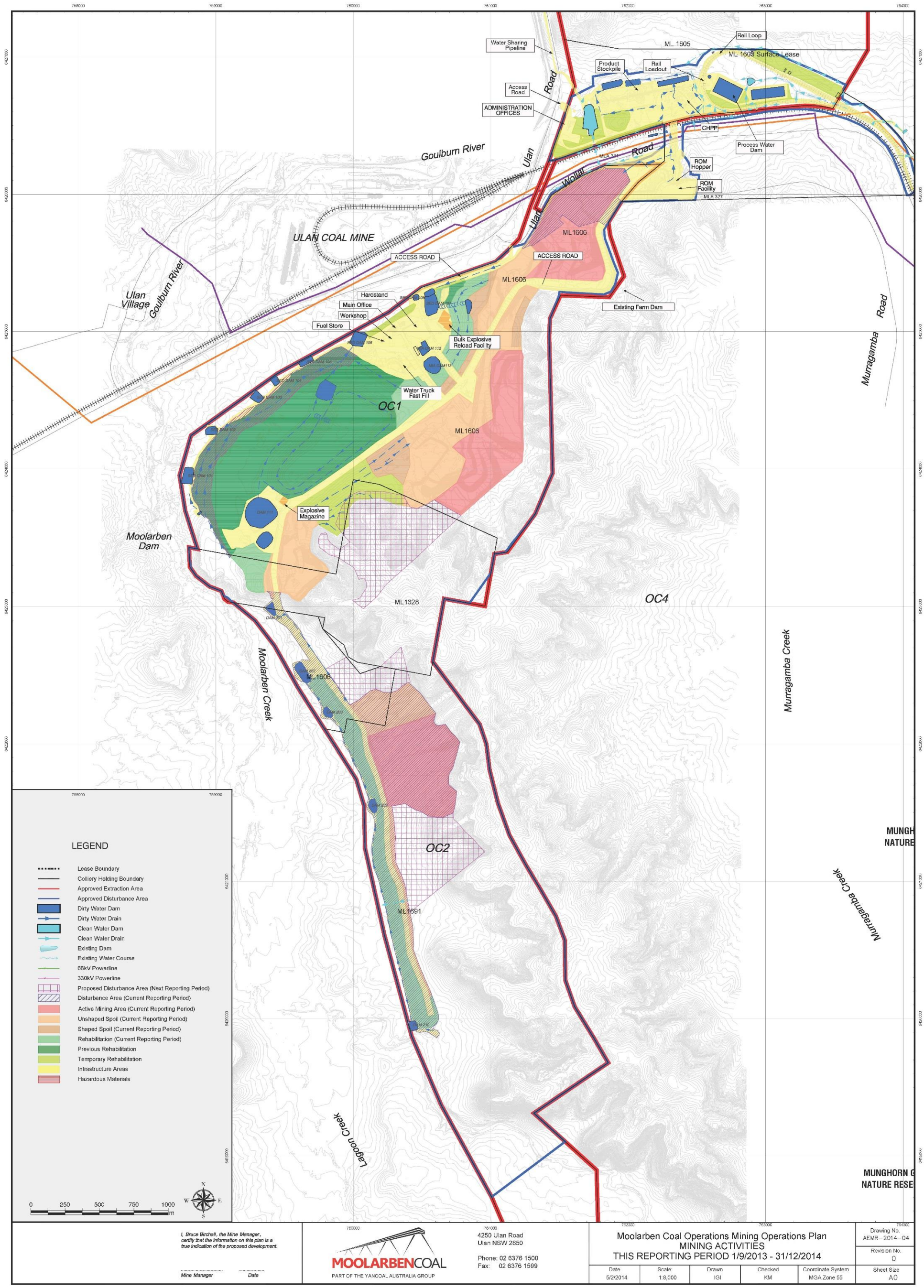


Figure 2: Mining Activities This Reporting Period

Mining is carried out by excavators and haul trucks supported by ancillary equipment including water carts, dozers, graders, fuel and service carts, loaders and drills. The mining equipment used at MCO includes:

- 3 x 996 excavators;
- 1 x 9800 excavator;
- 1 x PC450 support excavator;
- 1 x 6050 shovel;
- 1 x 1200 front end loader;
- 2 x drills;
- 5 x 475 dozers;
- 3 x 375 dozers;
- 2 x D11 dozers;
- 1 x WA900 dozer;
- 2 x 825 graders;
- 1 x 24M grader;
- 3 x 785 water trucks;
- 17 x 830E rear dump trucks; and
- 3 x WA200 (wheel loaders).

2.5 COAL PROCESSING

ROM coal is transported from the ROM stockpile via conveyor to the CHPP for processing. Product coal is stored on the product coal stockpile prior to transport. Coarse rejects is co-mingled with dewatered fine rejects and transported by conveyor to the Rejects Bin from where it is trucked back to the open pit for final disposal. Rejects are placed in selective areas of the open cut and are managed so that there will be at least a 5m cover over the rejects in the final landform.

In correspondence from Moolarben to the Department of Planning dated 26 August 2014, Moolarben confirmed that it would adopt a 16-month reporting period for its 2014 AEMR (1 Sept 2013 to 31 Dec 2014), as required by condition 6 of Schedule 2 and Condition 4 of Schedule 5 in Project Approval 05_0117.

Consistent with that approach, for the current 16-month AEMR reporting period (1 September 2013 to 31 December 2014), approximately 8.49 Mt of total saleable product was produced by MCO CHPP. During the reporting period there were no material variations from the MOP related to coal processing activities.

2.6 PRODUCTION AND WASTE SUMMARY

The amount of production and associated waste generated by MCO is detailed in **Table 6**.

Table 6: Production and Waste Summary

	CUMULATIVE PRODUCTION		
	Start of this Reporting Period	At end of this Reporting Period	Estimate, end of next Reporting Period
Topsoil Stripped (m^3)	557,662	878,554	1,454,494
Topsoil used/spread (m^3)	275,232	475,216	738,506
Topsoil stockpiled (m^3)	198,000	198,000	479,700
Waste Rock (BCM)	53,934,264	76,513,503	107,281,350
Open Cut ROM Coal (t)	24,793,925	35,746,667	44,246,118
Underground ROM Coal (t)	0	0	0
Total Coal (t)	24,793,925	35,746,667	44,246,118
Processing Waste (t)	7,113,642	9,575,749	12,098,605
Open Cut Product Coal (t)	17,680,283	26,170,918	32,126,098
Underground Product Coal (t)	0	0	0
Total Product Coal (t)	17,680,283	26,170,918	32,126,098

2.7 PRODUCT COAL TRANSPORT

In correspondence from Moolarben to the Department of Planning dated 26 August 2014, Moolarben confirmed that it would adopt a 16-month reporting period for its 2014 AEMR (1 Sept 2013 to 31 Dec 2014), as required by condition 6 of Schedule 2 and Condition 4 of Schedule 5 in Project Approval 05_0117.

Consistent with that approach, for the current 16-month AEMR reporting period (1 September 2013 to 31 December 2014), approximately 8,490,635 tonnes of product coal were transported by rail during the reporting period. The amount of coal transported from the site and timing of train movements was conducted in accordance with the conditions of approval from DP&E.

2.8 HAZARDOUS MATERIALS MANAGEMENT

MCO have a Hazardous Substances Management Procedure and dangerous goods management plan that outlines the requirements for bringing hazardous and dangerous goods onto site, how to store hazardous and dangerous goods and how to dispose of the hazardous and dangerous goods. Before any hazardous and dangerous goods are brought onto site they need to be approved by the Health and Safety Manager.

2.9 EMPLOYMENT

During the reporting period the number of employees working at MCO slightly decreased.

Table 7: Employment Statistics

Month	Employees
September 2013	278
October 2013	276
November 2013	273
December 2013	275
January 2014	280
February 2014	279
March 2014	279
April 2014	284
May 2014	290
June 2014	290
July 2014	286
August 2014	286
September 2014	275
October 2014	269
November 2014	244
December 2014	244

3.0 ENVIRONMENTAL MONITORING AND PERFORMANCE

3.1 ENVIRONMENTAL MANAGEMENT

Work continued during the reporting period on developing, implementing and improving MCO's Environmental Management System (EMS). This included the development and update of environmental management plans to address impacts from mining in extension areas in Open Cut 1 and Open Cut 2. In addition procedures, forms and training packages were reviewed and updated during the reporting period.

In order to measure compliance with the management plans, the project approval and various licences, MCO undertake a comprehensive monitoring program in the vicinity of the MCO mining areas. The locations of the sites monitored during the reporting period are shown on **Figure 3** to **Figure 4**.

3.2 METEOROLOGICAL

During the reporting period MCO utilised two meteorological monitoring stations. One is located adjacent to Open Cut 2 (referred to as WS04) and the other station is located on a property on Ulan Road and is referred to as WS03. WS03 is linked into the real-time monitoring system and is the main weather station for reporting purposes with WS04 used to supplement weather data as required.

Data capture for WS03 was 99.5% for the reporting period. Missing data was as a result of system function errors.

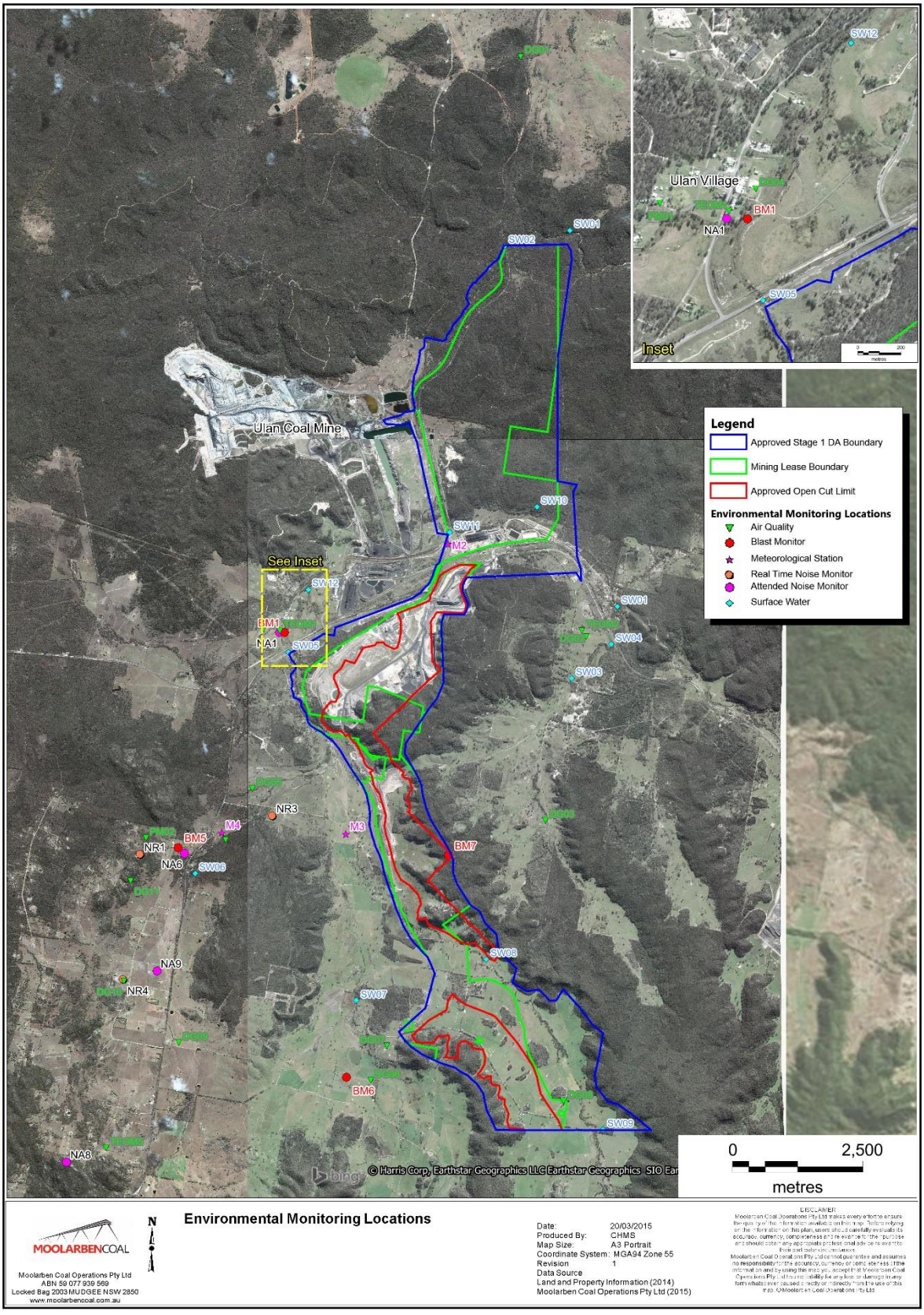


Figure 3: Environmental Monitoring Locations (excl. Groundwater)

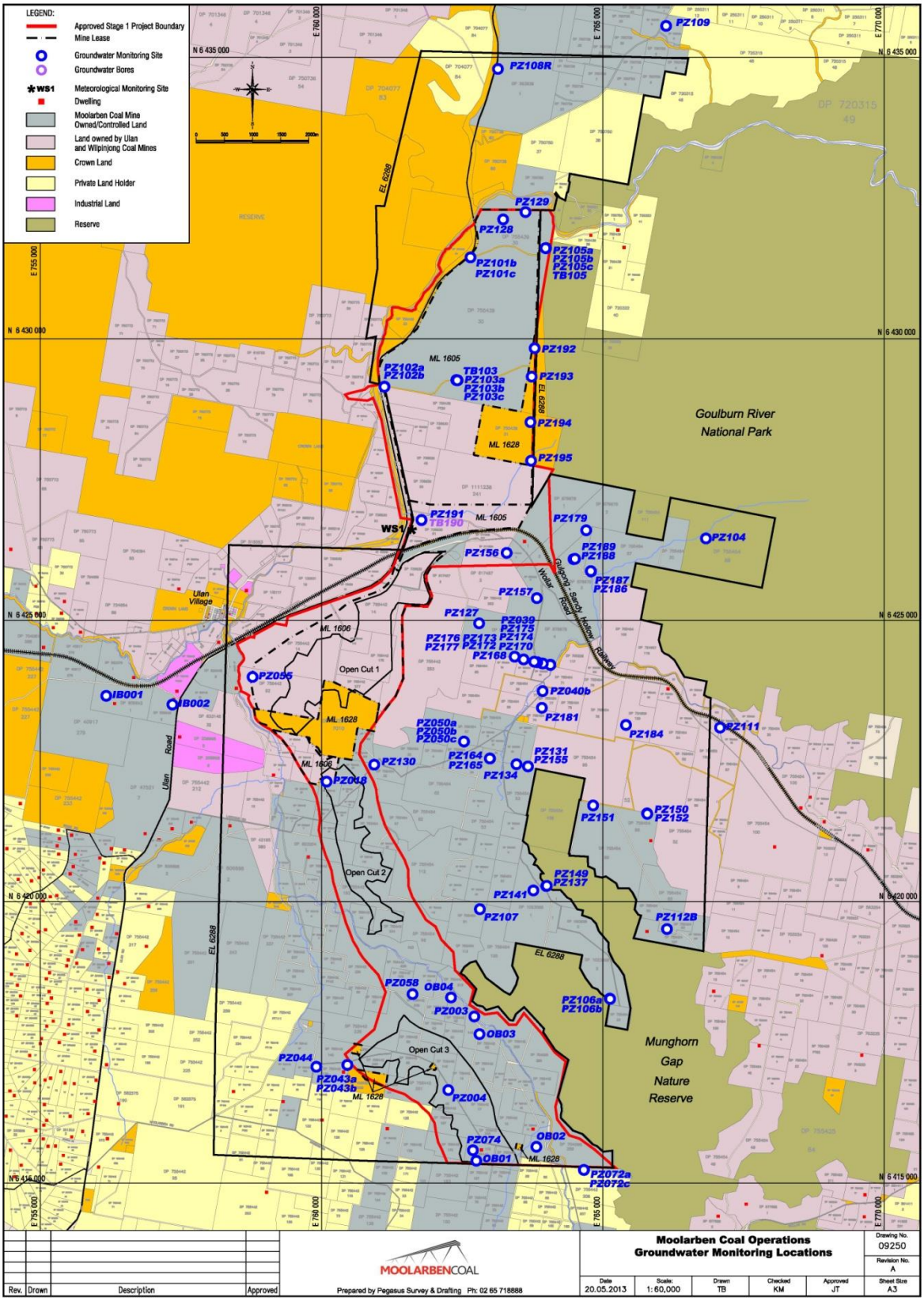


Figure 4: Groundwater Monitoring Locations

3.2.1 Rainfall

Table 8 summarises the rainfall over the reporting period at weather station WS03 and compares the data to the long term median rainfall from Gulgong Post Office while **Figure 5** presents the data graphically.

Rainfall recorded at WS03 during the reporting period was 833.2mm. This is slightly below the long-term average rainfall recorded at the Gulgong Post Office which is reported to be 885mm for the 16 month reporting period (Bureau of Meteorology website). **Figure 5** shows that the monthly rainfall was generally below the monthly average for most months except for November 2013, February, March, April and December 2014.

Table 8: Rainfall Data

Month	WS03 Rainfall (mm)	Long Term Average Rainfall* (mm)
September 2013	45.2	46.8
October 2013	8.0	56.6
November 2013	89.2	60.0
December 2013	23.6	67.4
January 2014	30.0	70.2
February 2014	97.6	62.5
March 2014	83.4	54.8
April 2014	66.2	44.2
May 2014	22.2	45.4
June 2014	34.4	50.5
July 2014	30.0	49.3
August 2014	25.2	46.5
September 2014	17.6	46.8
October 2014	23.4	56.6
November 2014	51.4	60.0
December 2014	158.2	67.4
Total	**833.2**	**885**

*Long Term Average Data from Bureau of Meteorology, for Gulgong Post Office.

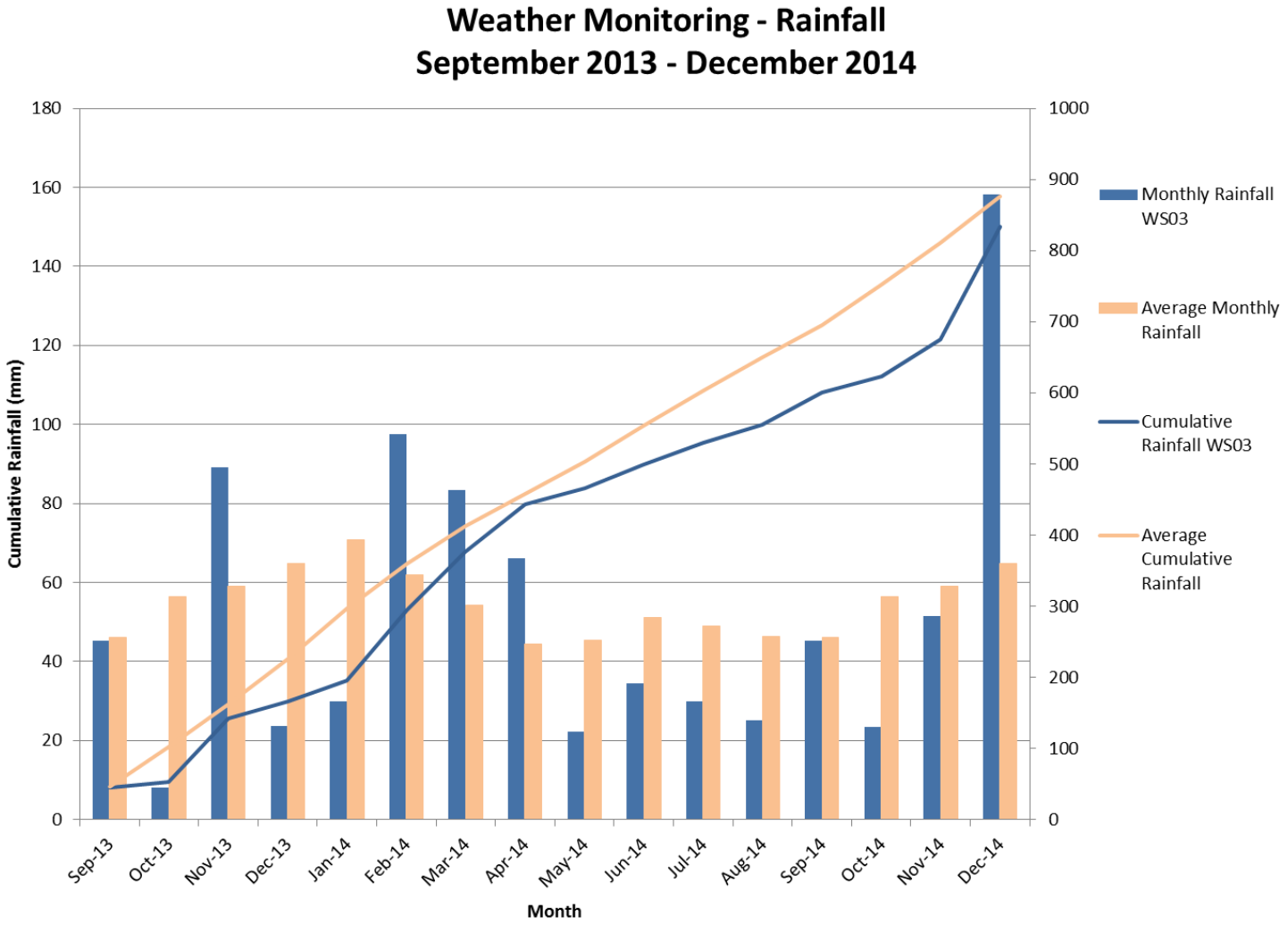


Figure 5: Rainfall Data

3.2.2 Temperature

Temperatures recorded during the reporting period are presented in **Table 9** and in **Figure 6**. During the reporting period, the coldest temperature recorded was -6.8°C in August 2014 and the hottest temperature recorded was 42.6°C in January 2014.

Table 9: Temperature Data

Month	Min. Temperature °C Woodhead (WS03)	Max. Temperature °C Woodhead (WS03)
September 2013	-0.2	29.6
October 2013	-0.8	33.6
November 2013	3.4	35.6
December 2013	2.6	39.3
January 2014	9.2	42.6
February 2014	8.2	37.6
March 2014	5.1	29.0
April 2014	1.6	28.7
May 2014	0.4	23.4
June 2014	-1.0	18.5
July 2014	-4.6	20.6
August 2014	-6.8	19.8
September 2014	-1.7	29.0
October 2014	-3.1	34.5
November 2014	3.4	42.3
December 2014	9.4	34.6

3.2.3 Wind Speed and Direction

Prevailing wind conditions for the reporting period were generally variable but were dominated by south-west winds during the winter months and north-east and east during the summer months.

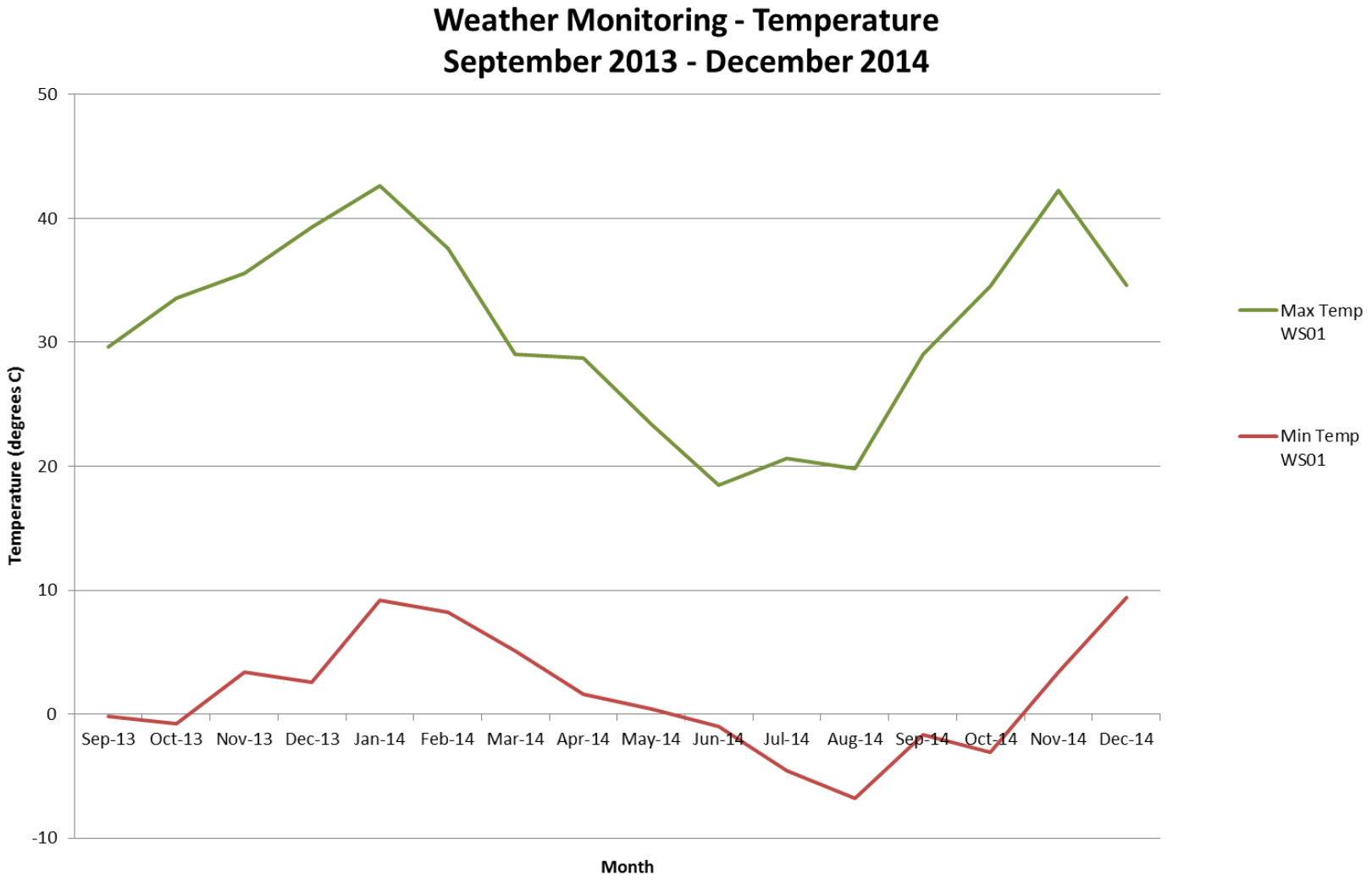


Figure 6: Temperature Data

3.3 AIR QUALITY

3.3.1 Activities This Reporting Period

Operational processes for MCO to reduce dust emissions include:

- Understanding the geology of the mining area;
- Disturb only the minimum area necessary for mining. Only one strip ahead of the active mining operations will be disturbed;
- Adoption of progressive rehabilitation of mining operations, to minimise exposed soils;
- Ensure coal handling facilities employ appropriate dust suppression methods;
- Use water carts on all trafficked areas to minimise dust generation as necessary and practicable;
- Use of chemical dust suppressants if necessary;
- Use of constructed roads only, minimisation of access roads and removal of obsolete access roads;
- Keeping disturbed active mining areas to a minimum as far as practicable;
- Maintain coal-handling areas and stockpiles in a moist condition using water carts and/or water sprays;
- Relocate, modify and/or stop mining operations in adverse meteorological conditions to minimise the short term air quality impacts;
- Dust suppression systems will be fitted to stationary and mobile plant (such as the dump hopper, transfer stations, drill rigs) to reduce dust levels and to minimise fugitive dust;
- Use of 240t haul trucks rather than 170t on the internal haul road in Open Cut 1 and Open Cut 2 to reduce vehicle traffic;
- Access tracks used by topsoil stripping equipment during their loading and unloading cycle will be watered;
- Long term topsoil stockpiles, not used for over 6 months will be revegetated;
- Dust aprons used during drilling;
- All drills will be equipped with water injection systems;
- Partial enclosure of raw coal transfer and rejects conveyors where possible;
- Use of daily environmental forecasting system to assess dust risks based on forecasted meteorological conditions; and,
- All blasting will be undertaken in accordance with the Blast Management Plan and Blast Fume Management Strategy with consideration given to prevailing wind conditions and residential receivers.

The AQMP was reviewed in consultation with EPA in the previous reporting period, and was approved by DP&E at the end of September 2013.

Air quality monitoring continued to be undertaken throughout the reporting period.

The AQMP includes a process for the review of data on a monthly basis against relevant criteria. This review process continued throughout the reporting period. The AQMP outlines response triggers for the real-time PM_{10} monitoring stations. When the trigger has been reached a SMS alarm is sent to operational personnel and members of the Environment and Community Department. The real-time response triggers that have been established and the management/control actions are shown in **Table 10**.

Table 10: Air Quality Real-Time Response Triggers

No	Trigger	Management/Control Actions	Responsibility
1	Winds from NE-SE and 24 hour average >38µg/m^3 at monitoring locations to the NW-SW of the operations	• Review weather data and trends • Review weather predictions • Review current dust generating activities • Review current dust control • Ensure standard mitigation measures are in place • Monitor changes in PM10	Area Supervisor (assistance can be sought from the environmental department)
2	Winds from NE-SE and 24 hour average >45µg/m^3 at monitoring locations to the NW-SW of the operations	• Actions as per Trigger 1. • Make operational changes as appropriate. For example: dumping in protected locations, shutting down equipment	Area Supervisor (assistance can be sought from the environmental department)
3	Winds from NE-SE and two consecutive 15 minute periods >50µg/m^3 at monitoring locations to the NW-SW of the operations	• Actions as per Trigger 1. • Make operational changes as appropriate. For example: dumping in protected locations, shutting down equipment	Area Supervisor (assistance can be sought from the environmental department)

During the reporting period MCO implemented a program to determine the level of control efficiency of wheel generated dust achieved on all active haul roads at MCO, the measured dust emissions generated from haul trucks travelling on an uncontrolled haul road were compared with the dust emissions generated from a controlled haul road.

This study was in accordance with condition U1 of MCO's EPL12932, the results indicated that the level of control efficiency of wheel generated dust achieved on active haul roads at MCO is greater than 90% and exceeds the target of 80%.

3.3.2 Air Quality Monitoring

The air quality criteria for MCO are shown in **Table 11**.

Table 11: Air Quality Criteria

Pollutant	Averaging Period	Criteria
Total Suspended Particulate	Annual	90µg/m^3
Particulate Matter (<10µm)	Daily	50µg/m^3
Particulate Matter (<10µm)	Annual	30µg/m^3
Deposited Dust – maximum total	Annual	4g/m^2/month
Deposited Dust – incremental increase	Annual	2g/m^2/month above background average

3.3.2.1 Total Suspended Particulates (TSP)

Total suspended particulates (TSP) are the component of the dust that is less than 50µg and is broken down into the following particle size range:

- $PM_{2.5}$ – 5% of TSP;
- $PM_{2.5-10}$ – 35% of TSP; and
- PM_{10-50} – 60% of TSP.

TSP isn't directly measured at MCO but based on the above breakdown a calculation can be made from the PM_{10} monitoring results to show that MCO is complying with the TSP criteria. The calculated TSP results can be seen in **Table 12**. These calculations show that MCO were below the TSP criteria at the monitoring locations.

Table 12: Calculated Total Suspended Solids Results

Site	Average PM_{10} Result ($\mu g/m^3$)	Calculated Average TSP Result ($\mu g/m^3$)	Criteria
TEOM01 (Ulan School)	14.3µg/m^3	35.7µg/m^3	90µg/m^3
TEOM02 (Murragamba)	14.1µg/m^3	35.2µg/m^3	90µg/m^3
TEOM04 (Ulan Road)	13.6 µg/m^3	34.0 µg/m^3	90µg/m^3
TEOM05 (Ridge Road)	14.0 µg/m^3	35.0 µg/m^3	90µg/m^3
PM01 (Ulan Village)	13.8µg/m^3	34.8µg/m^3	90µg/m^3
PM02 (Ridge Road)	11.7µg/m^3	29.0µg/m^3	90µg/m^3

3.3.2.2 Particulate Matter <10µg (PM_{10})

The location of the PM_{10} monitoring stations are presented on **Figure 3**. There are two types of PM_{10} monitoring undertaken at MCO, continuous real-time monitoring using Tapered Element Oscillating Membrane (TEOM) units and High Volume Air Sampling (HVAS). TEOM units are used at four locations, three permanent locations are at a property at Murragamba, Ridge Road and at Ulan School and during the entire reporting period a mobile unit was located at a property on Ulan Road. Two fixed HVAS units located in Ulan Village and Ridge Road are sampled every six (6) days. All monitoring is conducted in accordance with EPA guidelines and relevant Australian Standards.

Figure 7, **Figure 8**, **Figure 9** and **Figure 10** summarise the real-time PM_{10} results for the reporting period including the rolling average compared to the criteria. **Figure 11** summarises the HVAS PM_{10} results for the reporting period including a comparison of the rolling average against the criteria.

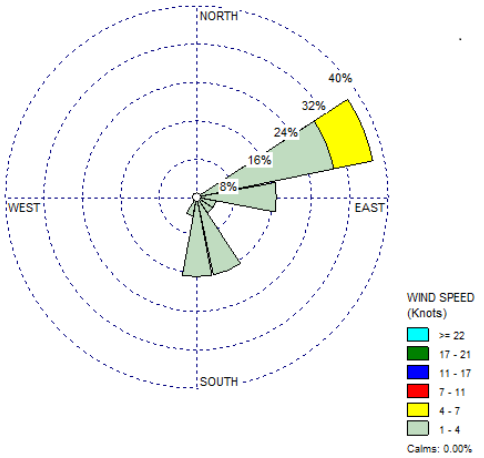
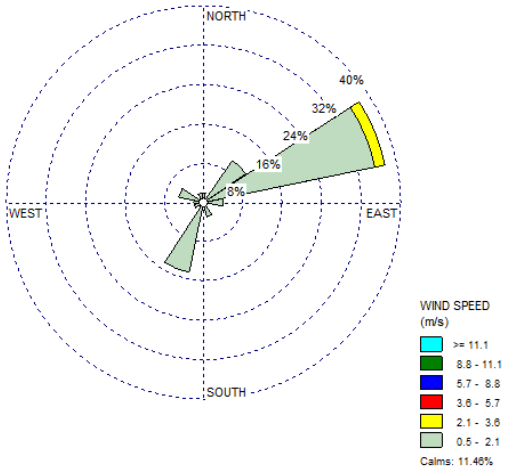
The average PM10 monitoring results remained below the Project Approval criteria of 30µg/m^3 at all sites during the reporting period. The average at the end of the reporting period and the maximum rolling average throughout the reporting period are shown in **Table 13**. Data capture rates for the reporting period are also included in **Table 13**. Data was lost at TEOM04 (Ulan Road) due to a system malfunction and power outage.

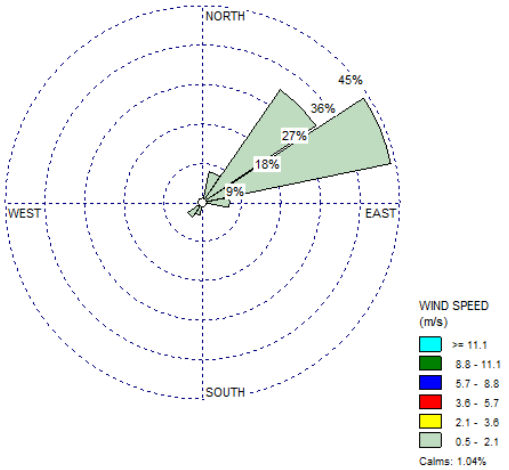
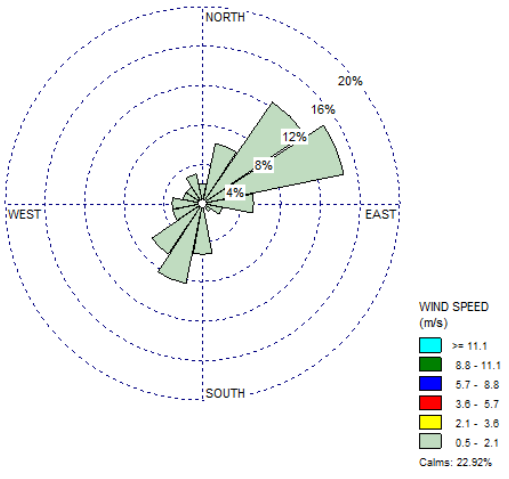
Table 13: PM_{10} Averages and Data Capture Rate

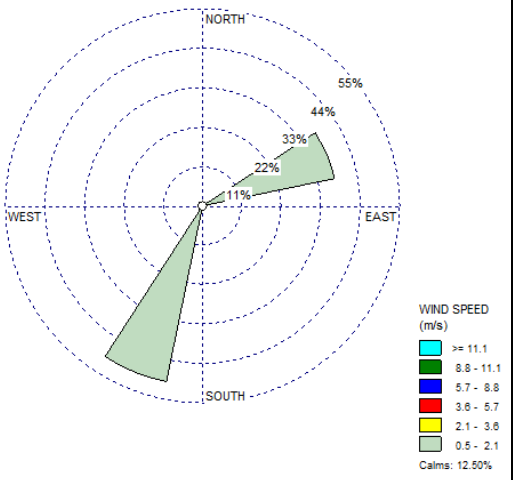
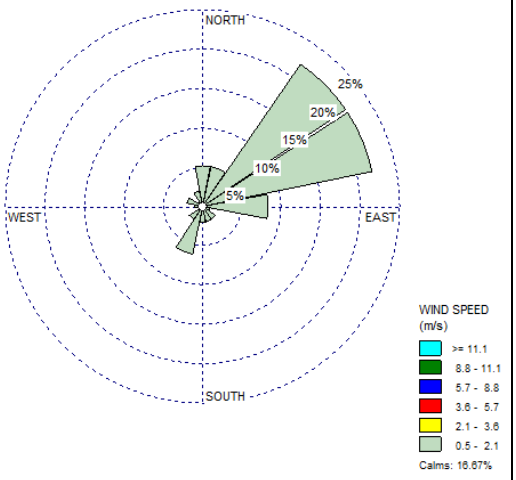
Location	Reporting Period Final Average	Criteria	Data Capture Rate
TEOM01 (Ulan School)	14.3µg/m^3	30µg/m^3	100%
TEOM02 (Murragamba)	14.1µg/m^3	30µg/m^3	100%
TEOM04 (Ulan Road)	13.6 µg/m^3	30µg/m^3	93%
TEOM05 (Ridge Road)	14.0 µg/m^3	30µg/m^3	100%
PM01 (Ulan Village)	13.8µg/m^3	30µg/m^3	100%
PM02 (Ridge Road)	11.7µg/m^3	30µg/m^3	100%

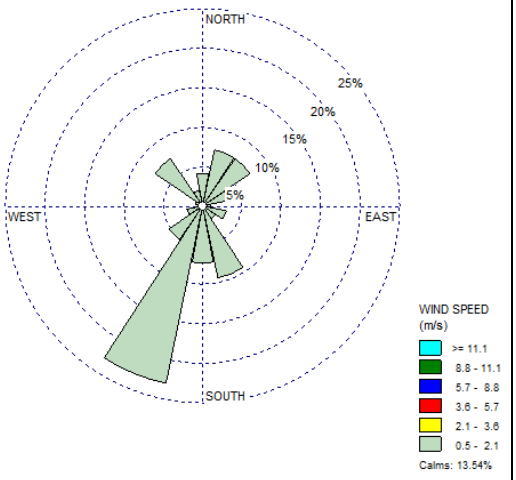
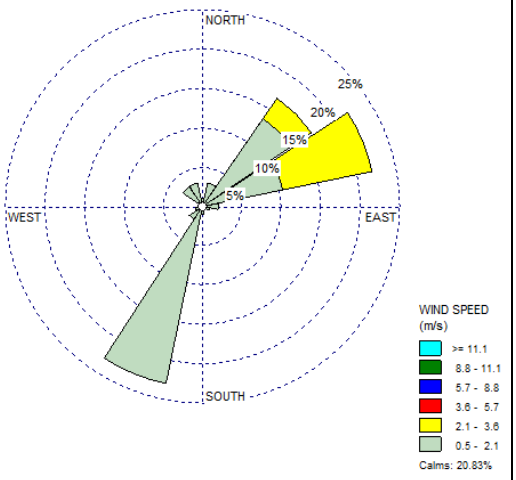
There were thirteen results which recorded above the 24 hour average criteria of 50µg/m^3 that required further analysis. Details of this analysis are shown in **Table 14**.

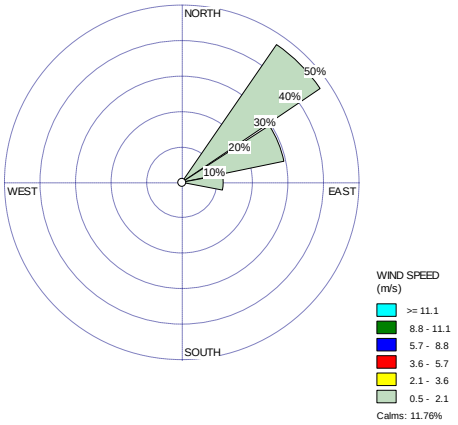
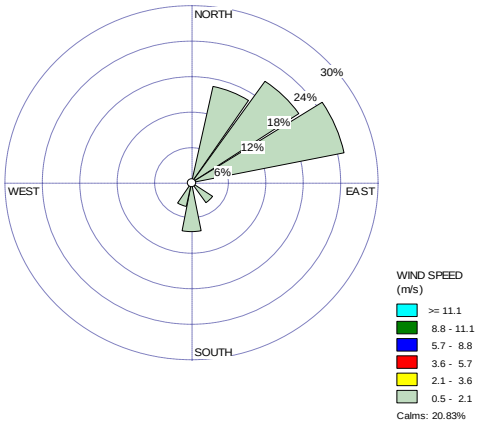
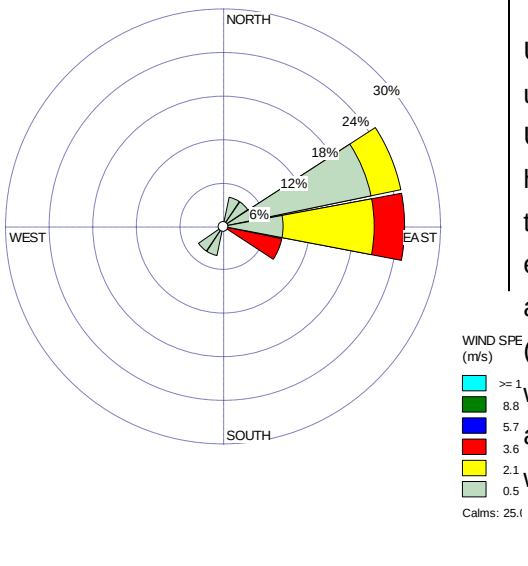
Table 14: Explanation of TEOM and HVAS Results Above the Daily Criteria

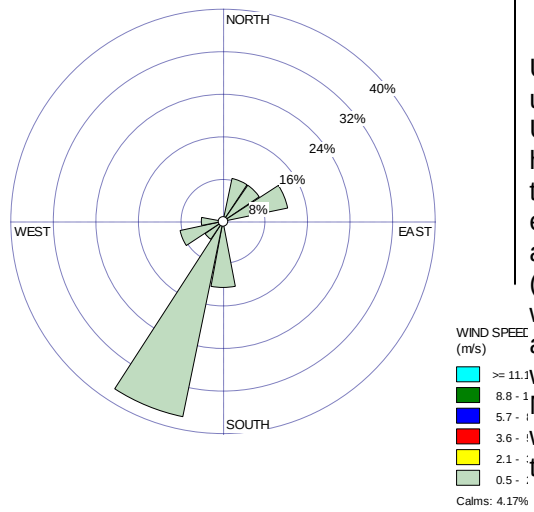
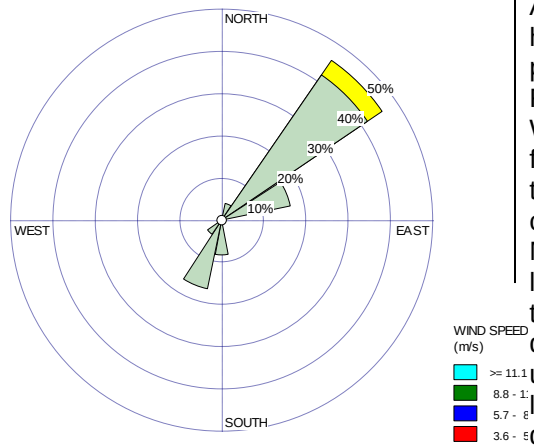
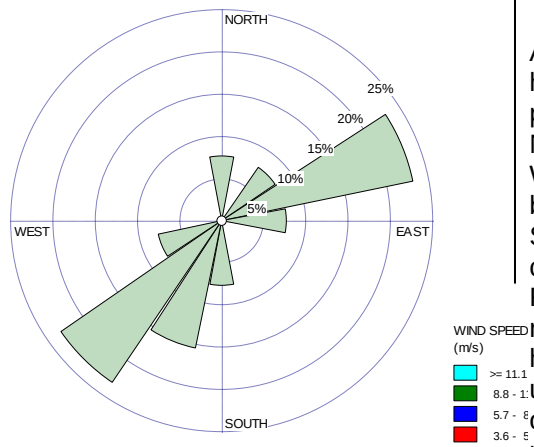
Site	Date	Result (µg/m^3)	Wind Rose	Comment
PM01	18/10/13	51.0		Interpretation of the data would imply a regional event, due to high levels recorded at all three TEOMS and increased bushfire activity in the region at the time of monitoring.
TEOM01, TEOM04, and TEOM05	12/01/14	51.0, 50.7, 65.0		A general smoke haze was present in the region on the 12th. All four TEOM levels were high as a result of this smoke haze

TEOM05	14/01/14	64.0		A general smoke haze was present in the region on the 14th. All four TEOMs had higher than usual levels
TEOM04, and TEOM05	15/01/14	107.1, 53.4		A general smoke haze was present in the region on the 15th. All four TEOMs had higher than usual levels. Upgrades to an unsealed section of Ulan Road and a high volume of traffic contributed to elevated dust levels at the Ulan Road (Mobile) unit which was located directly adjacent to the road works.

TEOM04	16/01/14	93.7		A general smoke haze was present in the region on the 16th. All four TEOMs had higher than usual levels. Upgrades to an unsealed section of Ulan Road and a high volume of traffic contributed to elevated dust levels at the Ulan Road (Mobile) unit which was located directly adjacent to the road works. MCO operations were down wind of the monitor.
TEOM01, and TEOM04	17/01/14	56.3, 130.4		A general smoke haze was present in the region on the 17th. All four TEOMs had higher than usual levels. Upgrades to an unsealed section of Ulan Road and a high volume of traffic contributed to elevated dust levels at the Ulan Road (Mobile) unit which was located directly adjacent to the road works.

TEOM04	18/01/14	55.2		A general smoke haze was present in the region on the 18th. All four TEOMs had higher than usual levels. Upgrades to an unsealed section of Ulan Road and a high volume of traffic contributed to elevated dust levels at the Ulan Road (Mobile) unit which was located directly adjacent to the road works. MCO operations were down wind of the monitor.
TEOM04	31/01/14	58.1		Smoke haze was present in the region on the 31st. All four TEOMs had higher than usual levels. Upgrades to an unsealed section of Ulan Road and a high volume of traffic contributed to elevated dust levels at the Ulan Road (Mobile) unit which was located directly adjacent to the road works.

TEOM04	01/02/14	62.9		Upgrades to an unsealed section of Ulan Road and a high volume of traffic contributed to elevated dust levels at the Ulan Road (Mobile) unit which was located directly adjacent to the road works.
TEOM04	03/02/14	84.0		Upgrades to an unsealed section of Ulan Road and a high volume of traffic contributed to elevated dust levels at the Ulan Road (Mobile) unit which was located directly adjacent to the road works.
TEOM04	04/02/14	72.4		Upgrades to an unsealed section of Ulan Road and a high volume of traffic contributed to elevated dust levels at the Ulan Road (Mobile) unit which was located directly adjacent to the road works.

TEOM04	09/02/14	56.3		Upgrades to an unsealed section of Ulan Road and a high volume of traffic contributed to elevated dust levels at the Ulan Road (Mobile) unit which was located directly adjacent to the road works. MCO operations were down wind of the monitor.
TEOM02	10/02/14	50.4		A general haze and hot weather was present on the 10th February 2014. Wind was blowing from the NE. During these wind conditions the Murragamba unit is located upwind of the operation. All downwind dust units recorded levels below the daily criteria. MCO has not contributed to the elevated result.
TEOM02, TEOM01, and TEOM05	15/11/14	54.4, 51.7, 57.9		A general haze and hot weather was present on the 15th November 2014. Wind was generally blowing from the SW. During these conditions the Ridge Road unit recorded the highest level. This unit is located south of MCO. MCO has not contributed to the elevated result.

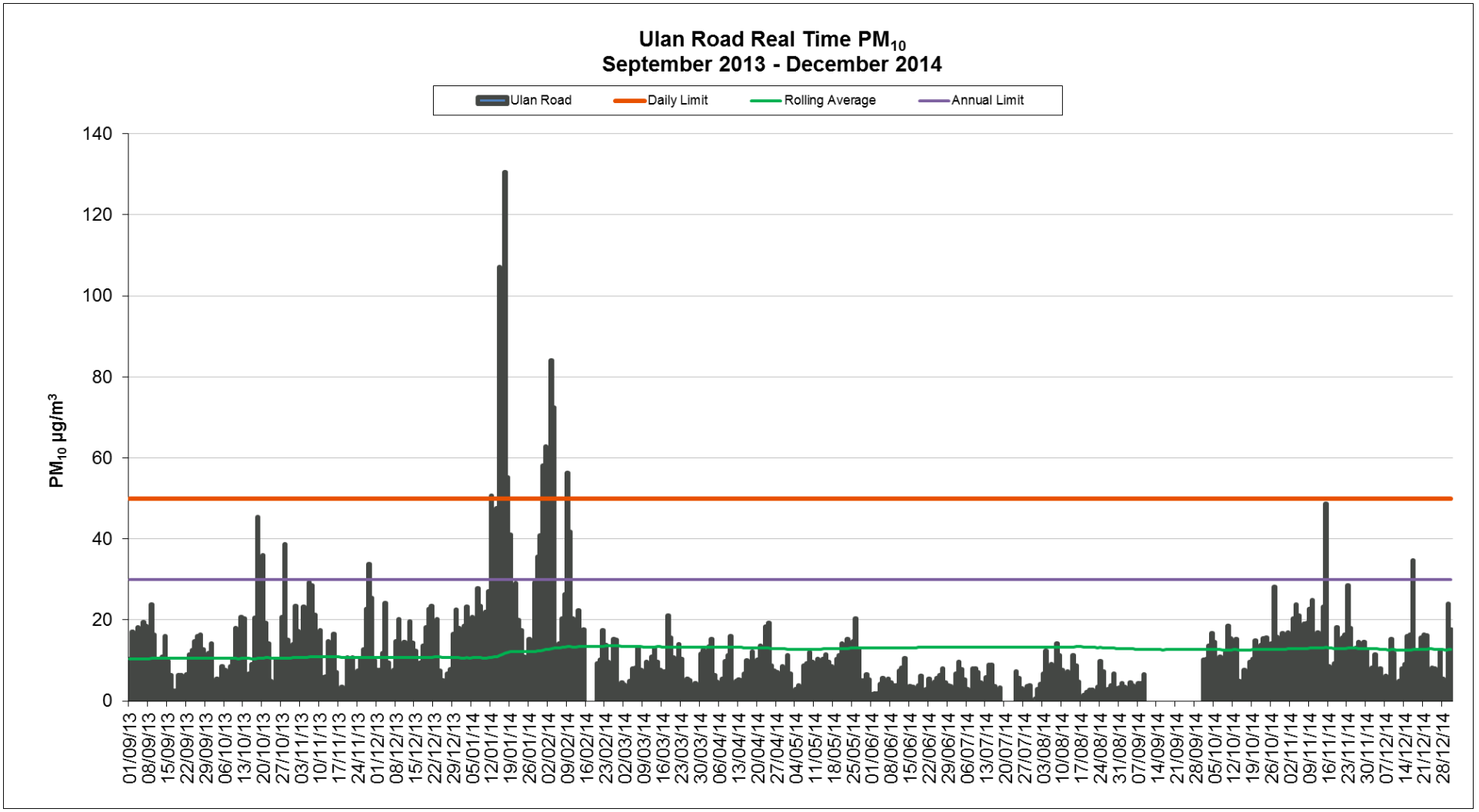


Figure 7: Real-Time PM10 Results – Ulan School (TEOM01)

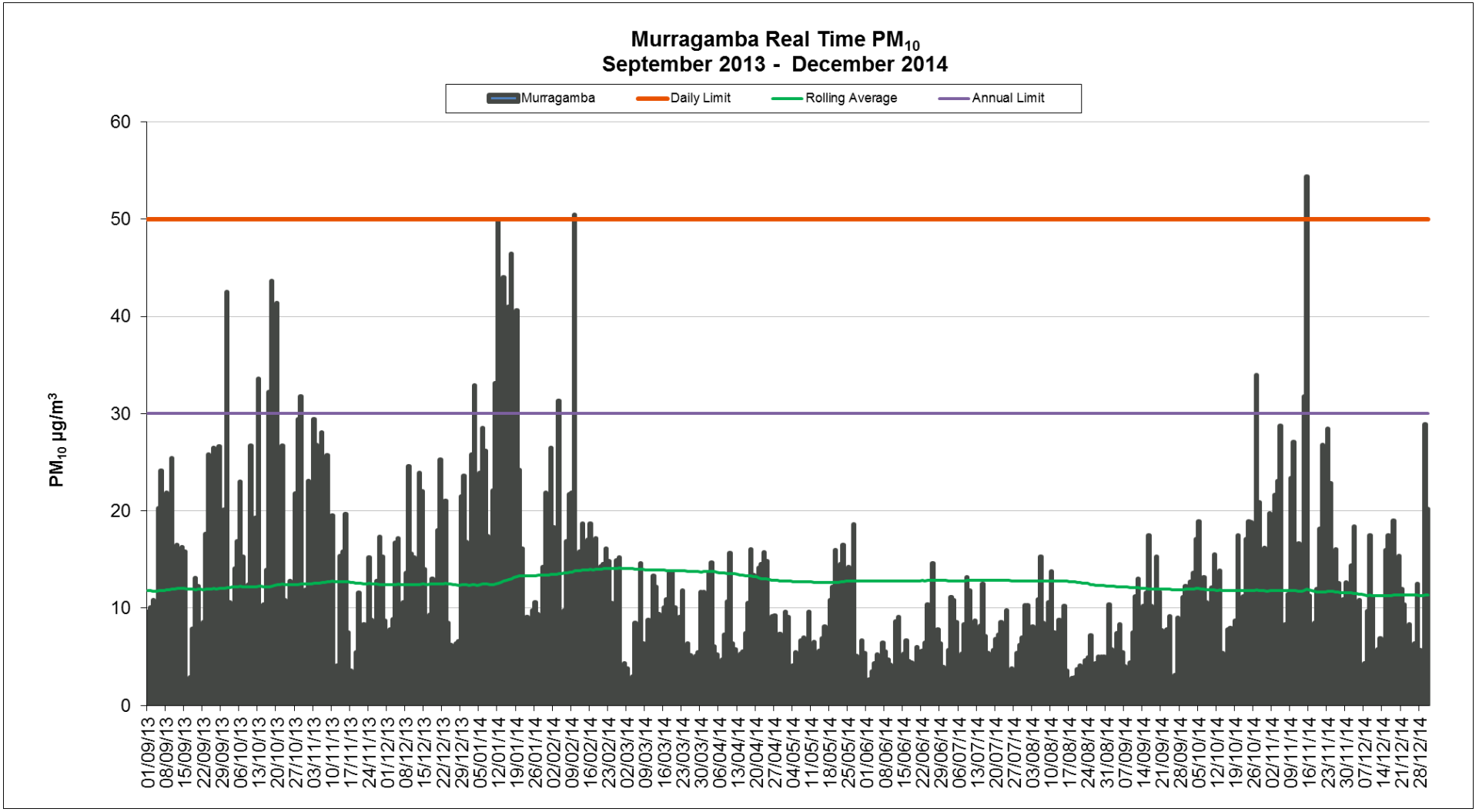


Figure 8: Real-Time PM10 Results – Murragamba (TEOM02)

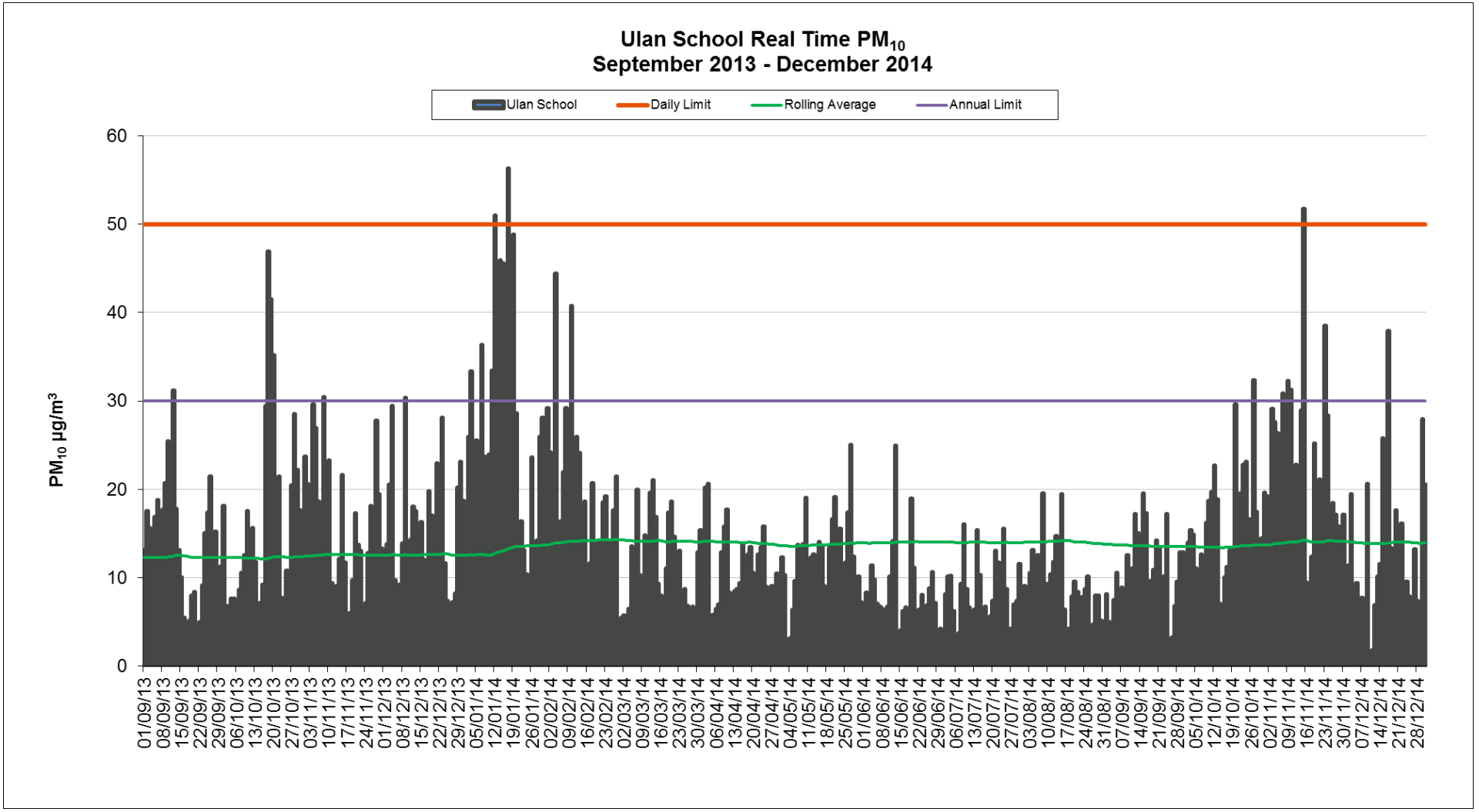


Figure 9: Real-Time PM10 Results – Ulan Road (TEOM04)

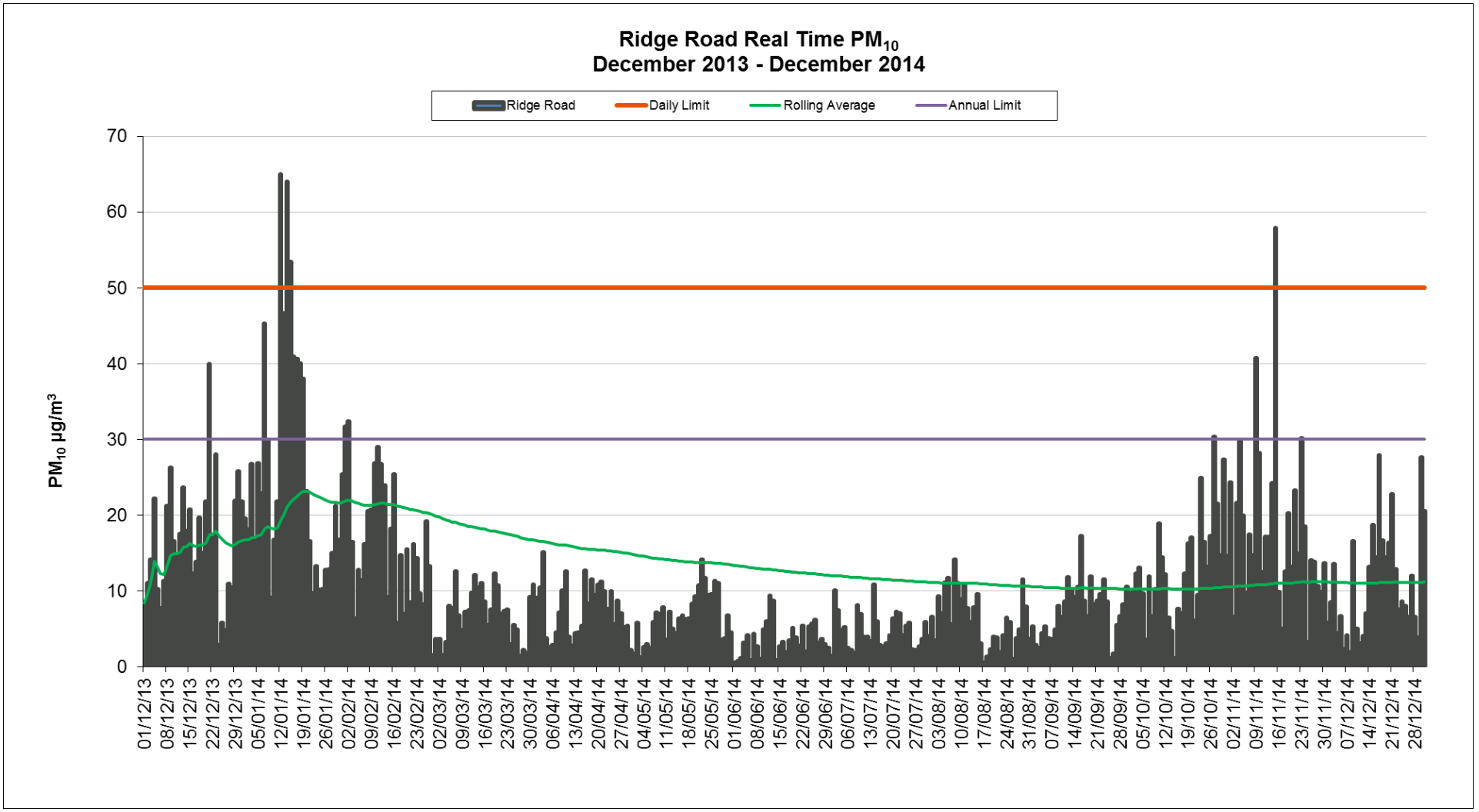


Figure 10: Real-Time PM10 Results – Ridge Road (TEOM05)

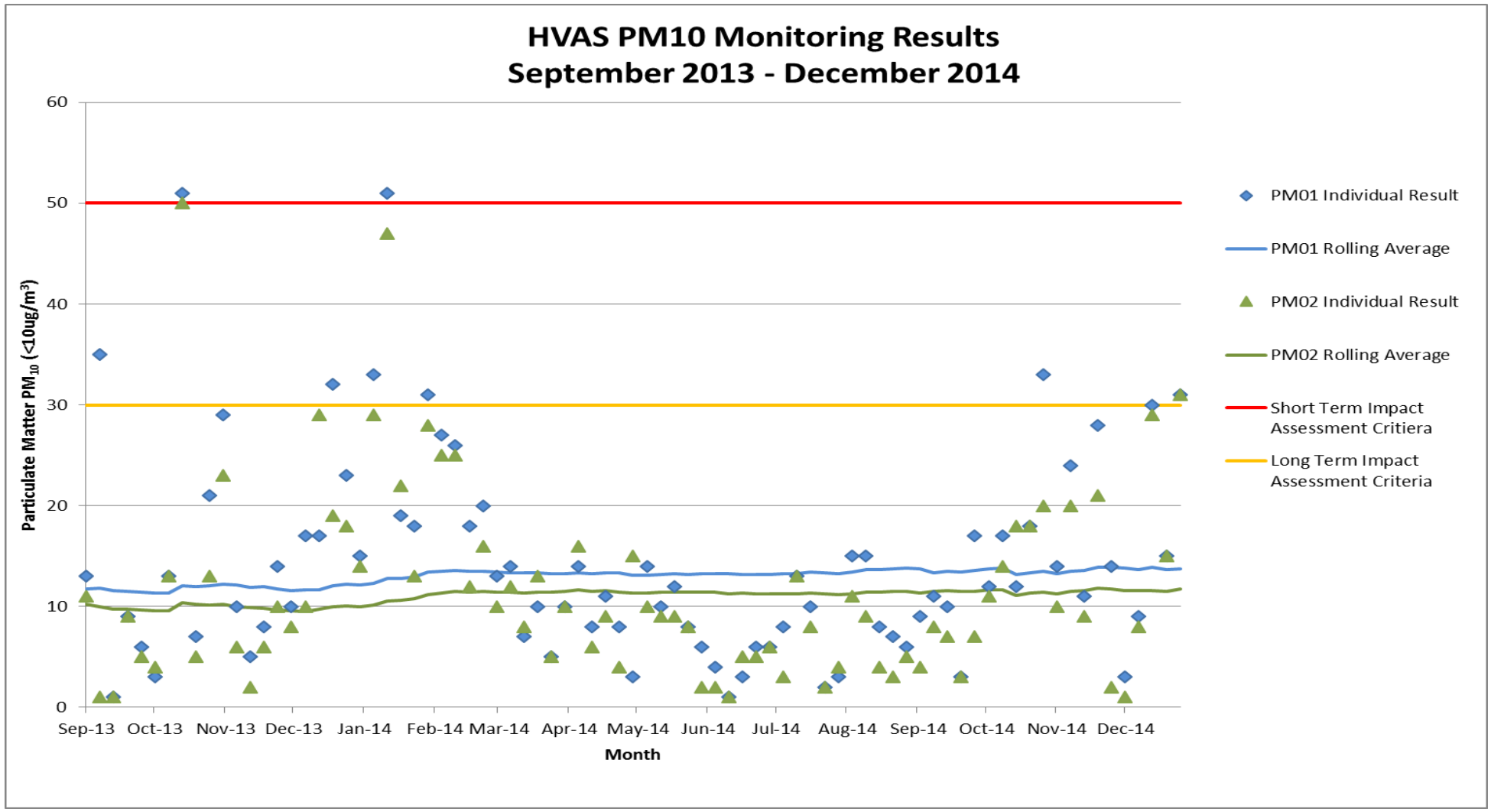


Figure 11: HVAS PM_{10} Results – Ulan Village (PM01) and Ridge Road (PM02)

3.3.2.3 Dust Deposition

Depositional dust is monitored at eleven locations (**Figure 3**) around the operations in accordance with EPA guidelines and relevant Australian Standards.

Samples are generally collected every 30 days with a tolerance of ± 2 days. Results from dust deposition gauges are expressed as insoluble solids and ash residue. Dust gauge results can become excessively contaminated from bird droppings, vegetation (such as plant matter, algae, pollen, seeds), and insects (classed as combustible matter). Over the reporting period approximately 8% of records were contaminated with organic matter such as bird droppings compared to 2% last reporting period and 5% for the reporting period before that. Bird deterrent rings have been installed on all dust gauges to minimise contamination by bird droppings.

Dust deposition results are presented in **Table 15** with contaminated results being excluded from the annual average. The annual averages are presented graphically in **Figure 12**. All uncontaminated results were below the annual average dust limit of 4 g/m^2/month. The annual average dust deposition results for uncontaminated insoluble solids ranged from 0.8g/m^2/month at sites DG01, DG8, DG11 to 2.2g/m^2/month at DG02.

Figure 13 shows the 2013-2014 average compared to the background average. This figure shows that at no site has the average increased by more than 2g/m^2/month and therefore the incremental increase criteria has not been exceeded. In fact there has been a drop in the depositional dust average at every location except for DG02. There was insufficient data collected from DG09, DG10 and DG11 to calculate a background average.

Table 15: Depositional Dust Gauge Results

Month	Insoluble Solids (g/m^2/month)	Ash Residue (g/m^2/month)	Insoluble Solids (g/m^2/month)	Ash Residue (g/m^2/month)	Insoluble Solids (g/m^2/month)	Ash Residue (g/m^2/month)
	DG01 – Bobadeen		DG02 – Hillview		DG03 – Oakey Park	
Sep-13	0.2	0.2	2.8	1.6	0.7	0.5
Oct-13	1.3	0.8	3.3	1.9	2.1	1.5
Nov-13	1.0	0.6	2.1	1.1	1.7	1.1
Dec-13	0.7	0.5	3.9	1.1	1.1	0.7
Jan-14	1.4	0.6	Contaminated		2.9	1.7
Feb-14	1.1	0.8	Contaminated		3.2	2.1
Mar-14	Contaminated		1.7	1.1	0.8	0.5
Apr-14	0.5	0.2	Contaminated		0.4	0.2
May-14	0.4	0.3	2.8	1.5	0.7	0.4
Jun-14	0.2	0.1	1.6	0.7	0.3	0.2
Jul-14	0.4	0.2	2.4	1.4	0.8	0.6
Aug-14	0.7	0.6	0.8	0.6	0.6	0.4
Sep-14	0.6	0.4	1.9	1.0	0.6	0.4
Oct-14	0.5	0.3	1.1	0.6	1.0	0.6
Nov-14	1.9	1.2	1.6	0.8	1.1	0.8
Dec-14	0.9	0.6	1.5	0.7	1.7	1.1
Annual Average	**0.8**	**0.5**	**2.2**	**1.2**	**1.2**	**0.8**

Month	Insoluble Solids (g/m²/month)	Ash Residue (g/m²/month)	Insoluble Solids (g/m²/month)	Ash Residue (g/m²/month)	Insoluble Solids (g/m²/month)	Ash Residue (g/m²/month)
	DG04 – Ulan Village		**DG05 – Glenmoor**		**DG06 – Barcoo**	
Sep-13	0.7	0.5	0.3	0.2	0.2	0.2
Oct-13	2.0	1.4	2.5	1.3	1.6	1.1
Nov-13	1.9	1.3	1.0	0.7	0.8	0.5
Dec-13	1.3	0.7	1.3	0.6	0.6	0.4
Jan-14	1.3	0.8	Contaminated		0.7	0.4
Feb-14	3.5	2.2	Contaminated		1.5	0.9
Mar-14	0.8	0.4	2.0	0.8	1.1	0.9
Apr-14	1.1	0.6	Contaminated		2.8	2.2
May-14	4.5	3.6	1.2	0.4	0.6	0.4
Jun-14	0.7	0.6	2.7	1.5	0.3	0.3
Jul-14	0.8	0.6	2.3	1.0	0.4	0.3
Aug-14	0.9	0.6	3.0	1.1	0.4	0.2
Sep-14	1.4	0.9	1.0	0.7	0.3	0.2
Oct-14	1.0	0.6	1.6	1.0	0.6	0.4
Nov-14	1.7	1.1	Contaminated		1.2	0.9
Dec-14	0.9	0.6	2.0	1.2	1.5	1.0
Annual Average	**1.5**	**1.0**	**1.7**	**1.2**	**0.9**	**0.6**
	DG07 – Hillside		**DG08 – Croydon**		**DG09 – Wilga**	
Sep-13	0.3	0.2	0.3	0.2	0.3	0.1
Oct-13	1.4	0.9	1.5	1.0	1.3	0.9
Nov-13	2.6	1.2	0.9	0.6	2.4	1.1
Dec-13	1.6	0.8	Contaminated		Contaminated	
Jan-14	0.9	0.6	0.6	0.4	3.6	2.1
Feb-14	1.5	1.0	1.8	1.1	Contaminated	
Mar-14	1.1	0.6	1.1	0.4	1.2	0.9
Apr-14	1.2	0.7	0.4	0.2	Contaminated	
May-14	0.5	0.2	0.4	0.2	Contaminated	
Jun-14	0.2	0.1	0.4	0.2	3.2	1.2
Jul-14	0.3	0.1	0.5	0.3	2.5	0.8
Aug-14	0.4	0.1	0.1	0.1	3.4	1.1
Sep-14	0.6	0.4	0.6	0.3	0.4	0.2
Oct-14	Contaminated		0.5	0.3	1.0	0.5
Nov-14	Contaminated		1.4	0.9	1.7	1.1
Dec-14	2.1	1.6	1.9	1.4	1.0	0.8
Annual Average	**1.1**	**1.1**	**0.8**	**0.6**	**1.8**	**1.2**

Month	Insoluble Solids (g/m^2/month)	Ash Residue (g/m^2/month)	Insoluble Solids (g/m^2/month)	Ash Residue (g/m^2/month)
	DG10		DG11	
Sep-13	0.2	0.1	0.2	0.1
Oct-13	1.1	0.7	0.9	0.6
Nov-13	1.0	0.6	0.9	0.5
Dec-13	0.9	0.5	0.7	0.5
Jan-14	1.0	0.6	1.1	0.8
Feb-14	1.5	1.1	2.1	1.4
Mar-14	1.6	0.6	0.6	0.3
Apr-14	2.1	0.5	0.8	0.3
May-14	1.2	0.6	0.4	0.3
Jun-14	0.5	0.3	0.3	0.2
Jul-14	1.1	0.3	0.4	0.2
Aug-14	0.2	0.1	0.4	0.2
Sep-14	0.3	0.2	0.4	0.2
Oct-14	0.6	0.4	0.7	0.4
Nov-14	1.6	0.9	1.4	0.9
Dec-14	1.6	1.1	1.2	0.9
Annual Average	**1.0**	**0.5**	**0.8**	**0.5**

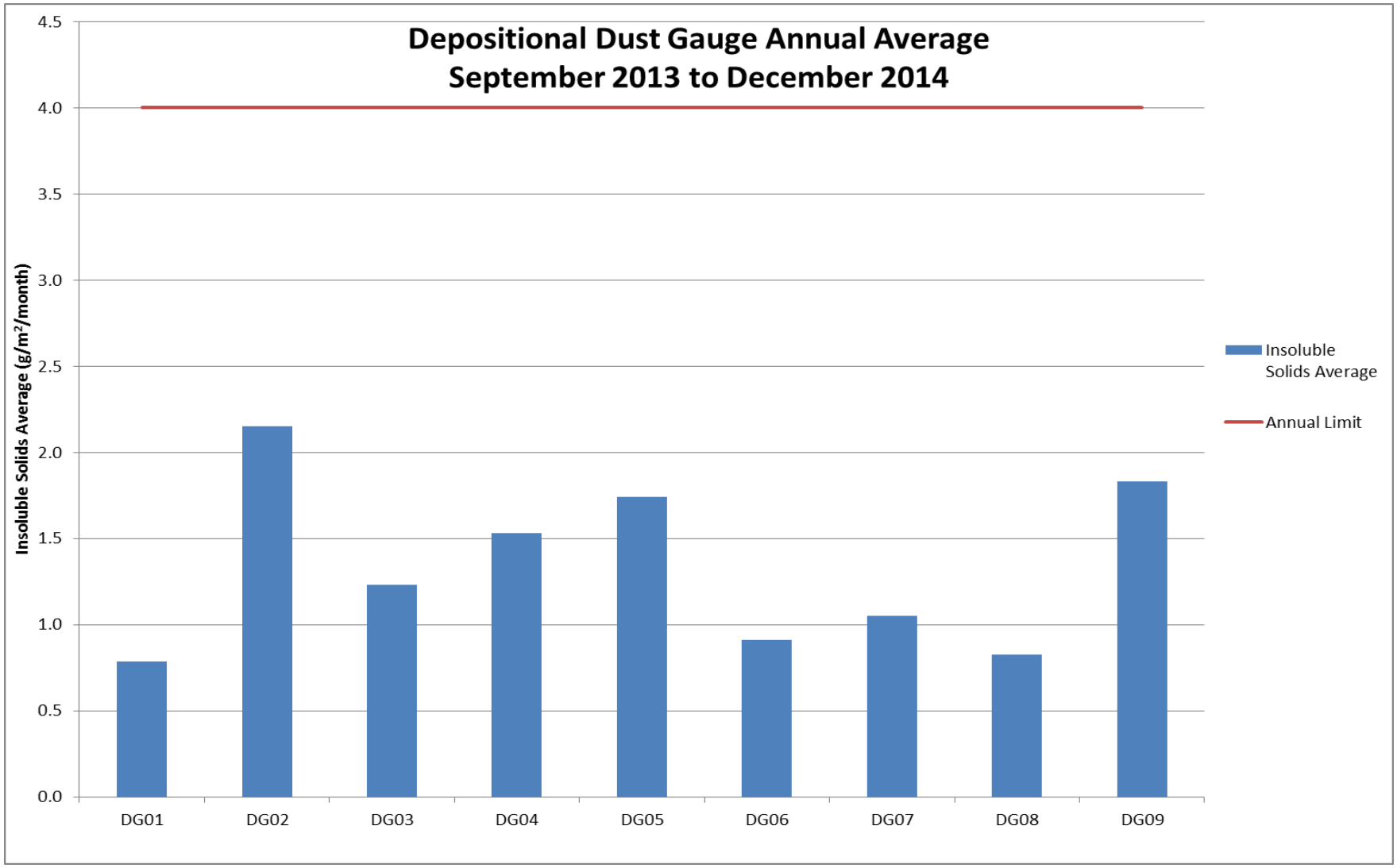


Figure 12: Depositional Dust Annual Average

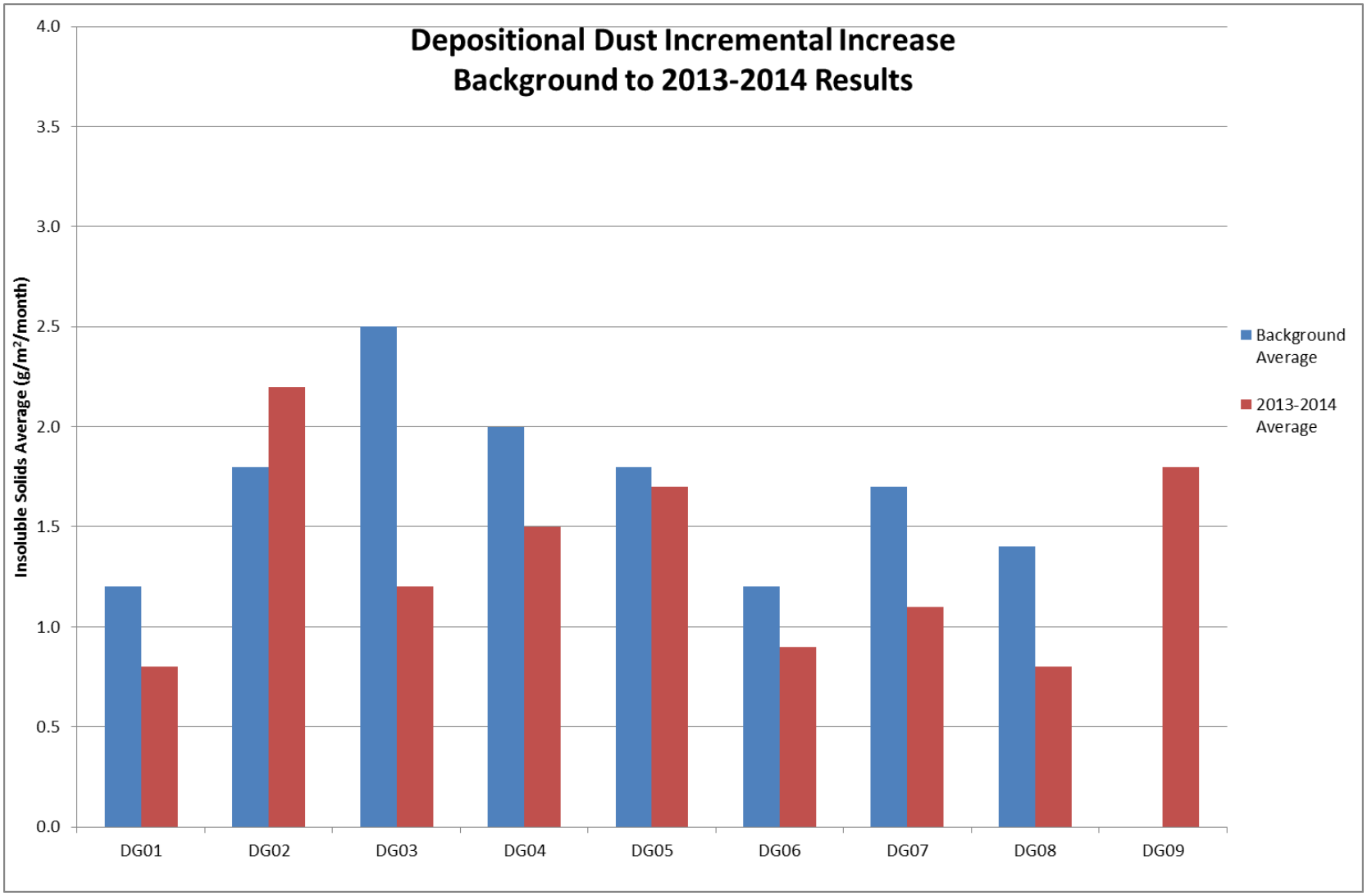


Figure 13: Depositional Dust Incremental Increase

3.3.3 Comparison to Previous Air Quality Monitoring and Predicted Levels

Table 16 to **Table 18** compares the air quality data from this reporting period to background levels and previous monitoring results. Contaminated depositional dust results have been removed from the results. The predicted values in these tables relate to the predicted air quality results at Year 8 of the operation. Year 8 has been chosen as it is the most reflective of the current mining operations at MCO.

Table 16: Comparison of Real-Time PM_{10} Results to Background and Predicted PM_{10}

Site	Background Range (µg/m^3)	Predicted Range (µg/m^3)	Previous Results Range (µg/m^3)	2013-2014 Data Range (µg/m^3)	Comment on 2013-2014 Data
Ulan School (TEOM01)	2.2 – 114.1	NA	0.0 – 38.7	0.0 – 56.3	Results at this site were higher than previous results due to regional bushfire activity. They were however lower than the background range.
Murragamba Road (TEOM02)	0.0 – 102.3	NA	0.0 – 59.7	0.7 – 54.4	Results at this site were similar to previous monitoring.
Ulan Road (TEOM04)	No background results as site installed after March 2009.	NA	0.0 – 38.4	0.0 – 130.4	Results at this site were higher than previous results due to upgrades of Ulan Road.
Ridge Road (TEOM05)	No background results as site installed in December 2013.	NA	NA	0.0 – 65.0	This is the first set of results for this site.
Site	**Background Average (µg/m^3)**	**Predicted Average (µg/m^3)**	**Previous Average (µg/m^3)**	**2013-2014 Average (µg/m^3)**	**Comment on 2013-2014 Data**
Ulan School (TEOM01)	15.1	21.3	12.4	14.3	The average result at this site is lower than background results and predicted levels but higher than previous levels,
Murragamba Road (TEOM02)	11.8	19.8	11.8	14.1	The average result at this site is slightly above background results and previous results but is below predicted average.
Ulan Road (TEOM04)	No background results as site installed after March 2009.	22.1	10.5	13.6	The average result at this site is slightly above previous results and lower than predicted levels.
Ridge Road (TEOM05)	No background results as site installed in December 2013.	NA	NA	23.1	This is the first set of results for this site.

All of the real-time PM_{10} averages were within the predicted levels for Year 5 of the operation.

Table 17: Comparison of HVAS PM_{10} Results to Background and Predicted HVAS PM_{10}

Site	Background Range (µg/m³)	Predicted Range (µg/m³)	Previous Results Range (µg/m³)	2013-2014 Data Range (µg/m³)	Comment on 2013-2014 Data
Ulan Village (PM01)	1.2 – 44.5	NA	1.0 – 28.1	1.0 – 51.0	Consistent with previous monitoring however elevated result was due to regional bushfire activity.
Ridge Road (PM02)	This site was installed in May 2009 so there is no background data available	NA	1.0 – 22.0	1.0 – 50.0	Consistent with previous monitoring however elevated result was due to regional bushfire activity.
Site	**Background Average (µg/m³)**	**Predicted Average (µg/m³)**	**Previous Average (µg/m³)**	**2013-2014 Average (µg/m³)**	**Comment on 2013-2014 Data**
Ulan Village (PM01)	17.9	26.3	11.7	11.3 – 13.9	The average result at this site is lower than background results, previous results and predicted levels.
Ridge Road (PM02)	This site was installed in May 2009 so there is no background data available	Assumed to be less than 20 as this site wasn't modelled	10.2	9.5 – 11.8	The average result at this site is consistent with previous results and lower than predicted levels.

All of the HVAS PM_{10} averages were within the predicted levels for Year 8 of the operation.

Table 18: Comparison of Insoluble Solids Results to Background and Predicted Insoluble Solids Results

Site	Background Range (Insoluble Matter) (g/m^2/month)	Predicted Range (Insoluble Matter) (g/m^2/month)	Previous Results Range (Insoluble Matter) (g/m^2/month)	2013-2014 Data Range (Insoluble Matter) (g/m^2/month)	Comment on 2013-2014 Data
DG01 – Bobadeen	0.2 – 3.1	NA	0.1 – 0.5	0.2 – 1.9	Consistent with previous monitoring
DG02 – Hillview	0.2 – 3.3	NA	0.6 – 2.7	0.8 – 3.8	Consistent with previous monitoring
DG03 – Oakey Park	1.2 – 3.8	NA	0.4 – 2.9	0.3 – 3.2	Consistent with previous monitoring
DG04 – Ulan Village	0.3 – 3.9	NA	0.6 – 3.2	0.7 – 4.5	Consistent with previous monitoring
DG05 – Glenmoor	0.5 – 3.6	NA	0.4 – 1.8	0.3 - 3.0	Consistent with previous monitoring
DG06 – Barcoo	0.2 – 3.2	NA	0.3 – 1.3	0.2 – 2.8	Consistent with previous monitoring
DG07 – Hillside	0.2 – 3.7	NA	0.3 – 2.1	0.2 – 2.8	Consistent with previous monitoring
DG08 – Croydon	0.3 – 3.6	NA	0.2 – 1.7	0.1 – 1.9	Consistent with previous monitoring
DG09 – Wilga	0.7 – 1.6	NA	0.2 – 0.9	0.3 – 3.6	Higher than previous monitoring
DG10	Insufficient Data	NA	NA	0.2 – 2.1	This is the first set of results for this site.
DG11	Insufficient Data	NA	NA	0.2 – 2.1	This is the first set of results for this site.
Site	**Background Average (Insoluble Matter) (g/m^2/month)**	**Predicted Average (Insoluble Matter) (g/m^2/month)**	**Previous Results Average (Insoluble Matter) (g/m^2/month)**	**2013-2014 Data Average (Insoluble Matter) (g/m^2/month)**	**Comment on 2013-2014 Data**
DG01 – Bobadeen	1.2	1.4	0.3	0.8	Higher than previous monitoring but lower than predicted levels
DG02 – Hillview	1.8	1.5	1.9	2.2	Consistent with previous monitoring and slightly higher than predicted levels
DG03 – Oakey Park	2.5	1.7	1.2	1.2	Consistent with previous monitoring and lower than predicted levels
DG04 – Ulan Village	2.0	1.8	1.2	1.5	Consistent with previous monitoring and predicted levels
DG05 – Glenmoor	1.8	1.9	0.9	1.7	Consistent with previous monitoring and predicted levels
DG06 – Barcoo	1.2	1.5	0.6	0.9	Slightly higher than previous monitoring but lower than and predicted levels

DG07 – Hillside	1.7	1.6	0.9	1.1	Consistent with previous monitoring and predicted levels
DG08 – Croydon	1.4	1.5	0.6	0.8	Consistent with previous monitoring and lower than predicted levels
DG09 – Wilga	Insufficient Data	No modelled predictions	0.5	1.8	As there is no background data or predicted data it is not possible to compare results to background or predicted levels
DG10	Insufficient Data	No modelled predictions	NA	1.0	As there is no background data or predicted data it is not possible to compare results to background or predicted levels
DG11	Insufficient Data	No modelled predictions	NA	0.8	As there is no background data or predicted data it is not possible to compare results to background or predicted levels

Generally, all of the depositional dust averages were within the predicted levels for Year 8 of the operation.

3.3.4 Activities Next Reporting Period

The revised AQMP will be implemented during the next reporting period.

3.4 GREENHOUSE

The *National Greenhouse and Energy Reporting Act 2007* establishes a national framework for corporations to report greenhouse gas emissions and energy consumption and production. The Act makes registration and reporting mandatory for corporations whose energy production, energy use or greenhouse gas emissions exceed specified thresholds. MCO submits National Greenhouse Energy Reporting (NGER) returns through its parent company, Yancoal Australia Ltd.

The most recent report on Greenhouse Gas Emissions for MCO stated total emissions to be 102,798 CO_2^{-e} for the period 1 July 2013 to 30 June 2014. This is a 12% increase in total emissions compared to the previous reporting period. The slight increase is contributed to the commencement of mining in Open Cut 2.

3.5 EROSION AND SEDIMENT

3.5.1 Activities This Reporting Period

All active mining and rehabilitation areas are designed to incorporate water management structures such as drains and sedimentation dams to retain runoff water to allow for the settlement of sediments. All structures were designed in accordance with the MCO Water Management Plan and industry guidelines such as Managing Urban Stormwater.

Regular inspections of the erosion and sediment control structures were undertaken prior to predicted rainfall events and following rainfall events. Sediment dams have been desilted as required to maintain capacity.

The water infrastructure upgrade commenced during the reporting period and is scheduled to be completed during 2015.

3.5.2 Activities Next Reporting Period

MCO anticipate the water infrastructure upgrades will be completed during the next reporting period.

The adequacy of the erosion and sediment control structures will continue to be monitored during the next reporting period. Where new land is to be disturbed erosion and sediment control structures will be installed prior to disturbance.

3.6 WATER MANAGEMENT

Water management activities this reporting period related to managing clean and dirty water around the operations and securing water sources for future mining operations.

MCO have continued to progress upgrading water infrastructure around the site. During the reporting period MCO commenced the upgrade of water infrastructure located in the CHPP area.

No discharges of mine water occurred during the reporting period. During the reporting period there were no material variations from the MOP related to water management activities.

3.6.1 Site Water Balance

The site water balance for the reporting period was prepared by WRM and can be seen in **Table 19** and shows that MCO increased the site water storages by 172ML of water during the reporting period.

Table 19: Site Water Balance

Water Sources (ML)	
Ulan Coal East Pit	638.9
Northern Borefield	0.0
Southern Borefield	2.7
Rainfall/runoff	542.4
Open Cut Seepage	206.6
Potable Supply	7.4
ROM feed	739.0
Total	**2,137.0**
Water Loss (ML)	
Evaporation	190.7
Seepage	0.0
Construction & dust suppression	935.7
Discharges	0.0
Tailings/Coarse Reject	436.8
Product	224.2
Effluent	1.0
Change in inventory	176.7
Total	**1,965.0**
Water Balance	**172**
Water Usage (ML)	
CHPP	661.0
Construction & dust suppression	935.7
Underground	0.0
Total	**1,596.6**

Note: Some of these figures are estimates only.

3.6.2 Activities This Reporting Period

Active surface water quality management strategies adopted at MCO during the reporting period include:

- Continued installation of clean and dirty water diversion drains;
- Continued building containment dams throughout the site; and
- Ongoing monitoring of surface water surrounding the site.

The Water Management Plan (WMP) includes a process for the review of data on a monthly basis against trigger levels. This review was ongoing throughout the reporting period and did not trigger the need for any specialised review of the results.

The WMP includes management response actions if it is found that MCO are impacting on surface water quality or quantity. MCO were not required to implement any of these actions during the reporting period. These actions include:

- Investigations into the cause of the impact, involving surface water experts where required;
- Reporting the impact to regulators and affected users;
- Investigating the adequacy of existing water management infrastructure and controls; and

- Implementing any mitigation where required and where possible.

3.6.3 Discharges

MCO did not have any licensed discharges during the reporting period.

3.6.4 Surface Water Monitoring

MCO surface water quality criteria are limited to water discharges from the site. These discharge criteria are presented below in **Table 20**. The WMP identifies trigger values that have been developed to act as triggers for investigations into surface water quality. Where insufficient site data was available to calculate these triggers the default ANZECC criteria have been used. These triggers can be seen in **Table 21**. The 80th percentile figure is used for internal investigation purposes only. If an investigation into results outside the maximum range finds that MCO is responsible for this result, it will be treated as a non-compliance and reported to regulators and affected landowners. If the investigation finds that MCO is not responsible no further action will be taken and the site will continue to be monitored.

Table 20: Discharge Water Criteria

Pollutant	Units of Measure	50 percentile concentration limit	100 percentile concentration limit
Discharge Points 1,2 and 28			
Conductivity	µS/cm	800	900
pH	pH	---	6.5-8.5
Oil and Grease	mg/L	---	10
Total Suspended Solids	mg/L	---	50
Turbidity	NTU	---	25
Discharge Points 24, 26 and 29			
pH	pH	---	6.5-8.5
Total Suspended Solids	mg/L	---	50
Turbidity	NTU	---	25

Table 21: Surface Water Quality Trigger Levels

Site No.	pH		Electrical Conductivity (µS/cm)		Total Suspended Solids (mg/L)	
	80th Percentile Trigger Value	Maximum Range Reported	80th Percentile Trigger Value	Maximum Range Reported	80th Percentile Trigger Value	Maximum Range Reported
SW01	6.5-8.0	5.4-8.1	922	1,500	50	310
SW02	6.5-8.0	4.4-7.9	1,162	1,560	50	71
SW12	6.5-8.0	N/A	350	N/A	50	N/A
SW10	6.5-8.0	N/A	350	N/A	50	N/A
SW11	6.5-8.0	N/A	350	N/A	50	N/A
SW05	6.5-8.0	5.3-7.7	1,168	1,590	50	2,600
SW08	6.5-8.0	4.5-7.6	5,020	5,910	69	510
SW09	6.5-8.0	5.2-7.9	5,076	5,750	50	140
SW04	6.5-8.0	5.1-7.8	1,480	2,260	97	440

Site No.	pH		Electrical Conductivity (µS/cm)		Total Suspended Solids (mg/L)	
	80th Percentile Trigger Value	Maximum Range Reported	80th Percentile Trigger Value	Maximum Range Reported	80th Percentile Trigger Value	Maximum Range Reported
SW07	6.5-8.0	5.3-8.0	5,180	6,540	50	64

Note: Shaded cells indicate ANZECC (2000) criteria; Unshaded cells indicate site developed criteria

The surface water monitoring locations are shown in **Figure 3** and described in **Table 22**.

Table 22: Surface Water Monitoring Site

Monitoring Station	Stream	Location
SW01	Goulburn River	Downstream of the Drip
SW02	Goulburn River	The Drip Picnic Area
SW03	Murragamba Creek	Murragamba Road crossing
SW04	Murragamba Creek	Off the Ulan-Wollar Road
SW05	Moolarben Creek	Below the Ulan - Cassilis Road near the Ulan Village
SW06	Ryan's Creek	Ulan - Cassilis Road
SW07	Lagoon Creek	Rayner Property
SW08	Moolarben Creek	Rayner Property
SW09	Moolarben Creek	Moolarben Road
SW10	Bora Creek	Upstream of operations
SW11	Bora Creek	Downstream of operations
SW12	Goulburn River	Crossing behind Ulan School

Table 23 to **Table 26** present the range of results for pH, EC, TDS and TSS for the reporting period with **Figure 14** to **Figure 17** presenting the pH, EC, TDS and TSS results graphically.

Table 23: pH Results

pH	SW01	SW02	SW04	SW05	SW07	SW08	SW09	SW10	SW11	SW12
80th Percentile	6.5-8.0	6.5-8.0	6.5-8.0	6.5-8.0	6.5-8.0	6.5-8.0	6.5-8.0	6.5-8.0	6.5-8.0	6.5-8.0
Min	6.9	7.6	7.1	7.2	7.6	6.6	6.8	0	6.6	7.2
Med	8.0	8.0	8.0	7.6	7.9	7.2	7.3	0	7.0	7.5
Max	8.3	8.4	**8.8**	7.9	8.4	7.8	8.0	0	7.4	7.8

Table 24: Electrical Conductivity (µS/cm) Results

EC	SW01	SW02	SW04	SW05	SW07	SW08	SW09	SW10	SW11	SW12
80th Percentile	922	1162	1,480	1,168	5,180	5,020	5,076	350	350	350
Min	401	678	162	546	2,610	2,850	2,550	0	150	484
Med	740	829	1,161	780	4,615	3,493	3,486	0	243	636
Max	**941**	1,020	**3,570**	1,150	**7,300**	4,230	3,900	0	329	**860**

Table 25: Total Dissolved Solids (mg/L) Results

TDS	SW01	SW02	SW04	SW05	SW07	SW08	SW09	SW10	SW11	SW12
Min	2240	362	191	246	1430	1580	1580	0	154	242

Med	426	475	665	428	2696	1946	1986	0	229	359
Max	573	626	2010	598	4190	2390	2550	0	360	502

Table 26: Total Suspended Solids (mg/L) Results

TSS	SW01	SW02	SW04	SW05	SW07	SW08	SW09	SW10	SW11	SW12
80th Percentile	50	50	97	50	50	69	50	50	50	50
Min	<5	<5	<5	<5	<5	<5	<5	0	20	<5
Med	9.3	7.4	28	17	23	16	23	0	23	15
Max	16	9	87	42	**72**	35	**72**	0	**59**	33

Red Bold, indicates readings outside of 80th Percentile - it is noted that MCO's internal assessment has identified that MCO were not responsible for the result.

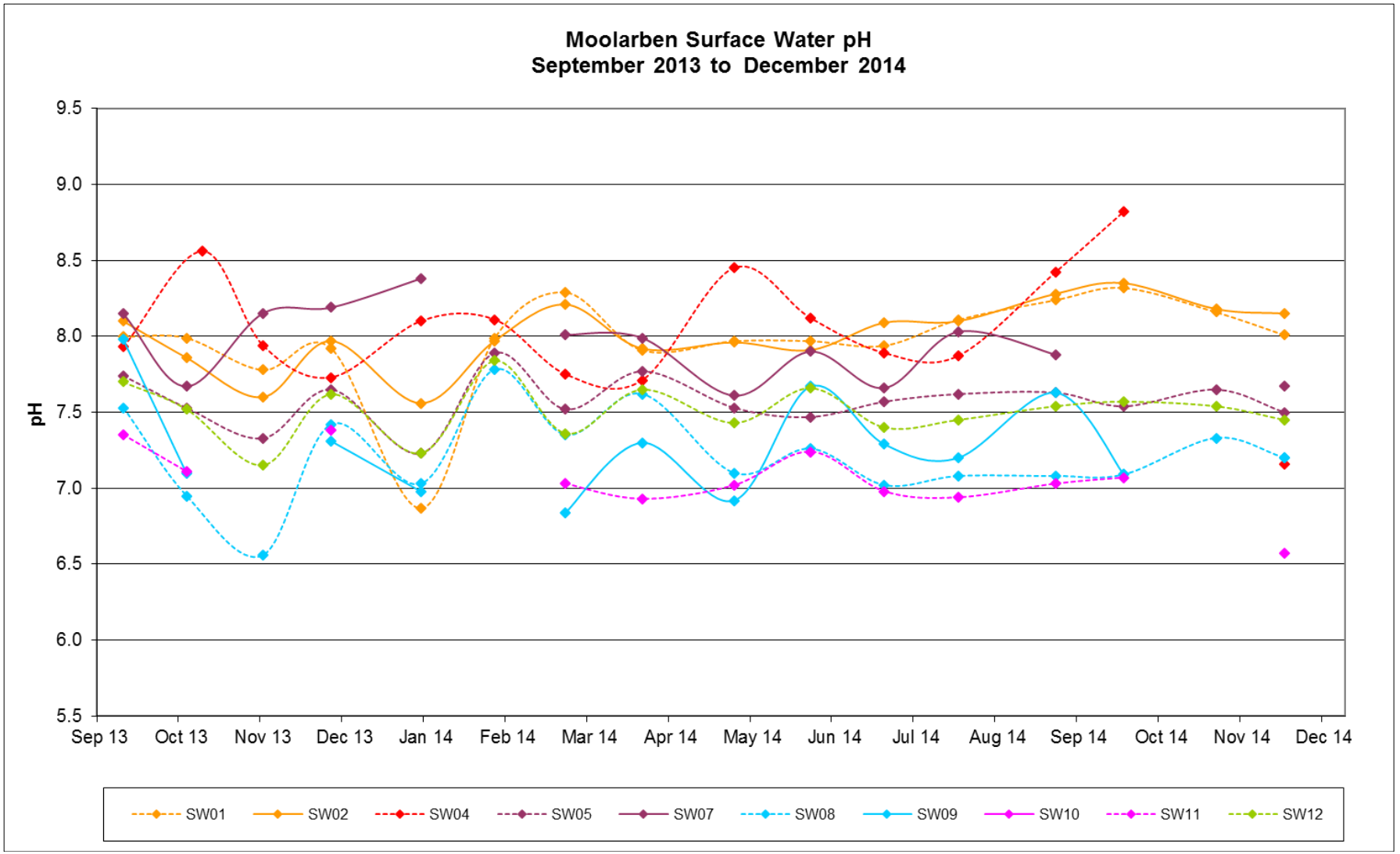


Figure 14: Surface Water pH Results

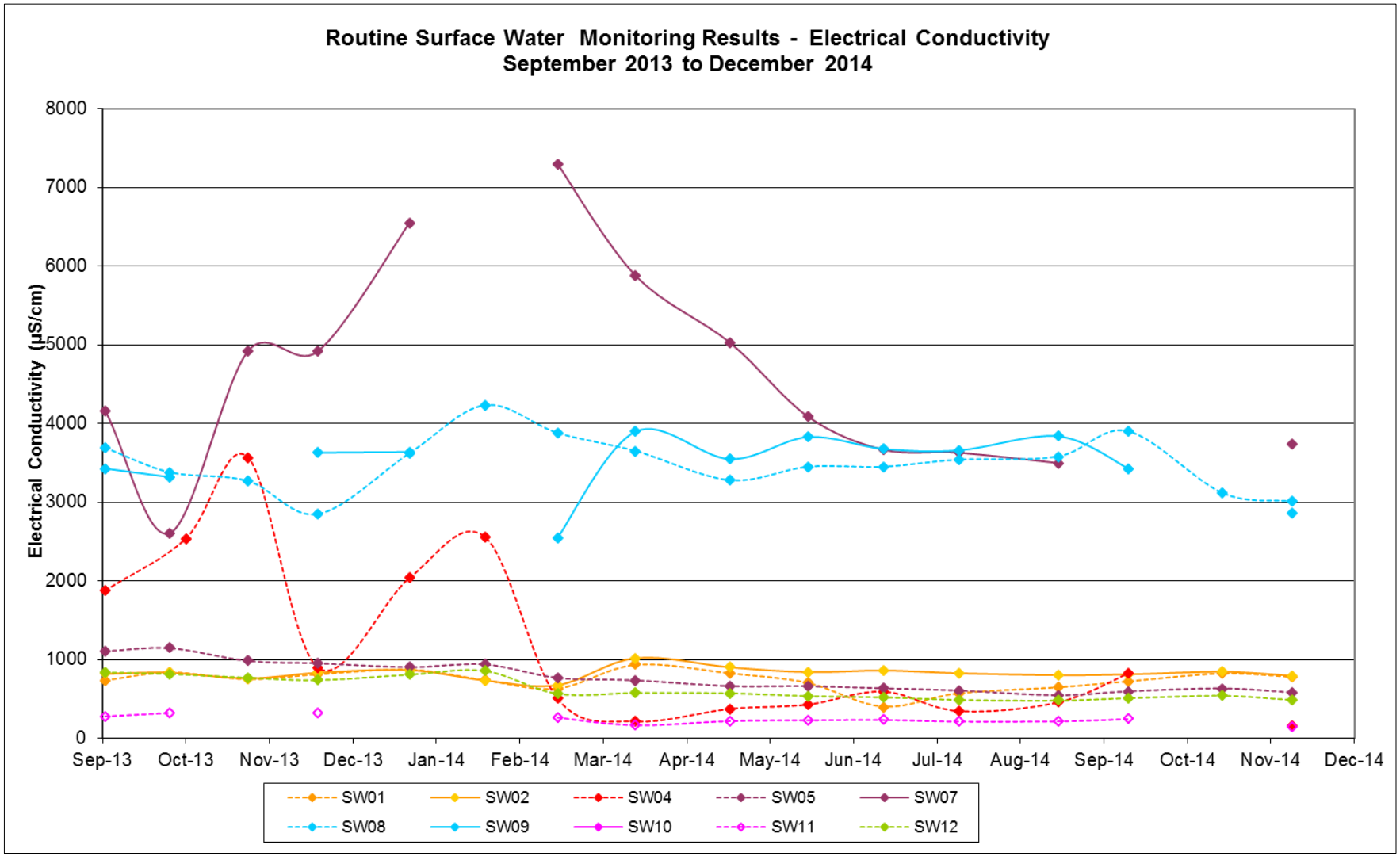


Figure 15: Surface Water Electrical Conductivity Results

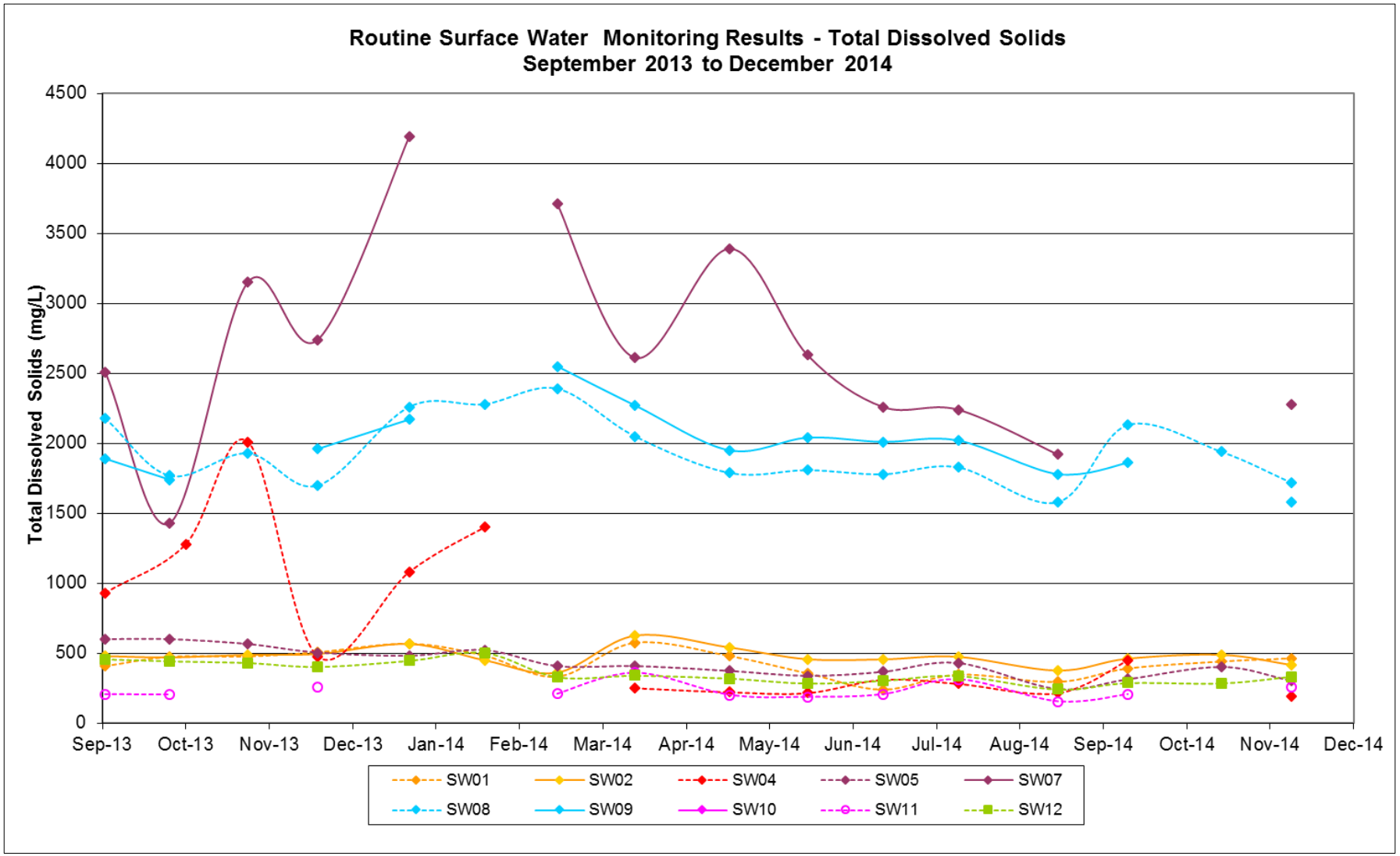


Figure 16: Surface Water Total Dissolved Solids Results

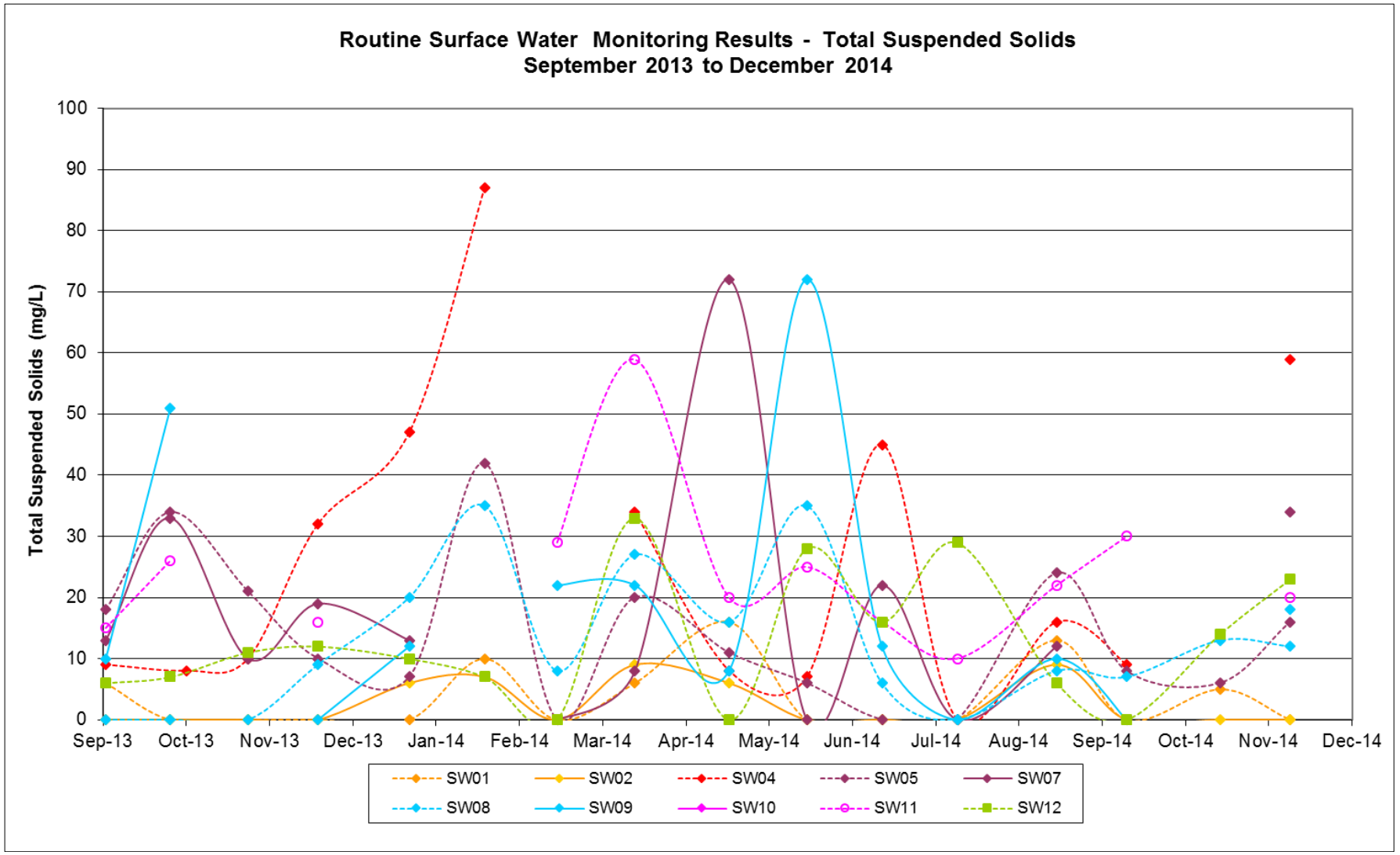


Figure 17: Surface Water Total Suspended Solids Results

3.6.5 Comparison to Previous Surface Water Quality Monitoring and Predicted Levels

Table 27 to **Table 30** compares water quality data from this reporting period to the background levels and previous monitoring results. There was no modelling conducted in the Environmental Assessment on predicted water quality surrounding the mining operations so a comparison isn't able to be made to predicted water quality.

Table 27: Comparison of Surface Water pH to Background and previous reporting period

Site	Background Range	Previous Data Range	2013-2014 Data Range	Comment on 2013-2014 Data
SW01	5.4 – 8.1	7.8 – 8.5	6.9 – 8.3	Generally consistent with previous monitoring
SW02	4.4 – 7.9	7.2 – 8.7	7.6 - 8.4	Generally consistent with previous monitoring
SW04	5.1 – 7.8	7.2 – 8.9	7.2 – 8.8	As this site is located in a different catchment to the mining operations the high result is not attributable to MCO's operations
SW05	5.3 – 7.7	6.9 – 7.9	7.2 – 7.9 – 7.9	Consistent with previous monitoring
SW07	5.3 – 8.0	7.4 – 9.0	7.6 – 8.4	Generally consistent with previous monitoring
SW08	4.5 – 7.6	6.0 – 7.7	6.6 – 7.8	Consistent with previous monitoring
SW09	5.2 – 7.9	6.4 – 7.8	6.8 – 8.0	As this site is located upstream of mining operations at MCO, the high result is not attributable to MCO's operations
SW10	No samples were collected due to the site being dry during the background sampling	6.5	No samples were collected due to the site being dry	Consistent with previous monitoring
SW11	5.5 – 7.2	6.0 – 8.1	6.6 – 7.4	Generally consistent with previous monitoring
SW12	6.0 – 7.0	6.6 – 7.8	7.2 – 7.8	Consistent with previous monitoring

Table 28: Comparison of Surface Water EC to Background and previous reporting period

Site	Background Range (µS/cm)	Previous Data Range (µS/cm)	2013-2014 Data Range (µS/cm)	Comment on 2013-2014 Data
SW01	300 – 1,500	425 – 960	401 – 941	Consistent with previous monitoring
SW02	200 – 1,560	742 – 942	678 – 1020	Consistent with previous monitoring
SW04	60 – 2,260	490 – 1,984	162 – 3,570	As this site is located in a different catchment to the mining operations the high result is not attributable to MCO's operations
SW05	290 – 1,590	496 – 1,060	546 – 1,150	Consistent with previous monitoring

Site	Background Range (µS/cm)	Previous Data Range (µS/cm)	2013-2014 Data Range (µS/cm)	Comment on 2013-2014 Data
SW07	750 – 6,540	1,890 – 4,380	2,610 – 7,300	As this site is located upstream of mining operations at MCO, the high result is not attributable to MCO's operations
SW08	2,060 – 6,990	1,910 – 4,420	2,850 – 4,230	Consistent with previous monitoring
SW09	490 – 5,750	2,010 – 3,760	2,550 – 3,900	Consistent with previous monitoring
SW10	No samples were collected due to the site being dry during the background sampling	90	No samples were collected due to the site being dry	Consistent with previous monitoring
SW11	40 – 150	105 – 410	150 – 329	Consistent with previous monitoring
SW12	50 – 670	415 – 920	484 – 860	Consistent with previous monitoring

Table 29: Comparison of Surface Water TDS to Background and previous reporting period

Site	Background Range (mg/L)	Previous Data Range (mg/L)	2013-2014 Data Range (mg/L)	Comment on 2013-2014 Data
SW01	194 – 700	225 – 560	240 – 573	Consistent with previous monitoring
SW02	199 – 790	444 – 580	362 – 626	Consistent with previous monitoring
SW04	157 – 1,100	442 – 1,210	191 – 2,010	As this site is located in a different catchment to the mining operations the high result is not attributable to MCO's operations
SW05	288 – 848	296 – 551	246 – 598	Consistent with previous monitoring
SW07	502 – 4,100	1,170 – 3,090	1,430 – 4,190	Consistent with previous monitoring
SW08	1,100 – 6,400	1,230 – 2,500	1,580 – 2,390	Consistent with previous monitoring
SW09	346 – 4,000	1,420 – 2,070	1,580 – 2,550	Consistent with previous monitoring
SW10	No samples were collected due to the site being dry during the background sampling	76	No samples were collected due to the site being dry	Consistent with previous monitoring
SW11	70 – 314	93 – 308	154 – 360	Consistent with previous monitoring
SW12	232 – 392	256 – 819	242 – 502	Generally consistent with previous monitoring

Table 30: Comparison of Surface Water TSS to Background and previous reporting period

Site	Background Range (mg/L)	Previous Data Range (mg/L)	2013-2014 Data Range (mg/L)	Comment on 2013-2014 Data
SW01	<2 – 310	<2 – 3	<5 – 16	Consistent with previous monitoring
SW02	<2 – 844	<2 – 3	<5 – 9	Consistent with previous monitoring
SW04	4 – 440	5 – 72	<5 – 87	Consistent with previous monitoring
SW05	<2 – 2,600	7 – 28	<5 – 42	Consistent with previous monitoring
SW07	<2 – 64	4 – 89	<5 – 72	Consistent with previous monitoring
SW08	<2 – 510	6 – 96	<5 – 35	Consistent with previous monitoring
SW09	2 – 140	2 – 1,910	<5 – 72	Consistent with previous monitoring
SW10	No samples were collected due to the site being dry during background sampling	5	No samples were collected due to the site being dry	Consistent with previous monitoring
SW11	13 – 66	5 – 429	10 – 59	Consistent with previous monitoring.
SW12	<2 – 564	6 – 28	<5 – 33	Consistent with previous monitoring

The surface water quality results recorded this reporting period are generally consistent with the background results, with any exceptions commented on in the tables above. There were no high results that are attributable to MCO's operations. Some monitoring results were influenced by extended dry periods.

3.6.6 Rainfall Event Sampling

As per MCO's approved WMP rainfall sampling is undertaken where rainfall exceeds 30mm in 24 hours. During the reporting period there were five occasions where rainfall events triggered the requirement to collect additional water samples. A summary of the results is shown in **Table 31**

Table 31: Rainfall Event Results

Location	Date	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)
SW01 – Goulburn River	17-Sep-13	8.1	620	<5
SW02 – Goulburn River	17-Sep-13	8.1	701	<5
SW04 – Murragamba Creek	17-Sep-13	7.6	1,500	33
SW05 – Moolarben Creek	17-Sep-13	7.4	806	19
SW07- Lagoons Creek	17-Sep-13	6.3	3,280	40
SW08 – Moolarben Creek	17-Sep-13	7.3	3,610	5

Location	Date	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)
SW09 – Moolarben Creek	17-Sep-13	7.4	2,680	6
SW10 – Bora Creek	17-Sep-13	No Flow		
SW11 – Bora Creek	17-Sep-13	7.6	225	21
SW12 – Goulburn River	17-Sep-13	7.5	733	14
SW01 – Goulburn River	24-Nov-13	8.0	861	<5
SW02 – Goulburn River	24-Nov-13	8.0	874	<5
SW04 – Murragamba Creek	24-Nov-13	7.3	1830	72
SW05 – Moolarben Creek	24-Nov-13	7.4	901	<5
SW07- Lagoons Creek	24-Nov-13	8.1	3420	<5
SW08 – Moolarben Creek	24-Nov-13	7.5	2000	10
SW09 – Moolarben Creek	24-Nov-13	6.9	3310	6
SW10 – Bora Creek	24-Nov-13	No Flow		
SW11 – Bora Creek	24-Nov-13	6.5	117	11
SW12 – Goulburn River	24-Nov-13	7.2	840	<5
SW01 – Goulburn River	20-Feb-14	8.1	654	6
SW02 – Goulburn River	20-Feb-14	8.0	734	<5
SW04 – Murragamba Creek	20-Feb-14	7.8	272	38
SW05 – Moolarben Creek	20-Feb-14	7.3	979	11
SW07- Lagoons Creek	20-Feb-14	7.6	4,960	10
SW08 – Moolarben Creek	20-Feb-14	7.4	4,000	28
SW09 – Moolarben Creek	20-Feb-14	6.8	4,520	23
SW10 – Bora Creek	20-Feb-14	No Flow		
SW11 – Bora Creek	20-Feb-14	6.9	151	11
SW12 – Goulburn River	20-Feb-14	7.7	364	13
SW01 – Goulburn River	06-Apr-14	7.6	1,060	<5
SW02 – Goulburn River	06-Apr-14	7.6	1,050	<5
SW04 – Murragamba Creek	06-Apr-14	7.3	185	60
SW05 – Moolarben Creek	06-Apr-14	7.7	731	14

Location	Date	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)
SW07- Lagoons Creek	06-Apr-14	7.5	5,970	<5
SW08 – Moolarben Creek	06-Apr-14	7.1	3,590	18
SW09 – Moolarben Creek	06-Apr-14	6.5	3,680	12
SW10 – Bora Creek	06-Apr-14	No Flow		
SW11 – Bora Creek	06-Apr-14	6.8	136	18
SW12 – Goulburn River	06-Apr-14	7.5	528	10
SW01 – Goulburn River	23-Dec-14	8.53	786	<5
SW02 – Goulburn River	23-Dec-14	8.7	819	<5
SW04 – Murragamba Creek	23-Dec-14	7.8	274	12
SW05 – Moolarben Creek	23-Dec-14	7.8	592	<5
SW07- Lagoons Creek	23-Dec-14	No Flow		
SW08 – Moolarben Creek	23-Dec-14	7.7	3,400	17
SW09 – Moolarben Creek	23-Dec-14	7.1	4,230	17
SW10 – Bora Creek	23-Dec-14	No Flow		
SW11 – Bora Creek	23-Dec-14	7.5	238	10
SW12 – Goulburn River	23-Dec-14	8.0	575	<5

3.6.7 Flow Monitoring

During the reporting period flow monitoring has been undertaken at Wilpinjong Creek, Murragamba Creek and Eastern Creek

Flow monitoring data for Moolarben Creek has been obtained from UCML at Moolarben Dam. All flow monitoring data collected during the reporting period is shown graphically in **Figure 18** to **Figure 22**.

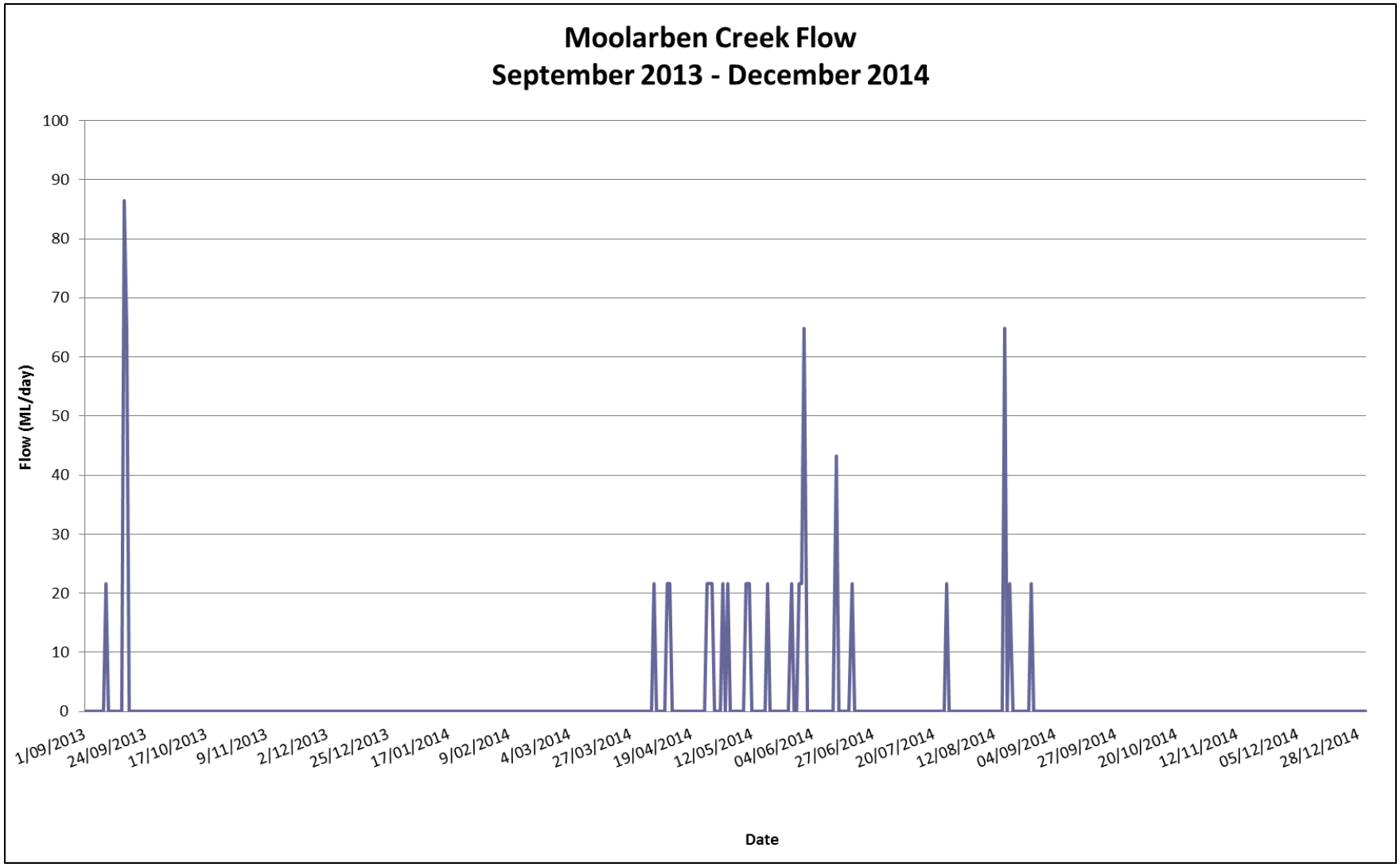


Figure 18: Flow Monitoring – Moolarben Creek

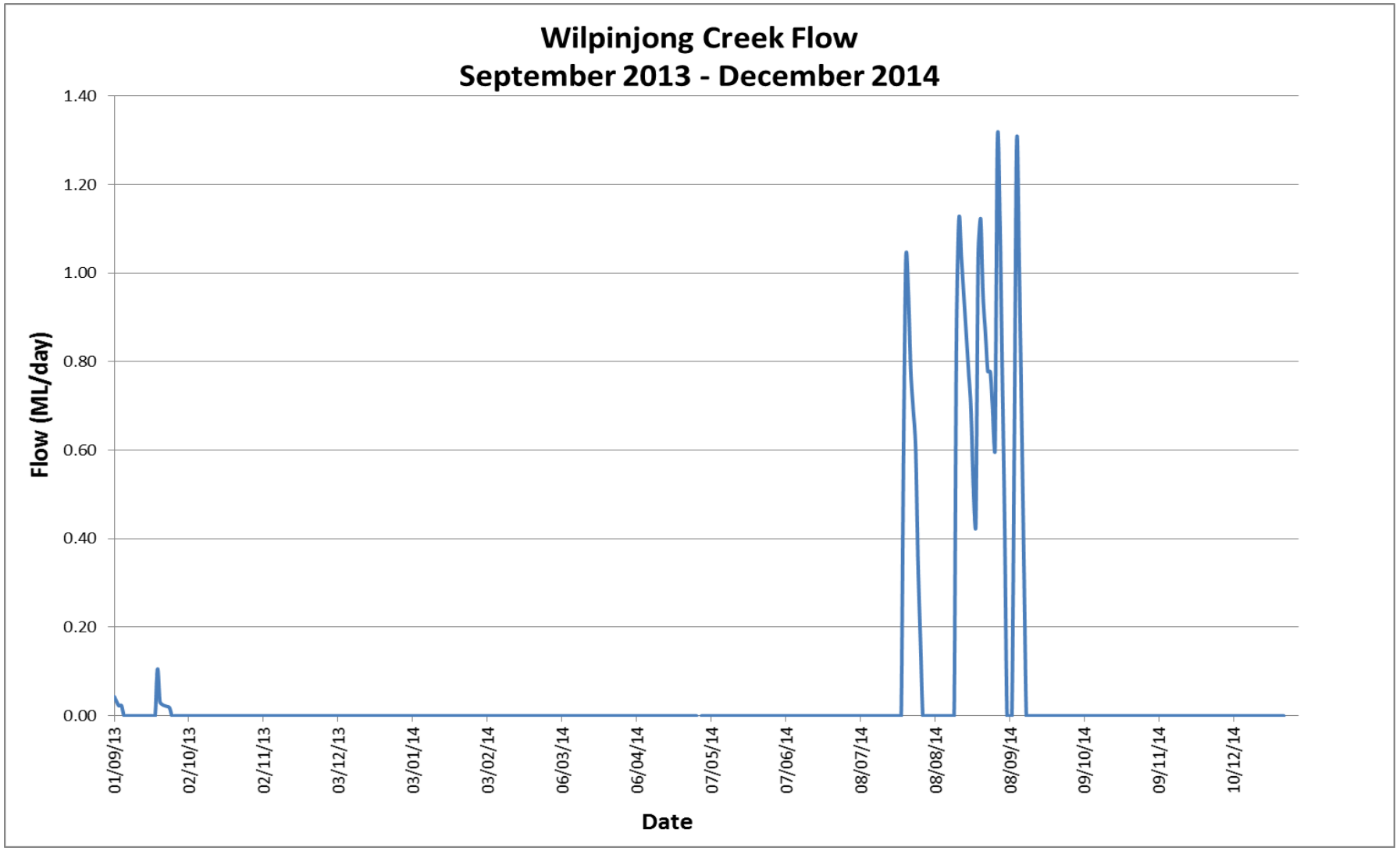


Figure 19: Flow Monitoring – Wilpinjong Creek

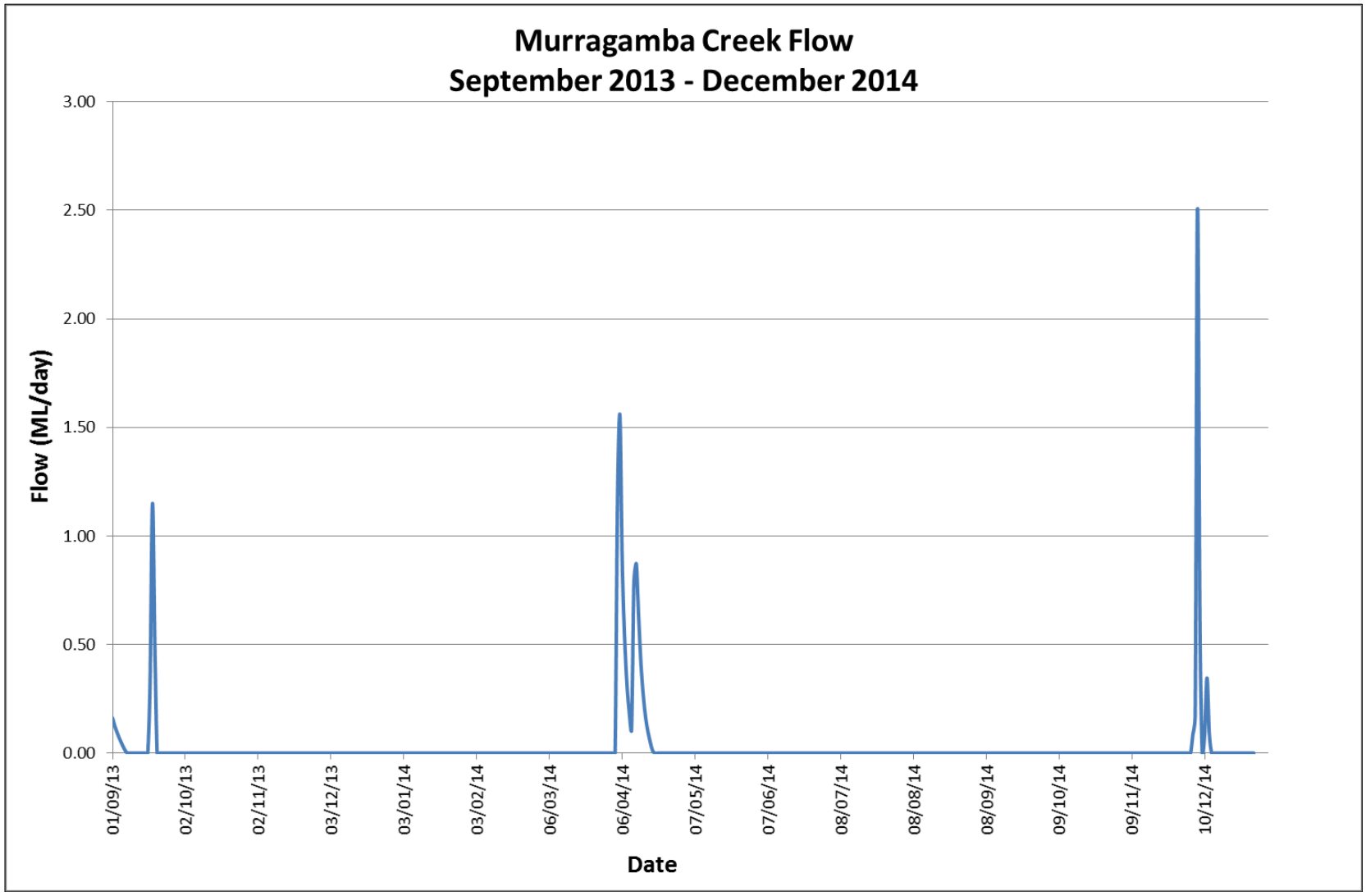


Figure 20: Flow Monitoring – Murragamba Creek

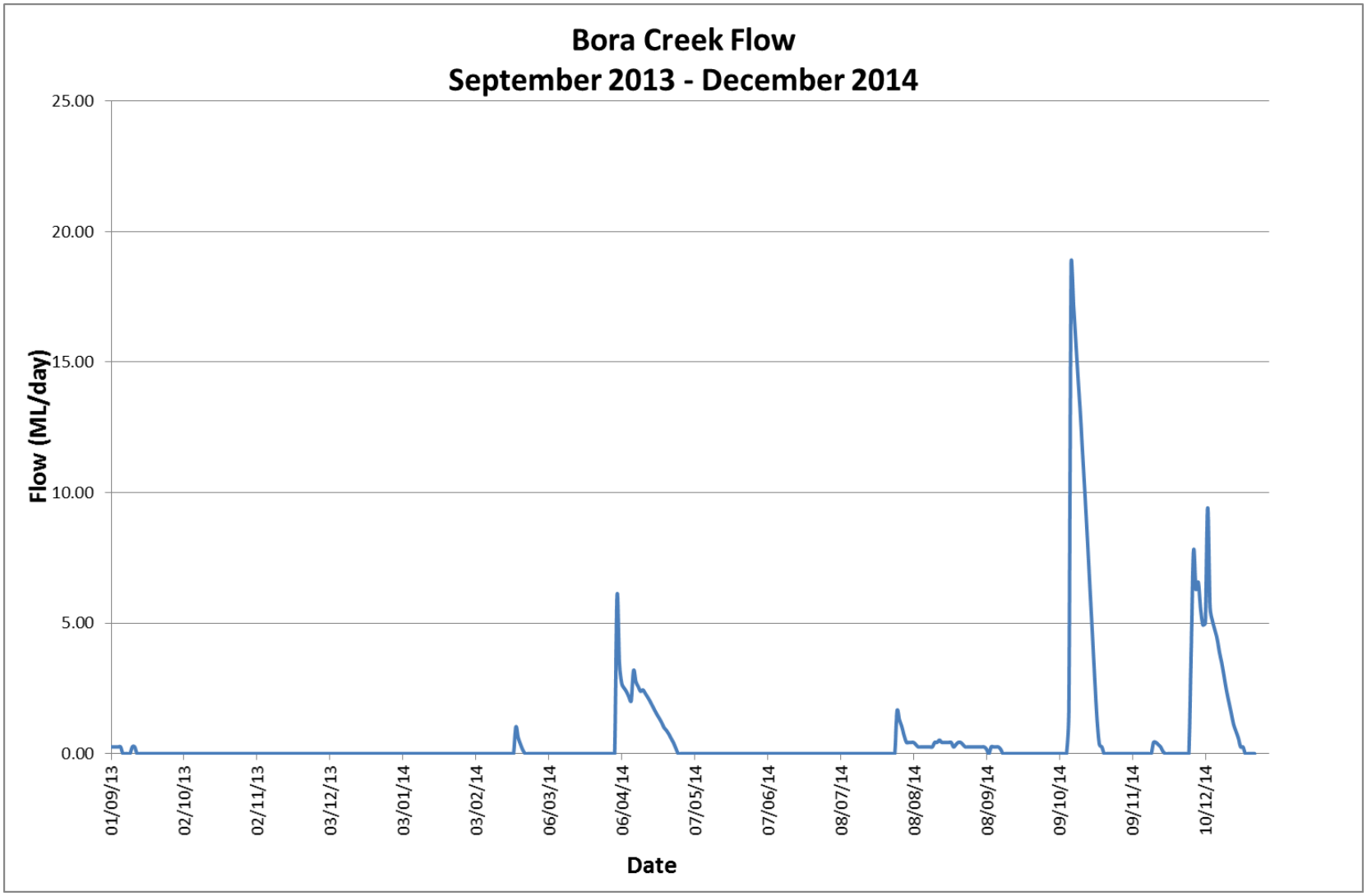


Figure 21: Flow Monitoring – Bora Creek

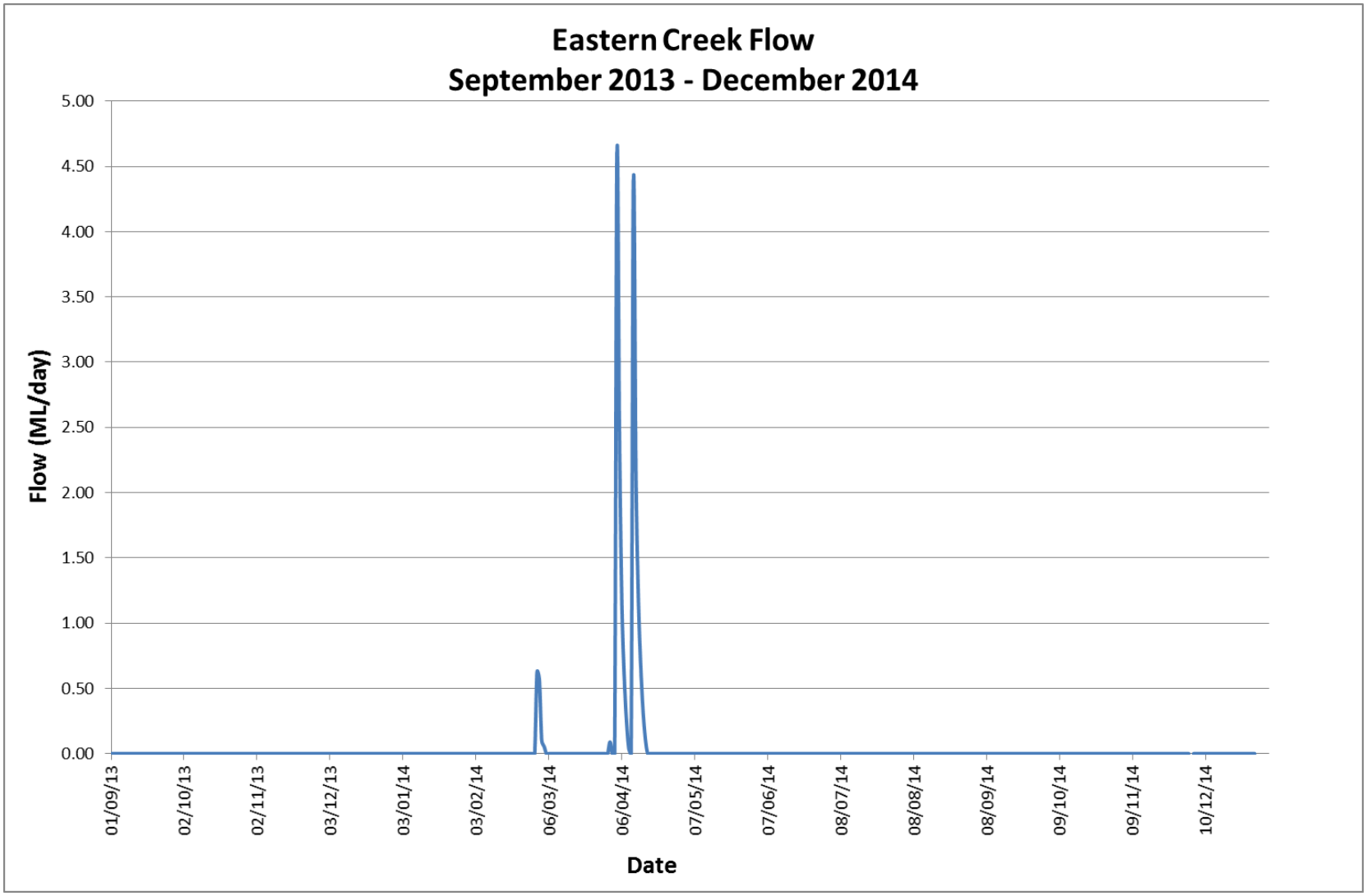


Figure 22: Flow Monitoring – Eastern Creek

3.6.8 Effluent Monitoring

MCO's Environmental Protection Licence (EPL) has a requirement for water samples to be collected from the effluent systems on a quarterly basis. The results from the sampling of the effluent systems at the Administration, CHPP and Open Cut offices are shown in **Table 32**.

Table 32: Effluent System Monitoring

Sample Location	Sample Date	Biological Oxygen Demand (mg/L)	Total Nitrogen (mg/L)	Oil & Grease (mg/L)	Total Phosphorus (mg/L)	pH	Total Suspended Solids (mg/L)
Administration	20-Nov-13	<2	41.2	<5	29.4	7.1	<5
CHPP	20-Nov-13	4	3.6	<5	0.43	7.1	14
Open Cut	20-Nov-13	9	6	<5	0.38	7.0	28
Administration	12-Feb-14	3	62	<5	22.3	6.1	6
CHPP	12-Feb-14	4	3	<5	0.18	7.6	25
Open Cut	12-Feb-14	23	6.7	<5	2.21	7.5	35
Administration	15-May-14	<2	59.6	<5	23.1	6.1	<5
CHPP	15-May-14	5	5.4	<5	0.27	7.6	42
Open Cut	15-May-14	4	5.5	<5	0.18	7.5	9
Administration	7-Aug-2014	2	107	<5	24.6	5.5	19
CHPP	7-Aug-2014	43	161	<5	25	7.8	129
Open Cut	7-Aug-2014	5	6.2	<5	0.7	7.2	56
Administration	12-Nov-2014	52	53.4	<5	23.1	6.8	40
CHPP	12-Nov-2014	56	75.2	<5	23.1	7.8	150
Open Cut	12-Nov-2014	62	59.3	<5	8.28	7.7	52

On-site waste water treatment plants treated sewage from the CHPP, administration building and open cut office with treated effluent irrigated to land. Effluent discharge is summarised in **Table 33** below. Discharge of effluent to land volumes were monitored quarterly rather than daily. MCO has commenced monitoring and recording discharge on a daily basis.

Table 33: Effluent Discharge

Release Point	Average daily release (kL/day)	Criteria (kL/day)
5 (EFF01)	1.9	25
22 (EFF02)	1.9	25
23 (EFF03)	1.9	25

3.6.9 Channel Stability Monitoring

The 2014 Channel Stability Monitoring Program was undertaken during March 2014. The extent of the program expanded to include additional reaches of Moolarben Creek (to capture any impacts of OC2) and to include baseline monitoring of Murragamba, Eastern and Wilpinjong Creeks during the reporting period.

Monitoring involved visual and written observational surveys and photographic records of each stream reach that included:

- Monitoring the reach of Bora Creek and a tributary from the western culvert of the MCO rail loop and its confluence with Goulburn River;
- Monitoring a 9km reach of Moolarben Creek upstream of Moolarben Dam;
- Monitoring at the confluence of Moolarben Creek, Sportsman Hollow Creek and the Goulburn River;
- Monitoring the reach of Murragamba Creek
- Monitoring the reach of Eastern Creek.
- Monitoring the reach of Wilpinjong Creek associated with proposed OC4.

The channel stability monitoring locations can be seen in **Figure 23**. The methodology used for this monitoring program was the *CSIRO Ephemeral Stream Assessment.* The classifications used in this methodology are shown in **Table 34** and the results from the monitoring are shown in **Table 35**.

The Monitoring Program identified that some sections of Bora Creek (BC) and Moolarben Creek (MC) remain vulnerable to erosion with areas of steep and exposed creek banks. Those areas are associated with exposed dispersive sub-soils, which hamper vegetation establishment by the development of a hard surface crust when the soil is dry, and the 'melting' nature of the soil when wet. Both creeks have been degraded by past land clearing and agricultural practices. With no major flow events occurring in either creek line over the 12 months prior to assessment due to below average rainfall, the majority of the monitoring sites were very similar with respects to stability compared to the 2013 survey. Vegetation cover remained similar throughout the creek lines and there was no apparent mass wasting or collapse of creek banks. Once again the survey recognised some sections of each creek displaying very stable environments, generally in locations which have lower gradient creek banks. There has been no further notable invasion of weed species along the creek lines since the baseline survey.

Bora Creek (BC) and the Bora Creek Tributary (BCT) remain relatively stable as a result of a similar vegetation cover and past stabilisation works. Since the baseline survey in 2009, disturbance to the creek has been restricted to native animals, with stock having been excluded from this section of the creek. The main areas of potential instability are generally located in those sections of the creek that have an incised low flow channel running between tree lined banks. Re-growth of vegetation remains slow in these areas due to the thick canopy cover. The steep, vertical banks have exposed dispersive subsoil in many locations preventing vegetation establishment and leaving the banks vulnerable to erosion.

Much of the previously placed straw mulch for rehabilitation purposes along the re-graded banks of the Bora Creek Tributary is no longer present leaving some areas prone to erosion. The likelihood for any significant erosion is considered minimal given the flatter grades of the banks, minimal lateral inflow potential and upstream catchment characteristics.

Moolarben Creek remains relatively unchanged compared to the baseline surveys. The lower reach has a stable creek bed which is heavily lined with Cumbungi. There are some isolated areas of bank erosion immediately upstream of Moolarben Dam which remain unstable. The instability is due to lateral inflows from the neighbouring cleared paddocks rather than from upstream flow. The exposed soil is very dispersive and may be saline which poses a hostile environment for vegetation establishment. Whilst the mid-reach does contain cut banks which are unstable they have remained unchanged, due to a lack of flow, to that observed during the baseline survey undertaken 5 months prior. The creek bed in the upper reaches of the creek line is stable and generally lined with thick Cumbungi. Areas of creek bank instability, due to exposed

dispersive and saline soil, remain and there has been no identifiable change since the 2013 baseline survey.

It can be concluded that the sites experiencing active erosion along Bora Creek, Bora Creek Tributary and Moolarben Creek are predominantly the result of natural influences, exacerbated by past land clearing and agricultural practices exposing dispersive sub-soils. The impact to channel stability within these creeks due to mining operations is considered negligible over the past 12 months.

During the reporting period MCO expanded the channel stability program to include the reaches of Murragamba Creek (MUC), Eastern Creek (EC) and Wilpinjong Creek (WC).

The results of this baseline channel stability monitoring survey indicated that channel stability fluctuates along both Murragamba Creek and Eastern Creek. The survey identified that some sections of both creeks are currently experiencing and are vulnerable to erosion with areas of steep and exposed creek banks. Those areas are associated with exposed dispersive sub-soils, which hamper vegetation establishment by the development of a hard surface crust when the soil is dry, and the 'melting' nature of the soil when wet. Both creeks have been degraded by past land clearing and agricultural practices. The survey also recognised some sections of both creeks displayed very stable environments, generally in locations which have lower gradient creek banks and complete vegetation coverage.

The Ephemeral Creek Assessment along Wilpinjong Creek identifies the creek as spatially variable, moving from areas of very high activity through to areas of high stability. The average classification for the creek is potentially stabilising. This is described by the CSIRO as 'the drainage line is potentially stabilising. Pooled water was recorded infrequently along the creek. There was no flowing water at the time of survey.

Animal stock activity is causing stability issues in some sections of both Murragamba Creek and Eastern Creek along with wombat activity the most dominant in the reaches with the presence of sandy-gravel alluvial soils within the creek banks.

Four sites within Murragamba Creek (MuC-pt5, MuC-pt6, MuC-pt15 and MuC-pt16) and one site from Eastern Creek (EC-pt6) were classified as being 'Very Active' under the CSIRO Ephemeral Stream Assessment. It can be concluded that the sites experiencing active erosion along Murragamba Creek and Eastern Creek are predominantly the result of natural influences, exacerbated by past land clearing and agricultural practices exposing dispersive sub-soils.

The channel stability monitoring program will continue on an annual basis or following significant flow events to monitor any changes in the channel stability of surrounding creeks.

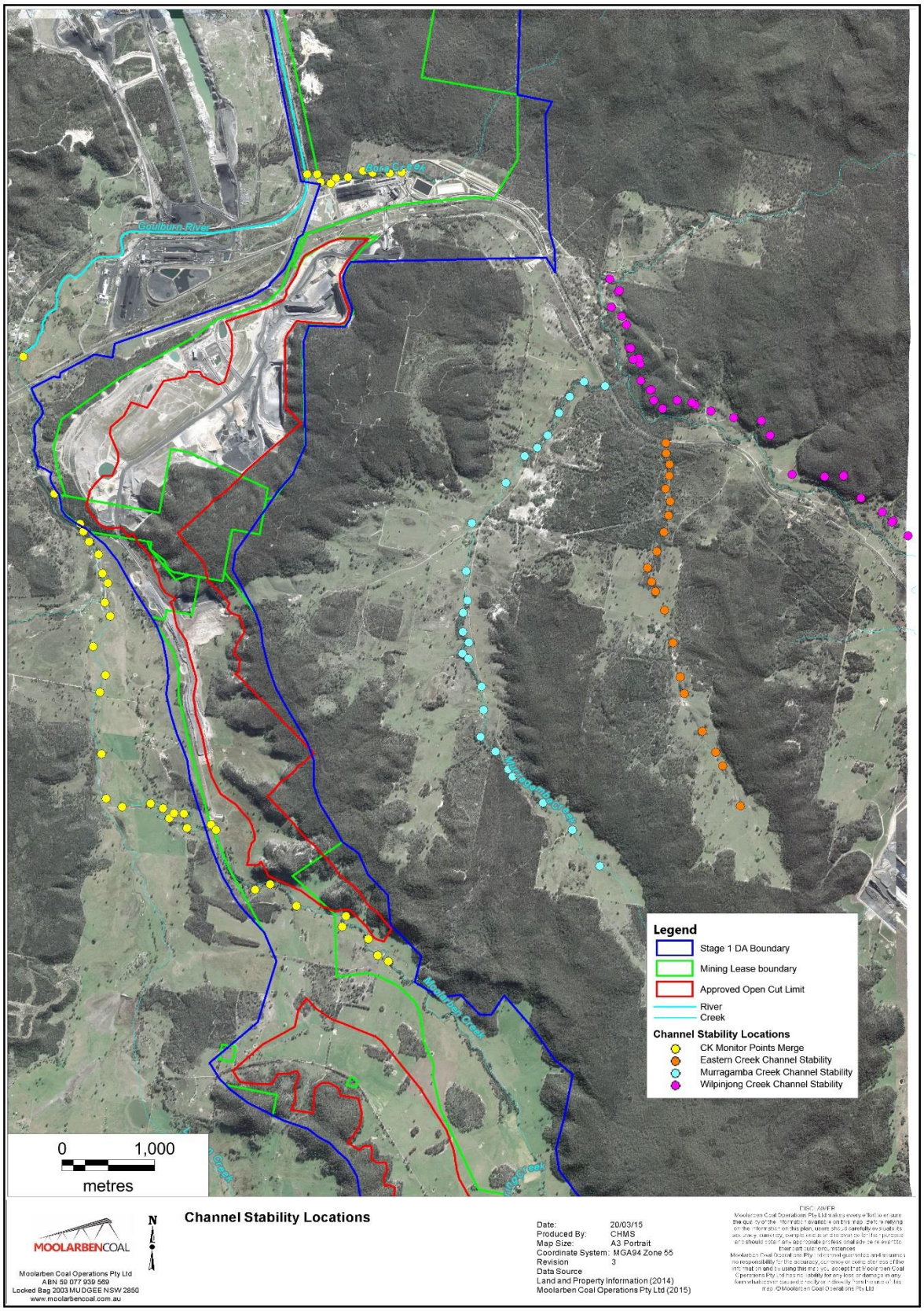


Figure 23: Channel Stability Monitoring

Table 34: Classification of Different Drainage Line States (CSIRO)

Activity Rating (%)	Classification	Discussion of Classification
80 +	Very Stable	Drainage line is very stable and likely to be in original form. It is able to withstand all flow velocities that have previously occurred in this area and only minimal monitoring is required, predominantly after high flow events, to ensure condition does not deteriorate
70-80	Stable	Drainage line is stable. It is important to assess this zone in relation to the other classifications and define whether this zone is moving from potentially stabilising to a more stable form or if it is deteriorating from a very stable form. The nature of this relationship will identify the type of monitoring required
60-69	Potentially Stabilising	Drainage line is potentially stabilising. Ongoing monitoring is required while rehabilitation works are not needed in the immediate future
50-59	Active	Drainage line is actively eroding and remedial actions are required. It is important to classify if erosion is caused primarily by upstream flows, lateral flows or unstable wall materials so that appropriate rehabilitation can be carried out.
< 50	Very Active	Drainage line is very actively eroding and immediate remedial actions are required. It is important to classify if erosion is caused primarily by upstream flows, lateral flows or unstable wall materials so that appropriate rehabilitation can be carried out.

Table 35: Classification of Channel Stability Monitoring Sites

Site Number	Classification 2009 – Background	Classification 2010	Classification 2011	Classification 2012	Classification 2013	Classification 2014	Comments
Bora Creek							
BC-pt1	Very Stable	Very Stable	Very Stable	Very Stable	Very Stable	Very Stable	No changes in stability
BC-pt2 (upstream)	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	No changes in stability
BC-pt2 (downstream)	Stable	Stable	Stable	Stable	Very Stable	Stable	No changes in stability
BC-pt3	Active/Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Slight improvement in stability over time
BC-pt4 (upstream)	Stable	Stable	Stable	Stable	Stable	Stable	No changes in stability
BC-pt4 (downstream)	Active	Potentially Stabilising	Potentially Stabilising	Stable	Stable	Stable	No changes in stability
BC-pt5	Active	Active/Potentially Stabilising	Very Active	Active	Active	Active	Slight improvement in stability over time
BC-pt6	Active	Active/Potentially Stabilising	Active	Active	Active	Active	No changes in stability
BC-pt7	Active/Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Slight improvement in stability over time
BC-pt8	Active to Very Active	Active to Very Active	Active to Very Active	Active	Active	Active	No changes in stability
BC-pt9	Very Active	Active	Active	Active	Active	Active	Slight improvement in stability over time but the area is still eroding and unstable
BC-pt10	Active	Potentially Stabilising	Potentially Stabilising	Active	Potentially Stabilising	Potentially Stabilising	Slight improvement in stability over time
BCT-pt1	N*	N*	N*	Stable	Stable	Stable	Slight improvement in stability over time
BCT-pt2 (upstream)	N*	N*	N*	Potentially Stabilising	Stable	Potentially Stabilising	Slight improvement in stability over time

Site Number	Classification 2009 – Background	Classification 2010	Classification 2011	Classification 2012	Classification 2013	Classification 2014	Comments
BCT-pt2 (downstream)	N*	N*	N*	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	No changes in stability
BCT-pt3	N*	N*	N*	Active	Active	Active	No changes in stability
Moolarben Creek							
MC-pt1	As this site is a dam the CSIRO assessment could not be applied						No change
MC-pt2	As this site is a dam the CSIRO assessment could not be applied						No change
MC-pt3	As this site is a dam the CSIRO assessment could not be applied						No change
MC-pt4	As this site is a dam the CSIRO assessment could not be applied						No change
MC-pt5	As this site is a dam the CSIRO assessment could not be applied						No change
MC-pt6	Active	Potentially Stabilising	Potentially Stabilising	Active	Active	Active	Western bank remains active however eastern side has greater vegetation cover
MC-pt7	Active	Active	Active	Active	Active	Active	No changes in stability
MC-pt8	Active	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Potentially Stabilising	Slight improvement in stability over time
MC-pt9	N*	N*	N*	N*	N*	Stable	New site in 2014
MC-pt10	N*	N*	N*	N*	N*	Very Stable	New site in 2014
MC-pt11	N*	N*	N*	N*	N*	Active	New site in 2014
MC-pt12	N*	N*	N*	N*	N*	Very Stable	New site in 2014
MC-pt13	N*	N*	N*	N*	N*	Stable	New site in 2014
MC-pt14	N*	N*	N*	N*	N*	Very Stable	New site in 2014
MC-pt15	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MC-pt16	N*	N*	N*	N*	N*	Stable	New site in 2014
	N*	N*	N*	N*	N*	Active	New site in 2014
MC-pt17	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MC-pt18	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MC-pt19	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014

Site Number	Classification 2009 – Background	Classification 2010	Classification 2011	Classification 2012	Classification 2013	Classification 2014	Comments
MC-pt20	N*	N*	N*	N*	N*	Stable	New site in 2014
MC-pt21	N*	N*	N*	N*	N*	Active	New site in 2014
MC-pt22	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MC-pt23	N*	N*	N*	N*	N*	Stable	New site in 2014
MC-pt24	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MC-pt25	N*	N*	N*	N*	N*	Stable	New site in 2014
MC-pt26	N*	N*	N*	N*	N*	Active	New site in 2014
MC-pt27	N*	N*	N*	N*	N*	Stable	New site in 2014
MC-pt28	N*	N*	N*	N*	N*	Stable	New site in 2014
MC-pt29	N*	N*	N*	N*	N*	Stable	New site in 2014
MC-pt30	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MC-pt31	N*	N*	N*	N*	N*	Very Stable	New site in 2014
Goulburn River							
GR-pt1	Very Stable	Very Stable	Very Stable	Very Stable	Very Stable	Very Stable	No changes in stability
Murragamba Creek							
MuC-pt1	N*	N*	N*	N*	N*	Active	New site in 2014
MuC-pt2	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MuC-pt3	N*	N*	N*	N*	N*	Active	New site in 2014
MuC-pt4	N*	N*	N*	N*	N*	Active	New site in 2014
MuC-pt5	N*	N*	N*	N*	N*	Very Active	New site in 2014
MuC-pt6	N*	N*	N*	N*	N*	Very Active	New site in 2014
MuC-pt7	N*	N*	N*	N*	N*	Active	New site in 2014
MuC-pt8	N*	N*	N*	N*	N*	Stable	New site in 2014
MuC-pt9	N*	N*	N*	N*	N*	Very Stable	New site in 2014
MuC-pt10	N*	N*	N*	N*	N*	Stable	New site in 2014
MuC-pt11	N*	N*	N*	N*	N*	Very Stable	New site in 2014
MuC-pt12	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014

Site Number	Classification 2009 – Background	Classification 2010	Classification 2011	Classification 2012	Classification 2013	Classification 2014	Comments
MuC-pt13	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MuC-pt14	N*	N*	N*	N*	N*	Active	New site in 2014
MuC-pt15	N*	N*	N*	N*	N*	Very Active	New site in 2014
MuC-pt16	N*	N*	N*	N*	N*	Very Active	New site in 2014
MuC-pt17	N*	N*	N*	N*	N*	Active	New site in 2014
MuC-pt18	N*	N*	N*	N*	N*	Very Stable	New site in 2014
MuC-pt19	N*	N*	N*	N*	N*	Very Stable	New site in 2014
MuC-pt20	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MuC-pt21	N*	N*	N*	N*	N*	Stable	New site in 2014
MuC-pt22	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
MuC-pt23	N*	N*	N*	N*	N*	Very Stable	New site in 2014
MuC-pt24	N*	N*	N*	N*	N*	Very Stable	New site in 2014
MuC-pt25	N*	N*	N*	N*	N*	Very Stable	New site in 2014
Eastern Creek							
EC-pt1	N*	N*	N*	N*	N*	Active	New site in 2014
EC-pt2	N*	N*	N*	N*	N*	Very Stable	New site in 2014
EC-pt3	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
EC-pt4	N*	N*	N*	N*	N*	Active	New site in 2014
EC-pt5	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
EC-pt6	N*	N*	N*	N*	N*	Very Active	New site in 2014
EC-pt7	N*	N*	N*	N*	N*	Active	New site in 2014
EC-pt8	N*	N*	N*	N*	N*	Active	New site in 2014
EC-pt9	N*	N*	N*	N*	N*	Active	New site in 2014
EC-pt10	N*	N*	N*	N*	N*	Active	New site in 2014
EC-pt11	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
EC-pt12	N*	N*	N*	N*	N*	Active	New site in 2014

Site Number	Classification 2009 – Background	Classification 2010	Classification 2011	Classification 2012	Classification 2013	Classification 2014	Comments
EC-pt13	N*	N*	N*	N*	N*	Very Stable	New site in 2014
EC-pt14	N*	N*	N*	N*	N*	Active	New site in 2014
EC-pt15	N*	N*	N*	N*	N*	Very Stable	New site in 2014
EC-pt16	N*	N*	N*	N*	N*	Active	New site in 2014
EC-pt17	N*	N*	N*	N*	N*	Very Stable	New site in 2014
EC-pt18	N*	N*	N*	N*	N*	Very Stable	New site in 2014
EC-pt19	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
EC-pt20	N*	N*	N*	N*	N*	Active	New site in 2014
Wilpinjong Creek							
WC-pt1	N*	N*	N*	N*	N*	Active	New site in 2014
WC-pt2	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
WC-pt3	N*	N*	N*	N*	N*	Active	New site in 2014
WC-pt4	N*	N*	N*	N*	N*	Very Active	New site in 2014
WC-pt5	N*	N*	N*	N*	N*	Very Active	New site in 2014
WC-pt6	N*	N*	N*	N*	N*	Stable	New site in 2014
WC-pt7	N*	N*	N*	N*	N*	Stable	New site in 2014
WC-pt8	N*	N*	N*	N*	N*	Stable	New site in 2014
WC-pt9	N*	N*	N*	N*	N*	Stable	New site in 2014
WC-pt10	N*	N*	N*	N*	N*	Active	New site in 2014
WC-pt11	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
WC-pt12	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
WC-pt13	N*	N*	N*	N*	N*	Stable	New site in 2014
WC-pt14	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
WC-pt15	N*	N*	N*	N*	N*	Active	New site in 2014
WC-pt16	N*	N*	N*	N*	N*	Active	New site in 2014
WC-pt17	N*	N*	N*	N*	N*	Active	New site in 2014
WC-pt18	N*	N*	N*	N*	N*	Very Stable	New site in 2014

Site Number	Classification 2009 – Background	Classification 2010	Classification 2011	Classification 2012	Classification 2013	Classification 2014	Comments
WC-pt19	N*	N*	N*	N*	N*	Very Stable	New site in 2014
WC-pt20	N*	N*	N*	N*	N*	Very Stable	New site in 2014
WC-pt21	N*	N*	N*	N*	N*	Active	New site in 2014
WC-pt22	N*	N*	N*	N*	N*	Active	New site in 2014
WC-pt23	N*	N*	N*	N*	N*	Potentially Stabilising	New site in 2014
WC-pt24	N*	N*	N*	N*	N*	Very Stable	New site in 2014
WC-pt25	N*	N*	N*	N*	N*	Stable	New site in 2014
WC-pt26	N*	N*	N*	N*	N*	Very Stable	New site in 2014

* = Not included in monitoring program at that time.

3.6.10 Activities in the Next Reporting Period

Surface water monitoring will continue to be undertaken with the results to be provided in the next AEMR.

3.7 GROUND WATER MANAGEMENT

3.7.1 Activities This Reporting Period

During the reporting period MCO continued to operate in accordance with its Water Management Plan (WMP). The WMP includes a process for monitoring and the review of data on a monthly basis against trigger levels. This review was ongoing throughout the reporting period.

A limit of 2.7ML was extracted from the southern borefields with no observed impacts on overlying alluvial aquifers. Groundwater and rainfall run-off was pumped from the open-cut pits.

3.7.2 Groundwater Monitoring

Piezometers have been installed to monitor water level and water quality associated with lithological units. These include:

- Quaternary Alluvium;
- Tertiary paleochannel deposits;
- Upper Triassic (and overlying Jurassic where present);
- Lower Triassic;
- Upper Permian coal measures;
- Middle Permian coal measures;
- Ulan Seam coal measures;
- Shoalhaven Group (Marrangaroo Formation and Nile SubGroup); and
- Basement (consisting mostly of granites and metavolcanics).

During the reporting period MCO monitored an extensive network of monitoring bores with depths ranging from less than 10m to over 150m. The locations of these piezometers are shown in **Figure 4**. Groundwater monitoring locations are sampled monthly for standing water level and chemical analysis is conducted in accordance with the WMP.

Trigger values have been developed to act as triggers for further investigations into groundwater quality and depth. These triggers can be seen in **Table 36** and **Table 37**. The 80th percentile figure is used for internal investigation purposes only. If an investigation into results outside the maximum anticipated range, including predicted impacts, finds that MCO is responsible for this result, it will be treated as a non-compliance and reported to regulators and affected landowners. If the investigation finds that MCO is not responsible no further action will be taken.

Table 36: Trigger Levels for Key Groundwater Monitoring Parameters

Site No.	pH		Electrical Conductivity (µS/cm)		Water Level (mAHD)		Justification for Monitoring Site
	80th Percentile Trigger Value	Maximum Range Reported	80th Percentile Trigger Value	Maximum Reported	80th Percentile Trigger Value	Minimum Reported	
PZ003	6.5-8.0	5.7-7.2	2,200	3,210	470.545	470.428	Located near OC3
PZ004	6.5-8.0	6.0-8.0	4,300	4,400	490.998	489.088	Located near OC3
PZ018	6.5-8.0	4.8-6.9	2,200	2,200	451.855	451.463	Background for Stage 2
PZ039	6.5-8.0	5.5-7.3	2,200	2,200	417.482	417.225	Background for Stage 2
PZ040b	6.5-8.0	5.5-7.1	2,200	2,200	419.740	419.444	Background for Stage 2
PZ041b	6.5-8.0	5.2-7.1	6,200	6,300	415.313	412.103	Background for Stage 2
PZ043a	6.5-8.0	5.8-7.2	2,552	2,600	489.574	489.318	Located near OC3
PZ043b	6.5-8.0	3.5-4.9	4,700	4,700	493.957	493.895	Located near OC3
PZ044	6.5-8.0	5.6-7.5	3,000	3,000	479.321	478.695	Located near OC3
PZ050b	6.5-8.0	5.5-7.5	2,200	2,200	432.031	431.711	Background for Stage 2
PZ050c	6.5-8.0	5.5-12.5	2,200	2,500	439.508	439.372	Background for Stage 2
PZ055	6.5-8.0	5.2-7.1	2,200	2,200	See Table 37		Located near OC1
PZ058	6.5-8.0	2.5-4.9	11,880	16,000	467.628	467.543	Located near OC3
PZ072a	6.5-8.0	6.2-7.9	2,200	2,200	496.112	494.852	Located near OC3
PZ072c	6.5-8.0	6.2-7.9	3,500	3,500	503.998	503.268	Located near OC3
PZ074	6.5-8.0	5.7-7.6	4,980	5,170	501.422	501.371	Located near OC3
PZ101b	6.5-8.0	6.0-8.0	2,200	2,200	363.858	363.484	Located above UG4
PZ101c	6.5-8.0	5.9-11.9	2,200	3,600	see Table 38		Located above UG4
PZ102a	6.5-8.0	6.1-8.3	2,432	2,550	357.997	355.627	Located above UG4
PZ102b	6.5-8.0	5.9-7.9	2,500	2,540	355.354	354.769	Located above UG4
PZ103a	6.5-8.0	5.4-8.1	2,200	2,200	357.927	355.985	Located above UG4
PZ103b	6.5-8.0	5.1-9.5	2,200	2,200	391.162	366.970	Located above UG4
PZ103c	6.5-8.0	5.1-13.1	2,200	13,000	see Table 38		Located above UG4
PZ104	6.5-8.0	5.9-13.1	8,360	8,900	380.681	380.166	Located near Southern Borefield
PZ105a	6.5-8.0	5.3-7.8	2,200	2,200	360.224	359.214	Located above UG4
PZ105b	6.5-8.0	6.2-7.9	2,200	2,200	376.660	375.052	Located above UG4
PZ105c	6.5-8.0	5.1-6.8	2,200	2,200	see Table 38		Located above UG4
PZ106a	6.5-8.0	5.8-12.3	2,200	3,800	427.943	424.817	Background for Stage 2
PZ106b	6.5-8.0	4.9-8.2	2,200	2,200	502.261	502.032	Background for Stage 2
PZ107	6.5-8.0	4.7-7.1	2,200	2,200	432.583	432.511	Background for Stage 2
PZ108R	6.5-8.0	5.6-8.0	2,200	2,200	333.953	332.843	Located near UG4
PZ109	6.5-8.0	6.1-12.3	2,200	2,200	383.045	382.990	Located near UG4
PZ111	6.5-8.0	5.8-7.0	2,200	2,200	379.794	379.703	Background for Stage 2
PZ112b	6.5-8.0	4.3-6.7	7,300	8,100	479.334	479.164	Background for Stage 2
PZ125	6.5-8.0	5.0-6.7	7,300	8,100	412.648	412.588	Located near OC1
PZ127	Not applicable due to vibrating wire piezometer being installed						Background for Stage 2
PZ128	Not applicable due to vibrating wire piezometer being installed						Located above UG4
PZ129	Not applicable due to vibrating wire piezometer being installed						Located near UG4
PZ130	Not applicable due to vibrating wire piezometer being installed						Background for Stage 2
PZ131	6.5-8.0	5.6-7.2	6,438	6,590	433.468	433.388	Background for Stage 2
PZ134	6.5-8.0	5.1-6.1	4,800	4,800	431.459	431.059	Background for Stage 2
PZ137	6.5-8.0	5.1-6.7	2,200	2,200	461.020	460.922	Background for Stage 2
PZ141	6.5-8.0	4.2-5.4	5,200	5,300	461.723	461.623	Background for Stage 2
PZ149	6.5-8.0	5.1-6.7	5,100	5,700	467.739	467.196	Background for Stage 2
PZ150	6.5-8.0	5.1-6.4	5,190	6,700	377.191	377.085	Background for Stage 2
PZ151	6.5-8.0	5.7-7.0	2,200	2,200	374.567	374.510	Background for Stage 2

Site No.	pH		Electrical Conductivity (µS/cm)		Water Level (mAHD)		Justification for Monitoring Site
	80th Percentile Trigger Value	Maximum Range Reported	80th Percentile Trigger Value	Maximum Reported	80th Percentile Trigger Value	Minimum Reported	
PZ152	6.5-8.0	5.1-6.4	6,800	6,800	442.200	442.000	Background for Stage 2
PZ155	6.5-8.0	5.8-6.6	7,980	8,000	438.042	437.979	Background for Stage 2
PZ156	6.5-8.0	4.3-7.1	2,200	2,200	372.591	372.278	Background for Stage 2
PZ157	6.5-8.0	5.9-7.6	2,200	2,200	373.723	373.153	Background for Stage 2
PZ164	6.5-8.0	3.4-5.1	9,200	10,000	See Table 37		Background for Stage 2
PZ165	6.5-8.0	5.9-6.2	2,200	2,200	See Table 37		Background for Stage 2
PZ168	6.5-8.0	5.8-7.0	2,200	2,200	427.836	427.800	Background for Stage 2
PZ170	6.5-8.0	5.4-6.7	4,412	4,700	420.984	420.926	Background for Stage 2
PZ172	6.5-8.0	5.7-6.4	7,264	7,400	See Table 37		Background for Stage 2
PZ173	6.5-8.0	6.3-7.2	14,000	14,000	See Table 37		Background for Stage 2
PZ174	6.5-8.0	5.4-6.5	8,860	11,900	418.109	418.068	Background for Stage 2
PZ175	6.5-8.0	5.3-7.0	16,472	18,000	419.965	419.323	Background for Stage 2
PZ176	6.5-8.0	5.0-7.8	2,200	2,200	See Table 37		Background for Stage 2
PZ177	6.5-8.0	5.8-6.7	8,260	8,500	See Table 37		Background for Stage 2
PZ179	Not applicable due to vibrating wire piezometer being installed				See Table 37		Located near production bore TB179
PZ181	6.5-8.0	5.3-5.9	2,200	2,200	See Table 37		Background for Stage 2
PZ184	6.5-8.0	3.9-5.6	4,360	4,460	412.456	412.299	Background for Stage 2
PZ186	6.5-8.0	6.5-8.0	2,200	2,200	New site – insufficient data	New site – insufficient data	Between production bore TB52a and Wilpinjong Creek
PZ187	6.5-8.0	6.5-8.0	2,200	2,200	New site – insufficient data	New site – insufficient data	Between production bore TB52a and Wilpinjong Creek
PZ188	6.5-8.0	6.5-8.0	2,200	2,200	New site – insufficient data	New site – insufficient data	Between production bore TB179 and Wilpinjong Creek
PZ189	6.5-8.0	6.5-8.0	2,200	2,200	New site – insufficient data	New site – insufficient data	Between production bore TB179 and Wilpinjong Creek
PZ191	6.5-8.0	6.5-8.0	2,200	2,200	New site – insufficient data	New site – insufficient data	Between production bore TB190 and Bora Creek
TB103	6.5-8.0	5.7-7.3	2,200	2,200	369.665	367.730	Potential production bore location
TB105	6.5-8.0	6.8-7.8	2,200	2,200	359.924	359.190	Potential production bore location
OB001	6.5-8.0	4.7-7.6	2,200	2,200	Not applicable as site is a spring		
OB002	6.5-8.0	5.5-7.9	2,200	2,200	495.056	492.046	
OB003	6.5-8.0	5.7-7.7	2,200	2,900	471.662	471.572	
OB004	6.5-8.0	3.1-4.8	2,200	2,200	Not applicable as site is a spring		

Note: Shaded cells indicate ANZECC (2000) criteria

Unshaded cells indicate site developed criteria

There are nine sites within 5km of Open Cut 1 that are predicted to show drawdown from mining operations. As it is predicted that there will be impact on these sites their trigger levels have been calculated differently and can be seen in Table 37. These trigger levels are set on an exceedance of 5% of the predicted drawdown following two years of mining and water extraction from the approved bores.

Table 37: Water Level Triggers for Selected Sites

Site No.	Minimum Observed/Predicted Groundwater Level (mAHD)	Trigger Level (mAHD)
PZ055	421.83	421.50
PZ164	431.49	431.46
PZ165	435.36	435.16
PZ172	421.08	421.05
PZ173	421.82	421.47
PZ176	416.36	416.34
PZ177	415.81	415.77
PZ179 (28m) PZ179 (33m) PZ179 (82m) PZ179 (145m)	418.77 413.15 349.40 351.15	418.68 412.35 344.90 347.95
PZ181	419.71	419.67

The cease-to-pump criteria for the licensed monitoring bores surrounding the production bores are provided in **Table 38** and have been determined based on deviation from the seasonal/climatic trends established in the baseline monitoring.

Table 38: Extraction Restriction Criteria

Monitoring Bore	Expected Drawdown Level (mAHD)	Cease-to-Pump Trigger Levels (mAHD)
PZ187	416.80	415.87
PZ188	415.41	414.79
PZ101c	NA	380.1
PZ103c	NA	397.7
PZ105c	NA	376.4
PZ129(35m)	NA	387.0

Summaries of the depth monitoring results from all piezometers (including vibrating wire piezometers) are presented in **Figure 24** to **Figure 36**. A summary of pH from all piezometers is presented in **Figure 37** to **Figure 43**. **Figure 44** to **Figure 50** present the groundwater electrical conductivity from all piezometers.

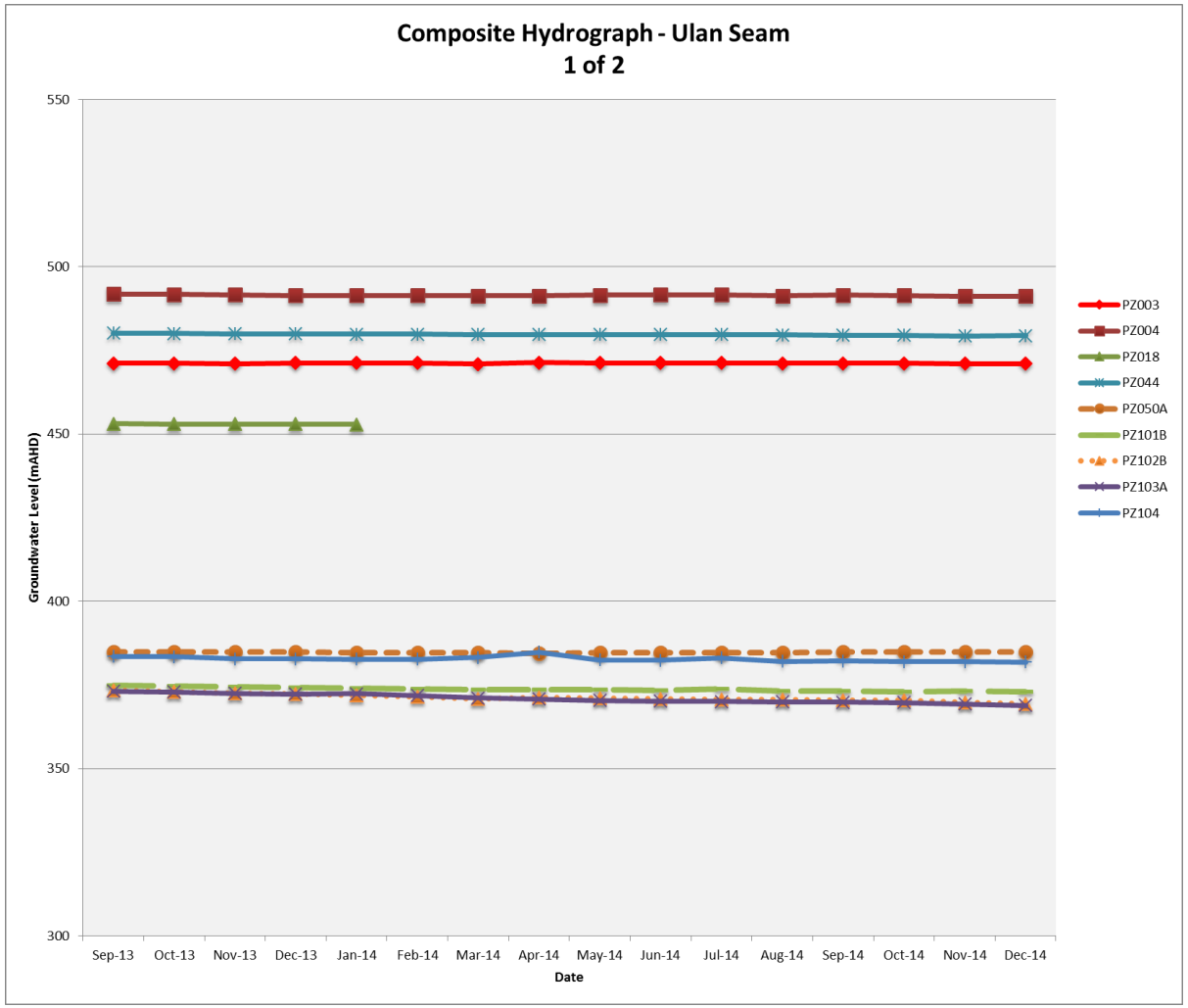


Figure 24: Composite Hydrograph 1

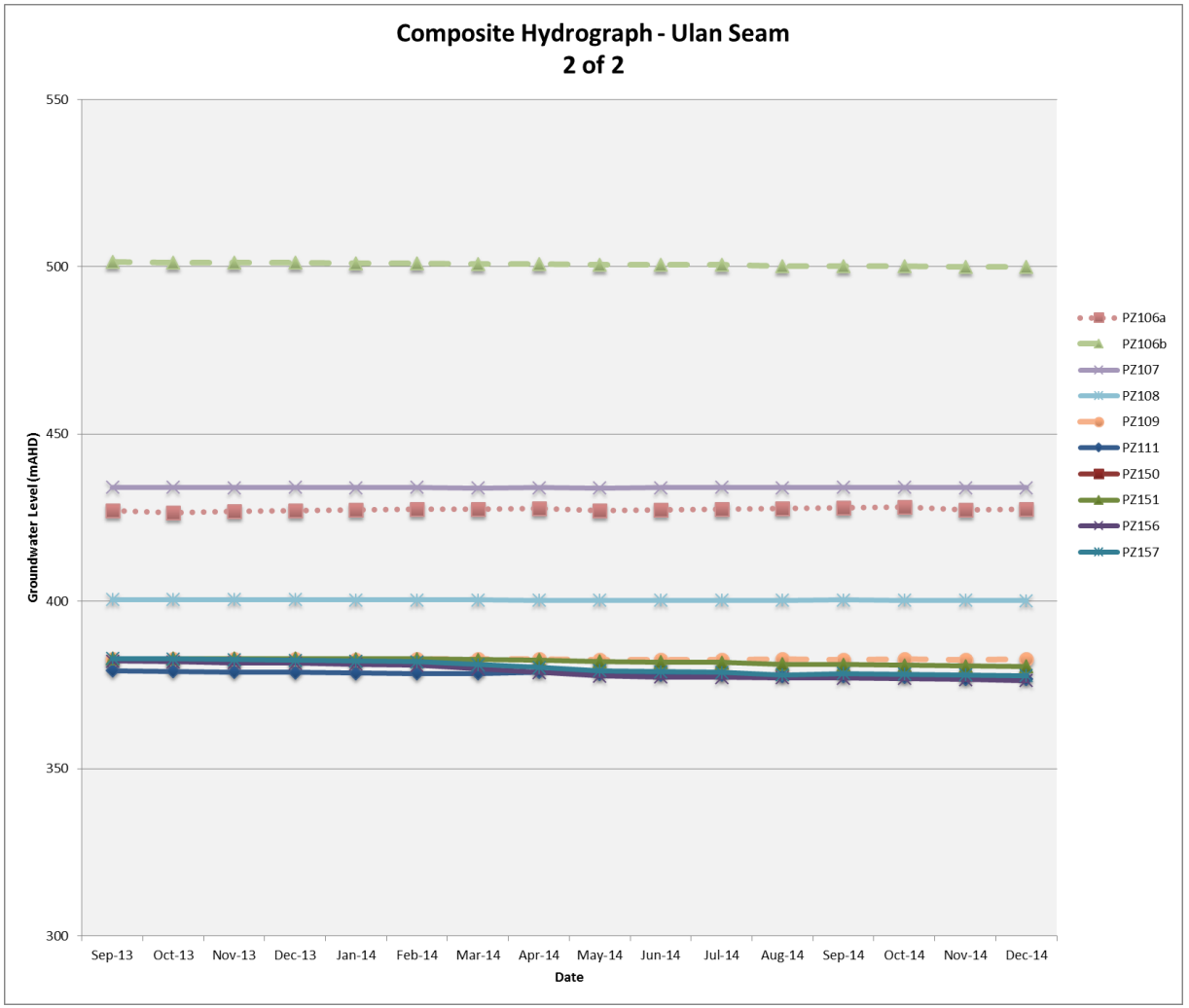


Figure 25: Composite Hydrograph 2

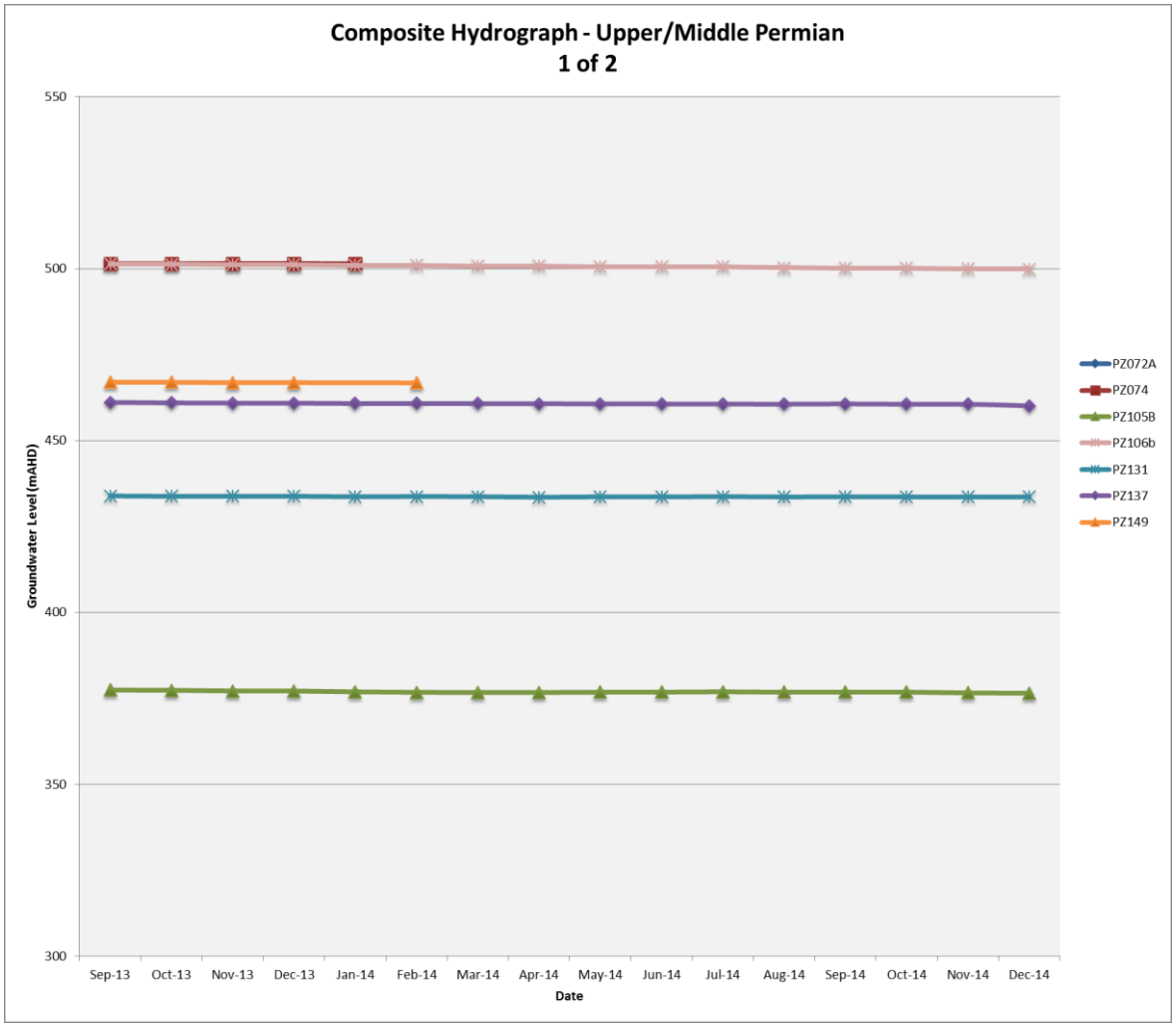


Figure 26: Composite Hydrograph 3

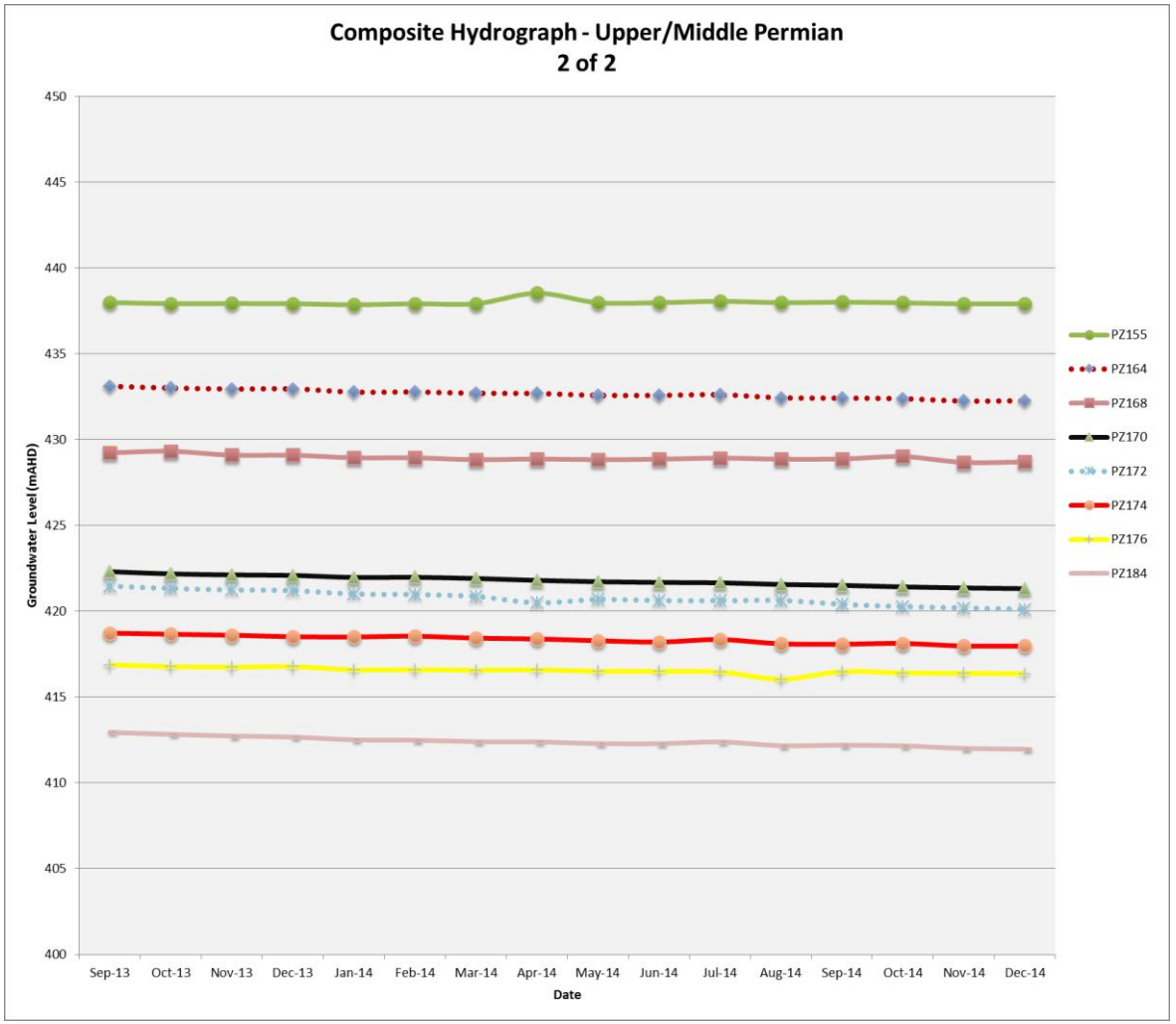


Figure 27: Composite Hydrograph 4

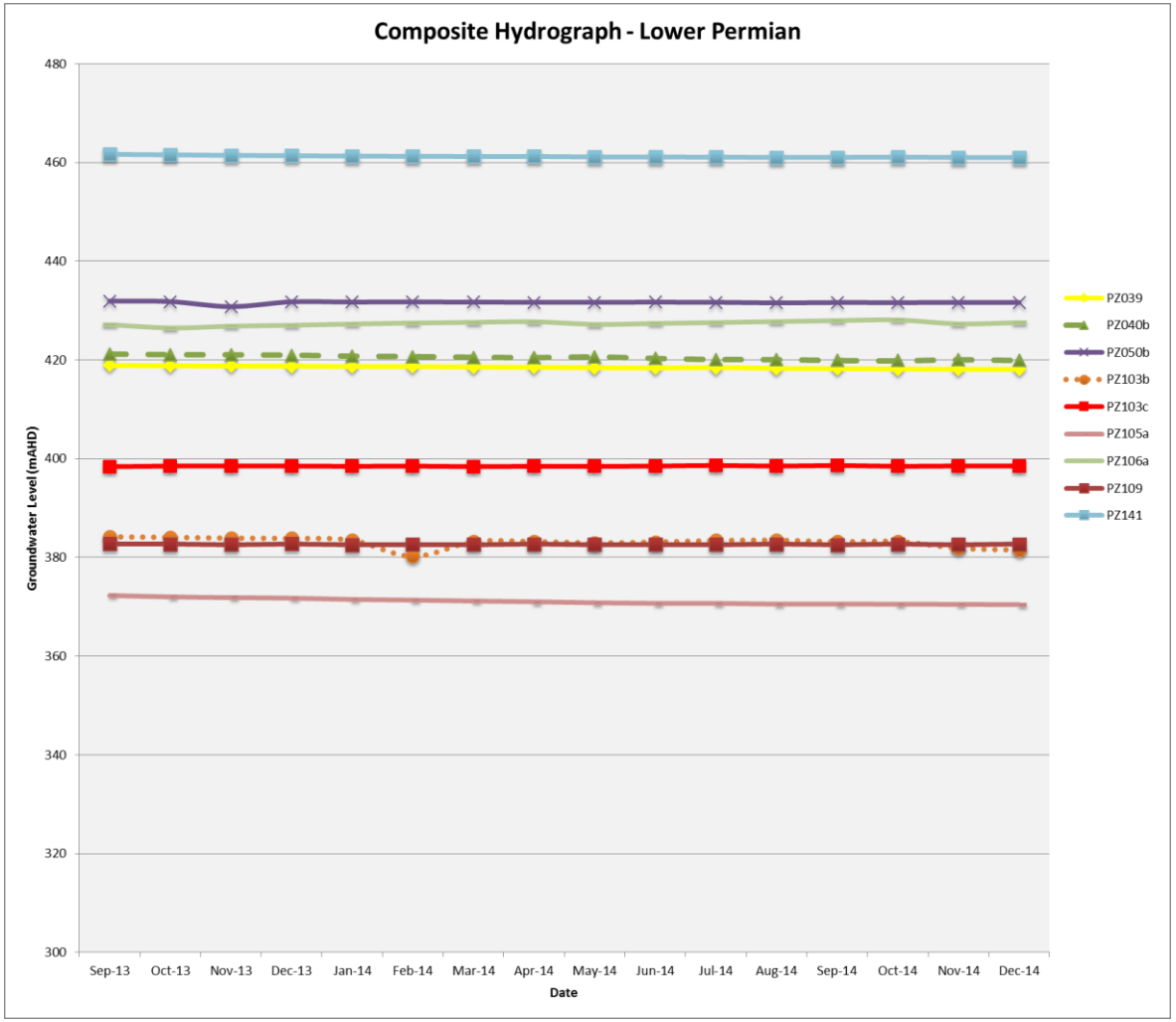


Figure 28: Composite Hydrograph 5

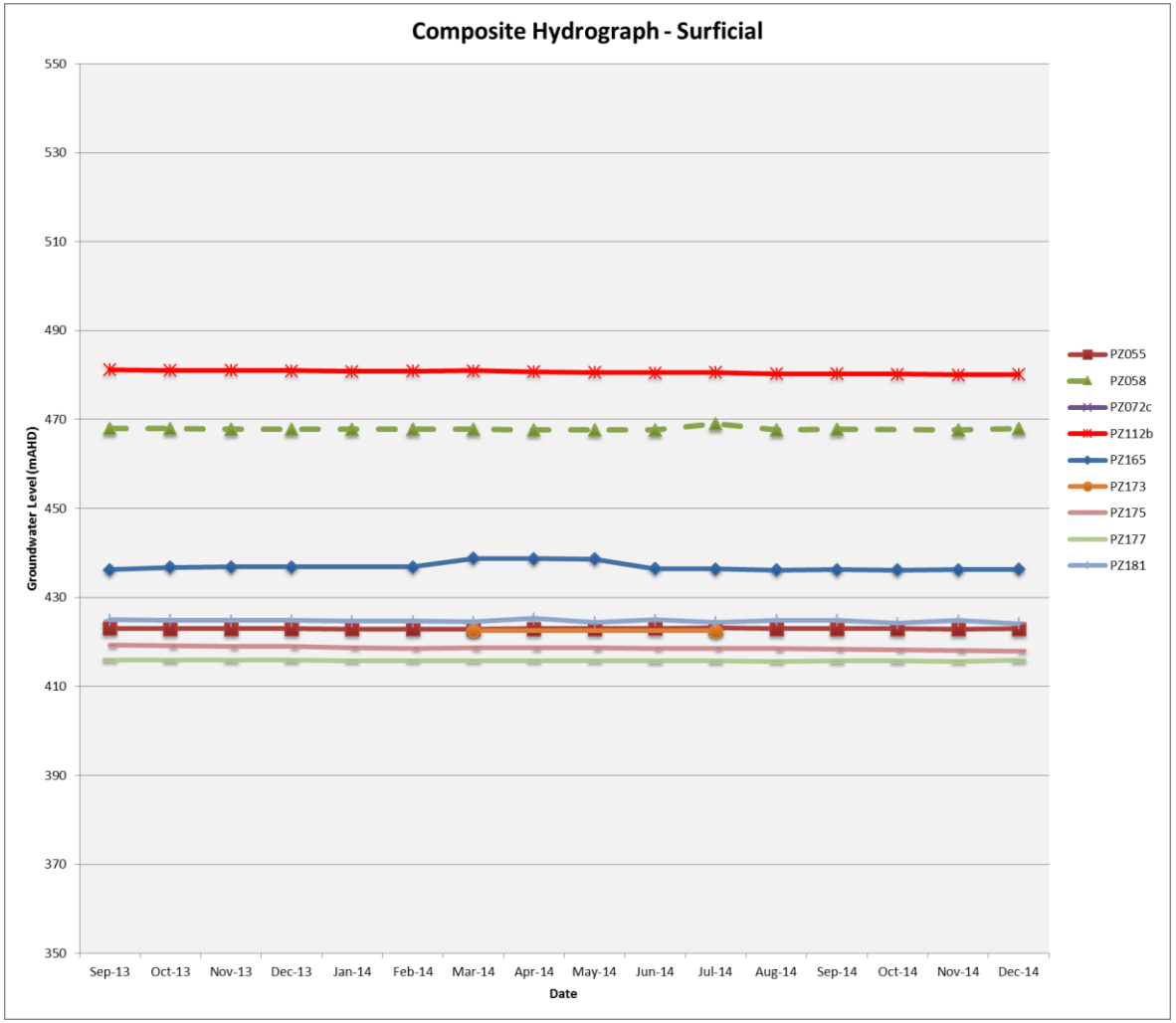


Figure 29: Composite Hydrograph 6

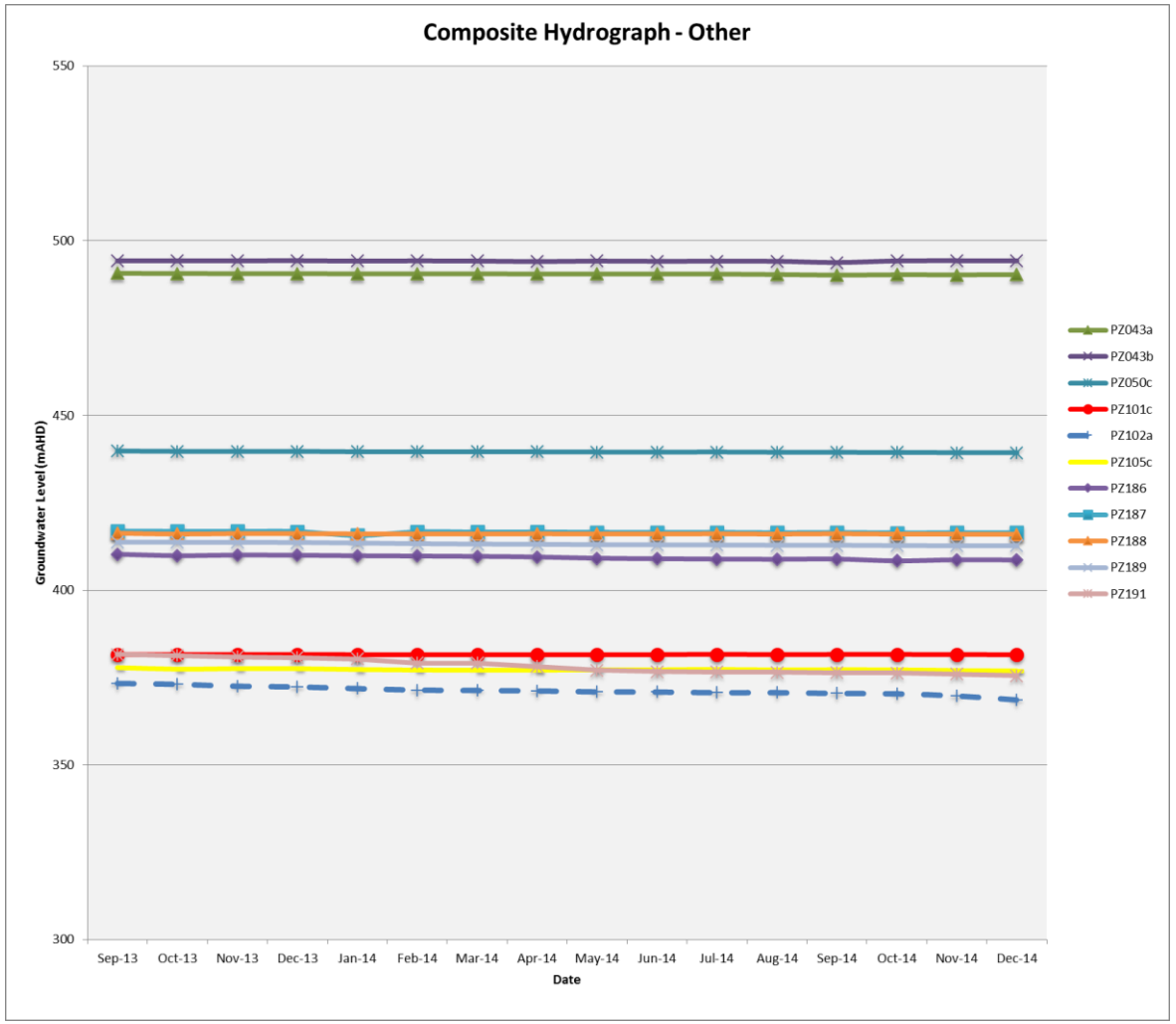


Figure 30: Composite Hydrograph 7

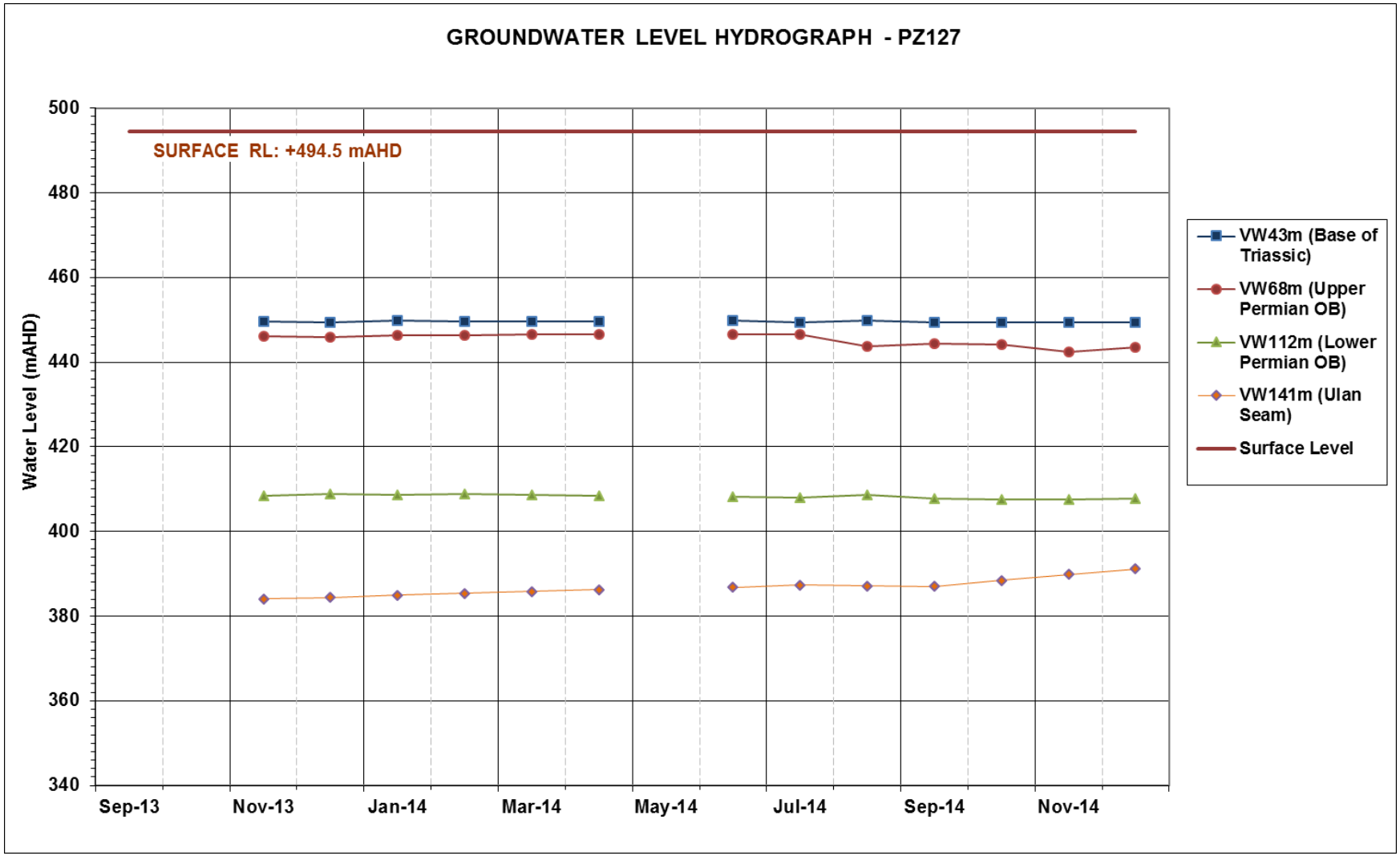


Figure 31: Hydrograph PZ127

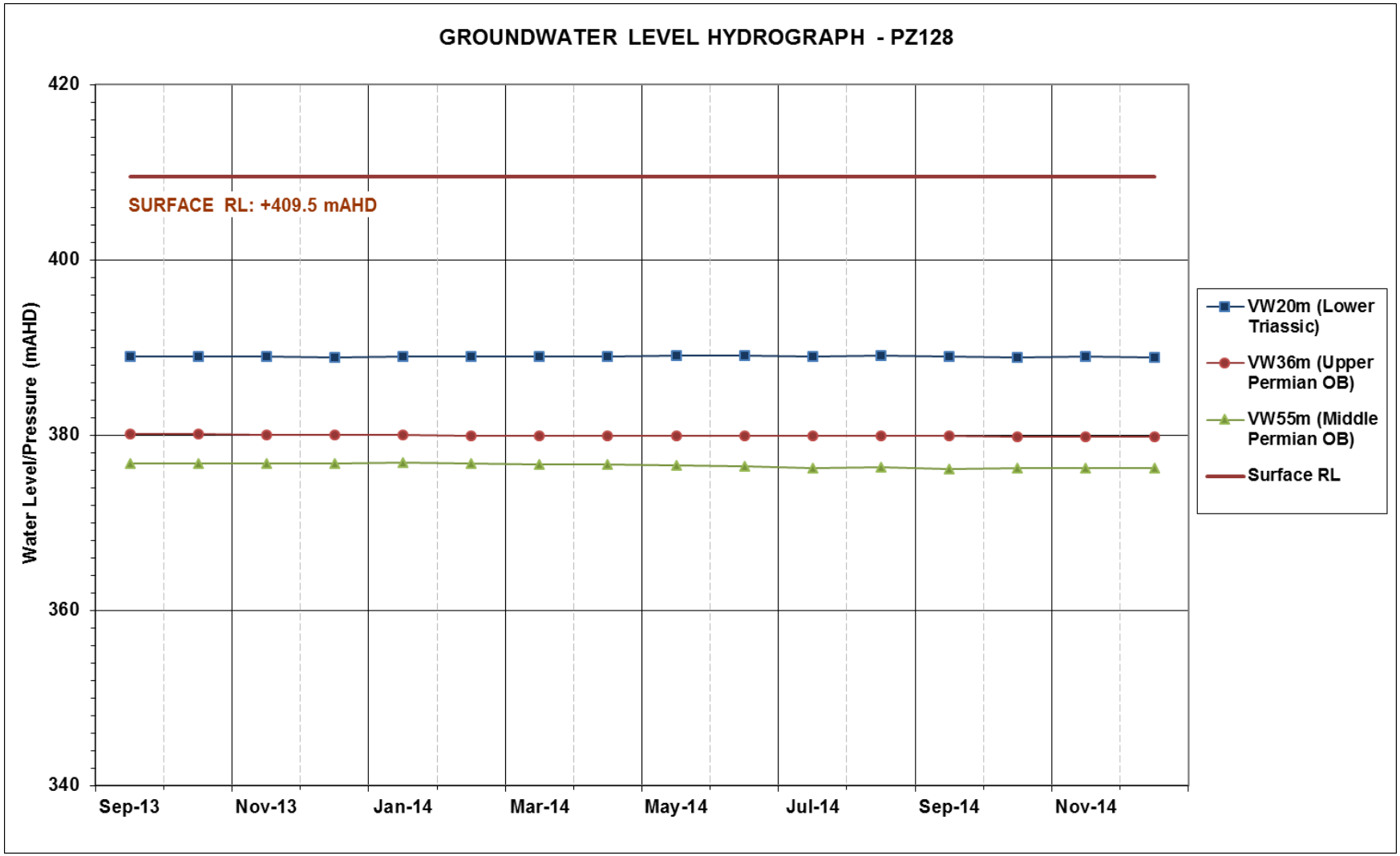


Figure 32: Hydrograph PZ128

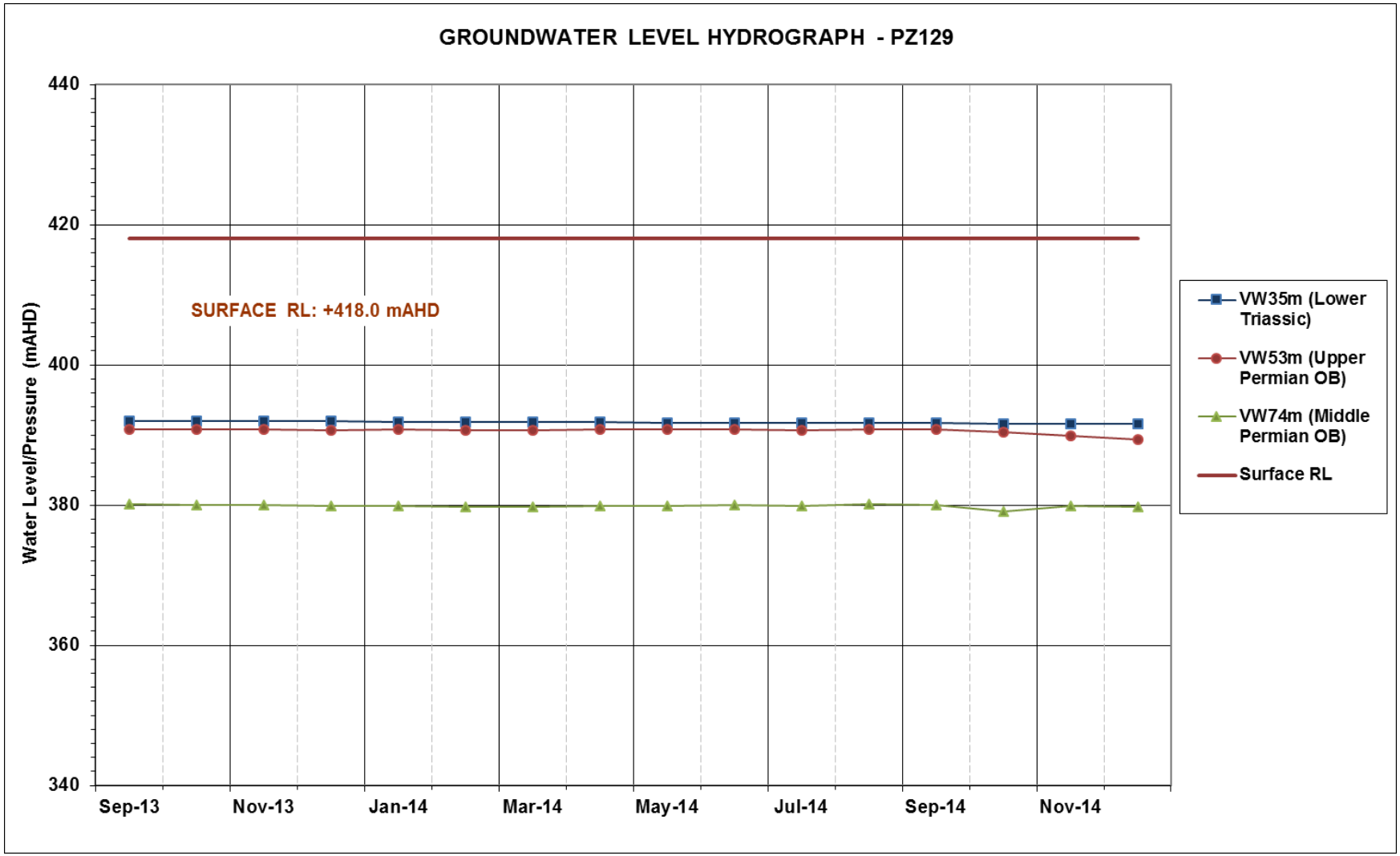


Figure 33: Hydrograph PZ129

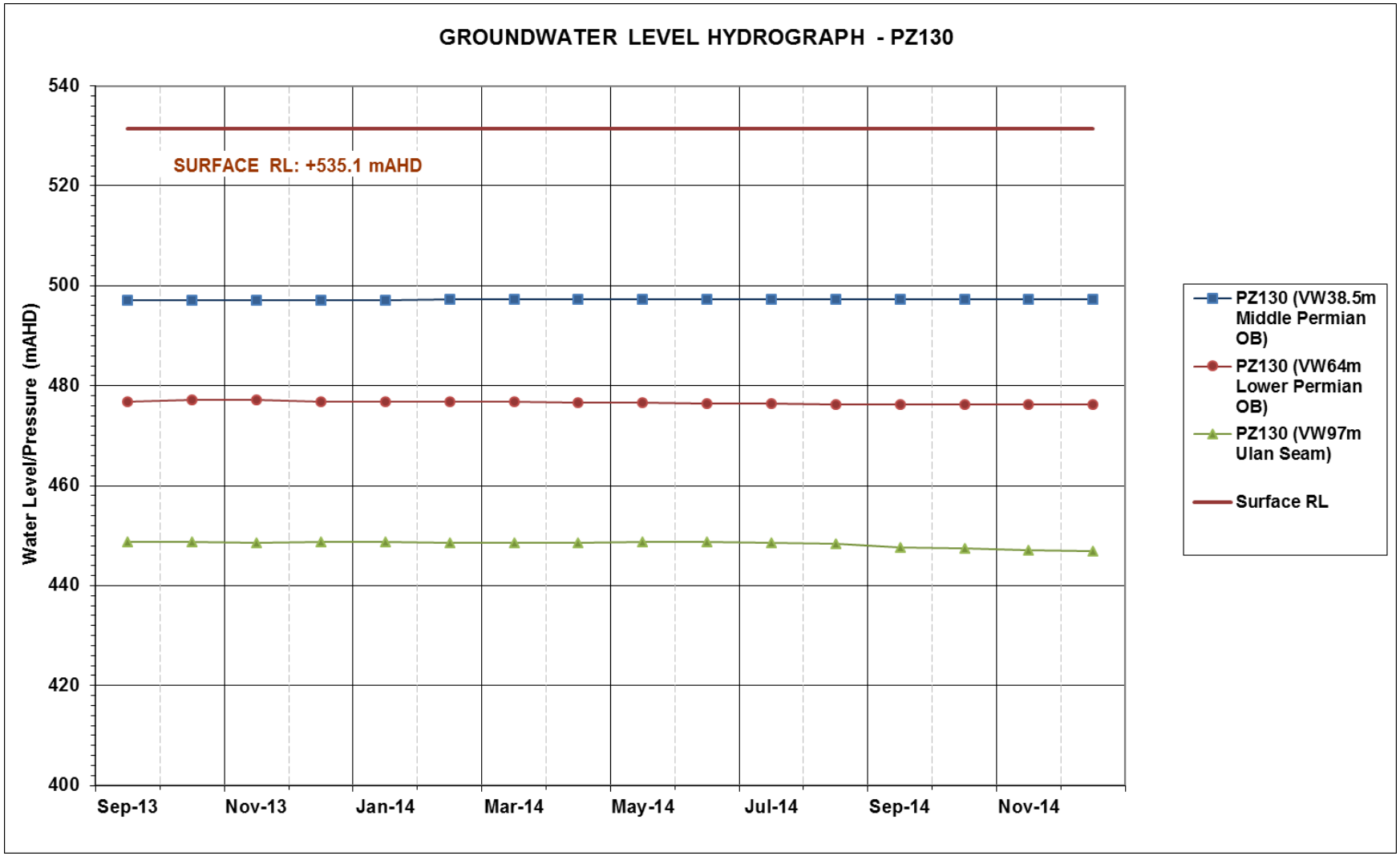


Figure 34: Hydrograph PZ130

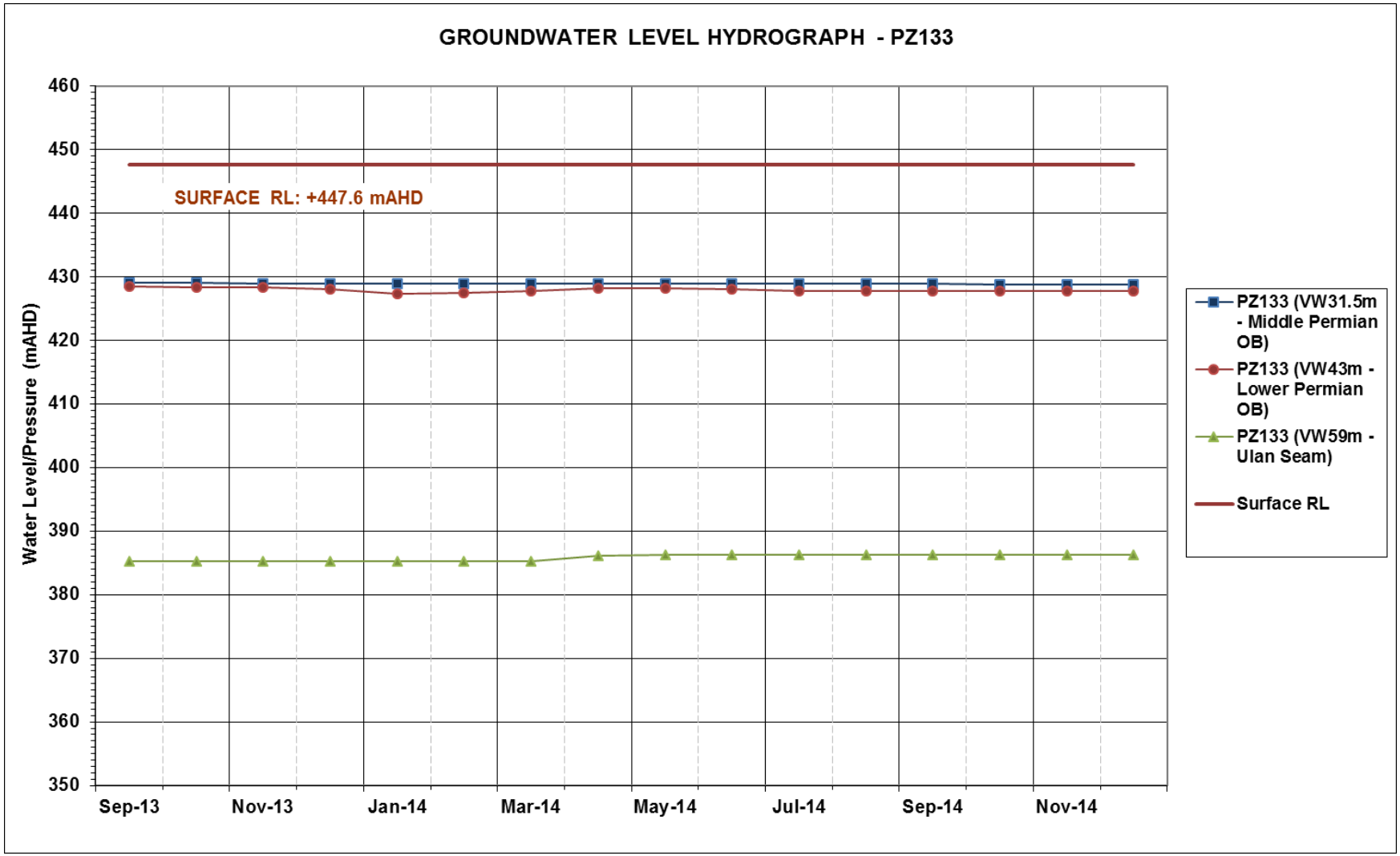


Figure 35: Hydrograph PZ133

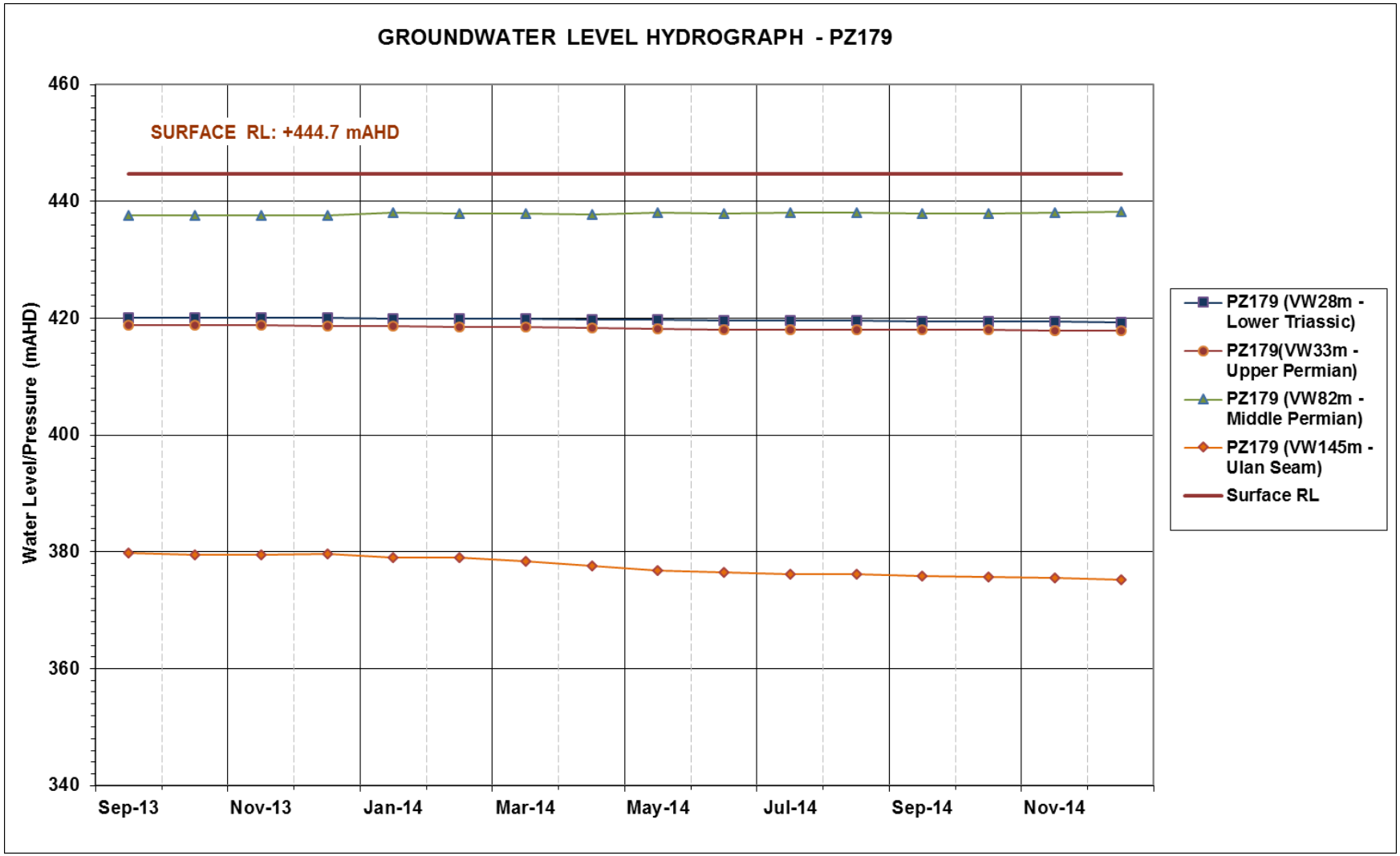


Figure 36: Hydrograph PZ179

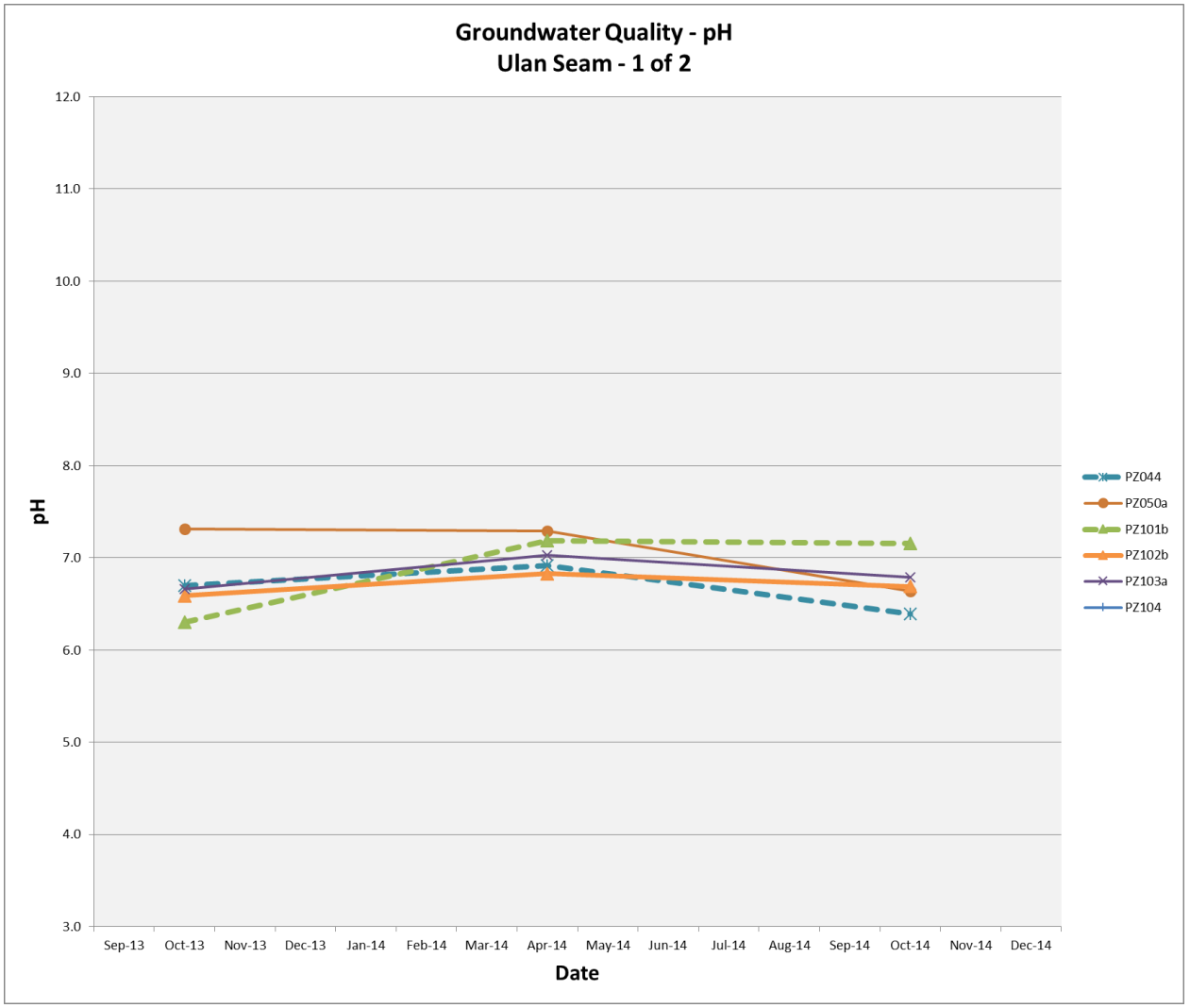


Figure 37: Groundwater pH 1

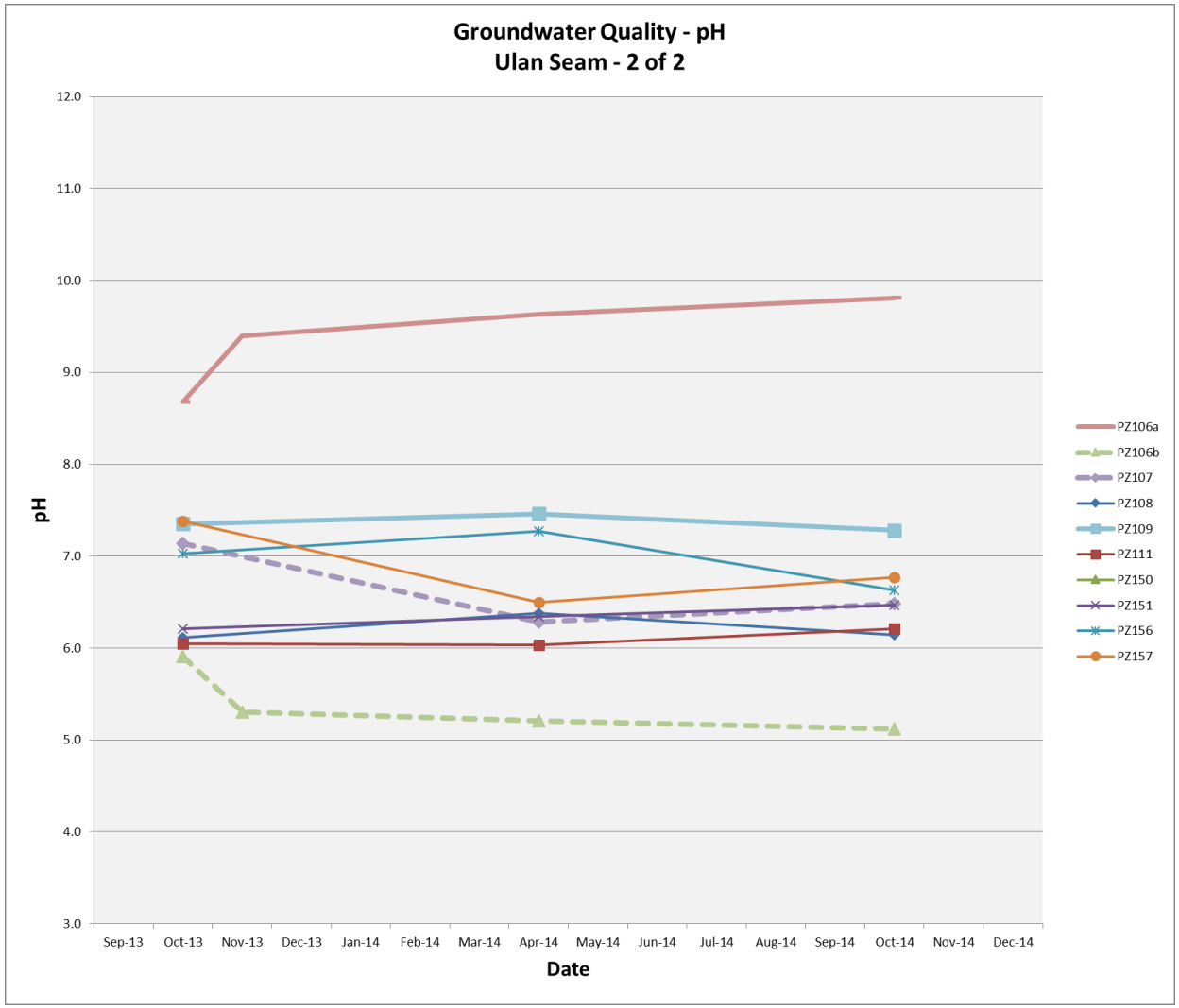


Figure 38: Groundwater pH 2

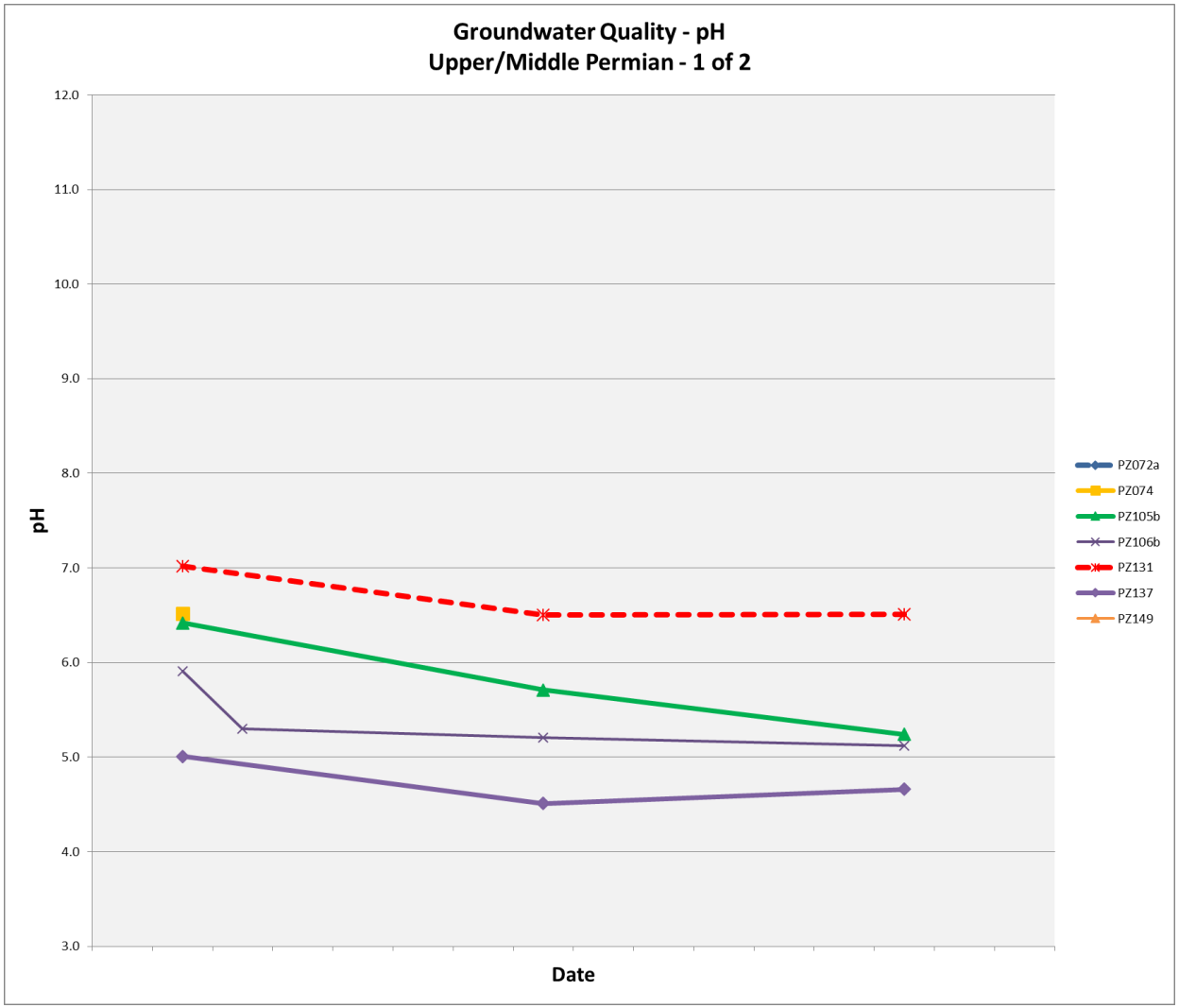


Figure 39: Groundwater pH 3

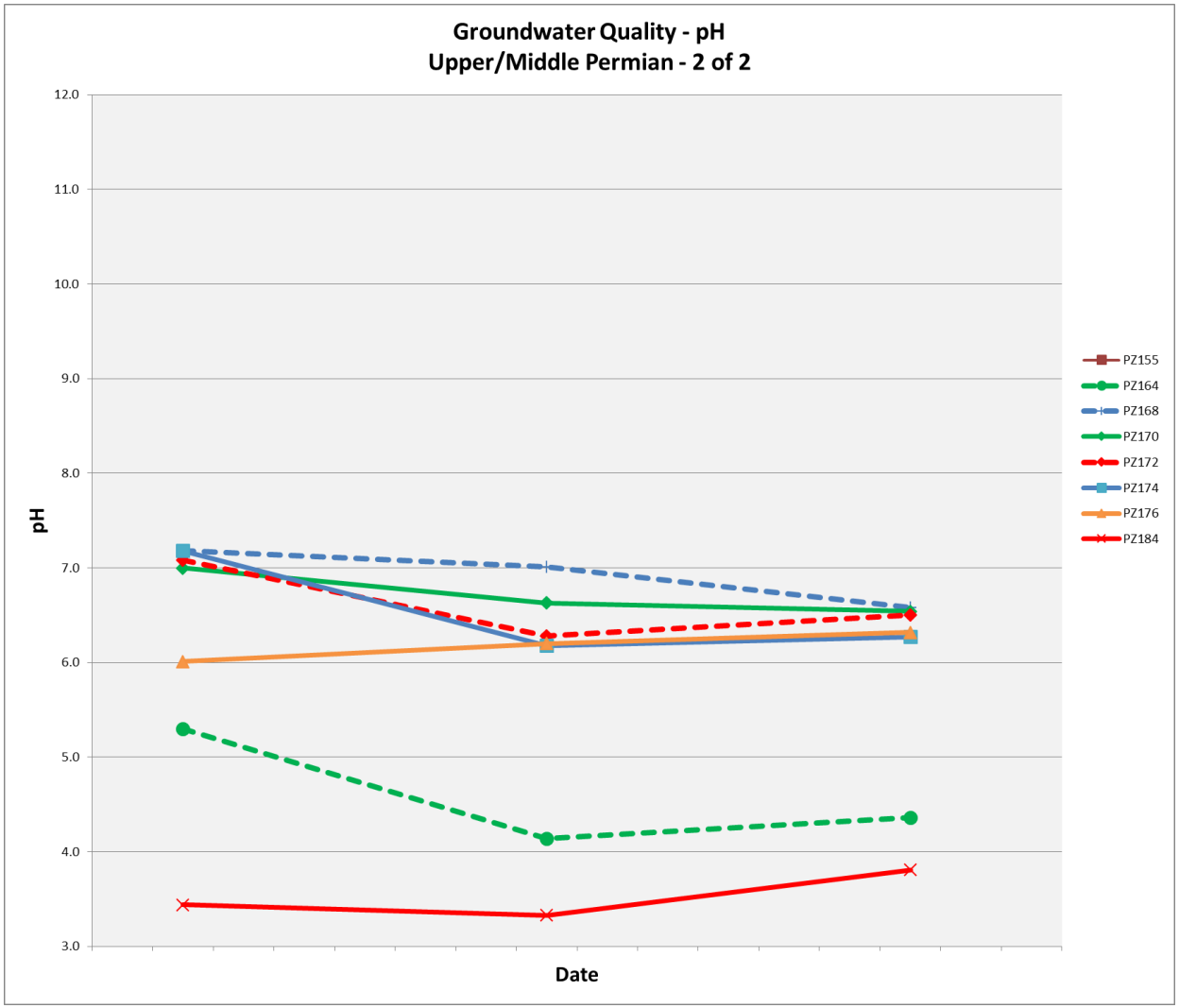


Figure 40: Groundwater pH 4

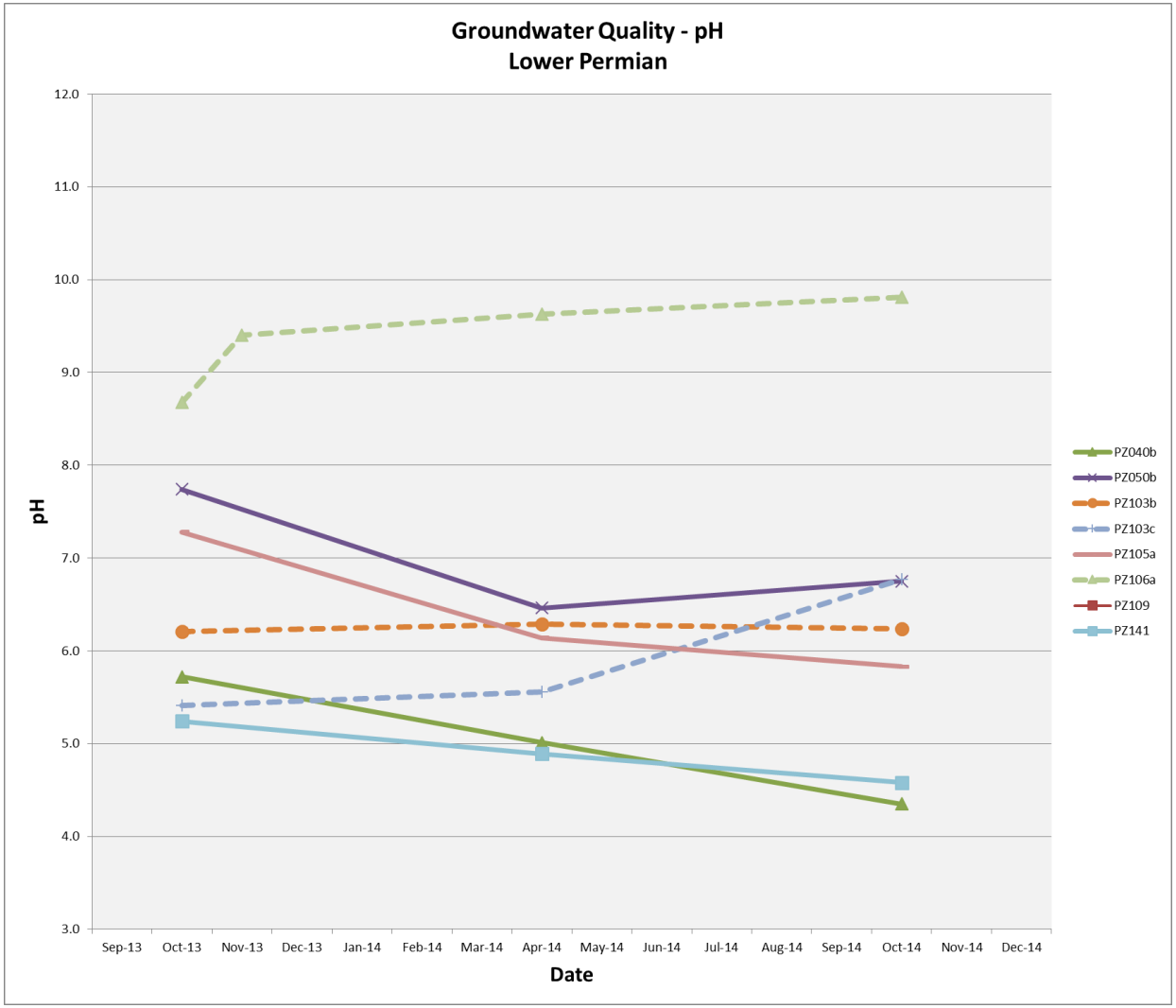


Figure 41: Groundwater pH 5

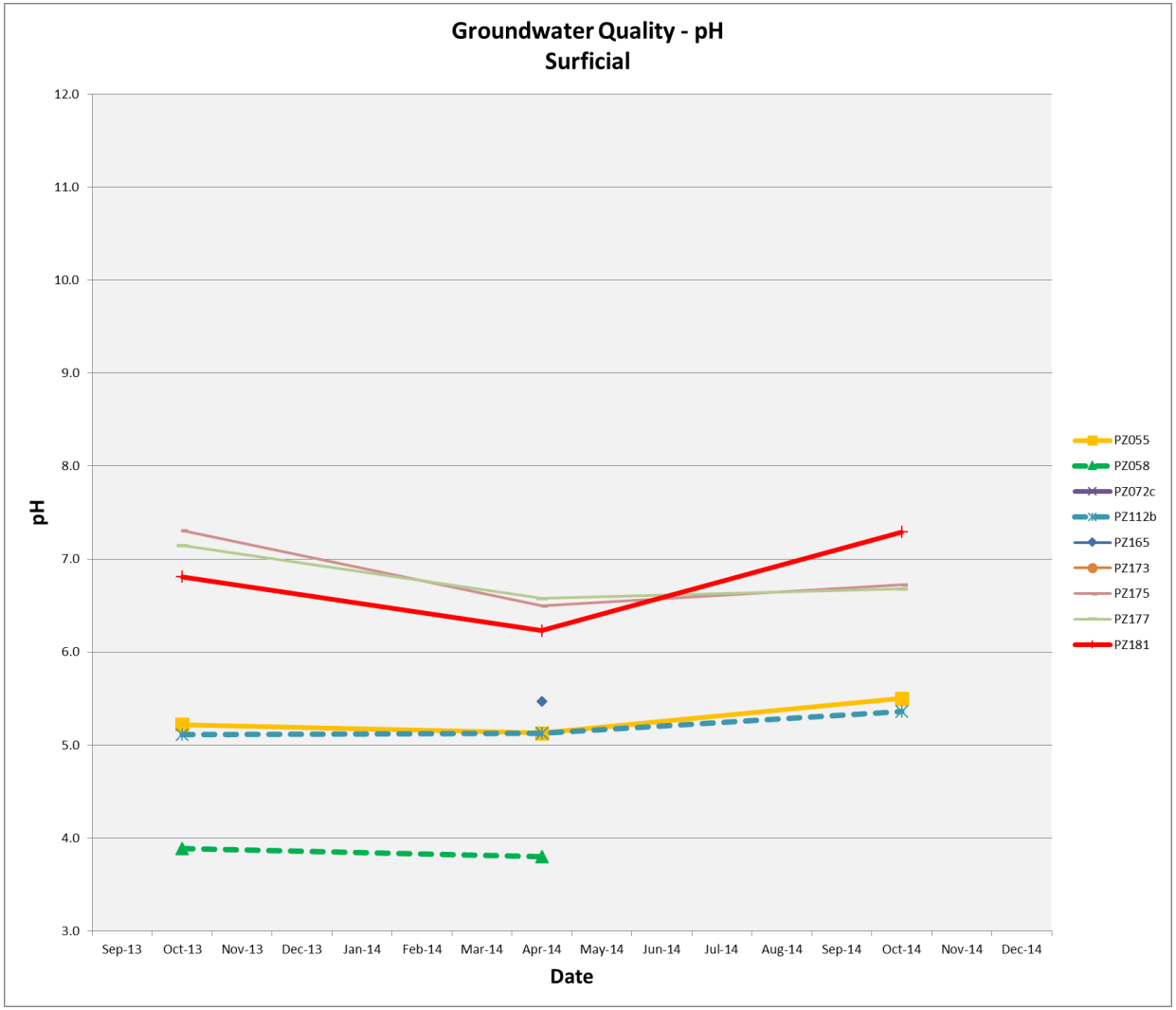


Figure 42: Groundwater pH 6

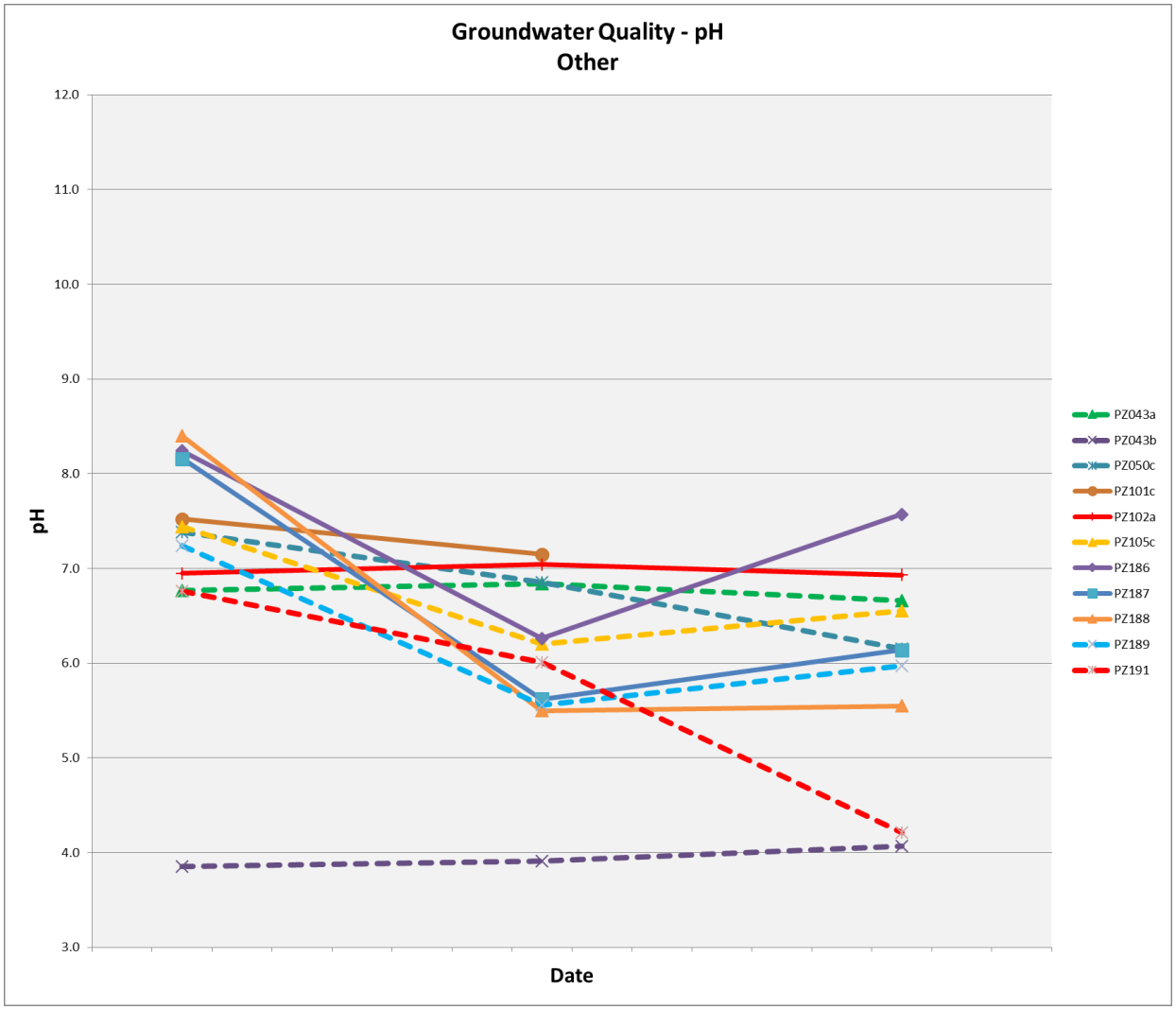


Figure 43: Groundwater pH 7

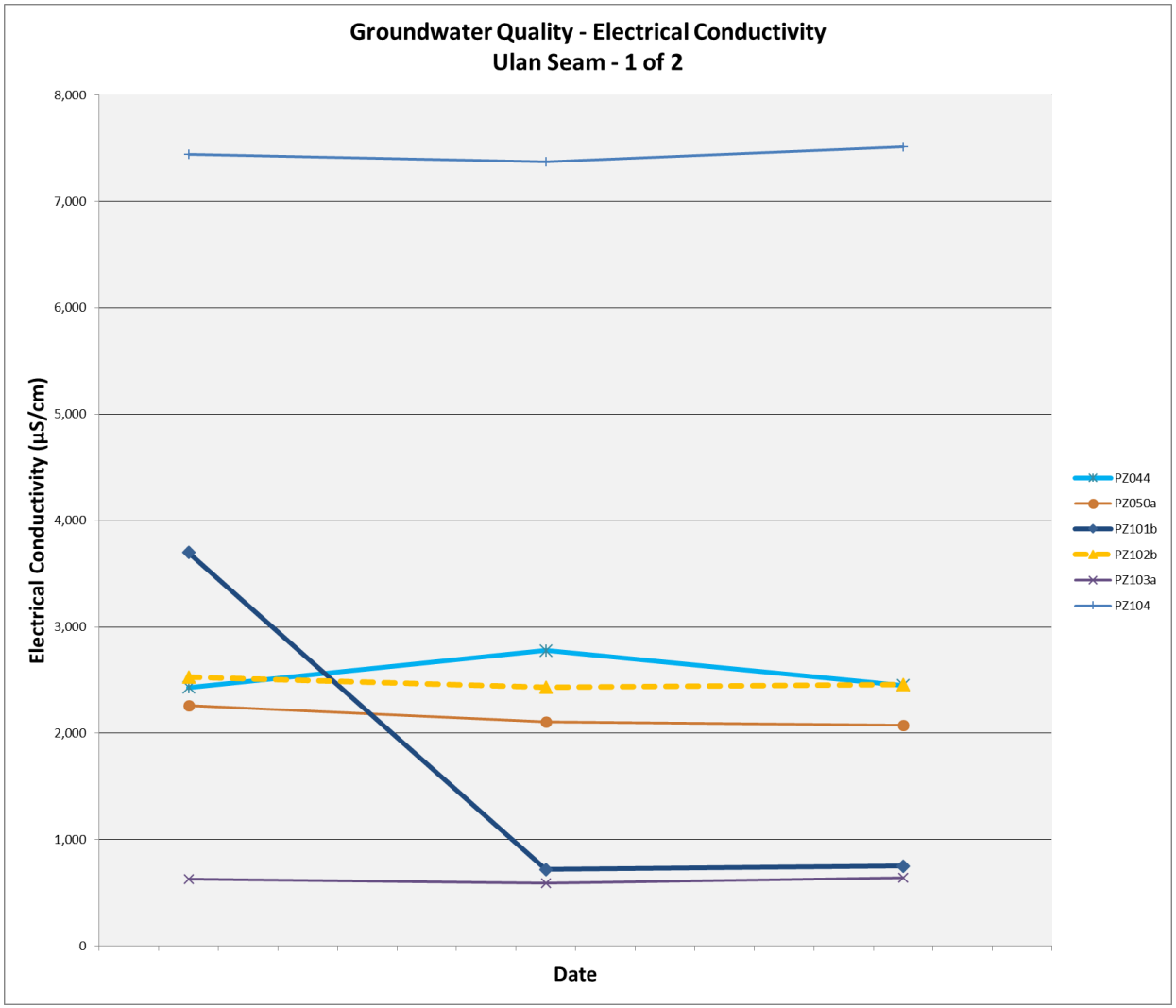


Figure 44: Groundwater Electrical Conductivity 1

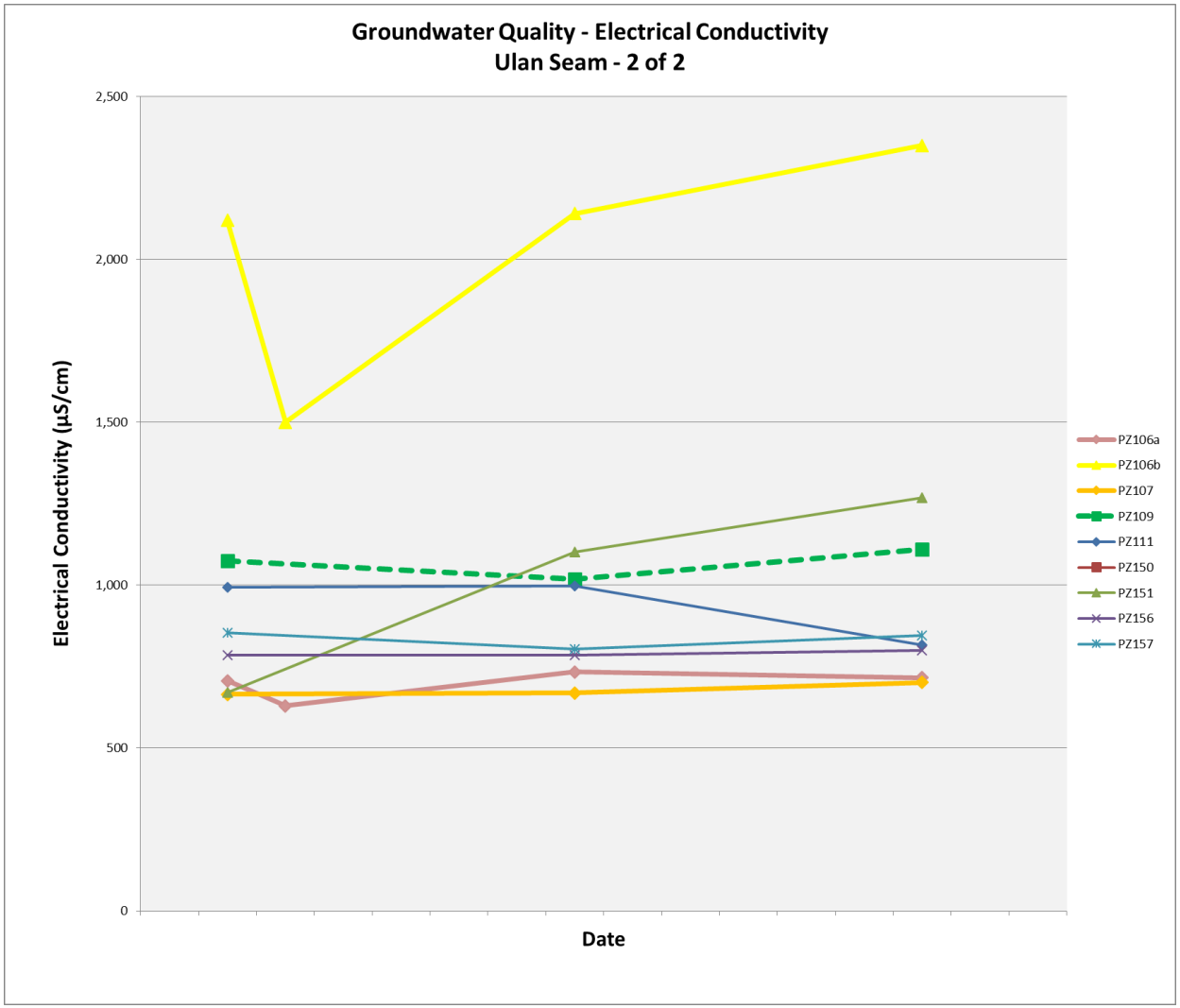


Figure 45: Groundwater Electrical Conductivity 2

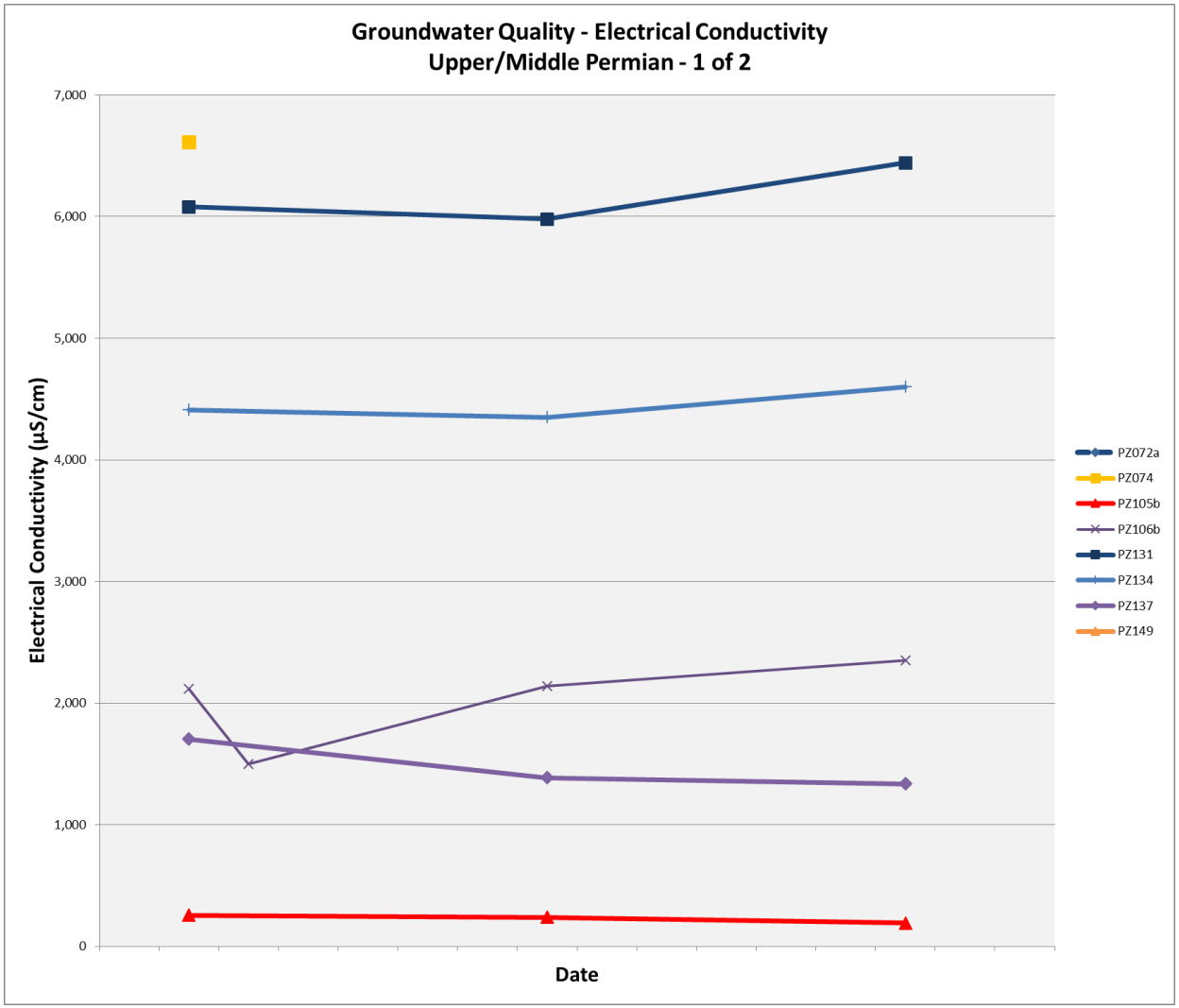


Figure 46: Groundwater Electrical Conductivity 3

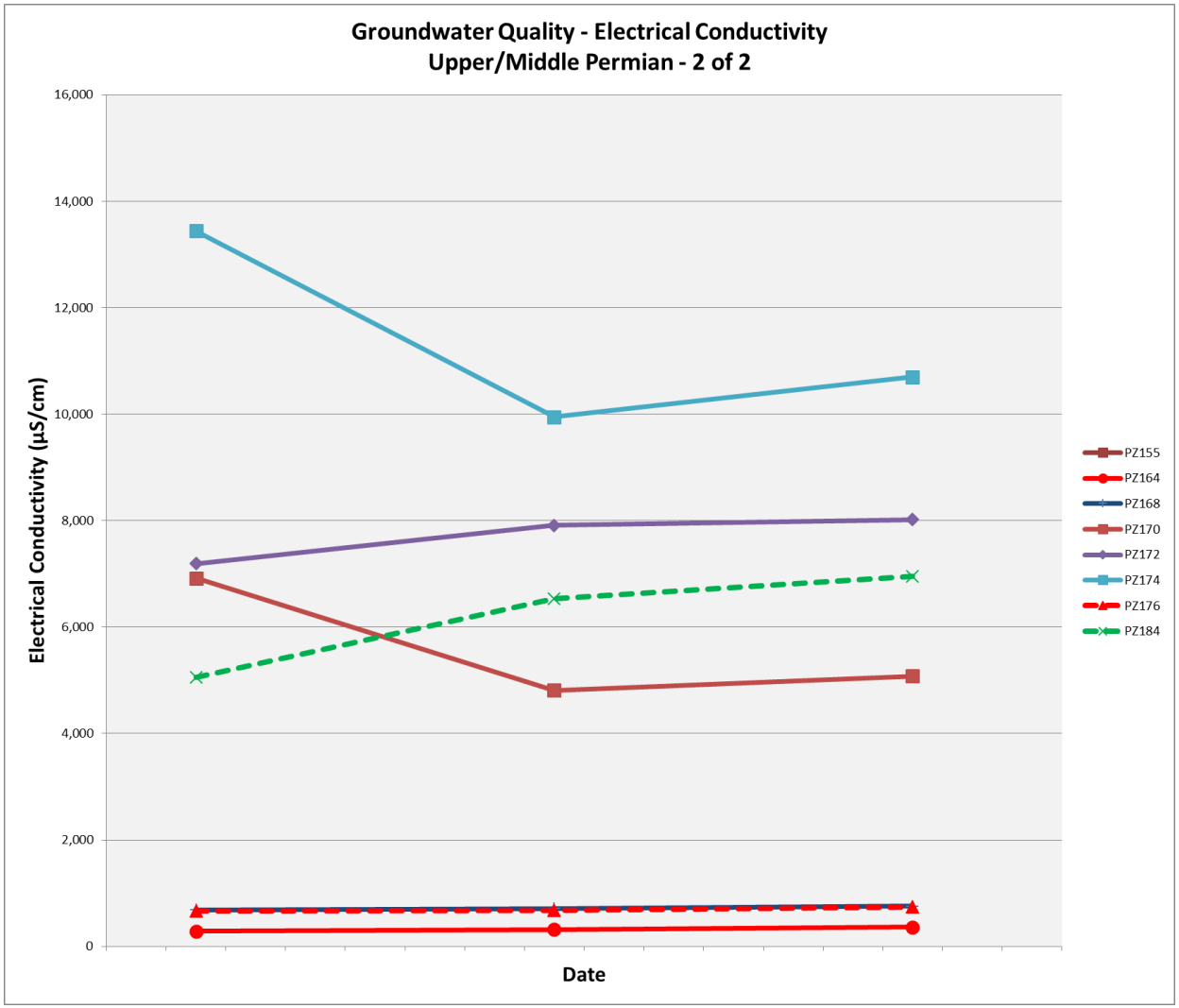


Figure 47: Groundwater Electrical Conductivity 4

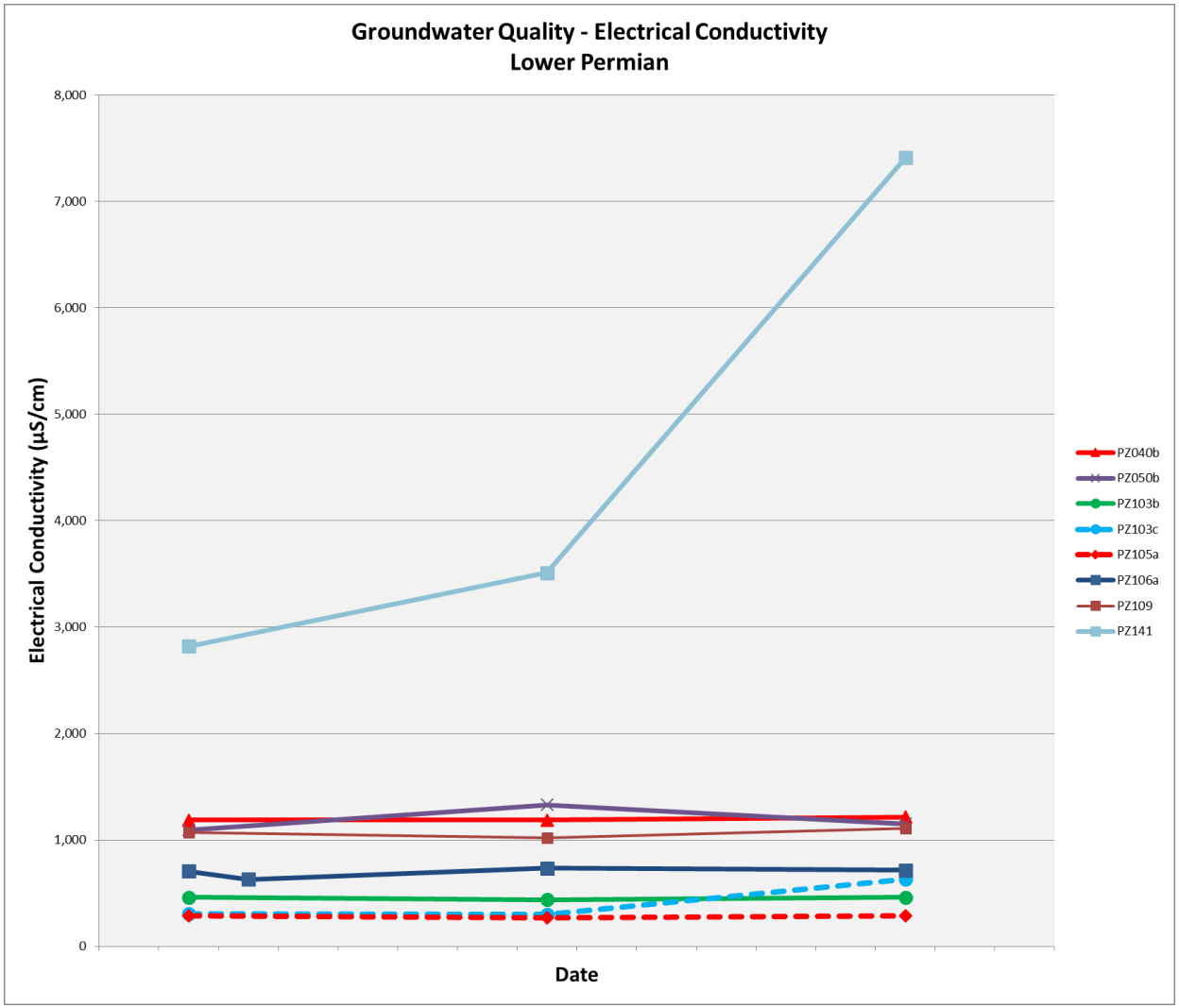


Figure 48: Groundwater Electrical Conductivity 5

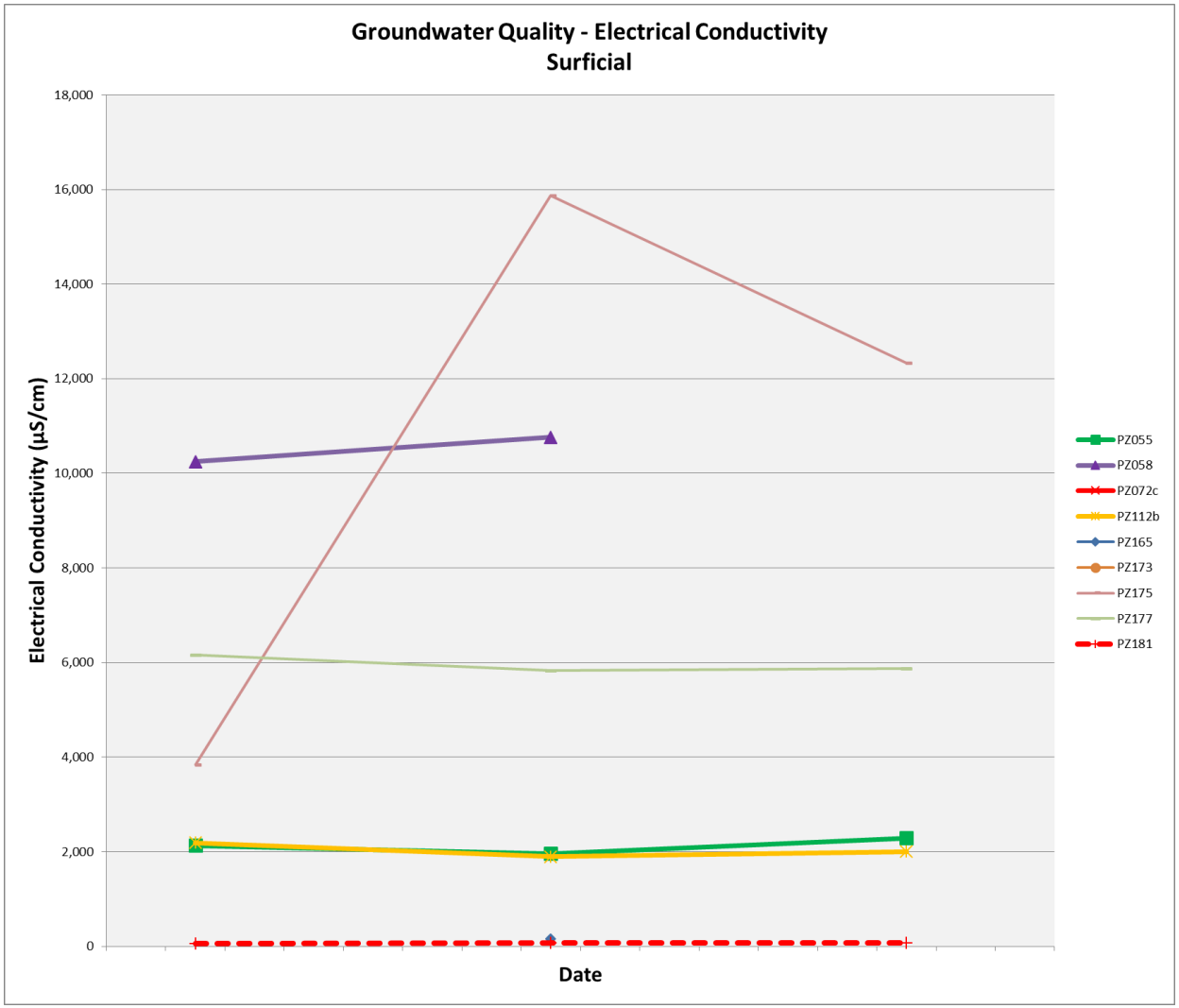


Figure 49: Groundwater Electrical Conductivity 6

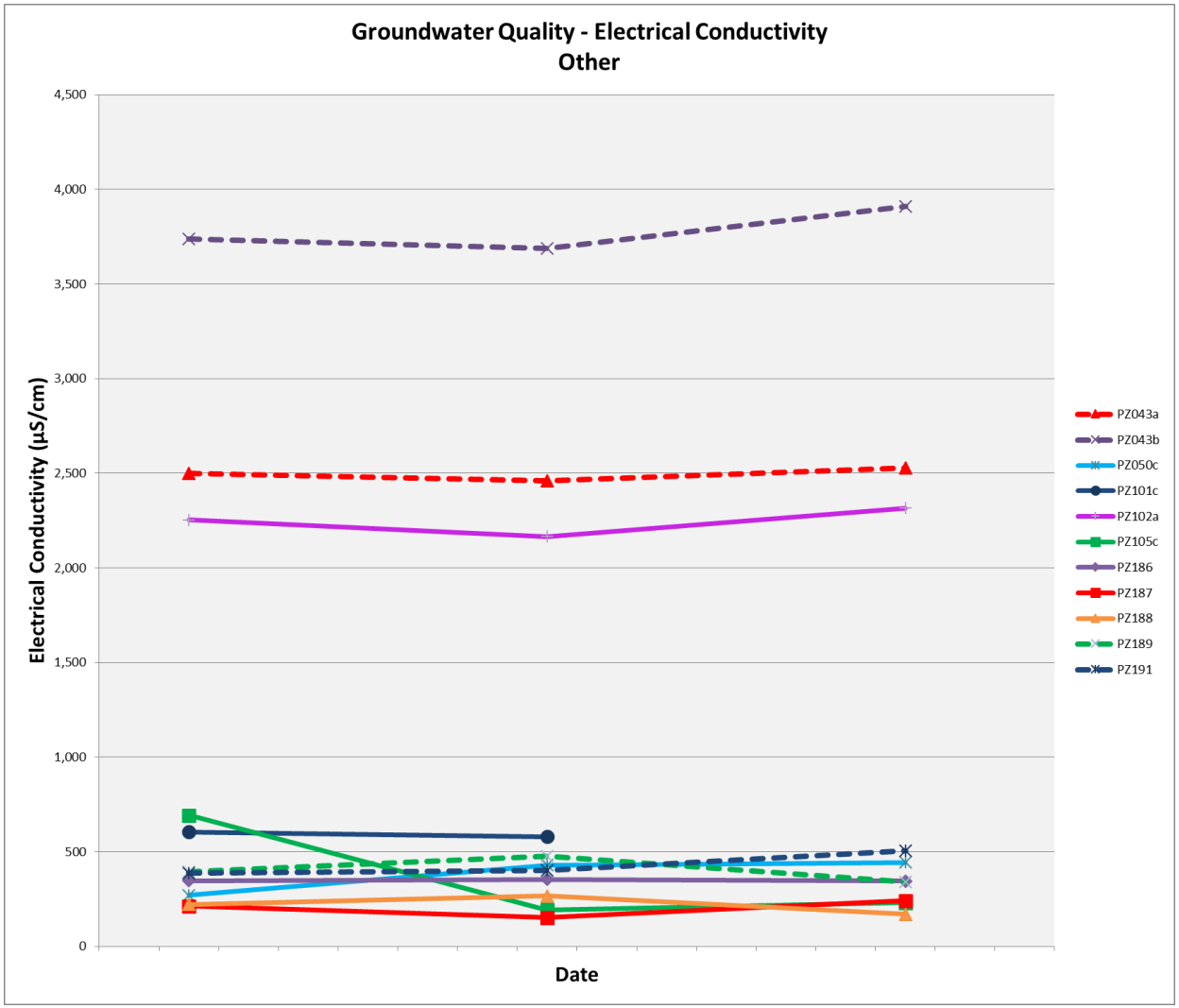


Figure 50: Groundwater Electrical Conductivity 7

3.7.3 Comparison to Previous Ground Water Monitoring and Predicted Levels

Table 39 compares the groundwater level data from this reporting period to background levels and previous monitoring results. **Table 40** and **Table 41** compares the pH and electrical conductivity water quality from this reporting period to background levels and previous monitoring results. The monitoring network was assessed for adequacy during the reporting period with no changes being made to the monitoring network.

There was no modelling conducted in the Environmental Assessment on predicted water quality surrounding the mining operations so a comparison can't be made to predicted water quality.

Monitoring bore hydrographs did not indicate groundwater extraction to date has impacted the creeks. No bores, springs, groundwater-fed dams or soaks have been identified directly within or close to the active Open Cut area, and no impact on any existing user is assessed to have occurred.

Several soaks, springs and dams have been identified in the area south, east and west of pumping bores TB179 and TB052A. Based on there being no impact on groundwater levels in the monitoring bores in the alluvium it is concluded that none of these water sources have been impacted.

Eight registered groundwater bores are located within a 2km radius from the Open Cut 1. No impact from groundwater extraction is assessed to have occurred on existing groundwater users, based on the following:

- Most of the bores are located to the west of the Open Cut 1 in an area that has been previously affected by mining at Ulan open cut; and
- Monitoring bores located closer to Open Cut 1 mine indicate that there are currently no impacts from dewatering on the groundwater levels in either alluvium, Permian or Marrangaroo Formation.

Table 39: Comparison of Groundwater Levels to Background Levels

Site	Background Minimum Level (mAHD)	Previous Results Minimum Level Range (mAHD)	2013-2014 Minimum Level (mAHD)	Comment on 2013-2014 Data
OB001	N/A as the site is flowing	N/A as the site is flowing	N/A as the site is flowing	Consistent with previous monitoring
OB002	495.06	N/A as the site is flowing	N/A as the site is flowing	Consistent with previous monitoring
OB003	471.57	471.74 – 472.49	471.74	Consistent with previous monitoring
OB004	N/A as the site is flowing	N/A as the site is flowing	N/A as the site is flowing	Consistent with previous monitoring
PZ003	470.43	470.12 – 471.06	470.97	Consistent with previous monitoring
PZ004	489.09	488.10 – 491.63	491.23	Consistent with previous monitoring
PZ018	451.46	452.79 – 453.55	452.86	Generally consistent with previous monitoring. Mining in Open Cut 2 removed the site in February 2014

Site	Background Minimum Level (mAHD)	Previous Results Minimum Level Range (mAHD)	2013-2014 Minimum Level (mAHD)	Comment on 2013-2014 Data
PZ039	417.23	417.41 – 418.93	418.12	Generally consistent with previous monitoring
PZ040B	419.44	419.23 – 421.16	419.87	Generally consistent with previous monitoring
PZ043A	489.32	489.68 – 490.79	490.18	Consistent with previous monitoring
PZ043B	493.90	493.97 – 494.10	493.79	As this site is located near open cut 3 and mining hasn't commenced in this area, this result is most likely not attributable to MCO and is most likely due to natural variation
PZ044	478.70	479.38 – 480.45	479.35	Generally consistent with previous monitoring
PZ050A	383.55	384.42 – 384.80	384.49	Consistent with previous monitoring
PZ050B	431.71	430.89 – 432.32	430.81	Generally consistent with previous monitoring
PZ050C	439.37	439.68 – 440.07	439.36	Generally consistent with previous monitoring
PZ055	421.83	421.88 – 422.84	422.88	Consistent with previous monitoring
PZ058	467.54	467.49 – 467.87	467.67	Consistent with previous monitoring
PZ072A	494.85	496.88 – 498.12		MCO no longer have access to this site
PZ072C	503.27	503.70 – 506.10		MCO no longer have access to this site
PZ074	501.37	501.38 – 501.42	501.42	Generally consistent with previous monitoring The site was damaged during the reporting period and can no longer be monitored
PZ101B	363.48	367.84 – 374.93	372.94	Generally consistent with previous monitoring
PZ101C	380.75	380.83 – 381.35	381.56	Generally consistent with previous monitoring
PZ102A	355.63	369.37 – 373.61	368.64	Generally consistent with previous monitoring
PZ102B	354.77	369.41 – 373.22	369.43	Consistent with previous monitoring
TB103	367.72	375.18 – 380.05	377.04	Generally consistent with previous monitoring
PZ103A	355.99	368.65 – 373.28	368.90	Generally consistent with previous monitoring
PZ103B	366.97	383.27 – 390.85	380.21	Consistent with previous monitoring
PZ103C	398.03	397.22 – 398.25	398.40	Consistent with previous monitoring
PZ104	381.89	380.17 – 382.84	381.85	Consistent with previous monitoring
TB105	359.19	365.01 – 372.11	370.40	Generally consistent with previous monitoring

Site	Background Minimum Level (mAHD)	Previous Results Minimum Level Range (mAHD)	2013-2014 Minimum Level (mAHD)	Comment on 2013-2014 Data
PZ105A	359.21	364.98 – 372.13	370.43	Generally consistent with previous monitoring
PZ105B	375.05	376.29 – 377.42	376.47	Generally consistent with previous monitoring
PZ105C	377.26	377.23 – 377.86	376.91	Consistent with previous monitoring
PZ106A	424.82	425.63 – 435.90	426.50	Generally consistent with previous monitoring
PZ106B	502.04	501.38 – 502.14	499.90	As this site is located in the Murragamba Valley and mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ107	432.51	432.40 – 433.64	433.83	Consistent with previous monitoring
PZ108	332.84	400.50 – 401.34	400.23	Consistent with previous monitoring
PZ109	383.02	382.34 – 382.98	382.54	Consistent with previous monitoring
PZ111	379.90	379.35 – 380.74	376.77	As this site is located in the Murragamba Valley and mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ112B	479.16	479.23 – 481.25	480.03	Generally consistent with previous monitoring
PZ127 – 43m	450.28	449.49 – 450.11	449.47	Consistent with previous monitoring
PZ127 – 68m	446.62	446.17 – 446.38	442.48	Consistent with previous monitoring
PZ127 – 112m	393.23	406.33 – 409.56	407.55	The water level has remained recharged following the rainfall event in late 2010 and subsequent follow up rain
PZ127 – 141m	362.30	369.54 – 377.18	384.09	The water level has remained recharged following the rainfall event in late 2010 and subsequent follow up rain
PZ128 – 20m	388.41	388.86 – 389.03	388.80	Consistent with previous monitoring
PZ128 – 36m	380.45	380.00 – 380.40	379.75	Consistent with previous monitoring
PZ128 – 55m	375.90	376.16 – 376.80	376.16	Consistent with previous monitoring
PZ129 – 35m	382.72	388.68 – 392.60	391.60	Consistent with previous monitoring
PZ129 – 53m	376.77	380.68 – 390.28	389.35	Consistent with previous monitoring

Site	Background Minimum Level (mAHD)	Previous Results Minimum Level Range (mAHD)	2013-2014 Minimum Level (mAHD)	Comment on 2013-2014 Data
PZ129 – 74m	379.66	379.40 – 379.64	379.12	Consistent with previous monitoring
PZ130 – 38.5m	494.82	494.65 – 496.93	497.03	The water level has remained recharged following the rainfall event in late 2010 and subsequent follow up rain
PZ130 – 64m	470.78	476.51 – 477.09	476.18	The water level has remained recharged following the rainfall event in late 2010 and subsequent follow up rain
PZ130 – 97m	448.51	446.91 – 448.73	446.93	Consistent with previous monitoring
PZ131	433.39	432.00 – 433.69	433.51	Consistent with previous monitoring
PZ133 – 31.5m	419.96	427.42 – 428.86	428.73	Consistent with previous monitoring
PZ133 – 43m	419.75	427.54 – 428.25	427.31	Generally consistent with previous monitoring
PZ133 – 59m	387.98	385.16 – 387.10	385.24	As this site is located in the Murragamba Valley and mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ134	431.06	430.95 – 432.64	431.82	Consistent with previous monitoring
PZ137	460.92	460.81 – 461.46	460.08	Consistent with previous monitoring
PZ141	461.62	461.46 – 462.27	461.03	Consistent with previous monitoring
PZ149	467.20	466.84 – 467.53	466.76	Consistent with previous monitoring
PZ150	377.09	377.43 – 379.94	No samples were collected due to collapsed casing	
PZ151	374.51	375.44 – 381.31	380.51	Consistent with previous monitoring
PZ152	441.22	441.99 – 442.33	441.14	Generally consistent with previous monitoring
PZ155	437.98	437.66 – 437.92	437.85	Consistent with previous monitoring
PZ156	372.28	375.81 – 382.22	376.34	Consistent with previous monitoring
PZ157	373.15	376.51 – 382.52	377.75	Consistent with previous monitoring
PZ164	431.49	431.51 – 433.03	432.25	As this site is located in the Murragamba Valley and mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ165	436.58	436.52 – 436.89	436.16	Consistent with previous monitoring

Site	Background Minimum Level (mAHD)	Previous Results Minimum Level Range (mAHD)	2013-2014 Minimum Level (mAHD)	Comment on 2013-2014 Data
PZ168	427.80	428.04 – 429.02	428.67	Consistent with previous monitoring
PZ170	420.93	421.09 – 422.35	421.32	Generally consistent with previous monitoring
PZ172	421.23	420.72 – 421.64	420.12	Consistent with previous monitoring
PZ173	421.62	421.09 – 422.35	422.52	Generally consistent with previous monitoring
PZ174	418.07	417.38 – 418.77	417.97	Generally consistent with previous monitoring
PZ175	419.76	418.73 – 419.70	418.00	Generally consistent with previous monitoring
PZ176	416.47	416.08 – 416.81	416.05	Generally consistent with previous monitoring
PZ177	415.87	415.66 – 415.91	415.66	Consistent with previous monitoring
PZ179 – 28m	418.77	416.72 – 419.97	419.35	Generally consistent with previous monitoring
PZ179 – 33m	417.67	412.48 – 418.67	417.85	Generally consistent with previous monitoring
PZ179 – 82m	415.63	435.42 – 437.14	437.62	Generally consistent with previous monitoring
PZ179 – 145m	373.38	373.81 – 379.56	375.25	Generally consistent with previous monitoring
PZ181	424.76	410.16 – 425.15	424.12	Consistent with previous monitoring
PZ184	412.38	412.05 – 412.794	411.97	Generally consistent with previous monitoring
PZ186	No background data	401.75 – 408.59	408.40	Generally consistent with previous monitoring
PZ187	No background data	416.45 – 417.40	415.66	Generally consistent with previous monitoring
PZ188	No background data	415.22 – 416.12	416.00	Generally consistent with previous monitoring
PZ189	No background data	409.27 – 413.41	412.72	Generally consistent with previous monitoring
PZ191	No background data	376.43 – 382.10	375.53	Generally consistent with previous monitoring. Temporally variable.

Table 40: Comparison of Groundwater pH to Background pH

Site	Background Range (pH)	Previous Results Data Range (pH)	2013-2014 Data Range (pH)	Comment on 2013-2014 Data
OB001	4.7 – 7.6	3.7 – 7.6	4.8 – 6.0	Generally consistent with previous monitoring
OB002	5.5 – 7.9	6.1 – 7.6	6.6 – 6.8	Consistent with previous monitoring

Site	Background Range (pH)	Previous Results Data Range (pH)	2013-2014 Data Range (pH)	Comment on 2013-2014 Data
OB003	5.7 – 7.7	6.0 – 6.7	6.4 - 6.5	Consistent with previous monitoring
OB004	3.1 – 4.8	3.4 – 5.8	4.0 – 4.9	Consistent with previous monitoring
PZ003	5.7 – 7.2	5.8 – 6.7	6.4 – 6.7	Consistent with previous monitoring
PZ004	6.0 – 8.0	6.5 – 7.2	7.0 – 7.2	Consistent with previous monitoring
PZ018	3.9 – 6.9	4.1 – 5.9	5.5 – 5.5	Consistent with previous monitoring. Mining in Open Cut 2 removed the site in February 2014
PZ039	5.5 – 7.3	5.4 – 7.0	6.1 – 7.1	Consistent with previous monitoring
PZ040B	5.5 – 7.1	3.8 – 6.3	4.4 – 5.7	Consistent with previous monitoring
PZ043A	5.8 – 7.2	6.2 – 7.3	6.7 – 6.8	Consistent with previous monitoring
PZ043B	3.4 – 5.4	3.4 – 4.0	3.9 – 4.1	Consistent with previous monitoring
PZ044	5.6 – 7.5	6.0 – 6.8	6.4 – 6.9	Consistent with previous monitoring
PZ050A	This site has had depth only readings between April 2007 and April 2010	6.4 – 6.6	6.4 – 7.3	Consistent with previous monitoring
PZ050B	5.5 – 7.5	5.2 – 6.3	6.5 – 7.7	Consistent with previous monitoring
PZ050C	5.5 – 12.5	5.3 – 6.5	6.2 – 7.4	Consistent with previous monitoring
PZ055	5.2 – 7.1	4.8 – 5.6	5.1 – 5.5	Consistent with previous monitoring
PZ058	2.5 – 4.9	3.2 – 3.8	3.8 – 3.9	Consistent with previous monitoring
PZ072A	6.2 – 7.9	6.2 – 7.0		MCO no longer have access to this site
PZ072C	6.2 – 7.9	6.5 – 7.2		MCO no longer have access to this site
PZ074	5.7 – 7.6	6.2 – 6.8	6.5	Consistent with previous monitoring. The site was damaged during the reporting period and can no longer be monitored
PZ101B	6.0 – 8.0	6.5 – 7.8	6.3 – 7.2	Consistent with previous monitoring
PZ101C	5.9 – 11.9	6.2 – 7.4	7.2– 7.5	Consistent with previous monitoring
PZ102A	6.1 – 8.3	5.8 – 7.1	6.9 – 7.0	Consistent with previous monitoring
PZ102B	5.9 – 7.9	6.0 – 6.9	6.6 – 6.8	Consistent with previous monitoring
TB103	5.7 – 7.3	6.0 – 6.9	6.8 – 7.1	Generally consistent with previous monitoring

Site	Background Range (pH)	Previous Results Data Range (pH)	2013-2014 Data Range (pH)	Comment on 2013-2014 Data
PZ103A	5.4 – 8.1	6.1 – 6.8	6.7 – 7.0	Consistent with previous monitoring
PZ103B	5.1 – 9.5	5.1 – 6.9	6.2 – 6.3	Consistent with previous monitoring
PZ103C	5.1 – 13.1	5.3 – 6.2	5.4 – 6.8	Consistent with previous monitoring
PZ104	5.9 – 13.1	11.4 – 12.6	12.2 – 13.0	Consistent with previous monitoring
TB105	6.8 – 7.8	6.4 – 7.5	7.1 – 8.1	Generally consistent with previous monitoring
PZ105A	5.3 – 7.8	5.4 – 7.0	5.8 – 7.3	Consistent with previous monitoring
PZ105B	5.3 – 7.9	4.6 – 5.9	5.2 – 6.4	Consistent with previous monitoring
PZ105C	5.1 – 6.8	5.3 – 6.2	6.2 – 7.4	Generally consistent with previous monitoring
PZ106A	5.8 – 12.3	9.2 – 10.8	8.7 – 9.8	Consistent with previous monitoring
PZ106B	4.9 – 8.2	4.3 – 6.4	5.1 – 5.9	Consistent with previous monitoring
PZ107	4.7 – 7.1	6.0 – 6.5	6.3 – 7.1	Consistent with previous monitoring
PZ108	5.6 – 8.0	5.5 – 7.2	6.1 – 6.4	Consistent with previous monitoring
PZ109	6.1 – 12.3	6.6 – 7.6	7.3 – 7.5	Consistent with previous monitoring
PZ111	5.8 – 7.0	5.9 – 6.6	6.0 – 6.2	Consistent with previous monitoring
PZ112B	4.3 – 6.7	4.6 – 5.7	5.1 – 5.4	Consistent with previous monitoring
PZ127	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ128	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ129	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ130	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ131	5.6 – 7.2	6.0 – 6.7	6.5 – 7.0	Consistent with previous monitoring
PZ133	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ134	5.1 – 6.1	5.3 – 6.5	5.8 – 6.4	Consistent with previous monitoring
PZ137	5.1 – 6.7	4.5 – 6.0	4.5 – 5.0	Consistent with previous monitoring
PZ141	4.2 – 5.4	3.8 – 5.5	4.6 – 5.2	Consistent with previous monitoring
PZ149	5.1 – 6.7	6.1 – 6.6	No samples were collected as the site was dry	
PZ150	5.1 – 6.4	5.0 – 6.0	No samples were collected due to collapsed casing	
PZ151	5.7 – 7.0	6.0 – 6.7	6.2 – 6.5	Consistent with previous monitoring
PZ152	5.1 – 6.4	4.9 – 5.9	5.5 – 5.6	Consistent with previous monitoring

Site	Background Range (pH)	Previous Results Data Range (pH)	2013-2014 Data Range (pH)	Comment on 2013-2014 Data
PZ155	This site has been dry since March 2008		No samples were collected as the site was dry	
PZ156	4.3 – 7.1	4.7 – 6.1	6.6 – 7.3	Consistent with previous monitoring
PZ157	5.9 – 7.6	5.8 – 6.8	6.5 – 7.4	Consistent with previous monitoring
PZ164	3.4 – 5.1	3.6 – 5.8	4.1 – 5.3	Consistent with previous monitoring
PZ165	5.9 – 6.2	4.8 – 5.4	5.5	Consistent with previous monitoring
PZ168	5.8 – 7.0	5.9 – 6.6	6.6 – 7.2	Consistent with previous monitoring
PZ170	5.4 – 6.7	5.6 – 6.4	6.5 – 7.0	Generally consistent with previous monitoring
PZ172	5.7 – 6.4	5.9 – 6.9	6.3 – 7.1	The results this year are higher than previous data. As this site is located in the Murragamba Valley and mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ173	6.3 – 7.2	6.4 – 6.8	No samples were collected as the site was dry	
PZ174	5.4 – 6.5	5.8 – 6.4	6.2 – 7.2	Generally consistent with previous monitoring
PZ175	5.3 – 7.0	6.0 – 7.8	6.5 – 7.3	Consistent with previous monitoring
PZ176	5.0 – 7.8	5.6 – 6.2	6.0 – 6.3	Consistent with previous monitoring
PZ177	5.8 – 6.7	6.0 – 6.7	6.6 – 7.2	The results this year are higher than previous data. As this site is located in the Murragamba Valley and mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ179	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ181	5.3 – 5.9	4.6 – 7.1	6.2 – 7.3	The results this year are higher than previous data. As this site is located in the Murragamba Valley and mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ184	3.9 – 5.6	3.2 – 3.9	3.3 – 3.8	Consistent with previous monitoring

Site	Background Range (pH)	Previous Results Data Range (pH)	2013-2014 Data Range (pH)	Comment on 2013-2014 Data
PZ186	No background data	5.8 – 6.8	6.3 – 8.2	No pumping has occurred from nearby boreholes during the reporting period, indicating that this result is most likely due to natural variation
PZ187	No background data	5.3 – 6.6	5.6 – 8.2	No pumping has occurred from nearby boreholes during the reporting period, indicating that this result is most likely due to natural variation
PZ188	No background data	4.6 – 5.7	5.5 – 8.4	No pumping has occurred from nearby boreholes during the reporting period, indicating that this result is most likely due to natural variation
PZ189	No background data	5.7 – 6.3	5.6 – 7.2	Generally consistent with previous monitoring
PZ191	No background data	3.9 – 6.9	4.2 – 6.8	Consistent with previous monitoring

Table 41: Comparison of Groundwater EC to Background and Previous results

Site	Background Range (µS/cm)	Previous Results Data Range (µS/cm)	2013-2014 Data Range (µS/cm)	Comment on 2013-2014 Data
OB001	90 – 110	80 – 120	81 – 195	Generally consistent with previous monitoring
OB002	1,800 – 2,000	1,420 – 2,080	2,012 – 2,027	Consistent with previous monitoring
OB003	1,730 – 2,900	1,580 – 2,085	1,684 – 1,807	Consistent with previous monitoring
OB004	400 – 490	335 – 780	329 – 361	Consistent with previous monitoring
PZ003	620 – 3,210	680 – 5,290	903 – 1,288	Consistent with previous monitoring
PZ004	2,300 – 4,400	2,380 – 3,420	3,060 – 3,410	Consistent with previous monitoring
PZ018	390 – 960	140 – 808	651	Consistent with previous monitoring. Mining in Open Cut 2 removed the site in February 2014
PZ039	510 – 2,100	720 – 2,600	637 – 867	Consistent with previous monitoring
PZ040B	500 – 1,430	820 – 1,800	1,188 – 1,216	Consistent with previous monitoring
PZ043A	2,480 – 2,600	2,270 – 2,640	2,460 – 2,530	Consistent with previous monitoring
PZ043B	4,000 – 5,100	3,060 – 4,500	3,690 – 3,910	Consistent with previous monitoring
PZ044	2,800 – 3,000	2,440 – 2,980	2,430 – 2,780	Consistent with previous monitoring

Site	Background Range (µS/cm)	Previous Results Data Range (µS/cm)	2013-2014 Data Range (µS/cm)	Comment on 2013-2014 Data
PZ050A	This site has had depth only readings between April 2007 and April 2010	1,770 – 2,280	2,076 – 2,260	Generally consistent with previous monitoring
PZ050B	1,300 – 2,200	980 – 1,600	1,095 – 1,329	Consistent with previous monitoring
PZ050C	340 – 2,500	264 – 1,150	270 – 444	Consistent with previous monitoring
PZ055	190 – 440	245 – 2,120	1,965 – 2,291	Generally consistent with previous monitoring
PZ058	7,600 – 16,000	8,820 – 13,430	10,250 – 10,760	Consistent with previous monitoring
PZ072A	1,500 – 1,700	1,635 – 1,780	MCO no longer have access to this site	
PZ072C	3,200 – 3,500	3,010 – 3,310	MCO no longer have access to this site	
PZ074	4,700 – 5,170	4,910 – 6,070	6,610	This site is located near Open Cut 3 and as mining hasn't commenced in Open Cut 3 this result is not attributable to MCO and is most likely due to natural variation
PZ101B	620 – 1,000	620 – 780	720 – 3,700	This site is located above underground 4 and as mining hasn't commenced in Open Cut 3 this result is not attributable to MCO and is most likely due to natural variation
PZ101C	620 – 3,600	530 – 750	579 – 605	Generally consistent with previous monitoring
PZ102A	550 – 2,550	1,610 – 3,800	2,166 – 2,316	Consistent with previous monitoring
PZ102B	1,100 – 2,540	1,360 – 2,540	2,430 – 2,530	Consistent with previous monitoring
TB103R	520 – 610	535 – 640	620 – 673	Consistent with previous monitoring
PZ103A	370 – 645	550 – 646	594 – 641	Consistent with previous monitoring
PZ103B	340 – 630	350 – 500	438 – 460	Consistent with previous monitoring
PZ103C	340 – 13,000	310 – 395	304 – 633	Consistent with previous monitoring
PZ104	590 – 8,900	1,060 – 6,950	7,370 – 7,510	The results are generally high but within background range.
TB105	500 – 755	370 – 740	701 – 742	Consistent with previous monitoring
PZ105A	250 – 545	250 – 700	271 – 291	Consistent with previous monitoring
PZ105B	210 – 560	200 – 250	191 – 255	Consistent with previous monitoring
PZ105C	275 – 545	193 – 275	193 – 693	Generally consistent with previous monitoring
PZ106A	660 – 3,800	630 – 850	630 – 734	Generally consistent with previous monitoring

Site	Background Range (µS/cm)	Previous Results Data Range (µS/cm)	2013-2014 Data Range (µS/cm)	Comment on 2013-2014 Data
PZ106B	750 – 1,600	1,500 – 4,303	1,500 – 2,350	Consistent with previous monitoring
PZ107	610 – 2,000	610 – 690	665 – 701	Consistent with previous monitoring
PZ108	240 – 350	360 – 420	376 – 420	Consistent with previous monitoring
PZ109	650 – 1,500	1,040 – 1,090	1,018 – 1,111	Consistent with previous monitoring
PZ111	720 – 1,200	725 – 1,018	817 – 997	Generally consistent with previous monitoring
PZ112B	2,500 – 8,100	1,310 – 4,380	1,895 – 2,190	Consistent with previous monitoring
PZ127	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ128	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ129	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ130	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ131	5,800 – 6,590	1,640 – 6,560	5,980 – 6,440	Generally consistent with previous monitoring
PZ133	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ134	4,350 – 4,800	1,750 – 5,700	4,350 – 4,600	Consistent with previous monitoring
PZ137	420 – 1,010	1,000 – 2,285	1,337 – 1,704	Consistent with previous monitoring
PZ141	4,490 – 5,300	1,200 – 7,940	2,825 – 7,410	Consistent with previous monitoring
PZ149	3,370 – 5,700	3,350 – 4,870	No samples were collected as the site was dry	
PZ150	2,700 – 6,700	5,660 – 6,500	No sample collected due to collapsed casing	
PZ151	420 – 1,050	790 – 1,270	670 – 1,268	Consistent with previous monitoring
PZ152	5,680 – 6,800	4,840 – 6,520	5,780 – 6,250	Consistent with previous monitoring
PZ155	7,900 – 8,000	This site has been dry since May 2008	No samples were collected as the site was dry	
PZ156	440 – 520	415 – 744	785 – 800	As this site is located in the Murragamba Valley and mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ157	445 – 500	460 – 838	804 – 855	This site is located in the Murragamba Valley and as mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation

Site	Background Range (µS/cm)	Previous Results Data Range (µS/cm)	2013-2014 Data Range (µS/cm)	Comment on 2013-2014 Data
PZ164	4,560 – 10,000	170 – 8,810	288 – 362	This site is located in the Murragamba Valley and is in the alluvium close to Murragamba Creek. A review of the data, weather conditions and site observations indicate that this result has been influenced by surface flow in Murragamba Creek and the results are consistent with last reporting period's results
PZ165	75 – 210	10 – 180	162	Consistent with previous monitoring
PZ168	640 – 720	615 – 750	686 – 759	Consistent with previous monitoring
PZ170	2,500 – 4,700	2,040 – 5,150	4,810 – 6,920	This site is located in the Murragamba Valley and as mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ172	7,000 – 7,400	5,390 – 8,710	7,190 – 8,020	This site is located in the Murragamba Valley and as mining hasn't commenced in Murragamba Valley this result is most likely not attributable to MCO and is most likely due to natural variation
PZ173	9,400 – 14,000	425 – 14,190	No samples were collected as the site was dry	
PZ174	2,400 – 11,900	7,020 – 14,660	9,950 – 13,440	Consistent with previous monitoring
PZ175	13,000 – 18,000	1,120 – 16,360	3,840 – 1,33015,870	Consistent with previous monitoring
PZ176	710 – 840	630 – 840	664 – 738	Consistent with previous monitoring
PZ177	1,235 – 8,500	350 – 7,740	5,830 – 6,160	Consistent with previous monitoring
PZ179	Due to the presence of the vibrating wire piezometer, water quality monitoring cannot be undertaken on this piezometer			
PZ181	190 – 220	30 – 255	61 – 78	Consistent with previous monitoring
PZ184	3,900 – 4,460	3,510 – 8,020	5,050 – 6,950	Consistent with previous monitoring
PZ186	No background data	370 – 510	345 – 354	Consistent with previous monitoring
PZ187	No background data	150 – 760	151 – 241	Consistent with previous monitoring
PZ188	No background data	149 – 935	170 – 266	Generally consistent with previous monitoring
PZ189	No background data	265 – 475	340 – 477	Consistent with previous monitoring

Site	Background Range (µS/cm)	Previous Results Data Range (µS/cm)	2013-2014 Data Range (µS/cm)	Comment on 2013-2014 Data
PZ191	No background data	210 – 370	388 – 505	Generally consistent with previous monitoring

3.7.4 Groundwater Logger Data

MCO has installed hard rock and alluvial monitoring piezometers associated with water extraction from bores TB052A and TB179. Each of the monitoring bores has been fitted with an automatic data logger set to record water levels. During the reporting period groundwater licences 20BL171998 and 20BL172000 required renewal, the requirement to monitor was removed from the renewed licences. MCO intend to continue to monitor the hard rock and alluvial aquifers.

Piezometers PZ186 and PZ187 were installed for monitoring of water levels in the hard rock and alluvial between TB052A and Wilpinjong Creek. PZ188 and PZ189 were installed for monitoring of water levels in the alluvium and hard rock between TB179 and Wilpinjong Creek.

Pumping from bores TB052A and TB179 commenced in mid-August 2009. No water was pumped from TB052A and TB179 during the reporting period. As part of the Water Management Plan, MCO have developed “cease to pump” trigger levels for the alluvial aquifers (PZ187 and PZ188). The hydrographs shown in **Figure 51** and **Figure 52** indicate these trigger levels have not been exceeded.

During the reporting period the piezometer located in PZ189 failed, MCO expects that this logger will be replaced in the next AEMR period.

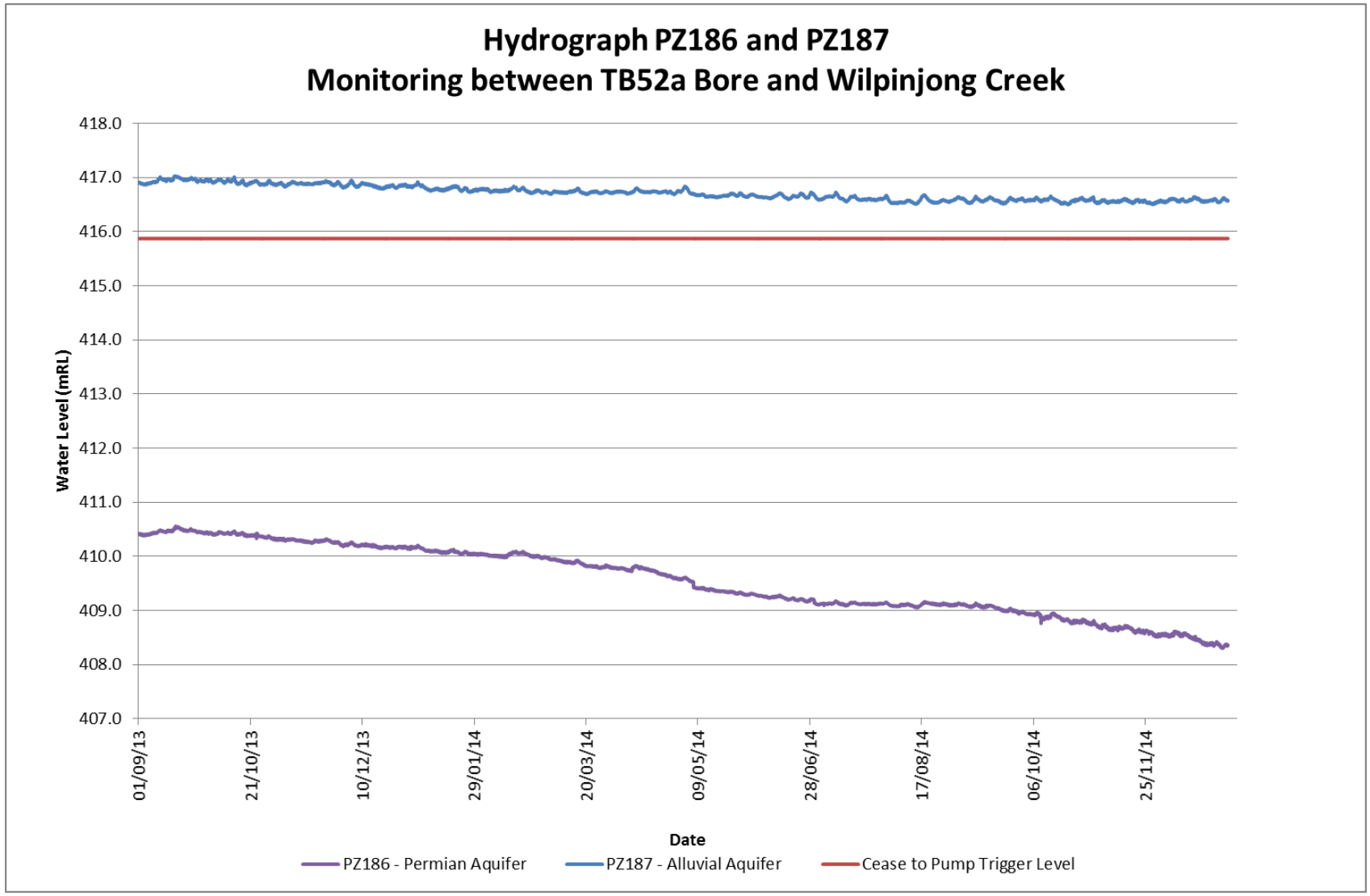


Figure 51: Monitoring Hydrograph for TB52A

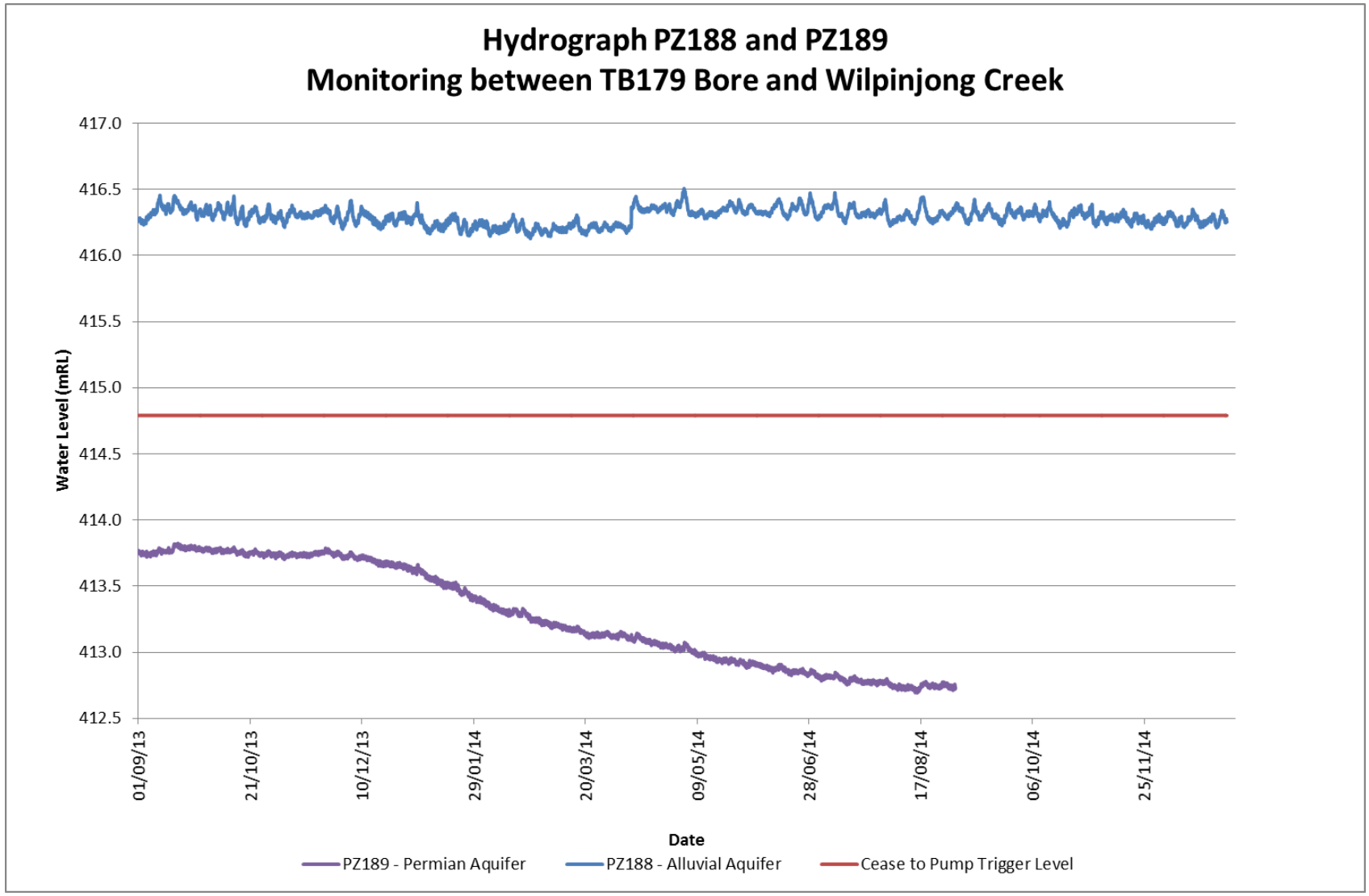


Figure 52: Monitoring Hydrograph for TB179

3.7.5 Groundwater Model Calibration

MCO area currently reviewing and updating ground water models are part of environmental assessments reflecting progressive operations.

3.7.6 Groundwater Census

Groundwater census surveys were undertaken in 2005 and 2007 to support the preparation of the groundwater assessments for the Moolarben Coal Project – Environmental Assessment. Surveys were conducted in 2009 and 2011 to supplement the existing baseline dataset for each site and were also extended to include any new groundwater-fed sites identified by landholders.

The groundwater census for 2013 commenced during the previous reporting period, a total of 66 sites were monitored. Details of each site including location, photograph, field water quality parameters and laboratory analysis were recorded.

3.7.7 Activities in the Next Reporting Period

Groundwater monitoring will continue to be undertaken with the results to be provided in the next AEMR. The revised WMP will be implemented during the next reporting period.

3.8 WASTE MANAGEMENT

During the reporting period MCO continued to maintain a Total Integrated Waste Management Service to manage all waste streams generated on site. This includes general waste, cardboard and paper recycling, co-mingled recycling, waste oil, and steel. The volumes of total waste and recycled material removed from site are shown in **Table 42** and **Figure 53**. The Waste Management Plan sets a recycling target of 70% for MCO. During the reporting period 88.98% of all waste removed from site was recycled. This is an improvement from last reporting period and is reflective of the work MCO are doing in consultation with the waste management contractor to identify opportunities to improve the recycling rates at MCO.

Table 42: Waste Removal Volumes

Month	Total Waste Removed (kg)	Waste Recycled (kg)	Percentage Waste Recycled
Sep-2013	138,135	121,297	87.81%
Oct-2013	112,516	92,972	82.63%
Nov-2013	121,180	95,997	79.22%
Dec-2013	100,358	89,687	89.37%
Jan-2014	92,109	74,394	80.77%
Feb-2014	110,970	98,188	88.48%
Mar-2014	64,328	51,348	79.82%
Apr-2014	68,638	59,691	86.96%
May-2014	129,271	119,865	92.72%
Jun-2014	135,427	125,383	92.58%
Jul-2014	147,226	133,726	90.83%

Month	Total Waste Removed (kg)	Waste Recycled (kg)	Percentage Waste Recycled
Aug-2014	98,959	91,955	92.92%
Sep-2014	225,067	213,068	94.67%
Oct-2014	127,968	116,474	91.02%
Nov-2014	136,847	120,135	87.79%
Dec-2014	153,725	142,272	92.55%

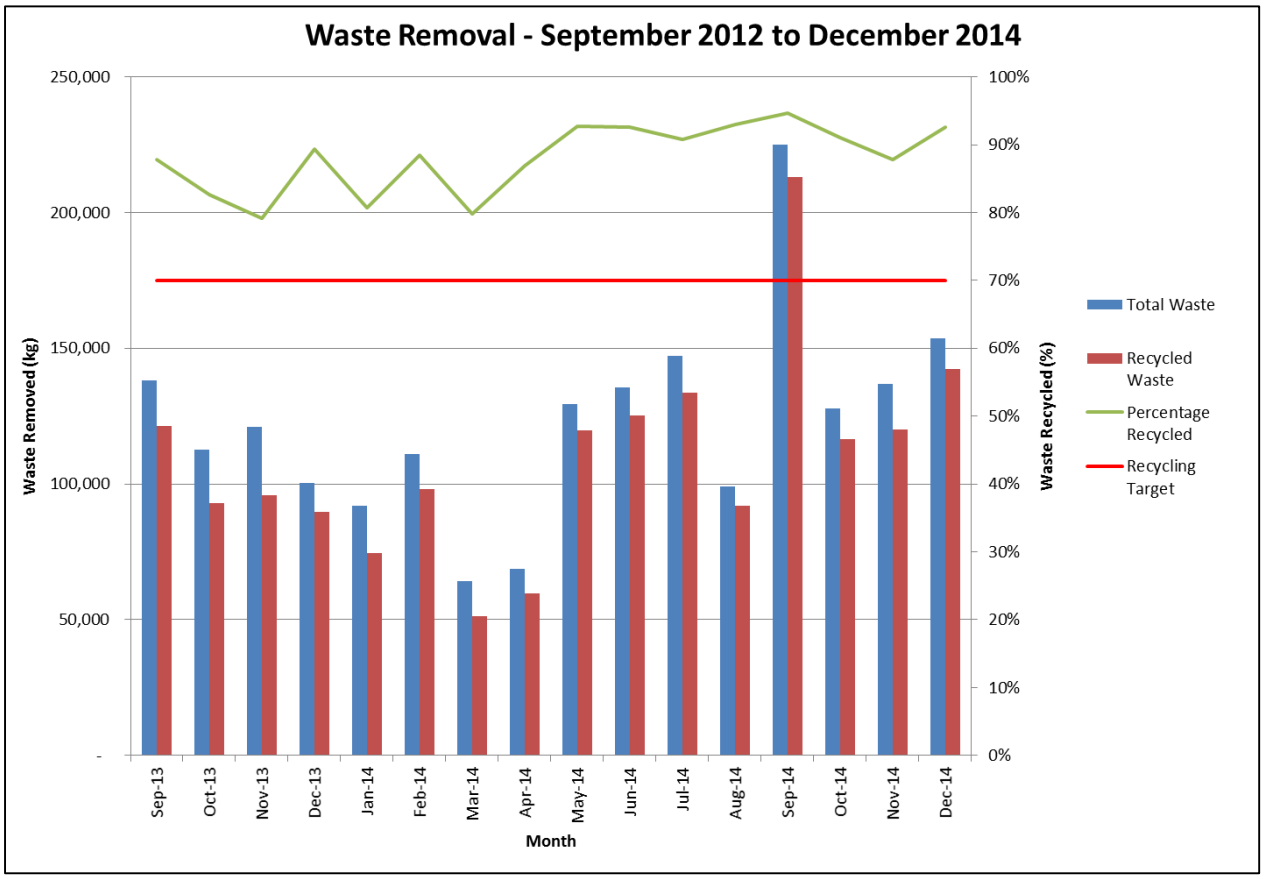


Figure 53: Waste Removed from Site

3.9 CONTAMINATED AND POLLUTED LAND

There was no action taken or required this reporting period to manage contaminated or polluted land within lands covered by this AEMR and owned or managed by MCO.

3.10 FLORA AND FAUNA

3.10.1 Activities This Reporting Period

During the reporting period MCO continued to clear vegetation for the advancement of mining operations in Open Cut 1 and Open Cut 2. The process outlined in **Section 2.2** was followed for these clearing activities. No additional management measures were required to manage threatened flora and fauna during these clearing activities.

On ground revegetation works continued in the Vegetation Offset Areas during the reporting period. More information on these works is discussed in **Section 5.3**. Protection of 1,282ha of existing native vegetation and 6ha of White Box Yellow Box Blakely's Red Gum Grassy Woodland endangered ecological community continued during the reporting period by limiting access through locked gates and fencing.

Flora and fauna monitoring in the Vegetation Offset Areas continued during the reporting period. Results of this monitoring are shown in **Section 3.10.2**.

3.10.2 Flora and Fauna Monitoring Results

Flora and fauna monitoring was undertaken during Spring 2013, Autumn 2013 and Spring 2014 and was conducted for flora (floristic and Landscape Function Analysis) and fauna (amphibians, diurnal birds, nocturnal birds, mammals, microbats and reptiles) with the flora component including associated analogue sites.

The following areas (**Figure 54**) were targeted during the monitoring:

- Offset Area 1 (Red Hills) – located off Ulan-Wollar Rd, comprising an area of approximately 441 ha.
- Offset Area 2 – located off Ulan Rd, to the north of current mining operations and incorporates an area of approximately 725 ha. The area includes the approved Underground (UG) 4.
- Offset Area 3 – this offset area is located off Lagoons Rd, to the southwest of the current mining operations and incorporates an area of approximately 473 ha.
- Bora Creek – Riparian vegetation along Bora Creek located off Ulan Rd.

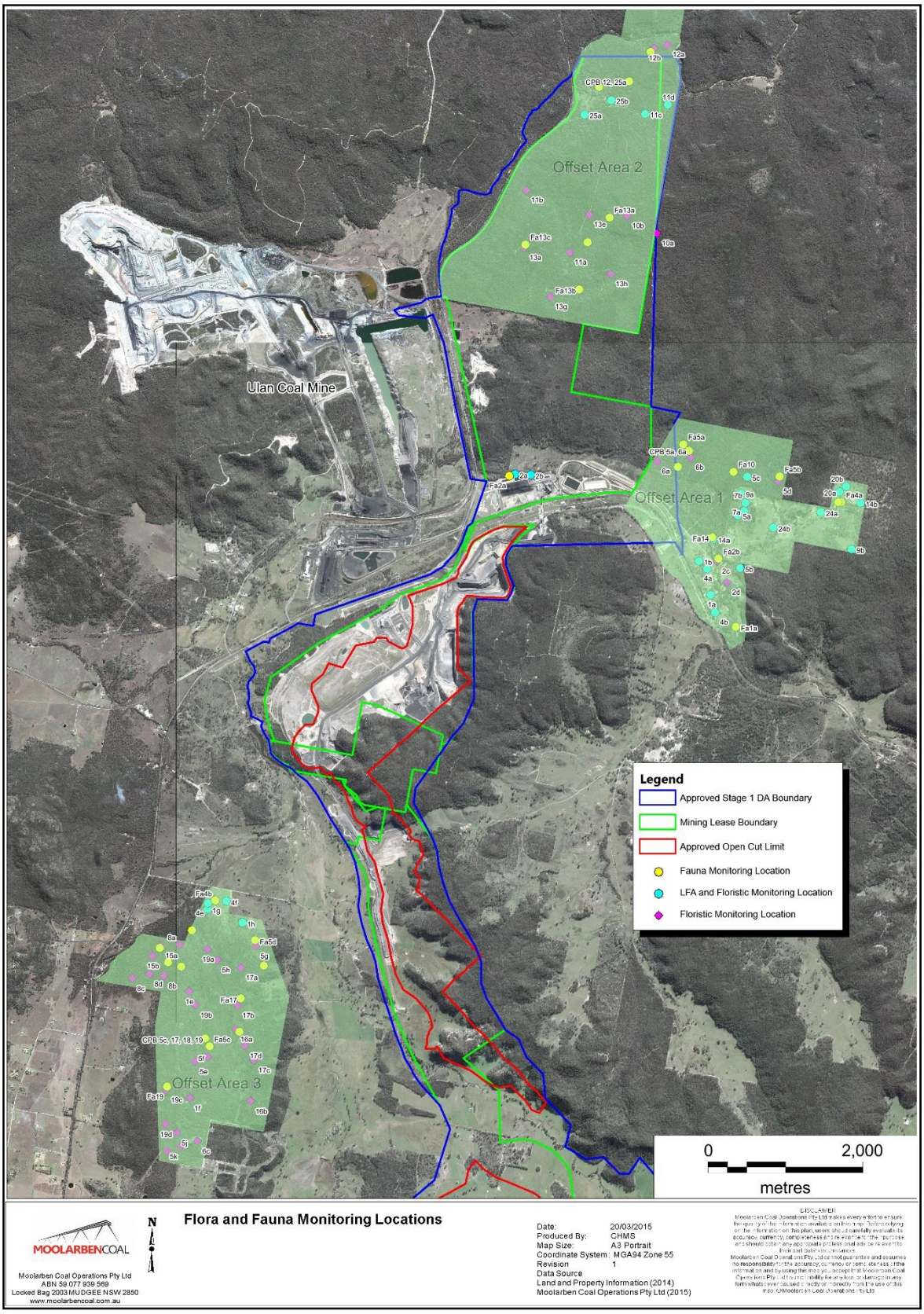


Figure 54: Offset Flora and Fauna Monitoring Sites

All monitoring during the reporting period was undertaken in accordance with the methods and survey techniques prescribed in the Landscape Management Plan and recommendations from each subsequent monitoring period. **Table 43** below summarises the methods utilised for each component of the monitoring program.

Table 43: Flora and Fauna Monitoring Methodology

	Spring 2013	Autumn 2014	Spring 2014	Methodology
Flora (Figure 54)				
Landscape Function Analysis (LFA)	✓		✓	At each site, a 20 m by 50 m nested quadrat (20 m x 20 m floristic plot and 50 m transect incorporated into 0.1 ha quadrat) was established. Within each nested quadrat LFA attributes were recorded on field data sheets in accordance with four main components of the method, as follows: • Geographic setting of the site; • Landscape organisation; • Soil surface assessment; • Vegetation dynamics.
Floristic Survey	✓	✓	✓	Full floristic survey plots were completed in each 20 m x 20 m plot of the nested 0.1 ha quadrat (see above) to collect floristic data. In addition to these nested plots, floristic-only sites were established utilising the 20 m x 20 m plot configuration. All visible vascular species were recorded, with each species being assigned to one of seven foliage cover-abundance classes (Walker & Hopkins 1984). Vegetation structure was recorded for each plot, specifically the height and total foliage cover of each stratum. All vascular plant species observed in the plots were identified to species level (where suitable material was available for identification), recorded and compiled into the species list.
Fauna (Figure 54)				
Amphibians	✓		✓	Amphibian monitoring targeted water bodies including dams and ephemeral creeks. Amphibian monitoring included active searches during the day and night for a total period of 1 h person hours per site.
Diurnal Birds	✓		✓	Diurnal bird monitoring involved conducting a census of birds along a randomly selected transect between two fixed points. Birds were recorded while walking along the random transect for a total period of 1 hour (0.5 hour in the morning and 0.5 hour in the afternoon), with all birds recorded either through direct observation, calls or other evidence (such as feathers and scats).
Nocturnal Birds	✓		✓	Nocturnal bird monitoring involved using call playback and spotlighting survey techniques. Call playback was undertaken at each site for a period of 0.75 hours over one night, targeting the Powerful Owl, Masked Owl and Barking Owl. The call playback involved 5 minutes playback, followed by 5 five minutes listening, then 5 minutes spotlighting within the immediate area where the call playback was undertaken. This was completed for each targeted species.
Mammals	✓		✓	Mammal monitoring was targeted at ground dwelling mammals. The spring 2013 and 2014 monitoring included the use of Elliott traps (using 'A' and 'B' sized traps), an infra-red camera with a closed baited cage trap, hair tubes (mixture of small (Entrance Diameter 50mm) and large (Entrance Diameter 110 x 70mm)) and spotlighting. A trap line was set up at each of the monitoring sites and contained a combination of trap types and survey techniques.
Microbats	✓		✓	Microbat monitoring was undertaken using ultrasonic echolocation recording (Anabat detection). Two Anabat detection devices were set up at each site over two nights, targeting both terrestrial and aquatic habitat.
Reptiles	✓		✓	Reptile monitoring included active searches during the day for 0.5 person hours per site. The search involved rock rolling, searching beneath woody debris, litter searches, and beneath other debris.
Habitat Assessment	✓		✓	Habitat assessment included the identification of scats, scratches and diggings along each trapping transect line. All feral animal scratchings, warrens and scats were mark with a GPS and noted.

3.10.2.1 Landscape Function Analysis

LFA is a tool that assists in measuring the recovery of biological processes at the soil surface. LFA monitoring transects have been established in offset areas within stratification units undergoing active rehabilitation and in near pristine examples of the same stratification/vegetation type (analogue sites) to measure and compare trends, landscape organisation (key features observed included the distribution, width and length of patches of grass, litter, logs, cryptogams and bare ground), soil stability, nutrient cycling, water infiltration and plant density. This was undertaken utilising the Landscape Organisation and Soil Surface Assessment (SSA) components of the LFA methodology.

In terms of interpreting the LFA results, the Landscape Organisation results are presented in an index, which essentially provides a proportion of the transect occupied by patches - patches being landscape elements that are relatively permanent and provide stable, resource accumulating structures, such as grassy tussocks, ground cover and logs. Therefore a higher Landscape Organisation index implies a more stable transect that is less prone to erosion. The SSA results go one step further than this and provide an index on stability, infiltration and nutrient cycling for all patch and inter-patch types for the whole of landscape (transect) and have been presented in a line graph using consecutive years of data, again, to identify any early trends.

The LFA results for all Derived Native Grassland (DNG) vegetation types sampled are presented and discussed below. When analysing trends in monitoring data, long-term, multi-year monitoring is far more informative, as variables such as climatic conditions and different monitoring technicians can influence results. The earliest LFA data recorded at Moolarben was during surveys conducted in spring 2010; additional sites were added to the monitoring program in 2011.

Blakely's Red Gum Grassy Woodland Derived Native Grassland

Landscape organisation
During the reporting period, the DNG sites generally showed stable or upward trends in the proportion of vegetation patches across the transects. Site 4b is the only exception to this trend, with a gradual reduction in the index from 2010 to 2011 and a marked reduction in 2012. As expected, analogue sites continued to have higher and more stable LO indices, with both A1a and A1b recording LO values of 1.0 in 2013, with only A1a showing any change (a reduction to 0.96) in 2014.

Soil Surface assessment
In terms of soil surface stability – a key factor contributing to erodibility of soils - the majority of DNG and analogue sites are showing improvements in stability or are remaining stable (within five to ten per cent fluctuations year on year). The exceptions to this are site 4f, which showed a reduction in stability index from 0.65 to 0.46 from 2013 to 2014, and both analogue sites, which declined from 0.68 to 0.55-56 from 2013 to 2014. However, this latter result means that in 2014, DNG sites had stability indices of between 80-100 per cent of analogue values. All sites appear to be remaining constant or trending towards improved soil stability. This can be contributed to the fact that these sites have sandy soils (high porosity). Soil stability has also been improved as a result of two good rainfall and growing seasons in 2010 and 2011, exclusion of livestock from the monitoring sites, and increased accumulation of leaf litter.

Ironbark – Cyprus – Stringybark Forest DNG

Landscape organisation
Both DNG sites recorded a slight increase in LO from 2012 to 2013; site 7b then remained stable through to 2014, while site 7a experienced roughly a 15 per cent reduction in LO to an index of 0.72, the lowest value recorded for this site since monitoring commenced in 2011. Both analogue

sites (A5a and A5b) for this DNG type also showed a continuous decline in LO from 2012 to 2013 and 2014 (from 1.0 to .95 for A5a, and from 1.0 to 0.83 for A5b).

Soil Surface assessment
Soil surface stability continued to slightly increase or remain stable from 2012 to 2013; this index in site 7a remained stable through to 2014, however site 7b experienced a reduction of almost 20 per cent over this same period. Similar reductions from 2013 to 2014 were observed for sites A5a and A5b, and as such DNG values remain within the range set by these analogues. Nutrient cycling in DNG sites, as well as in analogue site A5b, increased from 2012 to 2013, whereas site A5a showed a slight reduction in this index, from 40 to 37. All sites showed a reduction in nutrient cycling from 2013 to 2014; however for sites A5a, 7a and 7b, 2014 values remained within their previously recorded ranges.

Grey Box – Blakely's Red Gum Open Forest Derived Native Grassland

Landscape organisation
LFA assessment of the Grey Box – Blakely's Red Gum Open Forest DNG community offset sites showed that site 9a had decrease of almost 10 per cent in LO from 2012 to 2013, remaining relatively stable in 2014, while site 9b, while increasing in LO from 2012 to 2013, showed a further decline in 2014 to a low value of 0.35 – the lowest LO value recorded in 2014 from all sites. Both analogue sites similarly showed a reduction (approximately 10 per cent) in the proportion of patches from 2012 to 2013, with A8a slightly increasing to 0.9 in 2014 and A8b remaining stable at 0.92 – similar values to the 2014 LO index recorded in site 9a.

Soil Surface assessment
Soil surface stability fluctuated year on year between 2012 and 2014 for analogue site A8b and DNG site 9a, and steadily declined for analogue site A8a and DNG site 9b over the same period. The most recent results show that DNG sites have equal or greater stability values than their analogues, reflecting a lesser decline over the previous year in the former sites. Both infiltration and nutrient cycling declined for site 9a between 2012 and 2014, whereas these values increased or remained stable, respectively, for site 9b. Infiltration values fluctuated for analogue sites over this time period; 2014 indices were lower than those recorded in 2012, yet still between eight to 35 per cent greater than 2014 values for DNG sites. Nutrient cycling indices similarly fluctuated in analogue sites, increasing from 2012 to 2013 then declining again in 2014, yet remaining up to twice as high as the values recorded in DNG sites for this year.

Yellow Box Grassy Woodland Derived Native Grassland

Landscape organisation
Landscape organisation for the Yellow Box Grassy Woodland DNG community offset and analogue sites has remained relatively stable across all years, with all sites recording indices of between 0.96 and 1.0 in 2013 and 2014.

Soil Surface assessment
Despite an initial increase in soil surface stability recorded at all sites between 2011 and 2012, this index steadily decreased (by between 13 to 23 per cent) at all sites between 2012 and 2014. No consistent trends were observed across all sites for infiltration; one DNG site (21a) showed a decline from a value of 38 in 2012 to a value of 33 in 2014, while the other (21b) significantly increased from 30 to 50 over the same time period. Infiltration values for analogue sites showed no constant trend across monitoring years, increasing for both sites from 2012 to 2013, and then declining to between 36 and 39 in 2014.

Nutrient cycling appears to be improving across both analogue sites, with the nutrient cycling indices for sites 21a and 21b increasing from 21 to 27, and 21 to 49, respectively, between 2012

and 2014. In contrast, nutrient cycling slightly declined or at best remained stable at analogue sites over the same period.

The results for the Yellow Box Grassy Woodland DNG sites are generally constant across monitoring periods or showing improvement. These results can be contributed to the high productivity and resilience of the soils where the DNG sites are positioned. This is further supported by the landscape organisation scores which show a stable and patch dominated transect.

Blakely's Red Gum – Rough-barked Apple Woodland DNG
For the purpose of analysing the LFA and vegetation dynamics recorded for these sites, the Rough-barked Apple Alluvial Woodland analogue sites have been compared with data from this DNG vegetation community due to similarities in landscape position and general vegetation structure.

Landscape organisation
Site 25a was found to be comparable to the analogue equivalents, with proportionally higher grass/ground cover compared to bare soil. Both of the DNG sites showed an increase in the proportion of patches found across the transects, indicating an increase in stability of vegetation across the site.

Soil Surface assessment
With the exception of site A2a, all DNG sites and analogue sites are showing trends towards greater soil stability during the reporting period. In addition, the presence of cryptogams at sites 25a and 25b suggests that the soil surface is relatively stable. Infiltration is decreasing at sites 25a and 25b and in analogue A2b, though this reduction is not considered substantial between the 2011 and 2012 monitoring periods. Analogue site A2a is trending slightly upwards for infiltration between 2011 and 2012. The results for nutrient cycling varied across the sites. Sites 25a and A2a both trend slightly down between 2011 and 2012, whilst sites 25b and A2b both trend slightly upward between these years. Some explanation for the downward trends shown across the sites may be due to a particularly dry winter and early spring in 2012 leading to a firmer more surface resistant soil.

3.10.2.2 Floristic Surveys

A total of 583 species (482 native species, 74 exotic species, and 27 species unable to be identified as native or exotic) were recorded across all floristic monitoring sites during the spring 2013-2014 and autumn 2014 monitoring surveys. In terms of individual survey periods, 432 species were recorded in spring 2013, 404 in autumn 2014, and 432 in spring 2014.

Within individual sites, total species richness ranged between 12 and 56 species in spring surveys (sites 9b and 15b, and A1a respectively) and between 14 and 58 species in the autumn 2014 survey (sites 24b and 11a respectively). The number of exotic species recorded within individual sites ranged from 0 to 19 species during spring surveys, and between 0 and 13 species in autumn 2014. Unlike previous years' seasonal trends, there was a significant increase in species richness across the majority of sites between spring 2013 and autumn 2014; an increase that was largely sustained, or only partly reversed, in spring 2014. Above average rainfall was experienced in the lead up to and during autumn 2014.

There were a number of notable exceptions to this latter trend, including sites 4f and 14b, which showed a significant reduction in species richness between autumn 2014 and spring 2014 to richness values below those recorded in spring 2013.

A summary of the species richness for each site in spring 2013 and 2014, and autumn 2014, is presented in **Table 44.** Where plants were unable to be identified to species level, and native or exotic unable to be determined, these individuals were included in the total species count but not in native/exotic breakdown. Detailed results of the floristic surveys are provided in the spring 2014 monitoring report.

Table 44: Floristic Species Richness (N – native, E = Exotic)

Type Code	Vegetation Community	Site Number	Spring 2013			Autumn 2014			Spring 2014		
			Total Species	N	E	Total Species	N	E	Total Species	N	E
1	Blakely's Red Gum Grassy Woodland	1a	21	18	3	25	21	4	23	19	4
		1b	17	15	2	25	21	4	23	21	2
		1e	30	29	1	31	28	3	38	37	1
		1f	33	31	2	39	39	0	25	25	0
		1h	30	29	1	43	41	2	34	32	2
		A1a	31	28	3	50	45	5	56	49	7
		A1b	34	32	2	36	33	3	33	26	7
2	Rough-barked Apple Alluvial Woodland	2a	36	34	2	50	49	1	37	35	2
		2b	41	38	3	46	42	4	51	46	5
		2c	40	39	1	42	41	1	50	48	2
		2d	35	33	2	37	33	4	36	32	4
		A2a	19	18	1	51	33	12	40	33	7
		A2b	34	25	9	38	29	6	34	29	5
4	Blakely's Red Gum Grassy Woodland - DNG	4a	17	13	4	23	15	8	32	21	11
		4b	24	16	8	24	15	9	24	14	10
		4e	19	15	4	25	16	9	25	15	6
		4f	33	29	4	42	39	3	24	19	5
5	Ironbark – Cypress – Stringybark Forest	5a	38	37	1	39	35	4	44	41	3
		5b	28	28	0	45	45	0	43	43	0
		5c	39	39	0	50	50	0	42	41	1

Type Code	Vegetation Community	Site Number	Spring 2013			Autumn 2014			Spring 2014		
			Total Species	N	E	Total Species	N	E	Total Species	N	E
		5d	44	44	0	Removed					
		5e	37	36	1	37	37	0	39	38	1
		5h	41	40	1	44	43	1	50	48	2
		A5a	21	20	1	31	30	1	42	40	2
		A5b	22	22	0	34	34	0	33	33	0
6	Inland Scribbly Gum Forest	6a	40	40	0	42	42	0	43	43	0
		6b	35	35	0	45	44	1	51	51	0
		6c	25	25	0	28	28	0	29	28	0
		6d	29	29	0	35	35	0	27	27	0
		A6a	29	29	0	37	36	1	43	43	0
		A6b	20	20	0	29	28	1	31	30	1
7	Ironbark - Cypress - Stringybark - DNG	7a	45	44	1	46	46	0	45	43	2
		7b	42	41	1	42	40	2	43	41	2
8	Grey Box - Blakely's Red Gum Open Forest	8a	31	31	0	43	43	0	37	36	1
		8c	22	22	0	26	26	0	25	25	0
		8d	35	35	0	40	39	1	40	39	1
		A8a	20	20	0	27	27	0	27	27	0
		A8b	32	32	0	27	26	1	35	33	1
9	Grey Box - Blakely's Red Gum Open Forest - DNG	9a	37	27	10	44	31	13	42	23	19
		9b	12	10	2	15	15	0	16	11	2
10	Broad-leaved Ironbark - Dwyer's Red Gum Low Woodland	10a	29	29	0	29	29	0	29	29	0
		10b	28	28	0	25	25	0	31	30	0
11		11a	45	45	0	58	57	1	52	51	1

Type Code	Vegetation Community	Site Number	Spring 2013			Autumn 2014			Spring 2014		
			Total Species	N	E	Total Species	N	E	Total Species	N	E
	Blakely's Red Gum - Rough Barked Apple Alluvial Woodland	11b	30	29	1	46	31	15	36	32	0
		11c	38	38	0	39	38	1	41	41	0
		11d	37	37	0	48	47	1	45	44	1
12	Dwyer's Mallee Gum - Inland Scribbly Gum Low Open…	12a	24	24	0	37	36	1	32	32	0
		12b	26	26	0	40	40	0	33	33	0
13	Inland Scribbly Gum - Narrow-leaved Stringybark Forest	13a	30	30	0	33	33	0	47	47	0
		13e	-	-	-	48	47	1	45	45	0
		13g	26	26	0	39	39	0	29	29	0
		13h	44	44	0	47	47	0	49	48	0
14	Rough-barked Apple Woodland on valley Flats	14a	21	19	2	24	21	3	28	26	2
		14b	36	35	1	43	39	4	27	23	4
15	Callistemon pinifolius - Blakely's Red Gum Swamp	15a	28	28	0	34	30	4	31	29	1
		15b	12	12	0	29	22	7	27	23	4
16	Common Fringe Myrtle - Kunzea Heath	16a	24	24	0	25	25	0	27	27	0
		16b	28	28	0	29	29	0	43	41	2
17	Parramatta Red Gum - Black Cypress Pine Forest	17a	30	30	0	37	37	0	38	37	0
		17b	24	24	0	36	36	0	29	29	0
		17c	24	24	0	43	42	1	36	36	0
		17d	33	33	0	43	42	1	35	35	0
19	Tumbledown Gum - Currawang Open Forest	19a	38	37	1	45	44	1	46	42	4
		19b	32	30	2	40	37	3	38	37	1
		19c	35	35	0	28	28	0	32	32	0
20	Yellow Box Grassy Woodland	A20a	16	14	2	40	30	10	39	30	7
		A20b	29	27	2	32	28	4	41	34	7

Type Code	Vegetation Community	Site Number	Spring 2013			Autumn 2014			Spring 2014		
			Total Species	N	E	Total Species	N	E	Total Species	N	E
21	Yellow Box Grassy Woodland - DNG	21a	21	17	4	42	34	8	39	32	7
		21b	19	16	3	31	27	4	27	23	4
24	Rough-barked Apple on valley flats - DNG	24a	14	11	3	23	17	6	20	16	4
		24b	13	10	3	14	11	3	13	11	2
25	Blakely's Red Gum - Rough-barked Apple Alluvial Woodland – DNG	25a	21	13	8	39	26	13	40	26	14
		25b	29	28	1	32	30	2	31	29	2

3.10.2.3 Fauna

Fauna data collected during spring 2013 and 2014 is summarised below in **Table 45**.

Table 45: Fauna Monitoring Results Summary

Monitoring Site	Amphibian		Birds		Mammals		Microbats		Reptiles	
	S13	S14	S13	S14	S13	S14	S13	S14	S13	S14
Fa1a	2	5	34	39	3	4	8	10	3	2
Fa2a	5	3	29	15	6	3	7	5	1	4
Fa2b	3	7	29	46	3	3	9	5	0	5
Fa4a	4	0	37	0	5	3	10	8	2	1
Fa4b	3	0	22	16	6	2	9	5	0	2
Fa5a	1	1	18	24	3	1	5	11	0	3
Fa5b	0	0	25	28	6	1	6	9	0	3
Fa5c	1	0	12	0	5	3	10	7	1	0
Fa5d	3	1	32	27	5	2	11	7	1	1
Fa7a	-	3	-	28	-	3	-	9	-	1
Fa8a	0	1	30	27	3	4	6	7	0	4
Fa9a	-	0	-	29	-	7	-	11	-	6
Fa12	0	0	20	23	3	2	3	5	1	2
Fa13a	0	0	26	30	4	3	6	10	0	3
Fa13b	1	1	23	28	4	1	9	9	0	1
Fa13c	0	0	21	14	2	3	10	6	0	2
Fa13d	-	1	-	19	-	1	-	3	-	1
Fa16	0	0	22	21	3	6	10	6	1	1
Fa17	2	1	25	17	3	3	10	6	3	4
Fa19	1	0	28	19	8	6	8	5	1	2
Fa24	-	2	-	25	-	6	-	7	-	3
Fa25	1	0	31	35	7	7	8	5	3	1
Opportunistic (Opp) Area 1	1	6	40	99	0	9	0	-	3	9
Opp. Area 2	0	1	22	36	0	6	0	-	1	4
Opp. Area 3	0	5	18	46	0	7	0	-	0	2

Within Offset Area 1 thirteen bird and three microchiropteran bat species listed as vulnerable under the NSW Threatened Species Conservation Act 1995 (TSC Act) were observed during the spring 2013 and spring 2014 monitoring periods (**Table 46**). One of these species - the Large-eared Pied Bat - is also listed as vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). One migratory bird species (Rainbow Bee-eater) and one vulnerable mammal (New Holland Mouse) listed under the EPBC Act were also recorded, as well as one endangered bird species listed under the TSC Act (Swift Parrot).

Table 46: Threatened Fauna Recorded in Offset Area 1

Common Name	TSC Act	EPBC Act	Fa 1a	Fa 2b	Fa 4a	Fa 5a	Fa 5b	Fa 6a	Fa 7a	Fa 9a	Fa 24	Opp
Black-chinned Honeyeater	V	-		✓								
Brown Treecreeper (eastern subspecies)	V	-	✓	✓	✓						✓	✓
Diamond Firetail	V	-	✓	✓	✓							✓
Glossy Black-Cockatoo	V	-	✓			✓	✓		✓		✓	✓
Grey-crowned Babbler	V	-								✓		✓
Hooded Robin	V	-		✓	✓				✓			✓
Little Eagle	V	-		✓								✓
Little Lorikeet	V	-			✓						✓	
Painted Honeyeater	V	-	✓	✓	✓				✓	✓		✓
Powerful Owl	V	-			✓							✓
Rainbow Bee-eater	-	M	✓		✓	✓					✓	✓
Speckled Warbler	V	-	✓			✓				✓		✓
Swift Parrot	E	V		✓								✓
Turquoise Parrot	V	-		✓						✓		✓
Varied Sittella	V	-	✓	✓		✓						
Eastern Bent-wing Bat	V	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Large-eared Pied Bat	V	V	✓		✓	✓			✓	✓	✓	
New Holland Mouse	-	V							✓			
Yellow-bellied Sheathtail Bat	V	-								✓		

Within Offset Area 2, five bird species and three microchiropteran bat species listed as vulnerable under the TSC Act were recorded during the spring 2013 and spring 2014 monitoring (**Table 47**). One of these species - the Large-eared Pied Bat - is also listed as vulnerable under the EPBC Act. One migratory bird species (Rainbow Bee-eater) listed under the EPBC Act was also recorded opportunistically within this Offset Area.

Table 47: Threatened Fauna Recorded at Offset Area 2

Common Name	TSC Act	EPBC Act	Fa11a	Fa12	Fa13a	Fa13b	Fa13c	Fa25	Opp
Glossy Black-Cockatoo	V	-							✓
Little Eagle	V	-							✓
Powerful Owl	V	-			✓		✓		✓
Rainbow Bee-eater	-	M							✓
Turquoise Parrot	V	-			✓				
Varied Sittella	V	-			✓			✓	✓
Large-eared Pied Bat	V	V			✓	✓			
Eastern Bent-wing Bat	V	-			✓		✓		
Eastern Cave Bat	V	-				✓			

Three bird and three microchiropteran bat species listed as vulnerable under the TSC Act were recorded in Offset Area 3 (**Table 48**). One of these species - the Large-eared Pied Bat - is also listed as vulnerable under the EPBC Act. One migratory bird species (Rainbow Bee-eater) listed under the EPBC Act was also recorded opportunistically within this Offset Area.

Table 48: Threatened Fauna Recorded at Offset Area 3

Common Name	TSC Act	EPBC Act	Fa 4b	Fa 5c	Fa 5d	Fa 8a	Fa 16	Fa 17	Fa 19	Opp
Glossy Black-Cockatoo	V	-		✓						✓
Rainbow Bee-eater	-	M	✓				✓			
Speckled Warbler	V	-				✓				✓
Varied Sittella	V	-			✓					
Large-eared Pied Bat									✓	
Eastern Bentwing Bat	V	-		✓	✓	✓		✓		
Eastern Cave Bat				✓		✓				

Within Bora Creek, one bird species and two microchiropteran bat species listed as vulnerable under the TSC Act were recorded during the spring 2013 and spring 2014 monitoring (**Table 49**). One of these species - the Large-eared Pied Bat - is also listed as vulnerable under the EPBC Act.

Table 49: Threatened Fauna Recorded at Bora Creek

Common Name	TSC Act	EPBC Act	Fa2a	Opp.
Painted Honeyeater	V	-		✓
Large-eared Pied Bat	V	V	✓	
Eastern Bentwing Bat	V	-	✓	

Four species of declared vertebrate pests were recorded within the Offset Areas during the spring 2013 and 2014 monitoring periods. These were *Canis familliaris* (Dingo/Domestic Dog – Offset Areas 1 and 2), *Oryctolagus cunniculus* (European Rabbit – Offset Areas 1, 2 and 3), *Sus scrofa*

(Feral Pig – Offset Areas 1 and 3) and *Vulpes vulpes* (European Red Fox – Offset Areas 1, 2 and 3).

3.10.3 Activities in the Next Reporting Period

Revegetation and maintenance works in the Vegetation Offset Areas will continue during the next reporting period. The flora and fauna monitoring program will expand into additional offset areas during the next reporting period.

3.11 STREAM HEALTH MONITORING

3.11.1 Activities This Reporting Period

Stream Health Monitoring was undertaken during Spring 2013, Autumn 2014 and Spring 2014. The monitoring locations are illustrated in **Figure 3**. During Spring 2014 Stream Health sites SH14 to SH19 were established for the collection of baseline data prior to mining in OC4.

3.11.2 Monitoring Results and Comparison to Previous Stream Health Monitoring

Spring 2013

The monitoring for Spring 2013 was performed in September 2013. The results from this monitoring and comparison to previous results can be seen in **Table 50**. There was no modelling conducted in the Environmental Assessment on predicted stream health surrounding the mining operations so a comparison can't be made to predicted stream health.

Table 50: Spring 2013 Stream Health Monitoring Results

Index	Site	SH01	SH02	SH03	SH04	SH05	SH06	SH08	SH10	SH12	SH13
RCE	Mean	77.25	82.80	ND	66.45	53.21	52.57	51.19	54.89	70.67	75.96
RCE	SD	6.08	4.32	ND	11.43	3.19	3.59	5.63	1.96	8.77	6.50
RCE	Spring 2013	82.69	80.77	ND	69.23	53.85	51.92	51.92	53.85	76.92	84.62
RCE	**Compare to baseline**	**IR**	**IR**	**-**	**IR**	**IR**	**High**	**IR**	**IR**	**IR**	**High**
Diversity	Mean	26.50	27.60	ND	18.00	23.70	19.20	16.50	19.50	24.00	25.11
Diversity	SD	6.24	8.85	ND	4.42	4.52	3.65	5.10	4.20	6.58	5.13
Diversity	Spring 2013	24	26	ND	12	22	18	10	16	23	23
Diversity	**Compare to baseline**	**IR**	**IR**		**Low**	**IR**	**IR**	**Low**	**IR**	**IR**	**IR**
SIGNAL	Mean	4.16	4.21	ND	3.58	3.70	3.75	3.42	3.59	4.44	4.38
SIGNAL	SD	0.46	0.44	ND	0.59	0.38	0.38	0.47	0.54	0.48	0.45
SIGNAL	Spring 2013	4.5	4.4	ND	3.2	3.5	3.6	4.1	3.3	4.6	4.3
SIGNAL	**Compare to baseline**	**High**	**High**	**-**	**IR**	**IR**	**IR**	**High**	**IR**	**IR**	**IR**

ND represents no data. Comparison to baseline compares present seasonal score to long term mean ± standard deviation. IR means In Range.

Aquatic Habitat Condition (RCE Index)
RCE scores in spring 2013 were within the comparable range for all sites, except SH13 where it was higher. RCE scores appear quite stable at each site over time. Most fluctuations are attributable to relatively quick-response biological components such as riparian ground cover, aquatic macrophyte cover and algal cover.

Aquatic Macro Invertebrate Diversity
Taxa diversity was inside the comparable range at all sites, with the exception of SH04 and SH08 where it was below. SH04 had 12 families; the lowest recorded for this site since monitoring began and equal to spring 2011. SH08 had 10 families, the lowest recorded for this site (and all other sites) since monitoring began.

Both sites are experiencing low flow levels. There are no seasonal patterns or mine-related impacts apparent in the data.

Pollution Tolerance Site SIGNAL Scores
SIGNAL2 values were inside or above the comparable range at all sites. Although diversity was below the comparable range at SH04 and SH08 the SIGNAL2 values were not adversely affected. SH06 was inside the comparable range but the SIGNAL2 score has declined since autumn 2012 and the site is now severely, rather than moderately, impaired. This decline in condition appears to be within the normal fluctuation for this site. SH08 was above the comparable range and returned the highest SIGNAL2 score for this site since monitoring began, the site is now moderately impaired as opposed to severely impaired. Again, this fluctuation appears to be normal for this site.

Autumn 2014

The monitoring for Autumn 2014 was performed in March 2013. The results from this monitoring and comparison to previous results can be seen in **Table 51**. There was no modelling conducted in the Environmental Assessment on predicted stream health surrounding the mining operations so a comparison can't be made to predicted stream health.

Table 51: Autumn 2014 Stream Health Monitoring Results

Index	Site	SH01	SH02	SH03	SH04	SH05	SH06	SH08	SH10	SH12	SH13
RCE	Mean	77.61	82.60	ND	66.92	53.27	52.50	51.26	54.79	71.37	76.92
RCE	SD	5.84	4.12	ND	10.88	3.01	3.39	5.31	1.88	8.47	6.73
RCE	Autumn 2014	80.77	80.77	91.67	71.15	53.85	51.92	51.92	53.85	76.92	84.62
RCE	**Compare to baseline**	**IR**	**IR**	**-**	**-**	**IR**	**IR**	**-**	**IR**	**IR**	**High**
Diversity	Mean	25.64	27.09	ND	18.75	23.27	18.91	17.22	18.73	23.40	25.20
Diversity	SD	6.58	8.56	ND	4.06	4.52	3.59	4.84	4.73	6.48	4.85
Diversity	Autumn 2014	17	22	ND	ND	19	16	ND	11	18	26
Diversity	**Compare to baseline**	**Low**	**IR**	**-**	**-**	**IR**	**IR**	**-**	**Low**	**IR**	**IR**
SIGNAL	Mean	4.18	4.22	ND	3.63	3.72	3.73	3.35	3.59	4.41	4.42
SIGNAL	SD	0.44	0.41	ND	0.61	0.37	0.37	0.43	0.52	0.46	0.44
SIGNAL	Autumn 2014	4.39	4.27	ND	ND	3.89	3.44	ND	3.55	4.11	4.73
SIGNAL	**Compare to baseline**	**IR**	**IR**	**-**	**-**	**IR**	**IR**	**-**	**IR**	**IR**	**IR**

ND represents no data. Comparison to baseline compares present seasonal score to long term mean ± standard deviation. IR means In Range.

Aquatic Habitat Condition (RCE index)
RCE scores in autumn 2014 were within the comparable range for all sites, except SH13 where it was higher. RCE scores appear quite stable over time. Most fluctuations are attributable to relatively quick-response biological components such as riparian ground cover, aquatic macrophyte, and algal cover.

Aquatic Macro Invertebrate Diversity
Taxa diversity for autumn 2014 monitoring was below average yet inside the comparable range at all sites sampled, with the exception of SH01 and SH10. SH01 had 17 families, the second lowest since monitoring began. SH10 had 11 families, the lowest recorded for this site.

Pollution Tolerance Site SIGNAL Scores
SIGNAL2 scores were inside the comparable range at all sites and indicative condition has remained stable since spring 2013 monitoring. Although diversity was below the comparable range at SH01 and SH10 the SIGNAL2 values were not adversely affected.

Spring 2014

The monitoring for Spring 2014 was performed in October 2014. The results from this monitoring and comparison to previous results can be seen in **Table 52**. There was no modelling conducted in the Environmental Assessment on predicted stream health surrounding the mining operations so a comparison can't be made to predicted stream health.

Table 52: Spring 2014 Stream Health Monitoring Results

Index	Site	SH01	SH02	SH03	SH04	SH05	SH06	SH08	SH10	SH12	SH13
RCE	Mean	78.24	82.43	91.67	68.00	53.85	52.80	51.32	54.70	71.73	77.50
RCE	SD	5.93	3.95	0.00	10.93	3.44	3.37	5.05	1.81	8.06	6.60
RCE	Spring 2014	84.62	80.77	91.67	78.85	59.62	55.77	51.92	53.85	75.00	82.69
RCE	**Compare to baseline**	**High**	**IR**	**IR**	**IR**	**High**	**IR**	**IR**	**IR**	**IR**	**IR**
Diversity	Mean	24.92	26.25	ND	18.00	22.42	18.75	16.50	18.08	22.45	25.18
Diversity	SD	6.75	8.67	ND	4.42	5.23	3.47	5.10	5.04	6.90	4.60
Diversity	Spring 2014	17	17	ND	ND	13	17	ND	11	13	25
Diversity	**Compare to baseline**	**Low**	**Low**		**-**	**Low**	**IR**	**-**	**Low**	**Low**	**IR**
SIGNAL	Mean	4.19	4.28	ND	3.58	3.66	3.79	3.42	3.54	4.26	4.62
SIGNAL	SD	0.42	0.45	ND	0.59	0.41	0.42	0.47	0.52	0.65	0.81
SIGNAL	Spring 2014	4.30	5.00	ND	ND	3.00	4.50	ND	3.00	2.80	6.70
SIGNAL	**Compare to baseline**	**IR**	**High**	**-**	**-**	**Low**	**High**	**-**	**Low**	**Low**	**High**

ND represents no data. Comparison to baseline compares present seasonal score to long term mean ± standard deviation. IR means In Range.

Index	Site	SH014	SH15	SH16	SH17	SH18	SH19
RCE	Mean	ND	ND	ND	ND	ND	ND
RCE	SD	ND	ND	ND	ND	ND	ND
RCE	Spring 2014	53.85	80.77	75.00	59.62	76.92	69.23
RCE	**Compare to baseline**	**-**	**-**	**-**	**-**	**-**	**-**
Diversity	Mean	ND	ND	ND	ND	ND	ND
Diversity	SD	ND	ND	ND	ND	ND	ND
Diversity	Spring 2014	8	13	12	11	ND	ND
Diversity	**Compare to baseline**	**-**	**-**	**-**	**-**	**-**	**-**
SIGNAL	Mean	ND	ND	ND	ND	ND	ND
SIGNAL	SD	ND	ND	ND	ND	ND	ND
SIGNAL	Spring 2014	3.20	1.80	2.50	1.70	ND	ND
SIGNAL	**Compare to baseline**	**-**	**-**	**-**	**-**	**-**	**-**

Aquatic Habitat Condition (RCE index)

Apart from SH01 and SH05, RCE scores in spring 2014 were within the comparable range for all sites. RCE scores appear quite stable over time. Most fluctuations are attributable to relatively quick-response biological components such as riparian ground cover, aquatic macrophytes, and algal cover. Most of the components that are scored during RCE assessments will appear unchanged unless there is a significant disturbance such as a flood, fire, or there has been a long time between surveys.

Aquatic Macro Invertebrate Diversity

Taxa diversity decreased at SH02, SH05 and SH12, and remains similar to autumn 2014 at all other sites. Taxa diversity for spring 2014 monitoring was below the comparable range at all sites sampled, with the exception of SH06 and SH13 where it was below average but within the comparable range. Taxa diversity has remained low due to a prolonged period of below average rainfall and concomitant low flow and discharge in the Goulburn River.

At the newly established sites, diversity was well below the mean recorded for any of the pre-existing sites. No flow at the time of sampling, with water restricted to isolated pools, would have an influence on diversity. High water temperature at SH14 and SH16 (30.4°C and 27.75°C respectively) would also contribute to the low diversity.

Pollution Tolerance Site SIGNAL Scores

SIGNAL2 scores were below the comparable range at SH05, SH10 and SH12; and above the comparable range at SH02, SH06 and SH13. Despite this, indicative condition only changed at SH12 where it changed from moderately to severely disturbed, and at SH13 where it changed from moderately disturbed to undisturbed.

Flow and water temperatures also affected SIGNAL2 scores at the newly established sites, with very low scores indicating severe disturbance.

3.11.3 Activities Next Reporting Period

Stream health monitoring will continue to be undertaken with the results to be provided in the next AEMR.

3.12 WEEDS AND FERAL ANIMALS

3.12.1 Activities This Reporting Period

MCO continued to control weeds across the lands owned and managed by MCO. Noxious weeds controlled during the reporting period included:

- Blackberry;
- Blue Heliotrope;
- Spiny Burr Grass;
- Serrated Tussock;
- St John's Wort; and
- Tree-of-Heaven.

MCO were involved in regional feral animal treatment programs that targeted dogs and foxes. This involved on-ground and aerial baiting programs.

3.12.2 Activities Next Reporting Period

Weed and feral animal control will continue to be conducted during the next reporting period.

3.13 BLASTING

3.13.1 Activities This Reporting Period

Blast monitoring continued to be undertaken throughout the reporting period.

During the reporting period the Blast Management Plan (BMP) was reviewed and updated to manage blast related impacts associated with blasting in Open Cut 1 and Open Cut 2 extension areas. The BMP was reviewed in consultation with EPA and was awaiting approval from DP&E at the end of the reporting period. In addition, the Blast Fume Management Strategy (BFMS) was developed to manage blast related impacts associated with fume generation. The BFMS was developed in consultation with DP&E and was awaiting approval from DP&E at the end of the reporting period.

Blasting within 500m of public roads continued during this reporting period. These blasts require the roads to be closed to maintain public safety. This procedure outlines the process for notifications prior to the blast, what process to follow if emergency services need to get through the road closure and what inspections are taken of the public road before and after blasting. All road closures have been successful with members of the public being appreciative of the notification they receive.

3.13.2 Blast Monitoring

Blasting criteria for MCO are shown in **Table 53**.

Table 53: Blasting Assessment Criteria

Receiver	Air Blast Overpressure Level dB (linear Peak)	Allowable Exceedance
Residence on privately owned land	>115	5% of the total number of blasts over a period of 12 months
	>120	Nil
Receiver	**Peak Particle Velocity (mm/s)**	**Allowable Exceedance**
Residence on privately owned land	5	5% of the total number of blasts over a period of 12 months
	10	0%
Rock Shelters	40	0%

The blast monitoring locations can be seen in **Figure 3** and the results from the blasting can be seen in **Table 54**, **Figure 55** and **Figure 56**. Blasting within 2km of the Aboriginal rock shelters continued during the reporting period, triggering the requirement to monitor at these shelters. The results from these blasts can be seen in **Table 54**.

As shown in the blasting results, blasting activities were only carried out between 9am and 5pm Monday to Saturday inclusive. Blasting activities were also limited to:

- 2 blasts a day;
- 9 blasts a week, averaged over any 12 month period.

There were no occasions where vibration or overpressure results exceeded the criteria set in the Project Approval and Environment Protection Licence. Two blasts (1.53%) recorded overpressure of between 115dB and 120dB, which is less than the allowable 5%.

There were five occasions when blast fume was generated from overburden blasts in the northern part of Open Cut 1 and Open Cut 2. These incidents are discussed further in **Section 3.24.1**.

Table 54: Blast Monitoring Results

Date	Time	Blast Location	Type	BM1 Ulan School		BM2 Rock Shelters		BM4 Lagoons Rd		BM5 Ridge Road	
				Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)
04/09/13	12:00	S03B08	Overburden	0.55	97.5	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken		0.16	91.5		
05/09/13	12:00	S06B19-21	Coal	0.45	101.0			0.10	98.8		
11/09/13	12:01	S06B19-21	Coal	0.17	95.9			0.11	95.9		
13/09/13	12:05	S02B04	Overburden	0.25	97.5			0.10	107.5		
27/09/13	12:00	S06B21	Coal	0.15	100.0			Monitoring no longer required at BM4 in accordance with revised BMP		0.10	101.0
02/10/13	12:00	S05B16	Overburden	0.25	101.0					0.1	101.9
09/10/13	12:01	S02B07	Overburden	0.20	100.0					0.10	91.5
11/10/13	12:02	S02B06	Overburden	0.43	91.5					0.10	113.3
16/10/13	12:05	S06B21	Coal	0.39	101.9					0.11	101.9
18/10/13	12:00	S02B05	Overburden	0.39	115.0					0.10	94.0
22/10/13	12:00	S02B05	Overburden	0.99	94.0					0.09	88.0
23/10/13	12:00	S02B04	Overburden	0.15	116.0					0.10	101.9
25/10/13	12:00	S01B08	Overburden	0.28	97.5					0.10	91.5
30/10/13	12:10	S07B19	Coal	0.24	104.9					0.1	101
01/11/13	12:03	S07B20	Coal	0.26	91.5					0.11	88.0
06/11/13	12:02	S01B07	Overburden	0.33	91.5					0.1	104.2
08/11/13	12:03	S07B21	Coal	0.14	111.2					0.1	104
12/11/13	12:00	S07B21	Coal	0.83	106.5					0.22	108
13/11/13	12:00	S01B05	Overburden	0.31	107.5					0.1	91.5
15/11/13	11:58	S03B08	Overburden	0.10	97.5					0.1	94
20/11/13	11:59	S07B22	Coal	0.23	95.6					0.13	95.9
22/11/13	12:08	S01B04	Overburden	0.38	111.8					0.12	88

Date	Time	Blast Location	Type	BM1 Ulan School		BM2 Rock Shelters		BM4 Lagoons Rd		BM5 Ridge Road	
				Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)
26/11/13	12:01	S06B23	Coal	0.37	102.8					0.13	97.5
28/11/13	12:00	S03B05	Overburden	0.18	105.5					0.1	98.8
28/11/13	12:00	S06B23	Coal	0.18	91.5					0.1	91.5
03/12/13	12:00	S04B07	Overburden	0.21	88.0					0.1	105
06/12/13	12:00	S04B07	Overburden	0.45	116.6					0.13	109.2
12/12/13	12:00	S04B07	Overburden	0.48	95.9					0.14	91.5
13/12/13	12:00	S04B07	Overburden	0.27	91.5					0.12	88
18/12/13	12:00	S04B06	Overburden	0.63	100.0					0.16	94
03/01/14	11:56	S03B06	Overburden	0.71	101.0					0.13	91.5
03/01/14	12:03	S05B39	Overburden	0.09	88.0	0.46	not required			0.08	101
07/01/14	12:00	S04B06	Overburden	0.47	98.8	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.16	108
10/01/14	03:30	S05B39	Overburden	0.69	95.9	0.5	not required			0.2	88
17/01/14	11:56	S03B06	Overburden	0.78	98.8	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.28	88
22/01/14	12:01	S03B06	Overburden	0.78	98.8					0.09	108
24/01/14	12:02	S04B04	Overburden	0.58	94.0					0.12	108
31/01/14	12:04	S03B05	Overburden	0.59	97.5					0.12	105
05/02/14	12:02	S01B02 OC2	Overburden	0.59	101.0	3.67	not required			0.15	102.8
07/02/14	02:10	S03B05	Overburden	0.70	95.9	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.17	98.8
14/02/14	12:01	S03B05	Overburden	0.85	103.5					0.14	95.9

Date	Time	Blast Location	Type	BM1 Ulan School		BM2 Rock Shelters		BM4 Lagoons Rd		BM5 Ridge Road	
				Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)
14/02/14	12:05	OC2 - Dams 202	Overburden	0.10	95.9	0.28	not required			0.11	107
21/02/14	12:00	S04B06	Coal	0.18	97.5	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.13	91.5
21/02/14	12:03	S01B02 OC2	Overburden	0.83	91.5	2.3	not required			0.31	94
26/02/14	11:30	S01B02 OC2	Overburden	0.12	94.0	6.61	not required			0.08	107.5
27/02/14	10:30	S01B04	Overburden	0.18	91.5	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.12	98.8
28/02/14	16:45	S1B02 OC2	Overburden	0.86	101.9	3.28	not required			0.27	107.5
04/03/14	12:01	S01B35	Coal	0.21	104.2	0.3	not required			0.13	106.5
07/03/14	11:57	S01B01 OC2	Overburden	0.73	95.9	10.8	not required			0.34	101.9
11/03/14	11:58	OC2 - Dams 203	Overburden	0.18	112.0	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.18	120
12/03/14	12:15	S05B38	Coal	0.08	81.9					0.09	98.8
14/03/14	11:59	S01B01	Overburden	1.04	88.0	3.29	not required			0.38	97.5

Date	Time	Blast Location	Type	BM1 Ulan School		BM2 Rock Shelters		BM4 Lagoons Rd		BM5 Ridge Road	
				Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)
19/03/14	10:56	S01B03	Overburden	0.10	88.0	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.1	112.3
19/03/14	01:20	S02B01 OC2	Overburden	0.36	95.9	3.34	not required			0.18	114.4
21/03/14	11:54	S02B02 OC2	Overburden	0.23	91.5	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.2	107.5
26/03/14	10:46	S01B05	Overburden	0.36	107.5	0.29	not required			0.15	106.5
27/03/14	11:56	OC2- Dam 204	Overburden	0.08	88.0	0.41	not required			0.08	101
02/04/14	12:02	S02B01 OC2	Overburden	0.41	91.5	6.38	not required			0.24	100
02/04/14	14:09	S07B25	Coal	0.23	94.0	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.12	104.2
04/04/14	12:02	S02B01 OC2	Overburden	0.42	95.9	11.9	not required			0.32	103.5
08/04/14	01:20	S03B05	Coal	0.22	102.8	0.09	not required			0.17	108.4
09/04/14	10:01	S01B01 OC2	Overburden	0.08	98.8	0.1	not required			0.08	101
10/04/14	12:01	S03B05	Overburden	0.18	106.0	0.1	not required			0.12	97.5
11/04/14	12:11	S02B01 OC2	Overburden	0.34	107.0	0.1	not required			0.24	98.8
15/04/14	12:03	S03B07 OC2	Overburden	0.10	104.2	8.02	not required			0.4	101.9
17/04/14	12:07	S03B07 OC2	Overburden	0.33	101.9	0.32	not required			0.1	91.5
24/04/14	11:30	S01B04	Overburden	0.11	101.0					0.04	88

Date	Time	Blast Location	Type	BM1 Ulan School		BM2 Rock Shelters		BM4 Lagoons Rd		BM5 Ridge Road	
				Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)
29/04/14	12:01	S01B04	Overburden	0.25	97.5	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.1	91.5
02/05/14	12:10	S01B02 OC2	Overburden	0.25	88.0					0.16	94
08/05/14	11:53	S02B01 OC2	Overburden	0.52	101.0	1.56	not required			0.26	105.5
09/05/14	11:59	S01B07 OC1	Overburden	0.26	105.5	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.52	101
13/05/14	11:55	S01B02 OC2	Coal	0.24	97.5	1.32	not required			0.17	101
15/05/14	11:57	S01B02 OC2	Coal	0.35	91.5	1.06	not required			0.14	95.9
16/05/14	12:01	S01B05	Overburden	0.26	94.0	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.05	88
21/05/14	11:59	S03B02 OC2	Overburden	0.37	94.0	12.1	not required			0.49	98.8
21/05/14	12:41	S01B07	Overburden	0.32	91.5	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.12	91.5
23/05/14	12:03	S01B08	Overburden	0.32	88.0					0.33	95.9
23/05/14	12:07	S01B02 OC2	Coal	0.20	91.5	2.38	not required			0.16	97.5
28/05/14	12:04	S03B01 OC2	Overburden	0.41	91.5	16.0	not required			0.4	97.5
28/05/14	12:39	S01 B09	Overburden	0.30	91.5	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.11	94
30/05/14	13:55	S01 B04 OC2	Overburden	0.45	98.8	6.8	not required			0.33	107
04/06/14	12:09	S03B01 OC2	Overburden	0.26	98.8	0.2	not required			0.05	94

Date	Time	Blast Location	Type	BM1 Ulan School		BM2 Rock Shelters		BM4 Lagoons Rd		BM5 Ridge Road	
				Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)
04/06/14	14:39	S01B08	Overburden	1.17	88.0	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.18	91.5
06/06/14	12:05	S01B08	Overburden	0.14	95.9					0.03	88
06/06/14	12:09	S03B01 OC2	Overburden	0.43	97.5	20.0	not required			0.3	105.5
11/06/14	12:31	S01B05	Overburden	0.16	88.0	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.01	97.5
13/06/14	12:01	S04B02 OC2	Overburden	0.29	91.5	8.0	not required			0.29	95.9
18/06/14	12:59	S03B01 OC2	Overburden	0.08	94.0	24.7	not required			0.28	94
20/06/14	12:32	S03B01 OC2	Overburden	0.35	88.0	36.5	not required			0.24	110.6
27/06/14	12:04	S02B04	Overburden	0.83	91.5	Blast centroid >2 km from rock shelters. No monitoring is required to be undertaken				0.22	94
02/07/14	11:59	S02B05	Overburden	0.40	98.8					0.15	91.5
04/07/14	14:41	S02B02 OC2	Coal	0.18	94.0					0.14	100
08/07/14	12:01	S02B01 OC2	Coal	0.27	91.5					0.1	98.8
11/07/14	12:05	S02B07	Overburden	0.51	91.5					0.25	95.9
16/07/14	12:05	S02B08	Overburden	0.37	94.0					0.17	91.5
18/07/14	11:59	S01B05	Overburden	0.72	98.8					0.17	104.2
24/07/14	12:01	S04B01 OC2	Overburden	0.63	97.5					0.51	106.5
30/07/14	12:07	S01B07	Overburden	0.52	88.0					0.2	97.5
31/07/14	11:04	S04B01 OC2	Overburden	0.51	94.0					0.51	95.9
06/08/14	12:32	S01B07	Overburden	0.33	91.5					0.15	91.5

Date	Time	Blast Location	Type	BM1 Ulan School		BM2 Rock Shelters		BM4 Lagoons Rd		BM5 Ridge Road	
				Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)
06/08/14	12:58	S04B01 OC2	Overburden	0.41	88.0					0.32	94
15/08/14	11:59	S03B02 OC2	Overburden	0.26	97.5					0.15	103.5
22/08/14	12:01	S04B01	Overburden	0.11	91.5					0.03	101.9
26/08/14	10:59	S05B01 OC2	Overburden	0.42	97.5					0.61	104.2
28/08/14	12:01	S05B02 OC2	Overburden	0.18	100.0					0.2	104.2
29/08/14	12:04	S03B06	Coal	0.22	104.9					0.08	98.8
02/09/14	12:35	S03B15	Coal	0.19	95.9					0.01	108.8
05/09/14	11:00	S01B02	Overburden	0.19	98.8					0.1	105.5
10/09/14	12:32	S01B02	Overburden	0.32	91.5					0.09	100
12/09/14	12:07	S01B01	Overburden	0.30	98.8					0.06	94
17/09/14	13:04	S01B01	Overburden	0.14	88.0					0.13	95.8
19/09/14	12:03	S01B01	Overburden	0.20	95.9					0.07	91.5
24/09/14	13:01	S01B03	Overburden	0.10	91.5					0.01	91.5
26/09/14	12:00	S01B02	Overburden	0.09	91.9					0.04	88
01/10/14	12:05	S01B06	Coal	0.21	102.8					0.04	91.5
03/10/14	12:02	S01B06	Coal	0.23	100.0					0.08	88
09/10/14	09:57	S05B01 OC2	Overburden	0.52	94.0					0.36	100
10/10/14	14:29	S05B01 OC2	Overburden	0.11	88.0					0.07	94
17/10/14	12:00	S06B02 OC2	Overburden	0.08	91.5					0.03	97.5
23/10/14	11:58	S05B01 OC2	Overburden	0.24	88.0					0.25	95.9
24/10/14	12:10	S02B05	Overburden	0.17	101.0					0.08	98.8
29/10/14	12:05	S02B05	Coal	0.20	100.0					0.12	94
31/10/14	12:02	S01B05	Overburden	0.17	95.3					0.38	95.9
05/11/14	12:03	S02B05	Coal	0.18	101.0					0.18	91.5
14/11/14	12:01	S01B02	Overburden	0.37	94.0					0.1	103.5
19/11/14	12:03	S04B01 OC2	Coal	0.35	95.9					0.18	101

Date	Time	Blast Location	Type	BM1 Ulan School		BM2 Rock Shelters		BM4 Lagoons Rd		BM5 Ridge Road	
				Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)
26/11/14	12:44	S01B03	Overburden	0.32	95.9					0.01	88
28/11/14	12:04	S01B03	Overburden	0.27	97.5					0.07	97.5
03/12/14	12:01	S04B02	Coal	0.26	94.0					0.22	88
05/12/14	12:00	S04B02	Coal	0.22	94.0					0.11	91
11/12/14	12:01	S06B01	Overburden	0.45	94.0					0.36	95.9

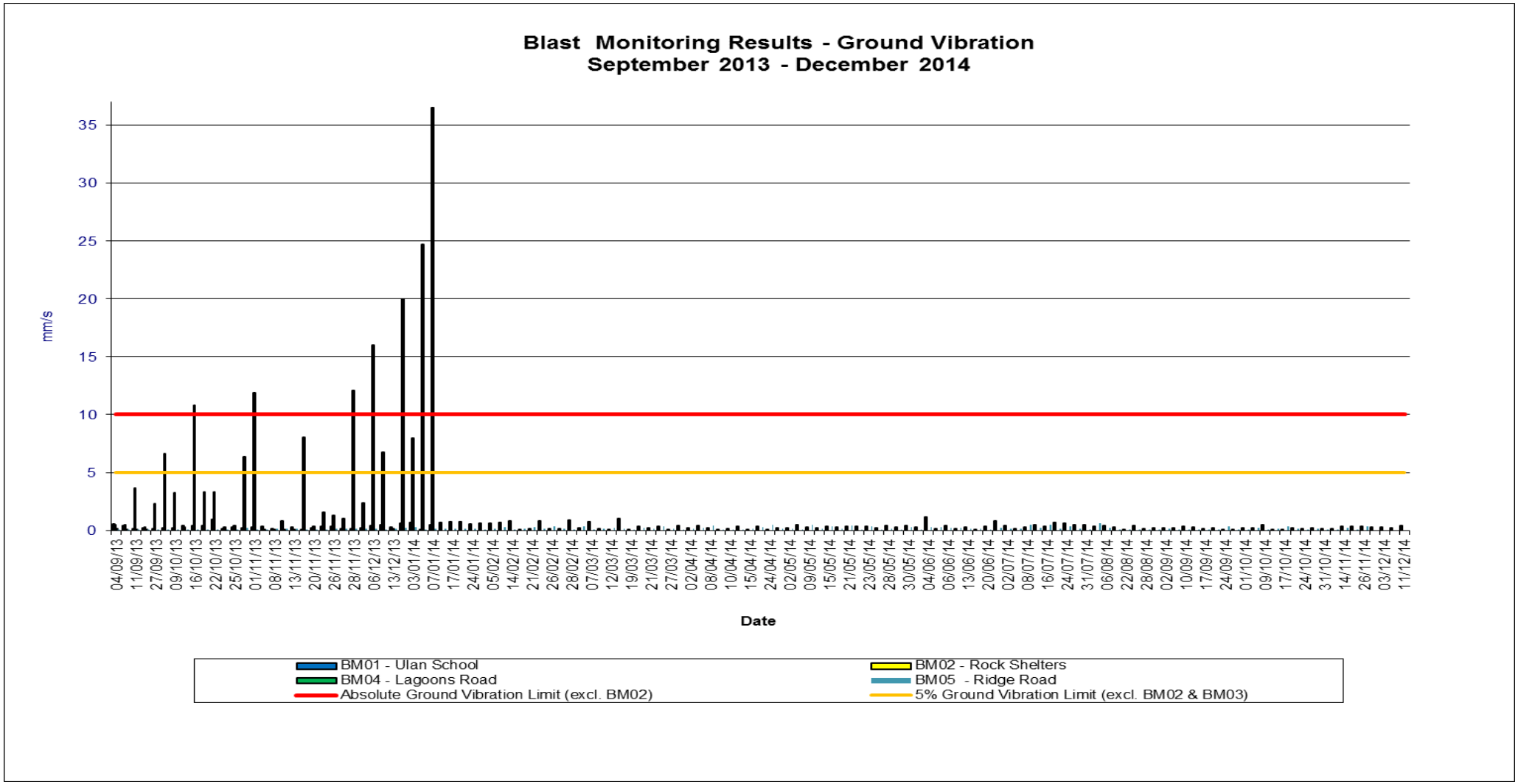


Figure 55: Vibration Results

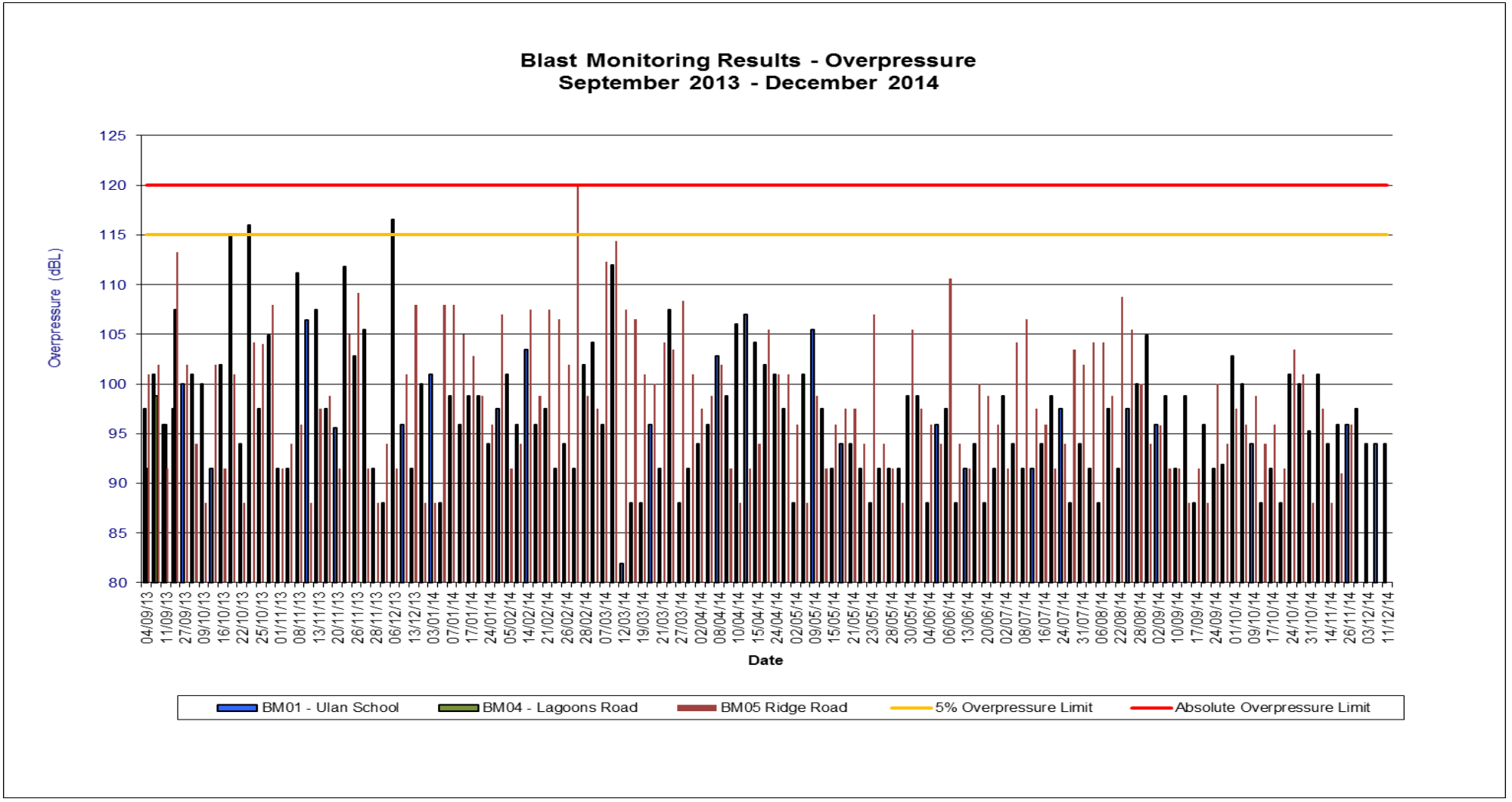


Figure 56: Overpressure Results

3.13.3 Comparison to Previous Blast Monitoring and Predicted Levels

A comparison of this year's blasting results to previous year's results and predictions in the Environmental Assessment is shown in **Table 55**.

Table 55: Comparison of Blasting Results to Previous Results

Site	Vibration Predictions in Environmental Assessment (mm/s)	Previous Year's Vibration Range (mm/s)	2013-2014 Vibration Range (mm/s)	Comments on 2013-2014 Results
Ulan School	2.3	0.08 – 1.09	0.08 – 1.17	Consistent with previous results and below predicted levels
Lagoons Road	2.6	0.01 – 0.84	0.10 – 0.16	Consistent with previous results and below predicted levels
Ridge Road	This site was not originally modelled	NA	0.01-0.61	This site was installed in September 2013
Site	**Overpressure Predictions in Environmental Assessment (dB(L))**	**Previous Year's Overpressure Range (dB(L))**	**2013-2014 Overpressure Range (dB(L))**	**Comments on 2013-2014 Results**
Ulan School	114.0	81.9 – 109.9	81.9 – 116.6	Generally consistent with previous results and slightly above predicted levels
Lagoons Road	114.0	88.0 – 115.8	91.5 – 107.50	Consistent with previous results and below predicted levels
Ridge Road	This site was not originally modelled	NA	88.0-120.0	This site was installed in September 2013. Only 1 blast exceed the 5% limit.

3.13.4 Activities during the Next Reporting Period

The revised BMP and the BFMS will be implemented during the next reporting period. MCO will also undertake predictive blast modelling on rock shelters near Open Cut 2 and Open Cut 4 with results to be provided in next year's AEMR.

Blast monitoring will continue to be undertaken with the results to be provided in the next AEMR.

3.14 NOISE MANAGEMENT

3.14.1 Activities This Reporting Period

During the reporting period the Noise Management Plan (NMP) was approved to manage project specific, cumulative and traffic noise impacts associated with mining operations in Open Cut 1, Open Cut 2 and Open Cut 3, associated infrastructure areas and the Northern Borefield.

The key changes to the NMP included:

- Review of the Real Time Response Protocols and management actions for responding to alarms. The real time response trigger levels are based on DP&E *Interim Noise Monitoring Application Note.* The guideline includes a traffic light system (green, amber and red) for responding to noise alarms and what actions are required following alarms.
- Addition of two attended noise monitoring locations. Winchester Crescent (NA9) prior to mining in Open Cut 2; and Moolarben Road (NA10) prior to mining in Open Cut 3.
- Attended noise monitoring will be undertaken monthly instead of quarterly.
- Attended noise monitoring will be undertaken during night time only, except for Ulan School where monitoring will be undertaken during school hours only.

Operational processes for MCO to reduce noise emissions include:

- Separate day and night dumping areas when deemed necessary;
- Use of shielded areas in adverse weather conditions;
- Use of real-time noise monitoring data to assist operational personnel in proactive management of noise impacts;
- Use of production assistants to assess real-time noise monitoring levels on night shift;
- Use of interactive predictive noise models to assess predicted noise monitoring levels at various sensitive receivers;
- Use of daily environmental forecasting system to assess noise risks associated with meteorological influences;
- Regular maintenance of equipment, including sound attenuation components; and
- Sound power testing of mobile and stationary equipment.

Noise attenuation on MCO's equipment continued during the reporting period. The status of the noise attenuation program on the current fleet of equipment at the end of the reporting period is:

- Additional excavator (9800) purchased with noise attenuation kit.

During the reporting period MCO relocated the Ulan School real-time noise monitoring station to upper Ridge Road. MCO undertook consultation with Ulan School and DP&E prior to relocating the unit. Attended noise monitoring will continue to take place at Ulan School in accordance with the NMP.

The NMP outlines response triggers for the real-time noise monitoring stations. When the trigger has been reached a SMS alarm is sent to operational personnel and members of the Environment and Community Department. The real-time response triggers in the approved NMP and the management/control actions are shown in **Table 56** and **Table 57**. These triggers were reviewed and updated as part of the NMP review.

Table 56: Noise Real-Time Response Triggers

Time Period	Location	Green	Amber	Red
Day (7am-6pm)	Lagoons Road	Low frequency LA_{eq} >34dBA for 24 consecutive 5 minute periods	Low frequency LA_{eq} >36dBA for 24 consecutive 5 minute periods	Low frequency LA_{eq} >38dBA for 12 consecutive 5 minute periods
	Winchester Crescent	Low frequency LA_{eq} >31dBA for 24 consecutive 5 minutes periods	Low frequency LA_{eq} >33dBA for 24 consecutive 5 minute periods	Low frequency LA_{eq} >35dBA for 12 consecutive 5 minute periods
Evening (6pm-10pm)	Lagoons Road	Low frequency LA_{eq} >34dBA for 12 consecutive 5 minute periods	Low frequency LA_{eq} >36dBA for 6 consecutive 5 minute periods	Low frequency LA_{eq} >38dBA for 6 consecutive 5 minute periods
	Winchester Crescent	Low frequency LA_{eq} >31dBA for 12 consecutive 5 minute periods	Low frequency LA_{eq} >33dBA for 6 consecutive 5 minute periods	Low frequency LA_{eq} >35dBA for 6 consecutive 5 minute periods
Night (10pm-7am)	Lagoons Road	Low frequency LA_{eq} >33dBA for 12 consecutive 5 minute periods	Low frequency LA_{eq} >35dBA for 6 consecutive 5 minute periods	Low frequency LA_{eq} >37dBA for 6 consecutive 5 minute periods
	Winchester Crescent	Low frequency LA_{eq} >31dBA for 12 consecutive 5 minute periods	Low frequency LA_{eq} >33dBA for 6 consecutive 5 minute periods	Low frequency LA_{eq} >35dBA for 6 consecutive 5 minute periods
Note: For all triggers wind speed is <3m/s and there is no rainfall				

Table 57: Noise Real-Time Response Management Actions

Colour	Management/Control Action	Responsibility
Green	• Confirm that the weather conditions are acceptable as per the Project Approval and EPL. • Review the audio to determine noise source. Record observations. • If MCO noise is audible. - Review predicted weather conditions to identify if noise enhancing conditions are forecast for the rest of the shift. Rerun the model if forecast has changed. - Review predicted noise impacts for the shift against actual observations. Rerun the model if predictions have changed. • Monitor changes in noise levels • Record management strategies. This includes details of investigation, type of response (if any required), real time monitoring results and actions taken.	Production Department
Amber	• Confirm that the weather conditions are acceptable as per the Project Approval and EPL. • Drive to alarm location to determine noise source. Record observations • If MCO noise is audible. - Alert the Open Cut Examiner (OCE) of the noise observations - Review noise generating activities and make preparations for moving into a protected area or shutting down equipment if noise levels remain elevated. - Review predicted weather conditions to identify if noise enhancing conditions are forecast for the rest of the shift. Rerun the model if forecast has changed. - Review predicted noise impacts for the shift against actual observations. Rerun the model if predictions have changed. • Monitor changes in noise levels • Record management strategies. This includes details of investigation, type of response (if any required), real time monitoring results and actions taken.	Production Department
Red	• Confirm that the weather conditions are acceptable as per the Project Approval and EPL. • Drive to alarm location to determine noise source. Record observations • If MCO noise is audible. - Alert the OCE of the noise observations - Commence moving equipment into protected areas or shutting down equipment. • Monitor changes in noise levels against operational changes - Review predicted weather conditions to identify if noise enhancing conditions are forecast for the rest of the shift. Rerun the model if forecast has changed. - Review predicted noise impacts for the shift against actual observations. Rerun the model if predictions have changed. • Recording of management strategies. This includes details of investigation, type of response (if any required), real time monitoring results and actions taken.	Production Department

3.14.2 Noise Monitoring

Impact Assessment Criteria

Noise Impact Assessment Criteria are set for day, evening and night time periods to protect the amenity of neighbouring residents. Impact Assessment Criteria are expressed as L_{A1eq} (15min). The noise impact assessment criteria for MCO are provided in **Table 58**.

Table 58: Project Specific Noise Impact Assessment Criteria for Mining

Land Number	Day	Evening	Night	
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{A1(1min)}$
30, 63	39	39	39	45
70	37	37	37	45
75	36	36	36	45
31	36	35	35	45
All other privately owned land residences	35	35	35	45
Ulan Primary School[1]	35 (internal) when in use			-
Ulan Anglican Church, Ulan Catholic Church	35 (internal) when in use			-
Goulburn River National Park, Munghorn Gap Nature Reserve	50			-

Note: Properties 22, 23, 41a, 49, 64, 169, 170, 172 and 173 have been purchased by MCO since granting of Project Approval 05_0117 and have been removed from Table 58. Property 26 is now zoned industrial land and has been removed from Table 58.

Note: An independent noise study conducted at Ulan Primary School found that the difference between external and internal measurements was 8 dB(A) with windows normally open. The noise criterion as measured outside the school classrooms is therefore 43 dB(A).

Land Acquisition Criteria

The properties listed in **Table 59** must be acquired by MCO upon receiving written request from the landowner.

Table 59: Land Subject to Acquisition upon Request

Land Number
32 – D & J Stokes

If the noise generated by MCO exceeds the criteria in **Table 60** at any residence on privately owned land, MCO will upon receiving a written request from the landowner, acquire the land.

Table 60: Project Specific Land Acquisition Criteria

Day/Evening/Night $LA_{eq(15min)}$	Land Number
43 / 43 / 42	63
40 / 40 / 40	All other private land owners

Note: Properties 22, 23, 41a, 64, 49, 169, 170, 172 and 173 have been purchased by MCO since granting of Project Approval 05_0117 and have been removed from Table 60. Property 26 is now zoned industrial land and has been removed from Table 60.

Cumulative Noise Criteria

In order to protect the amenity of local residents, noise mitigation criteria have been set for noise generated by MCO operations audible at monitoring locations. If noise generated by MCO exceeds the criteria in **Table 61**, then upon receiving a written request, MCO will implement additional noise mitigation measures at the residence in consultation with the land owner.

Table 61: Noise Mitigation Criteria

Land Number	Day/Evening $L_{Aeq(period)}$	Night $L_{Aeq(15min)}$
63	40/40	39
All other privately owned land	37	37

Results – Mining

The attended noise monitoring results during the reporting period can be seen in **Table 62** to **Table 69**. The monitoring period for each of these results is 15 minutes. Wind speed and/or estimated temperature inversion conditions resulted in development consent criteria not always being applicable. When properties 64, 170 and 172 were purchased the requirement to monitor in these locations was removed.

MCO complied with the project specific criteria at all monitoring sites during the reporting period.

Table 62: Attended Noise Monitoring Results – Quarter 4 2013

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	20/11/2013 12:07	43	1.1	-1.9	43	Yes	IA	Nil				
NA1	20/11/2013 12:24	46	1.7	-1.9	43	Yes	IA	Nil				
NA6	19/11/2013 22:00	33	2.2	-1.0	37	Yes	25	Nil	45	Yes	26	Nil
NA6	19/11/2013 22:17	31	1.6	-1.0	37	Yes	23	Nil	45	Yes	30	Nil
NA8	19/11/2013 23:47	31	0.8	3.0	37	Yes	<20	Nil	45	Yes	20	Nil
NA8	20/11/2013 00:04	29	0.5	3.0	37	Yes	IA	Nil	45	Yes	IA	Nil
NA9	19/11/2013 22:50	35	1.3	3.0	37	Yes	<25	Nil	45	Yes	<25	Nil
NA9	19/11/2013 23:17	36	1.6	3.0	37	Yes	<25	Nil	45	Yes	<25	Nil

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - *Wind speeds of up to 3 m/s at 10 metres above ground level; or*
   - *Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;*
2. *Estimated or measured $L_{Aeq,15minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red indicate exceedance of criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Criteria apply under all weather conditions at this location (when in use).*

Table 63: Attended Noise Monitoring Results – December 2013

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	13/12/2013 11:51	46	0.2	-1.9	43	Yes	<30	Nil	NA	NA	NA	NA
NA6	12/12/2013 22:00	28	0.7	3.0	37	No	IA	NA	45	No	IA	NA
NA8	12/12/2013 22:47	30	1.4	0.5	37	Yes	IA	Nil	45	Yes	IA	Nil
NA9	12/12/2013 23:30	41	0.5	3.0	37	No	IA	NA	45	No	IA	NA

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{Aeq,15minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red indicate exceedance of criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Criteria apply under all weather conditions at this location (when in use).*

Table 64: Attended Noise Monitoring Results – January 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	29/01/2014 10:37	44	2.3	-1.9	43	Yes	IA	Nil	NA	NA	NA	NA
NA6	28/01/2014 22:11	35	1.6	3.0	37	No	<25	NA	45	No	26	NA
NA8	29/01/2014 00:10	36	0.3	3.0	37	No	IA	NA	45	No	IA	NA
NA9	28/01/2014 23:21	37	0.3	3.0	37	No	IA	NA	45	No	IA	NA

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{Aeq,15minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red indicate exceedance of criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Criteria apply under all weather conditions at this location (when in use).*

Table 65: Attended Noise Monitoring Results – February 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	25/02/2014 12:25	45	1.1	-1.9	43	Yes	IA	Nil	NA	NA	NA	NA
NA6	25/02/2014 22:28	32	1.4	0.5	37	Yes	26	Nil	45	Yes	35	Nil
NA8	25/02/2014 22:56	28	0.5	3.0	37	Yes	IA	Nil	45	Yes	IA	Nil
NA9	25/02/2014 22:04	31	0.8	3.0	35	Yes	<25	Nil	45	Yes	<25	Nil

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 66: Attended Noise Monitoring Results – March 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	21/03/2014 7:51	48	0.7	-1.8	43	Yes	IA	Nil	NA	NA	NA	NA
NA6	20/03/2014 22:00	33	2.0	3.0	37	No	29	NA	45	No	31	NA
NA8	20/03/2014 22:52	29	1.0	3.0	37	No	NM	NA	45	No	NM	NA
NA9	20/03/2014 22:23	35	1.6	3.0	35	No	27	NA	45	No	30	NA

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 67: Attended Noise Monitoring Results – April 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	23/04/2014 10:24	40	1.4	-1.9	43	Yes	IA	Nil	NA	NA	NA	NA
NA6	22/04/2014 23:01	42	0.7	3.0	37	No	IA	NA	45	No	IA	NA
NA8	22/04/2014 22:31	47	1.0	3.0	37	No	IA	NA	45	No	IA	NA
NA9	22/04/2014 22:00	38	0.9	3.0	35	No	IA	NA	45	No	IA	NA

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 68: Attended Noise Monitoring Results – May 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies ? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	06/05/2014 10:40	45	2.3	-1.9	43	Yes	NM	Nil	NA	NA	NA	NA
NA6	05/05/2014 23:00	33	1.0	3.0	37	No	IA	NA	45	No	IA	NA
NA8	05/05/2014 22:00	27	0.8	3.0	37	No	IA	NA	45	No	IA	NA
NA9	05/05/2014 22:31	29	1.0	3.0	35	No	IA	NA	45	No	IA	NA

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 69: Attended Noise Monitoring Results – June 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies ? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	19/06/2014 10:40	43	0.9	-2.0	43	Yes	IA	Nil	NA	NA	NA	NA
NA6	18/06/2014 23:00	32	0.3	0.5	37	Yes	31	Nil	45	Yes	40	Nil
NA8	18/06/2014 22:32	31	0.6	-1.0	37	Yes	IA	Nil	45	Yes	IA	Nil
NA9	18/06/2014 22:00	37	0.6	0.5	35	Yes	<24	Nil	45	Yes	24	Nil

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 70: Attended Noise Monitoring Results – July 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies ? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	22/07/2014 12:33	41	1.3	-2.0	43	Yes	IA	Nil	NA	NA	NA	NA
NA6	21/07/2014 22:00	29	0.0	4.1	37	No	27	NA	45	No	35	NA
NA8	21/07/2014 22:55	30	0.0	4.1	37	No	20	NA	45	No	26	NA
NA9	21/07/2014 22:27	22	0.0	4.1	35	No	<20	NA	45	No	26	NA

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 71: Attended Noise Monitoring Results – August 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies ? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	15/08/2014 09:28	48	3.9	-1.8	43	No	IA	NA	NA	NA	NA	NA
NA6	13/08/2014 22:00	35	0.0	4.1	37	No	33	NA	45	No	38	NA
NA8	13/08/2014 22:27	31	0.2	-1.0	37	Yes	<25	Nil	45	Yes	<25	Nil
NA9	13/08/2014 22:00	28	0.0	4.1	35	No	28	NA	45	No	42	NA

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 72: Attended Noise Monitoring Results – September 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies ? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	12/09/2014 13:51	46	1.7	-2.0	43	Yes	IA	Nil	NA	NA	NA	NA
NA6	11/09/2014 00:15	28	0.8	3.0	37	Yes	IA	Nil	45	Yes	IA	Nil
NA8	10/09/2014 23:50	35	1.1	3.0	35	Yes	IA	Nil	45	Yes	IA	Nil
NA9	10/09/2014 23:51	34	1.1	3.0	35	Yes	IA	Nil	45	Yes	IA	Nil

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 73: Attended Noise Monitoring Results – October 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies ? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	22/10/2014 13:33	43	1.7	-2.0	43	Yes	NM	Nil	NA	NA	NA	NA
NA6	22/10/2014 22:00	33	0.4	3.0	37	Yes	28	Nil	45	Yes	32	Nil
NA8	22/10/2014 23:07	29	0.5	-1.0	37	Yes	IA	Nil	45	Yes	IA	Nil
NA9	22/10/2014 22:30	33	0.8	-1.0	35	Yes	24	Nil	45	Yes	25	Nil

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 74: Attended Noise Monitoring Results – November 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies ? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	19/11/2014 09:30	46	3.8	-1.8	43	No	IA	NA	NA	NA	NA	NA
NA6	18/11/2014 22:25	29	0.3	3.0	37	Yes	29	Nil	45	Yes	33	Nil
NA8	18/11/2014 23:06	28	0.7	3.0	37	Yes	IA	Nil	45	Yes	IA	Nil
NA9	18/11/2014 22:00	31	0.0	3.0	35	Yes	NM	Nil	45	Yes	<20	Nil

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

Table 75: Attended Noise Monitoring Results – December 2014

Location	Start Date/Time	Total L_{Aeq} dB	Wind Speed [1,8]	VTG [2,8]	$L_{Aeq(15min)}$ Criterion dB	Criterion Applies? [2]	MCO L_{Aeq} dB [4,5]	Exceedance [6]	$L_{A1(1min)}$ Criterion dB	Criterion Applies ? [2]	MCO $L_{A1(1\ min)}$ dB [4,5]	Exceedance [6]
NA1	03/12/2014 09:54	46	2.9	-2.0	43	Yes	IA	Nil	NA	NA	NA	NA
NA6	02/12/2014 22:00	35	0.6	3.0	37	Yes	22	Nil	45	Yes	26	Nil
NA8	02/12/2014 23:02	42	1.1	-1.0	37	Yes	IA	Nil	45	Yes	IA	Nil
NA9	02/12/2014 22:32	29	1.1	-1.0	35	Yes	<20	Nil	45	Yes	<20	Nil

Notes:

1. *Noise emission limits apply under meteorological conditions of:*
   - Wind speeds of up to 3 m/s at 10 metres above ground level; or
   - Temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level;
2. *Estimated or measured $L_{A1,1minute}$ attributed to MCO;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bolded results in red are possible exceedances of relevant criteria;*
5. *Atmospheric data sourced from the MCO meteorological station; and*
6. *Night measurements are not undertaken at NA1 as outside hours of use, so criterion not applicable.*

3.14.3 Comparison to Predicted Levels

Results – Mining
The noise predictions for Year 2 and Year 6 of the mining operations in the Environmental Assessment can be seen in **Table 76** and **Table 77**.

Year 2 and Year 6 have been chosen as it is the most reflective modelled scenario of the current mining operations at MCO. A comparison of the mining attended noise monitoring results to predictions made in the Environmental Assessment for Year 2 and Year 6 of mining operations can be seen in **Table 78** to **Table 89**.

Table 76: Year 2 EA Predictions Under Various Weather Conditions – dB(A) $L_{eq(15min)}$

Location	Lapse	ENE	SW	Inversion
NA1 Ulan School[1]	35	39	35	44
NA6 Lower Ridge Rd[2]	<25	32	<25	37
NA8 South Ridge Rd[3]	<25	32	<25	37
NA9 Winchester Cres[3]	<35	<35	<35	<35

Table 77: Year 6 EA Predictions Under Various Weather Conditions – dB(A) $L_{eq(15min)}$

Location	Lapse	ENE	SW	Inversion
NA1 Ulan School[1]	35	39	35	44
NA6 Lower Ridge Rd[2]	<25	32	<25	37
NA8 South Ridge Rd[3]	<25	32	<25	37
NA9 Winchester Cres[3]	<35	<35	<35	<35

Source: MCO EA (August 2006);
1. *Predicted levels for property 157 – Ulan Village;*
2. *Predicted levels for property 41A – Ulan Road;*
3. *Predicted levels for "all other receivers"*

Measured operational levels have been compared to the predicted levels in the EA for the relevant meteorological conditions. In the tables below, a positive difference is where the measured level is greater than the predicted level and a negative difference is where the measured levels are less than the predicted level. **Table 78** provides the difference between measured and predicted levels under lapse conditions.

Table 78: Comparison to Year 2 EA Predictions Under Lapse Conditions (Day)

Location	Nov 13	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA1 Ulan School	NR/NR	<-5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Notes:

1. *NR denotes met conditions not relevant, NA is not applicable; IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring*
2. *Daytime lapses assumes calm conditions with -1°C/100m VTG during monitoring; and*
3. *Day 1, Measurement 1/ Day 1 Measurement 2.*

Table 79: Comparison to Year 2 EA Predictions Under ENE Conditions (Day)

Location	Nov[1] 13	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA1 Ulan School	NR/NR	NR	NR	IA	NR	NR	NR	NR	NR	NR	IA	NM	IA[3]	NR

Notes:

1. *NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;*
2. *ENE wind conditions assumes winds at speeds between 0.1 and 3 m/s from a wind direction of 45 to 90 degrees during monitoring;*
3. *Conditions relevant, however, wind speeds greater than 3 metres per second during monitoring; and*
4. *Day 1, Measurement 1 / Day 1, Measurement 2.*

Table 80: Comparison to Year 2 EA Predictions Under SW Conditions (Day)

Location	Nov[1] 13	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA1 Ulan School	NR/NR	NR	NR	IA	NR	NR	NR	NR	NR	NR	NR	NM	NR	NR

Notes:

1. *NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;*
2. *SW wind conditions assumes winds at speeds between 0.1 and 3 m/s from a wind direction of 202.5 to 247.5 degrees during monitoring;*
3. *Conditions relevant, however, wind speeds greater than 3 metres per second during monitoring; and*
4. *Day 1, Measurement 1 / Day 1, Measurement 2.*

Table 81: Comparison to Year 2 EA Predictions Under ENE Conditions (Night)

Location	Nov 13[1]	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA6 Lower Ridge Rd	-10/-12	NR	>-11	NR	-7	NR	NR	NR	NR	NR	NM	NR	NR	NR
NA8 South Ridge Rd	NR/NR	NR	NR	NR	NR	NR	NR	NR	NM	NR	NR	NR	NR	NR
NA9 Winchester Cres	>-10/>-10	NR	IA	NR	-8	NR	NR	NR	NM	NR	NR	NR	NR	NR

Notes:

1. *NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;*
2. *ENE wind conditions assumes winds at speeds between 0.1 and 3 m/s from a wind direction of 45 to 90 degrees during monitoring;*
3. *Conditions relevant, however, wind speeds greater than 3 metres per second during monitoring; and*
4. *Night 1, Measurement 1 / Night 1, Measurement 2.*

Table 82: Comparison to Year 2 EA Predictions Under SW Conditions (Night)

Location	Nov 13[1]	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA6 Lower Ridge Rd	NR/NR	NR	NR	NR	NR	NR	NR	NR	NM	NR	IA	NR	NR	-6
NA8 South Ridge Rd	NR/NR	IA	IA	IA	NR	NR	NR	IA	NR	NR	IA	IA	NR	IA
NA9 Winchester Cres	NR/NR	NR	NR	NM	NR	NR	NR	>-11	NM	NR	IA	>-11	NM	-5

Notes:

1. *NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;*
2. *SW wind conditions assumes winds at speeds between 0.1 and 3 m/s from a wind direction of 202.5 to 247.5 degrees during monitoring;*
3. *Conditions relevant, however, wind speeds greater than 3 metres per second during monitoring; and*
4. *Night 1, Measurement 1 / Night 1, Measurement 2.*

Table 83: Comparison to Year 2 EA Predictions Under Inversion Conditions

Location	Nov 13[1]	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA6 Lower Ridge Rd	NR/NR	IA	>-12	NR	-8	IA	IA	NR	-10	-4	IA	-9	-8	-15
NA8 South Ridge Rd	>-17/IA	NR	IA	IA	NM	IA	IA	NR	-15	>-10	IA	NR	IA	NR
NA9 Winchester Cres	>-10/>-10	IA	IA	NM	-8	IA	IA	NR	>-15	-7	IA	NR	NM	NR

Notes:

1. *NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;*
2. *Inversion conditions assumes a 3oC/100m VTG during monitoring; and*
3. *Night 1, Measurement 1 / Night 1, Measurement 2.*

As shown above, a comparison of predicted and measured levels from MCO operation varies greatly. This comparison does not take into account operational activities at the time of monitoring compared to predicted scenarios.

Table 84: Comparison to Year 6 EA Predictions Under Lapse Conditions (Day)

Location	Nov 13	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA1 Ulan School	NR/NR	<2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Notes:

1. *NR denotes met conditions not relevant, NA is not applicable; IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring*
2. *Daytime lapses assumes calm conditions with -1oC/100m VTG during monitoring; and*
3. *Day 1, Measurement 1/ Day 1 Measurement 2.*

Table 85: Comparison to Year 6 EA Predictions Under ENE Conditions (Day)

Location	Nov 13[1]	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA1 Ulan School	NR/NR	NR	NR	IA	NR	NR	NR	NR	NR	NR	IA	NR	IA[3]	NR

Notes:

1. NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;

2. ENE wind conditions assumes winds at speeds between 0.1 and 3 m/s from a wind direction of 45 to 90 degrees during monitoring;

3. Conditions relevant, however, wind speeds greater than 3 metres per second during monitoring; and

4. Day 1, Measurement 1 / Day 1, Measurement 2.

Table 86: Comparison to Year 6 EA Predictions Under SW Conditions (Day)

Location	Nov 13[1]	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA1 Ulan School	NR/NR	NR	NR	IA	NR	NR	NM	NR	NR	NR	NR	NR	NR	NR

Notes:

1. NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;

2. SW wind conditions assumes winds at speeds between 0.1 and 3 m/s from a wind direction of 202.5 to 247.5 degrees during monitoring;

3. Conditions relevant, however, wind speeds greater than 3 metres per second during monitoring; and

4. Day 1, Measurement 1 / Day 1, Measurement 2.

Table 87: Comparison to Year 6 EA Predictions Under ENE Conditions (Night)

Location	Nov 13[1]	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA6 Lower Ridge Rd	-10/-12	NR	>-11	NR	-7	NR	NR	NR	NR	NR	NR	NR	NR	NR
NA8 South Ridge Rd	NR/NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
NA9 Winchester Cres	>-10/>-12	NR	IA	NR	-8	NR	NR	NR	NR	NR	NR	NR	NR	NR

Notes:

1. NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;

2. ENE wind conditions assumes winds at speeds between 0.1 and 3 m/s from a wind direction of 45 to 90 degrees during monitoring;

3. Conditions relevant, however, wind speeds greater than 3 metres per second during monitoring; and

4. Night 1, Measurement 1 / Night 1, Measurement 2.

Table 88: Comparison to Year 6 EA Predictions Under SW Conditions (Night)

Location	Nov 13[1]	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA6 Lower Ridge Rd	NR/NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	IA	NR	NR	-6
NA8 South Ridge Rd	NR/NR	IA	IA	IA	NR	NR	NR	IA	NR	NR	IA	IA	NR	IA
NA9 Winchester Cres	NR/NR	NR	NR	NM	NR	NR	NR	>-11	NR	NR	IA	>-11	NM	>-5

Notes:

1. NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;

2. SW wind conditions assumes winds at speeds between 0.1 and 3 m/s from a wind direction of 202.5 to 247.5 degrees during monitoring;

3. Conditions relevant, however, wind speeds greater than 3 metres per second during monitoring; and

4. Night 1, Measurement 1 / Night 1, Measurement 2.

Table 89: Comparison to Year 6 EA Predictions Under Inversion Conditions (Night)

Location	Nov 13[1]	Dec 13	Jan 14	Feb 14	Mar 14	Apr 14	May 14	Jun 14	Jul 14	Aug 14	Sep 14	Oct 14	Nov 14	Dec 14
NA6 Lower Ridge Rd	NR/NR	IA	>-11	NR	-7	IA	IA	NR	-9	-3	IA	-8	-7	-14
NA8 South Ridge Rd	>-16/IA	NR	IA	IA	NM	IA	IA	NR	-15	>-10	IA	NR	IA	NR
NA9 Winchester Cres	>-10/>-10	IA	IA	NM	-8	IA	IA	NR	>-15	-7	IA	NR	NM	NR

Notes:

1. *NR denotes met conditions not relevant, NA denotes not applicable, IA denotes conditions relevant but MCO inaudible during monitoring, NM denotes conditions relevant but MCO not measurable during monitoring;*
2. *Inversion conditions assumes a 3oC/100m VTG during monitoring; and*
3. *Night 1, Measurement 1 / Night 1, Measurement 2.*

As shown above, a comparison of predicted and measured levels from MCO operation Year 6 (Start of OC2) varies greatly. This comparison does not take into account operational activities at the time of monitoring compared to predicted scenarios.

3.14.4 Activities Next Reporting Period

The NMP will be reviewed and updated during the next reporting period for Stage 1 MOD9 and Stage 2 approvals. Attended noise monitoring results will be provided in the next AEMR. Independent noise studies and acquisitions of properties will be considered on a case by case basis during the next reporting period.

3.15 VISUAL, STRAY LIGHT

Potential lighting impacts from MCO are largely limited to a night-time glow for the open cut and CHPP operations areas. To minimise impacts on neighbours lighting plants are positioned such that light is directed towards work areas and not towards private residents.

3.16 ABORIGINAL HERITAGE

3.16.1 Activities This Reporting Period

During the reporting period MCO continued to engage a Native Title Cultural Heritage Officer (NTCHO) as an outcome of the negotiated Ancillary Deed Agreement with the Native Title Party (North East Wiradjuri). The role of the NTCHO is to co-ordinate the implementation of the Ancillary Deed. This includes planning, co-ordinating and implementing various activities required by the Implementation Committee, co-ordinating liaison with the Aboriginal Stakeholder Groups, and undertaking other cultural heritage activities at MCO.

MCO hold regular meetings with the registered Aboriginal Stakeholder Groups regarding Aboriginal heritage matters at MCO. Training of the workforce on Aboriginal heritage continued throughout the reporting period. Posters displaying examples of Cultural Material are displayed in prominent locations around the site. Specialised presentations on Cultural Heritage have been presented at tool box talks and induction sessions for mine personnel and contractors to the mine.

During the reporting period MCO completed a comprehensive salvage program of the Open Cut 2 disturbance area. It is envisaged that during the next reporting period further survey and salvage works will be undertaken within the MOD 9 area and Stage 2.

The Aboriginal Cultural Heritage Management Plan (ACHMP) was updated during the reporting period to cover all of the approved mining operations in Stage 1. Consultation on the updated ACHMP was undertaken with the registered Aboriginal stakeholder organisations.

Field work undertaken by the registered Aboriginal stakeholder organisations included:

- Due diligence surveys for exploration activities.
- Salvage works in Open Cut 2.
- Surveys of the areas included in Stage 2

3.16.2 Activities Next Reporting Period

Registered Aboriginal groups will continue to be involved in due diligence works associated with exploration. MCO will continue to engage Registered Aboriginal Stakeholder Organisations with regards to aboriginal heritage.

Meetings of the Cultural Heritage Consultation Committee will continue.

Reviews of the ACHMP will be undertaken to include additional mining areas.

3.17 EUROPEAN HERITAGE

3.17.1 Activities This Reporting Period

Site 20 is a memorial garden that MCO are required to maintain. MCO maintained the inspection program of this garden to identify any maintenance required to maintain this garden. No active management activities to this site have been required during the reporting period.

No other European Heritage management activities were undertaken during the reporting period.

3.17.2 Activities Next Reporting Period

During the next reporting period MCO will continue to maintain Site 20 (Memorial Garden).

3.18 SPONTANEOUS COMBUSTION

There have been no spontaneous combustion incidences at MCO during the reporting year.

3.19 BUSHFIRE

There were no major outbreaks of fire at MCO during the reporting period. MCO and NPWS are proposing a Hazard Reduction Burn on MCO and NPWS boundaries in 2015. Results of this will be reporting in the next AEMR.

3.20 MINE SUBSIDENCE

There was no underground mining during the reporting period. Consequently, there was no subsidence associated with MCO.

3.21 HYDROCARBON CONTAMINATION

Large scale hydrocarbon storage facilities have been constructed as part of the workshop, stores and blasting facilities. These storage facilities comply with the requirements of *AS1940 – The storage and handling of flammable and combustible liquids*. Activities undertaken on site to reduce the risk of hydrocarbon contamination include:

- The main fuel tanks are self bunded meaning that if the main layer is broken a second layer is in place to stop leakage from the tanks.
- Anti-siphon pipes have been installed on the fuel tanks to stop the tanks draining in the event of a leakage.
- Installation of an oil/water separator. Pipes at the refuel area and in the workshop are plumbed to flow through the oil/water separator. The water from the vehicle wash-down bay also flows through the oil/water separator.
- Spill kits are maintained in the workshop and in service vehicles to assist in the clean up any hydrocarbon spills.
- Dry-break couplings have been installed on the hydrocarbon hoses so that they are non-drip.

- Automatic fuel shut off systems have been installed so that tanks can't be overfilled.
- A dedicated waste oil tank has been installed so that the waste oil can be removed off site and disposed of correctly.
- Refuelling procedures have been developed for guidance on how to correctly refuel equipment.

Appropriate disposal of hydrocarbons to reduce the risk of hydrocarbon contamination is managed through the integrated Waste Management Service.

3.22 METHANE DRAINAGE/VENTILATION

As there was no underground mining at MCO during the reporting period, there was no methane drainage or ventilation required.

3.23 PUBLIC SAFETY

To maintain the safety of visitors, neighbours and the general public the following measures are implemented at MCO:

- Fencing of mining lease;
- Locking gates on access roads and entries into land owned by MCO;
- Placement of signage on gates and fences; and
- Installation of boom gates at main entrances into the operations.

3.24 COMPLIANCE SUMMARY

3.24.1 Independent Compliance Audits

There were no independent compliance audits during the reporting period. MCO three yearly compliance audit is scheduled for late 2015. Results of the audit will be provided in the next AEMR.

3.24.2 Reportable Incidents This Reporting Period

Blast Generated Fume Event – February 2014
On 14 February 2014 at 12:01pm, MCO fired an overburden blast in Strip 03 Block 6 in Open Cut 1 resulting in blast related fume. The overburden blast was located near Ulan Road and Ulan-Wollar road which resulted in the road being closed temporarily for the blast. At the time of the blast wind direction was from the E and wind speed was 1.1m/s. The fume travelled in a NW-W direction and dissipated.

An investigation was undertaken into the cause of this fume generation. The root cause of the incident was identified to be the product used in the blasting process and the presence of groundwater. The incident was reported in accordance with the Pollution Incident Response Management Plan (PIRMP).

Blast Generated Fume Event – March 2014
On 26 March 2014 at 10:46am, MCO fired an overburden blast in Strip 01 Block 5 in Open Cut 1 resulting in blast related fume. The overburden blast was located within 500m of Ulan - Cassilis Road and Ulan-Wollar road and the Gulgong-Sandy Hollow Railway Line which required both the road and the Sandy Hollow railway line being temporarily closed for the blast.
At the time of the blast wind direction was from the E and wind speed was 2.4m/s. The fume travelled in an ENE direction and dissipated.

An investigation was undertaken into the cause of this fume generation. The root cause of the incident was identified to be the product used in the blasting process and the presence of groundwater. The incident was reported in accordance with the Pollution Incident Response Management Plan (PIRMP).

Blast Generated Fume Event – May 2014
On 8 May 2014 at 10:46am, MCO fired an overburden blast in Strip 02 Block 1 in Open Cut 2 resulting in blast related fume. The blast was not located near any public infrastructure and a 500m exclusion zone was in place. At the time of the blast wind direction was from the ESE and wind speed was 5.1m/s. The fume travelled in an NW direction and dissipated prior to reaching any MCO boundaries.

An investigation was undertaken into the cause of this fume generation. The root cause of the incident was the product used in the blasting process. The emulsion temperature of the product was outside the gassing specifications provided by the supplier, causing the product to gas slowly. Fume was generated as a result. The incident was reported in accordance with the Pollution Incident Response Management Plan (PIRMP).

Blast Generated Fume Event – June 2014
On 6 June 2014 at 12:08pm, MCO fired an overburden blast in Strip 04 Block 1 in Open Cut 2 resulting in blast related fume. The blast was not located near any public infrastructure and a 500m exclusion zone was in place. At the time of the blast the wind speed was 1.9m/s from the ESE. The fume travelled in northerly direction and completely dissipated prior to reaching any MCO boundaries.

An investigation was undertaken into the cause of this fume generation. The eastern section of the shot was affected by groundwater resulting in 15 holes containing wet walls and a further 14 containing water ranging from 1m to 14m in depth. The incident was reported in accordance with the Pollution Incident Response Management Plan (PIRMP).

Blast Generated Fume Event – August 2014
On the 6 August 2014 at 12:58pm, MCO fired an overburden blast in Strip 4 Block 1 in Open Cut 2 resulting in blast related fume. The blast was not located near any public infrastructure and a 500m exclusion zone was in place. At the time of the blast the wind speed was 1.9m/s from the W. The fume did not breach any of the planned fume management zones established in a risk assessment undertaken prior to the blast.

An investigation was undertaken into the cause of this fume generation. Over 50% of blast holes had water ranging from 0.5 – 1.0m with 16 blast holes having in excess of 2.0m of water. Furthermore, during loading it was discovered that the product was not gassing correctly. The blast was cancelled on three occasions until wind direction was more favourable. The incident was reported in accordance with the Pollution Incident Response Management Plan (PIRMP).

3.24.3 Non-Compliances

Discharge of effluent to land volumes were monitored quarterly rather than daily as required by the EPL. MCO received a formal warning from the EPA MCO has commenced monitoring and recording discharge volumes on a daily basis.

4.0 COMMUNITY RELATIONS

4.1 ENVIRONMENTAL COMPLAINTS

MCO has developed a Community Complaints Procedure which details how to receive, respond to, and record and action any community complaints. MCO will record specific details relating to any community complaint including;

- The location of the complaint;
- The nature of the complaint;
- The method of the complaint, e.g. telephone;
- Monitoring results, including meteorological conditions at the time of the complaint;
- Site investigation outcomes;
- Site activity and activity changes; and
- Any necessary actions assigned.

MCO maintains a 24 hour Community Hotline (1800 556 484) to respond to any complaints from neighbouring residents or interested stakeholders. The Community Hotline is advertised in the local media and is also available on the MCO website and in the community newsletters.

During the reporting period, MCO received 256 direct complaints. Whilst MCO is aware that EPA has received complaints relating to MCO's operations these complaints they have not been included in this report. A summary of the direct complaints and the investigation is provided in **Appendix 1**.

4.1.1 Comparison to Previous Complaints

The number and type of complaints received this reporting period is compared to previous complaints in **Table 90** and **Figure 57**. The complaints during this reporting period came from 33 residents. 37% of the complaints came from one resident.

There was an increase in total complaints compared to the previous reporting period. This can be attributed to the increase in mining activity in the south, particularly in Open Cut 2. The use of Mining and Production Environmental Assistants continued to provide real-time feedback to the mining operations, and mine planning to allow for protected work areas to be developed. Other work such as acquisitions and ongoing community consultation continued.

Table 90: Comparison of Community Complaints

Reporting Period	Noise	Blasting	Dust	Lighting	Water	Other	Total
2007-2008	0	0	0	0	0	2	**2**
2008-2009	4	0	1	0	2	0	**7**
2009-2010	35	8	10	0	2	1	**56**
2010-2011	110	3	0	0	0	0	**113**
2011-2012	334	17	2	0	3	3	**359**
2012-2013	117	0	1	0	0	2	**120**
2013-2014	239	12	2	0	0	3	**256**

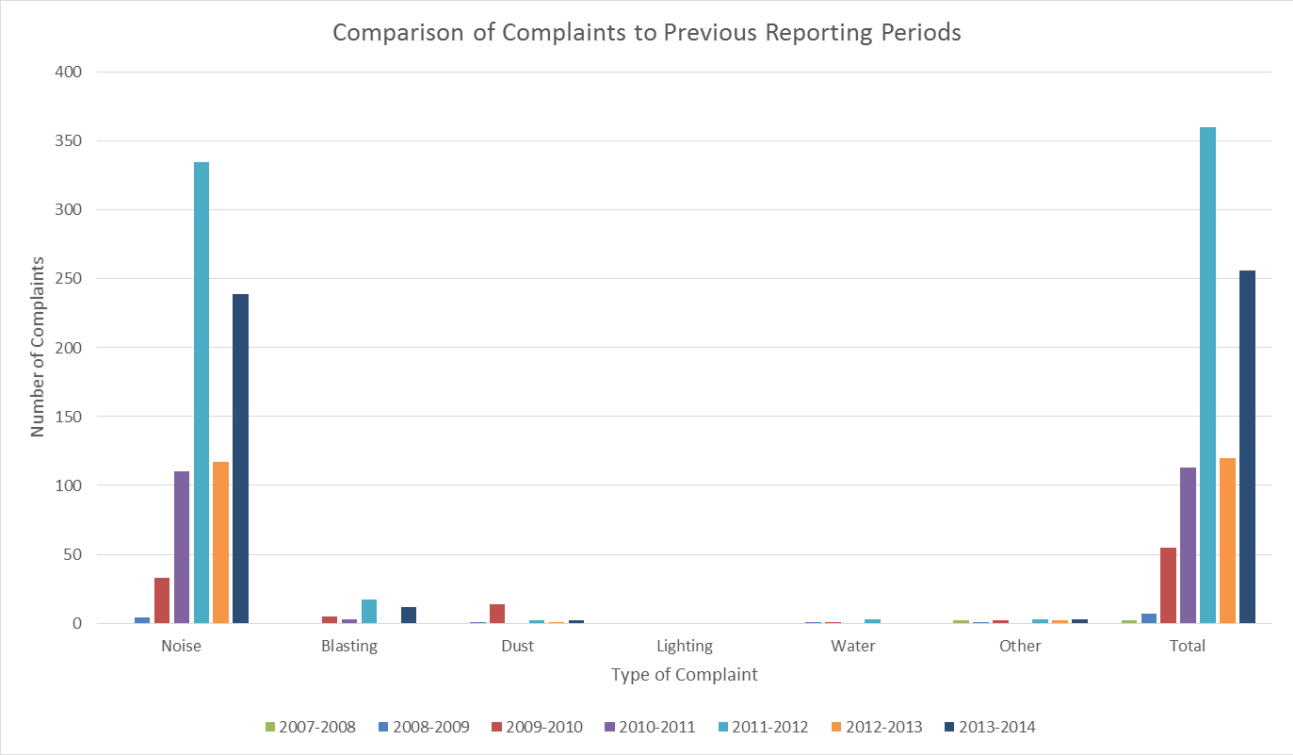


Figure 57: Comparison of Community Complaints

4.1.2 Activities Next Reporting Period

During the next reporting period MCO will continue to undertake the following actions to manage complaints:

- Continued noise attenuation of the equipment;
- Ongoing consultation with neighbouring landowners including acquisition as required;
- Ongoing training with the workforce on issues being raised through community complaints; and
- Modifying operations as required.

4.2 COMMUNITY LIAISON, SPONSORSHIPS AND DONATIONS

4.2.1 Activities This Reporting Period

Community/stakeholder related activities undertaken during the reporting period include:

- Tours of the site by CCC members;
- Careers talks with local school students;
- School Partnership meetings with Department of Education and Training;
- Tours by individual local schools;
- Participation in Mudgee Chamber of Commerce business expo;
- Visit by 1st year Mining Engineering students from UNSW;
- Emergency Response Team members are volunteers in the Rural Fire Service;
- Provide use of MCO's training facilities to the Rural Fire Service;
- Emergency Response Team respond to offsite emergencies;
- Moolarben Spirit Awards program with district high schools;

Approximately $255,000 of community donations and sponsorships were provided to local groups during the reporting period. The following groups were supported:

- Moolarben Coal Celebrity Golf Classic - charity fundraising event;
- Mudgee District Hospital – Cataract surgery machine;
- Ulan Public School – outdoor play equipment with soft fall area;
- Mudgee Scouts – upgrade bathroom facilities;
- Lifeskills Plus Mudgee – facility upgrade;
- Mudgee Police Cup – Police rugby team;
- Mudgee Chamber of Commerce – local business expo;
- Rotary Club Mudgee Sunrise - community Christmas carols event;
- Cooks Gap Bushfire Brigade – security system;
- Cudgegong Cruiser – car rally fundraiser for Can Assist Mudgee;
- Gulgong Cricket – turf mower;
- Arts Council Gulgong – art competition;
- Australian Breastfeeding Mudgee Group – purchase breast pumps;
- Mudgee Public School – purchase Ipads;
- Mudgee Region Dragon Boats – Dragon Boat trailer;

- Rylstone Show Society – zone final showgirl judging event;
- Gulgong Golf Club – tree planting program;
- Mudgee Valley Writers – literary competition;
- Merriwa Tennis Club – new nets & poles;
- Pioneer House Nursing Home – garden project;
- Mudgee Little Athletics – new discus cage & line marker;
- Gulgong CWA – blinds and curtains;
- Rotary Club Mudgee Sunrise – Clock Awards;
- Henry Lawson Festival – event sponsorship;
- Mid- Western Dance Festival – district dance concert;
- Mudgee Junior Rugby – training equipment;
- Rylstone/Kandos Rescue – upgrade rescue trailer;
- Mudgee Dragons Rugby League – training equipment;
- Gulgong Fishing Club – fingerlings for Cudgegong River;
- Sculptures in the Gardens – sculpture/art festival;
- Mudgee Readers – readers festival;
- Mudgee Bowling Club – regional bowling competition;
- Cooyal Tennis Club – practise wall;
- Gulgong Pre School – safety fence;
- North West Falcons Ladies Soccer – equipment & clothing;
- Gulgong Aviculture – bird show;
- Mudgee Men's Shed – update men's health trailer;
- Mudgee Triathlon Club – Mudgee running festival;
- Mudgee Tennis Club – hot shots precinct;
- Kandos Public School – handyman project, tools & equipment;
- Eurunderee Provisional School – rehabilitate C1876 gardens;
- Pioneer House Nursing Home – lounge chairs – dementia wing;
- CWA Mudgee – fundraising cookbook;
- Hargraves Public School – school resources;
- Gulgong High School – vegetable garden and irrigation;
- Gulgong Folk Club – folk festival;
- Mudgee Fine Foods – children's cooking classes;
- Mudgee Public School – seatbelts on bus;
- Mudgee Junior Cricket – bowling machine;
- Mudgee District Cricket – team sponsorship;
- Vision Australia Mudgee – opera festival;
- Dunedoo Lions Club – art exhibition;
- Turill Community Committee – outdoor community area;
- Gulgong Hostel – new bed;
- Gulgong Pony Club – canteen fridge;

In addition to the above donations, MCO also paid Mid-Western Regional Council $180,000 in accordance with the Voluntary Planning Agreement.

4.2.2 Activities Next Reporting Period

During the next reporting period MCO will continue to implement the Community engagement strategy.

4.3 COMMUNITY CONSULTATIVE COMMITTEE

During the reporting period, five Community Consultative Committee (CCC) meetings were held. The CCC contains members of the local community, representatives from Mid-Western Regional Council, and representatives of MCO. These meetings are chaired by an independent chairperson and all meetings are minuted with the minutes being available publicly on the MCO website (www.moolarbencoal.com.au). A summary of the items discussed in the meetings is shown in **Table 91.**

Table 91: CCC Meetings

Meeting Date	Items Addressed
10 September 2013	Introduction of new Community Relations Coordinator Discussion on The Drip and EPL Operational & Environmental update
10 December 2013	Presentation of 2012-2013 AEMR A Christmas dinner was provided by Moolarben Coal Community Relations update Operational & Environmental update
1 April 2014	Tour of the Open Cut 1 area Discussion on The Drip Community Relations update Operational & Environmental update
1 July 2014	Presentation, Ben Harrison, NSW Planning & Infrastructure Community Relations update Operational & Environmental update
25 November 2014	Introduction of new General Manager Discussion Exploration update Community Relations update Operational & Environmental update

5.0 REHABILITATION

5.1 BUILDINGS

No buildings were demolished during the reporting period.

5.2 REHABILITATION OF DISTURBED LAND – OPEN CUT

5.2.1 Activities This Reporting Period

During the reporting period MCO continued bulk reshaping of the 440RL and other dump areas for rehabilitation with approximately 25.7 of land being rehabilitated this reporting period. This included approximately 22ha of land in OC2 (out of pit dump).

Rehabilitation activities consist of bulk reshaping of overburden, installing water control systems consisting of drop structures, drainage lines, contours and sediment dams, spreading a mixture of topsoil and mulch at an approximate thickness of 100mm, deep ripping to a depth of 300mm and then spreading seed and fertiliser. The rehabilitation activities and locations of the water control systems can be seen in **Figure 69**.

All of the rehabilitation conducted to date has been on overburden spoil with the final landform proposed to be native vegetation. Depending on the location of the rehabilitation area two vegetation communities are used in the seeding mix. Box Gum Woodland is used on lower slopes and Ironbark Open Forest is used on upper slopes and elevated flat areas. This is consistent with the naturally occurring vegetation in the area. For the drainage lines, a drainage line mix is used. **Table 92** to **Table 94** show the seed mixes used on the rehabilitation program.

Table 92: Seed Mix for Box Gum Woodland

Genus	Species
Acacia	decora
	hakeoides
	polybotrya
	verniciflua
	implexa
	spectabilis
Angophora	floribunda
Dodonaea	spatulata
Eucalyptus	albens
	blakelyi
	crebra
	moluccana
Kunzea	ambigua
Leptospermum	polygalifolium
Melaleuca	thymifolia
Ghania	aspera
Austrodanthonia	sp
Aristida	sp
Cynodon	dactylon
Chloris	truncata
Millet	Millet
Fertiliser	Granulock 12
Ameliorants	As required

Table 93: Seed Mix for Ironbark Open Forest

Genus	Species
Acacia	buxifolia
	gladiformis
	uncinata
	verniciflua
	spectabilis
	ulicifolia
	penninervous
Allocasuarina	gymnanthera
	diminuta
	verticilliata
Dodonaea	viscosa
	triangularis
Eucalyptus	crebra
	dweryii
	fibrosa
	macroryncha
	parramattensis
	punctata
	rossii
	sparsifolia
	agglomerata
Hakea	dactyloides
Ghania	aspera
Callitris	endlicherii
Microlaeana	stipoides
Austrodanthonia	sp
Aristida	sp
Cynodon	dactylon
Millet	Millet
Fertiliser	Granulock 12
Ameliorants	As required

Table 94: Seed Mix for Drainage Lines

Genus	Species
Callistemon	rigidus
Leptospermum	arachnoides
	continentale
	polygalifolium
Melaleuca	thymifolia
Themeda	triandra
Microlaeana	stipoides
Cynodon	dactylon
Chloris	truncata
Millet	Millet
Fertiliser	Granulock 12
Ameliorants	As required

5.2.2 Rehabilitation Monitoring Results

Rehabilitation monitoring is scheduled to commence two years after final rehabilitation is completed and continue in autumn and spring each year thereafter. Monitoring was undertaken in spring 2013, autumn 2014 and spring 2014. Monitoring was conducted for flora (floristic and Landscape Function Analysis), fauna, geochemical characteristics, visual monitoring and associated analogue sites for flora and geochemical components of the monitoring program. Given the areas rehabilitated to date occur on the lower slopes and landform of OC1, rehabilitation progress is benchmarked against analogue sites of Box Gum Woodland. The analogues sites used are those already established for the Moolarben Offset Monitoring Program, namely the Blakely's Red Gum Grassy Woodland sites A1a and A1b in the Turill Conservation Area. These analogues represent a mature structural and floristic composition.

The area in **Figure 58** was targeted during the monitoring. All monitoring was undertaken in accordance with the methods and survey techniques prescribed in the LMP. **Table 95** below summarises the methods utilised for each component of the monitoring program.

Table 95: Rehabilitation Monitoring Methodology

Survey	Spring 2013	Autumn 2014	Spring 2014	Methodology
Flora				
Landscape Function Analysis (LFA)	✓			LFA was undertaken at seven sites across the monitoring area, two existing sites within the November 2010 rehabilitation area and five sites within the February 2012 rehabilitation area (**Figure 58**). EFA comprises the following components: • Landscape Function Analysis (LFA) • Vegetation dynamics • Habitat complexity.
Floristic Survey	✓	✓	✓	Full floristic survey plots were completed in each quadrat (400m2) (**Figure 59**). All visible native and exotic vascular species were recorded, with each species being assigned to one of six foliage cover classes. Vegetation structure was recorded for each plot, specifically the height and total foliage cover of each stratum. All vascular plant species observed in the plots were identified to species level (where suitable material was available for identification) and compiled into a species list.
Fauna				
Microbats	✓		✓	Microbat monitoring was undertaken using ultrasonic echolocation recording (Anabat detection). Three Anabat detection device set up at each site over two nights (**Figure 60**).
Diurnal Birds	✓		✓	Diurnal bird monitoring involved a timed, fixed area surveys for diurnal birds, observing and listening for 30 minutes at four sites (**Figure 60**).
Reptile searches	✓		✓	Scanning surfaces, rolling logs and rocks and raking leaf litter.

Survey	Spring 2013	Autumn 2014	Spring 2014	Methodology
Habitat Assessment	✓		✓	The identification of scats, scratches and diggings along each transect line.
Visual				
Visual Transects	✓		✓	Transects ran upslope from the base of the rehabilitation area to the ridgeline. The start and finish of each transect was used as a photo point to be used as a comparison for future monitoring events (**Figure 3**). Assessment results were used to identify any particular aspects of interest or issues that were not recorded during other field monitoring, including: • Reproductive stage (e.g. flowering species) • Presence of exotic weed infestations • Evidence of feral animals (scats, prints, burrows/warrens) • Surface stability and erosion issues • Evidence of other disturbance.
Geochemical				
Geochemical	✓			Soil in the rehabilitation and revegetation areas were monitored for pH, electrical conductivity (EC) and major cations to confirm that the vegetation substrate is approaching conditions similar to those found in the analogue sites. Soil samples were taken from the five new floristic quadrats established during the spring 2013 monitoring period. Soil samples are taken to a minimum depth of 300 mm and samples taken from the 0–100 mm, 100-200 mm intervals and 200–300 mm. The samples are taken from the EFA monitoring transects. The current requirement is to sample every three years commencing in the year that the transect is established.

Landscape Function Analysis

The Landscape Function Analysis is primarily an assessment of the amount of area losing resources (interpatch areas) and those areas gaining resources (patches) along a transect. **Table 96** and **Table 97** presents the monitoring results from spring 2013 and spring 2014 respectively. Bare soil was the dominant surface type, covering an average of 59% over all of the rehabilitation monitoring sites in spring 2013. This is a substantial decrease from the previous the previous monitoring in 2012 which recorded bare soil at an average of 95% of all the rehabilitation monitoring sites. Bare soils continued to account for less than 5% of the area in the analogue sites. The percentage cover of bare soils is gradually decreasing overtime with maturation of vegetation cover.

Table 96: Landscape Organisation – Percentage of Patch or Inter Patch Types Across the Sampled Transects in spring 2013

Patch/Inter-patch type	R1	R2	R3	R4	R5	R6	R7	A1A	A1B
Bare Soil (%)	25.4	69	56	91.1	74	76.3	23	4.8	0.3
Ground Cover (%)	6.3	1.1	4	-	3.3	-	5.5	53.1	88.7
Log (%)	-	-	-	1.3	-	0.4	1.2	1.6	2.4
Shrubs (%)	1.1	-	-	-	-	-	-	-	-
Litter (%)	60.5	14.7	-	7.6	0.9	6.5	1.6	40.4	8.6
Other (%)	6.7	15.2	40	-	20.1	16.8	68.7	-	-

Table 97: Landscape Organisation – Percentage of Patch or Inter Patch Types Across the Sampled Transects in spring 2014

Patch/Inter-patch type	R1	R2	R3	R4	R5	R6	R7	A1A	A1B
Bare Soil (%)	48.5	21.3	35.9	88.9	97.7	74.2	23.1	4.4	0.4
Ground Cover (%)	0.6	14.9	63.9	9.8	1.8	17.6	64.7	49.6	80.8
Log (%)	0	1.3	0	1.3	0.2	0.2	1.8	0.6	16.9
Shrubs (%)	3.6	1	0.2	0	0	0.1	0.1	0	1.9
Litter (%)	46.8	57	0	0	0.1	7	7.4	45.1	0
Other (%)	0.5	4.5	0	0	0.2	0.9	2.9	0.2	0

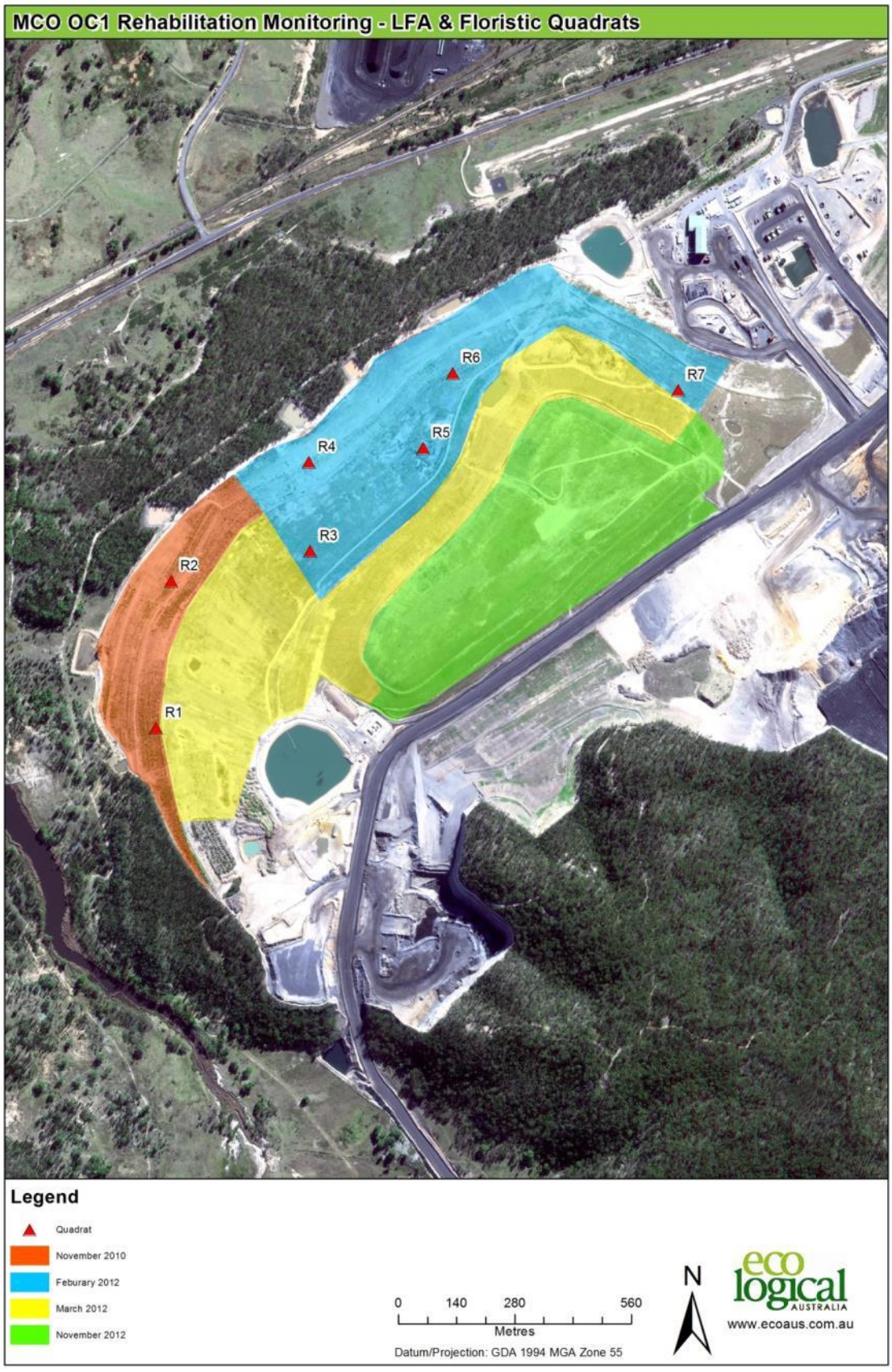


Figure 58: Open Cut 1 Rehabilitation Monitoring LFA & Floristic Survey Plots

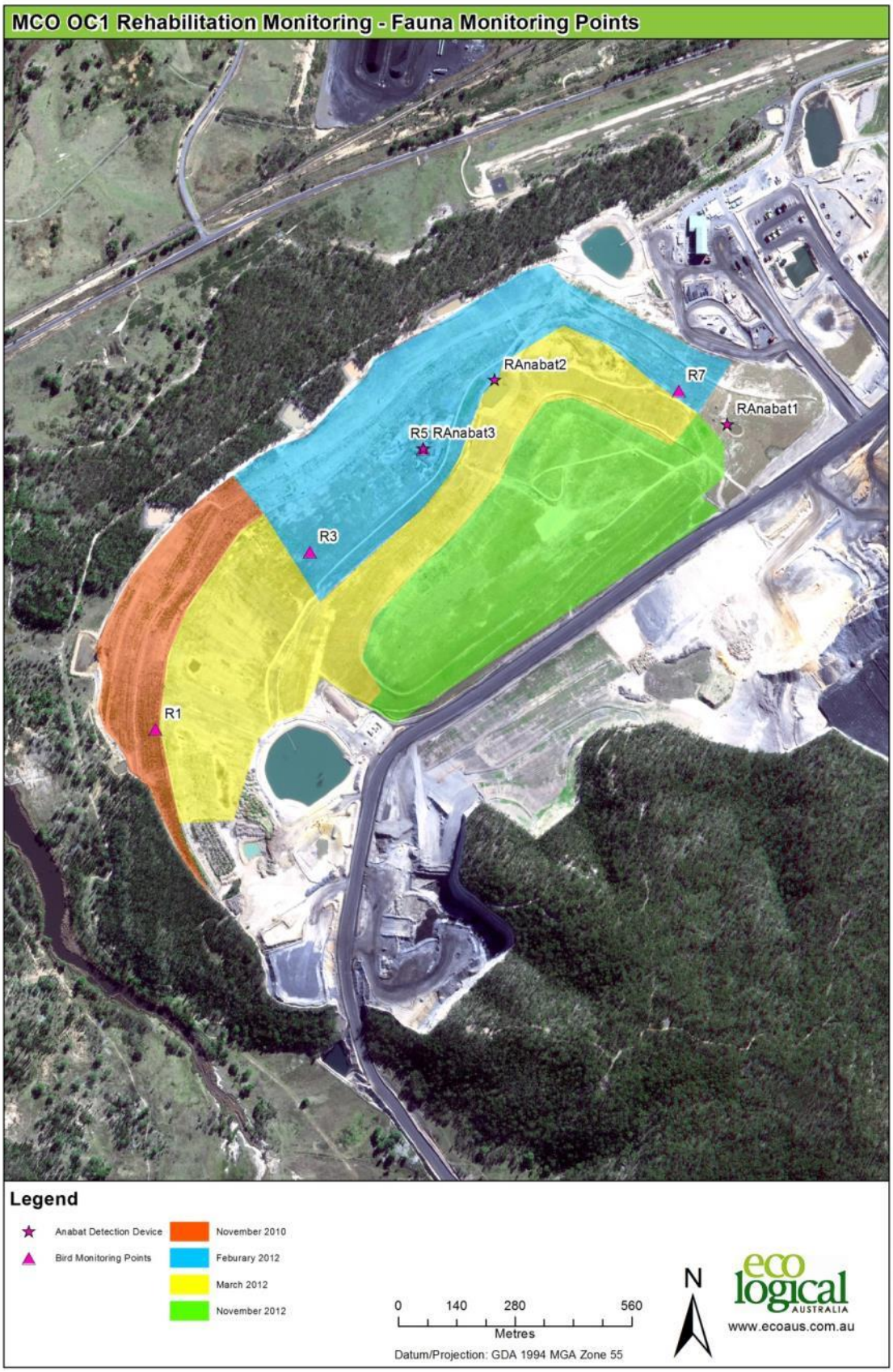


Figure 59: Open Cut 1 Rehabilitation Monitoring Fauna Survey Plots

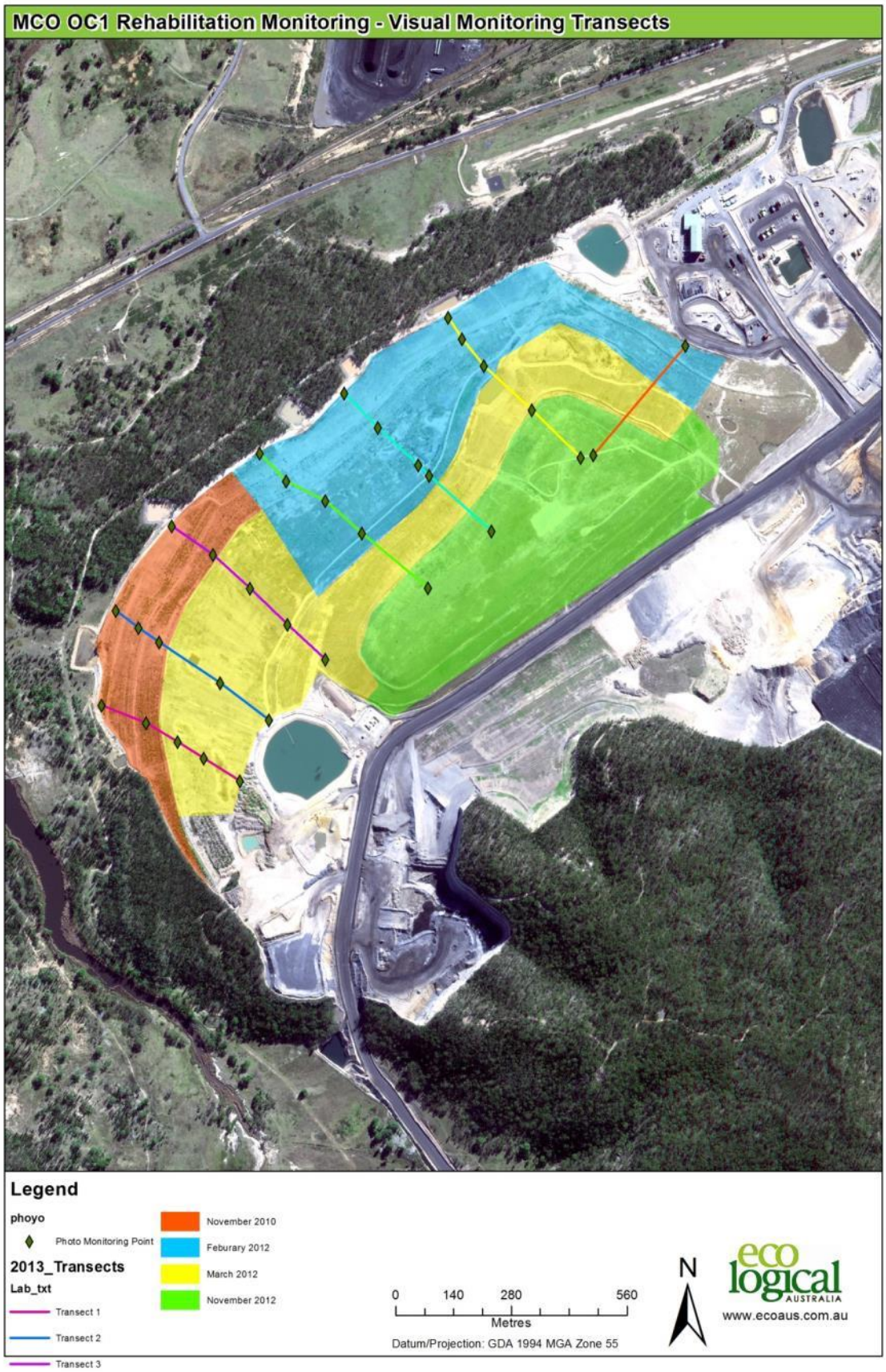


Figure 60: Open Cut 1 Rehabilitation Monitoring Visual Transects

Soil Surface Assessment

The soil surface assessment presents the indices of stability, infiltration and nutrient cycling that was calculated for the site in analysing the 11 soil surface assessment attributes for each patch/interpatch type. **Table 98** presents these indices which show that with the rehabilitation monitoring sites, bare soil, being the largest feature within the sampled landscape, offers the greatest contribution to each of the three indices – stability, infiltration and nutrient cycling.

The analogue sites had a greater contribution to each of these indices through ground cover and to a lesser degree, leaf litter, with the total scores for the three attributes being greater (63.3 and 61 for A1a and A1b respectively) than the rehabilitation sites (48.2 and 43.2 for R1 and R2 respectively).

Table 98: Landscape Organisation – Percentage of Patch or Inter Patch Types Across the Sampled Transects

Plot	Stability				Infiltration				Nutrient Cycling			
	R1	R2	A1a	A1b	R1	R2	A1a	A1b	R1	R2	A1a	A1b
Bare Soil	46.4	43	1.9	0.1	28.3	26.9	1.5	0.1	17.7	16.6	0.9	0.1
Ground Cover	1.6	0.2	33.9	54.3	0.8	0.1	21.8	42.4	0.6	0.1	16.5	28.4
Log	-	-	1.0	1.7	-	-	0.5	1.3	-	-	0.4	1.4
Shrubs	0.2	-	-	-	0.1	-	-	-	0.1	-	-	-
Litter	-	-	26.5	4.9	-	-	18.8	4.6	-	-	15.5	3.4
Rock	-	-	0.1	-	-	-	0.1	-	-	-	0.1	-
Total	48.2	43.2	63.3	61.0	29.2	27	42.6	48.4	18.3	16.7	33.3	33.3

Vegetation Dynamics

The Vegetation Dynamics assessment collates the number of stems present in various growth form types and canopy volume along the 50m LFA transect, all converted to a measure per hectare. These measures provide an assessment of the functional role of vegetation in regulating resources. For instance the volume of canopy in the low shrub layer gives an indication of the rain splash protection provided to the soil.

Between 2013 and 2014 the shrub-small tree layer above 1m (mostly Acacias) increased in number at all sites (**Table 82**), meaning that the vegetation structure is getting more complex and greater cover. The picture for small shrubs (<1m) is a less even, with some sites increasing between years and others decreasing. Some of the variation in small shrubs would be attributable to them growing into shrubs-small trees. In 2014 measures were included into the Vegetation Dynamics to assess the number of eucalypt stems with up to 3000 stems per hectare recorded at site 3. Eucalyptus are yet to be dominant in the canopy, being slower growers than the Acacia species which comprise the upper layer of vegetation on the site.

Table 99: Vegetation Dynamics Results from spring 2013 and 2014

Site	2014	2013	2014	2013	2014
	Eucalypt stems/ha	Shrub-small tree (>1m)/ha	Shrub-small tree (>1m/ha	Low shrub (<1m)/ha	low shrub (<1m)/ha
R1	39	2328	2767	6850	6858
R2	84	482	1008	888	3257
R3	2938	0	2099	2685	974
R4	361	145	188	1780	2993
R5	1068	19	497	2133	1253
R6	1047	19	878	2557	1413
R7	101	158	984	808	805

Habitat Complexity

Habitat complexity is a simple scoring method which involves allocating a score out of 3 to each of five 'habitat features' present at each monitoring site. The features are:

- Tree canopy
- Shrub cover
- Ground herbage
- Rocks/debris
- Soil moisture

These scores for each of the five features are combined to obtain a total score. The higher the score, the more 'complex' the habitat value of the site. A comparison of Habitat Complexity scores at each of the seven rehabilitation monitoring sites between 2013 and 2014 is presented (**Figure 61).** It is evident that the habitat complexity values at each of the sites have increased between 2013 and 2014. It is expected that values will increase over time. The results of the habitat complexity assessment should complement the fauna monitoring and should be reflected by comparable trends in fauna diversity.

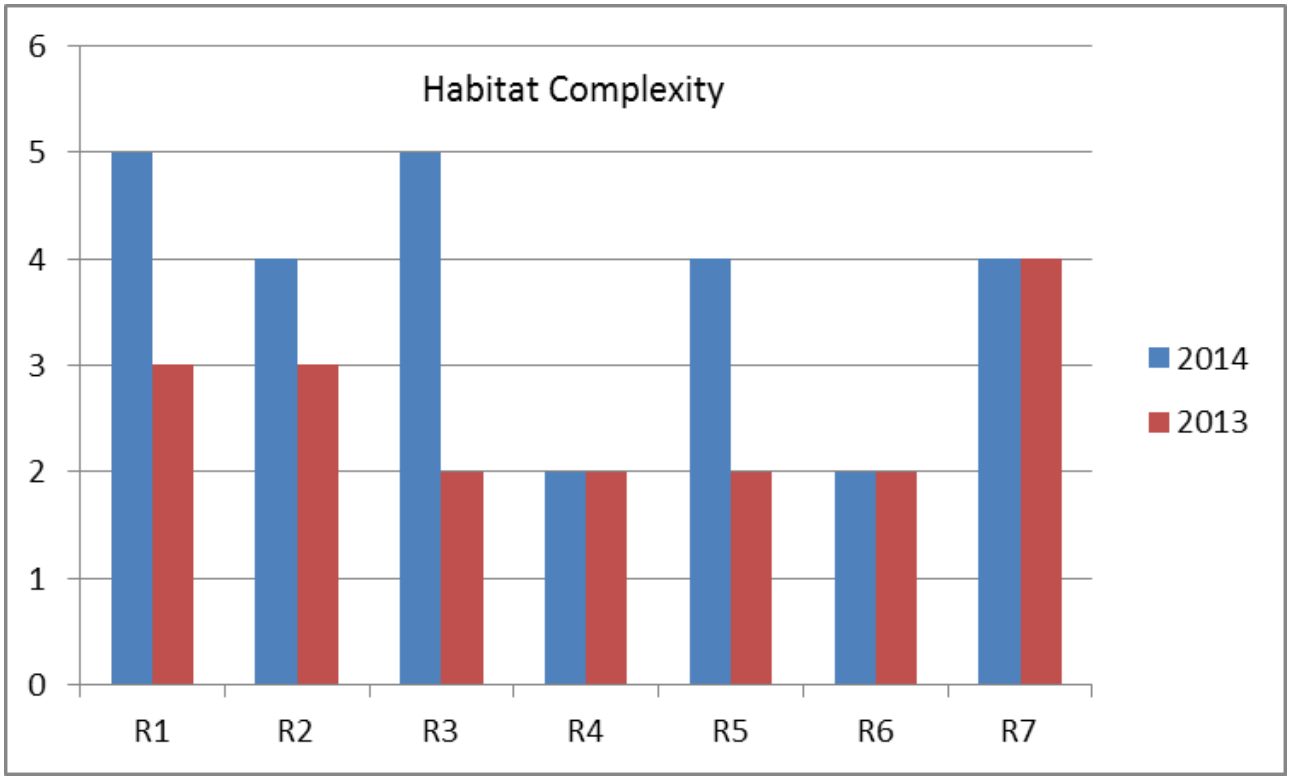


Figure 61: Habitat Complexity Scores for each Rehabilitation Monitoring Site between spring 2013 and 2014

Floristic Monitoring

Autumn 2013 monitoring revealed lower species richness in the original survey sites, R1 and R2 than in spring 2012. This is not unexpected as the species recorded in spring consisted of plants only likely to be identifiable in that season. The spring 2013 floristic monitoring continued monitoring at two sites (R1 and R2) and baseline surveys for five sites (R3, R4, R5, R6 and R7). Floristic species numbers were highest at R5 (31 species) and lowest at R6 (14 species). Both native and introduced species were recorded at every site, with native species numbers being highest at R5 (24 species) and lowest at R7 (11 species). The cover abundance at each site shows variation between those sites rehabilitated during 2010 and sites rehabilitated during 2012. R1 and R2 have higher canopy abundance and a greater height than those areas rehabilitated during 2012. Generally, the sites within areas rehabilitated during 2012 contain higher groundcover abundance. Tree/shrub cover varied from 1% to 20% for rehabilitation sites, whilst for analogues sites the tree/shrub cover ranged from 5% to 20% (**Table 100**).

Analogue sites had greater than 35% groundcover, whilst rehabilitation sites had generally less than 5% (apart from R7). At the rehabilitation sites the two species providing most groundcover were the leguminous spreading creeper *Hardenbergia violaceae* and stoloniferous grass, *Cynodon dactylon*, at the analogue sites the common grasses were species such as *Echinopogon intermedius, Aristida spp., Austrodanthonia spp*., and *Microlena stipoides*.

The analogue sites A1a and A1b had 47 and 31 native species respectively, whereas the rehabilitation sites range from 11 to 24 native species. During autumn 2014, species richness across the sites ranged from 15 species at R4 to 30 species at R1. Native species were dominant, ranging from 10 species at R4 to 28 species at R1. Exotic species ranged from no species at R2 to nine species at R7. Spring 2014 species richness across the sites ranged from 17 species at R4 to 38 species at R1. Native species were dominant, ranging from 13 species at R4 to 34 species at R1. Exotic species ranged from two species at R2 to nine species at R7.

Autumn 2014 survey results show that the species richness of R1 and R2 has increased marginally when compared to previous autumn monitoring results. Autumn species richness has increased in R1, from 29 species to 30 species, while R2 has increased from 19 species to 22 species. For the remainder of the quadrats there are no historical autumn results to compare against.

Table 100: Cover Abundance during the spring 2014, autumn 2014 and spring 2014 monitoring

Site	Stratum	Lower Height (m)	Upper Height (m)	Cover (%)	Dominant Species
			Spring 2013		
R1	Canopy	3	6	20	*Acacia gladiformis, Acacia leucolobia, Acacia spectabilis*
	Mid-storey	0.5	0.75	2	*Pultenaea microphylla*
	Groundcover	0.01	0.1	2	*Cynodon dactylon, Hardenbergia violacea*
R2	Canopy	1.5	4	10	*Acacia gladiformis, Acacia spectabilis, Acacia verniciflua*
	Mid-storey	0.3	0.8	<1	*Daviesia ulicifolia, Pultenaea microphylla*
	Groundcover	0.05	0.1	<5	*Cynodon dactylon*
R3	Mid-storey	0.4	1.5		*Acacia gladiformis, Acacia spectabilis, Eucalyptus crebra*
	Groundcover	0.05	0.1		*Cynodon dactylon*
R4	Mid-storey	0.3	1	3	*Acacia buxifolia, Acacia decora, Acacia spectabilis*
	Groundcover	0.05	0.2	5	*Cynodon dactylon, Hardenbergia violacea*
R5	Mid-storey	0.5	2	5	*Acacia spectabilis*
	Groundcover	0.05	0.2	<1	*Euchiton spp., Calotis spp.*
R6	Mid-storey	0.25	1	5	*Acacia gladiformis, Acacia leucolobia, Acacia linearifolia, Eucalyptus crebra*
	Groundcover	0.05	0.2	5	*Cynodon dactylon, Hardenbergia violacea*
R7	Mid-storey	0.5	1.5	2	*Acacia linearifolia, Casinia spp.*
	Groundcover	0.05	0.2	60	*Cynadon dactylon, Calotis canefolia*
A1A	Canopy	14	16	20	*Eucalyptus blakelyi*
	Mid-storey	1	9	20	*Eucalyptus blakelyi*
	Groundcover	0.05	0.1	35	*Aristida ramosa*

Site	Stratum	Lower Height (m)	Upper Height (m)	Cover (%)	Dominant Species
A1B	Canopy	12	16	20	*Eucalyptus blakelyi, Angophora floribunda*
	Mid-storey	0.1	1.2	5	*Acacia spectabilis*
	Groundcover	0.05	0.1	90	*Aristida vagans, Aristida ramosa*
			Autumn 2014		
R1	Mid-storey	0.7	4	75	*Acacia gladiformis, Acacia spectabilis*
	Groundcover	0.01	0.45	3	*Cynodon dactylon, Pultenea microphylla*
R2	Mid-storey	0.5	4	30	*Acacia gladiformis, Acacia spectabilist*
	Groundcover	0.01	0.25	5	*Cynodon dactylon, Hypochaeris radicata*
R3	Mid-storey	0.5	3	30	*Acacia spectabilis*
	Groundcover	0.01	0.3	50	*Cynodon dactylon, Trifolium repens*
R4	Mid-storey	0.5	1.8	5	*Acacia decora, Acacia verniciflua*
	Groundcover	0.01	0.35	5	*Cynodon dactylon*
R5	Mid-storey	0.8	2.5	10	*Acacia spectabilis, Eucalyptus* spp.
	Groundcover	0.01	0.6	50	*Cynodon dactylon*
R6	Mid-storey	0.45	2	5	*Acacia gladiformis, Acacia spectabilis, Eucalyptus* spp.
	Groundcover	0.01	0.5	10	*Cynodon dactylon, Trifolium repens*
R7	Mid-storey	0.5	2.5	5	*Acacia spectabilis, Cassinia arcuata*
	Groundcover	0.01	1	95	*Cynodon dactylon, Setaria pumila*
			Spring 2014		
R1	Upper Mid-storey	3	5	5	*Acacia spectabilis, Acacia* sp.
	Mid-storey	0.5	3	10	*Acacia gladiformis, Acacia leucolobia, Pultenea microphylla*
	Groundcover	0.01	0.5	5	*Cynodon dactylon, Hardenbergia violaceae*
R2	Upper Mid-storey	3	6	10	*Acacia gladiformis, Acacia caesiella*
	Mid-storey	0.5	1.5	3	*Daviesia genistifolia, Pultenea microphylla*
	Groundcover	0.01	0.2	5	*Cynodon dactylon*
R3	Upper Mid-storey	2	4	20	*Acacia spectabilis*
	Mid-storey	0.75	1.5	15	*Acacia buxifolia, Acacia gladiformis, Acacia verniciflua, Eucalyptus crebra*
	Groundcover	0.01	0.25	50	*Cynodon dactylon*
R4	Mid-storey	0.5	1.5	5	*Acacia decora, Acacia verniciflua*
	Groundcover	0.01	0.2	5	*Cynodon dactylon*
R5	Canopy	2.5	4	5	*Acacia linearifolia, Acacia spectabilis*

Site	Stratum	Lower Height (m)	Upper Height (m)	Cover (%)	Dominant Species
	Mid-storey	0.5	1.5	5	*Acacia verniciflua, Cassinia arcuata, Eucalyptus crebra*
	Groundcover	0.01	0.2	35	*Cynodon dactylon*
R6	Mid-storey	1	2.5	10	*Acacia spectabilis, Acacia verniciflua, Eucalyptus punctata*
	Groundcover	0.01	0.2	10	*Cynodon dactylon*
R7	Mid-storey	0.5	1	2	*Cassinia arcuata*
	Groundcover	0.01	0.3	60	*Cynodon dactylon*
A1A	Canopy	9.0	12	6	*Eucalyptus blakelyi, Eucalyptus crebra*
	Mid-storey	6	6	1	*Brachychiton populneus*
	Groundcover	0.1	1	30	*Aristida* spp., *Gahnia aspera*
A1B	Canopy	10	15	15	*Eucalyptus blakelyi, Angophora floribunda*
	Mid-storey	1.5	1.8	1	*Acacia linearifolia*
	Groundcover	0.1	0.8	80	*Aristida ramosa, Microlaena stipoides*

Fauna Monitoring

Anabat recordings over three nights recorded a total of eight (8) different microbat species, including the threatened Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*). General microbat activity was low with calls recorded less than every ten minutes throughout the evenings. No reptiles were observed. The overall fauna species richness recorded in spring 2014 was greater than that recorded in spring 2013. A graph comparing target fauna species richness data between spring 2013 and spring 2014 is presented (**Figure 62**).Birds were the most abundant fauna recorded onsite during the spring 2013 monitoring. Four bird species were observed within Quadrat R1, five species were observed within Quadrat R3, two species within Quadrat R5 and four species within Quadrat R7.

As in 2013, birds were the most diverse abundant fauna group recorded onsite during the spring 2014 monitoring. A total of 21 bird species were observed utilising habitat within the rehabilitation area during this spring 2014. Six bird species were observed at R1, two bird species at R3, five bird species at R5 and one bird species at R7. This is a significant increase within the rehabilitation area from spring 2013 when only 13 bird species were recorded.

In spring 2013 no threatened birds were recorded within the rehabilitation areas. In spring 2014, two threatened birds listed under the NSW Threatened Species Conservation Act 1995 (TSC Act) were observed opportunistically within the rehabilitation area in 2014. These were *Chthonicola sagittata* (Speckled Warbler) and *Epthianura albifrons* (White-fronted Chat). In 2013, Anabat devices within the rehabilitation area recorded a total of six different microbat species, including the threatened *Miniopterus schreibersii oceanensis* (Eastern Bent-wing Bat), which is

listed as vulnerable under the NSW TSC Act. General microbat activity was low with calls recorded less than every ten minutes throughout the evenings.

In 2014, eight microbat species were recorded during the survey. This is two more species than spring 2013. The threatened Eastern Bent-wing Bat was recorded within the rehabilitation area for second year in a row. During the 2013 season this species was only positively recorded once from one site (RAnabat 2). In spring 2014 there were a total of 15 positive recordings from two sites, RAnabat1 (4 recordings) and RAnabat2 (11 recordings). Few reptiles were recorded across both years. The first species, *Pogona barbata* (Eastern Bearded) Dragon was recorded in 2014.

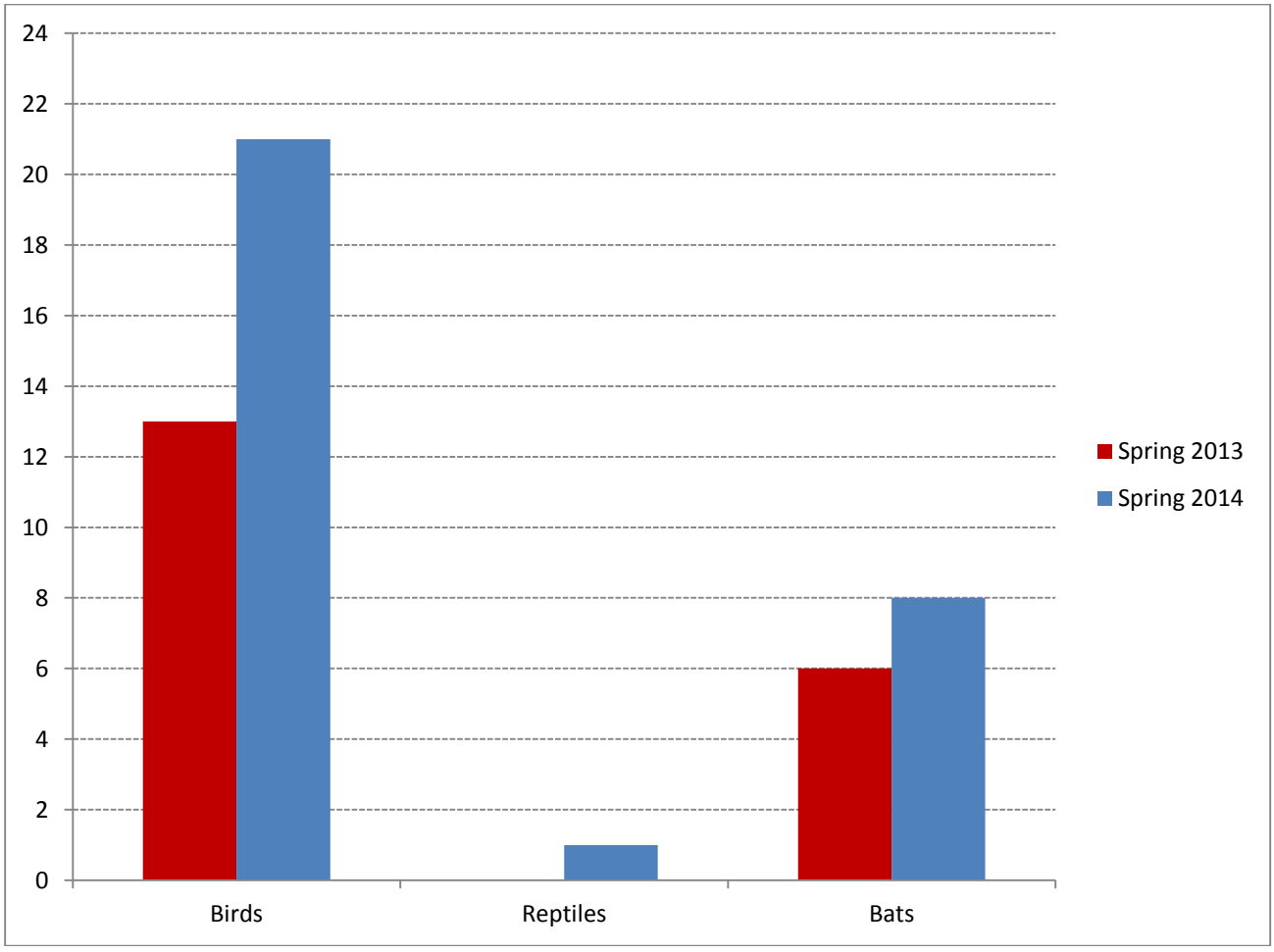


Figure 62: Species Richness of each of the Targeted Fauna Groups Recorded in 2013 and 2014

Geochemical Monitoring

Geochemical monitoring was undertaken in spring 2013 at the five new floristic sites. The monitoring showed that surface pH is lower in the rehabilitation area than Analogue sites (**Table 101**). The topsoil range of pH is 4.5 to 5.5 for the rehabilitation area, whereas analogue sites have a pH range of 5.6 to 6. The subsurface pH range of the rehabilitation monitoring sites (pH 4.2 to pH 5.4) intersects the pH range for Analogue sites (pH 5.1 to pH 5.8). The surface pH of the rehabilitation monitoring plots (pH 4.5 to pH 5.5) is in the range where issues of aluminium

and manganese toxicity can be triggered (Handreck and Black, 2002), but further investigation would be required to test if this is the case. However, a pH level of 4.9 is well within the range of the commonly occurring Yellow Podzolic soil of the Moolarben mine area (Jammel, 2006).

This soil ranges in pH from 4.5 to 5.5. EC of the topsoil at R3, R4, R5, R6 and R7 ranged from 128 to 1,320 µS/cm, whilst analogue sites ranged from 18 to 43 µS/cm. The levels recorded in the rehabilitation plots (apart from R6) are below the 1000 µS/cm which will allow even salinity sensitive plants to grow unimpeded (Handreck and Black, 2002).

Table 101: Geochemical Data for Rehabilitation Plots at Moolarben OC1 and Analogue Plots in Box-Gum Grassy Woodland

Factor	R3	R4	R5	R6	R7	A1A	A1B
pH							
0-100mm	4.7	4.5	4.9	4.6	5.5	5.6	6
100-200mm	4.8	4.2	5.1	4.3	4.7	5.1	5.8
200-300mm	4.6	4.3	5.4	4.4	4.7	5.1	5.7
Electrical Conductivity (µS/cm)							
0-100mm	298	128	686	1320	818	18	43
100-200mm	59	64	127	96	183	19	23
200-300mm	209	52	65	95	217	10	22

Completion Criteria Assessment

The data collected during the 2013 and 2014 monitoring periods allows an assessment to be made of success in meeting a selected number of the completion criteria. **Figure 63** and **Figure 64** below illustrates the success of the rehabilitation works undertaken so far, assessed against the performance criteria. The success of the rehabilitation has been based upon the results obtained during the 2013 and 2014 spring monitoring with success ranked as good, average or poor.

A good success ranking means that those areas are meeting the performance criteria and the rehabilitation works have been successful and are performing well. Average success ranking indicates that those areas are generally meeting the performance criteria. Poor success ranking means that those areas are not meeting the performance criteria and that the rehabilitation works are currently of a low condition rating. These poor areas will be prioritised for follow-up works and carefully monitored for success or failure.

Overall, the most noticeable gap between preliminary Completion Criteria and the current situation is the lack of eucalypts that will form the dominant layer of the target vegetation communities of Box Gum Woodland and Sedimentary Ironbark Forests in some areas. It should be noted however rehabilitated areas are less than 5 years old. The area around R1 has low eucalypt numbers (40/ha), although very good establishment of understorey species. Eucalypts numbers are on the low side in the area of R2 and R7 ($\leq$100/ha). In contrast some areas have

up to 3,000 eucalyptus (R3) stems per hectare. This issue of patches of low eucalypt numbers may require consideration of further broadcasting of seed or use of tubestock planting.

Figure 63: Success Ranking of OC1 Rehabilitation Monitoring 2013

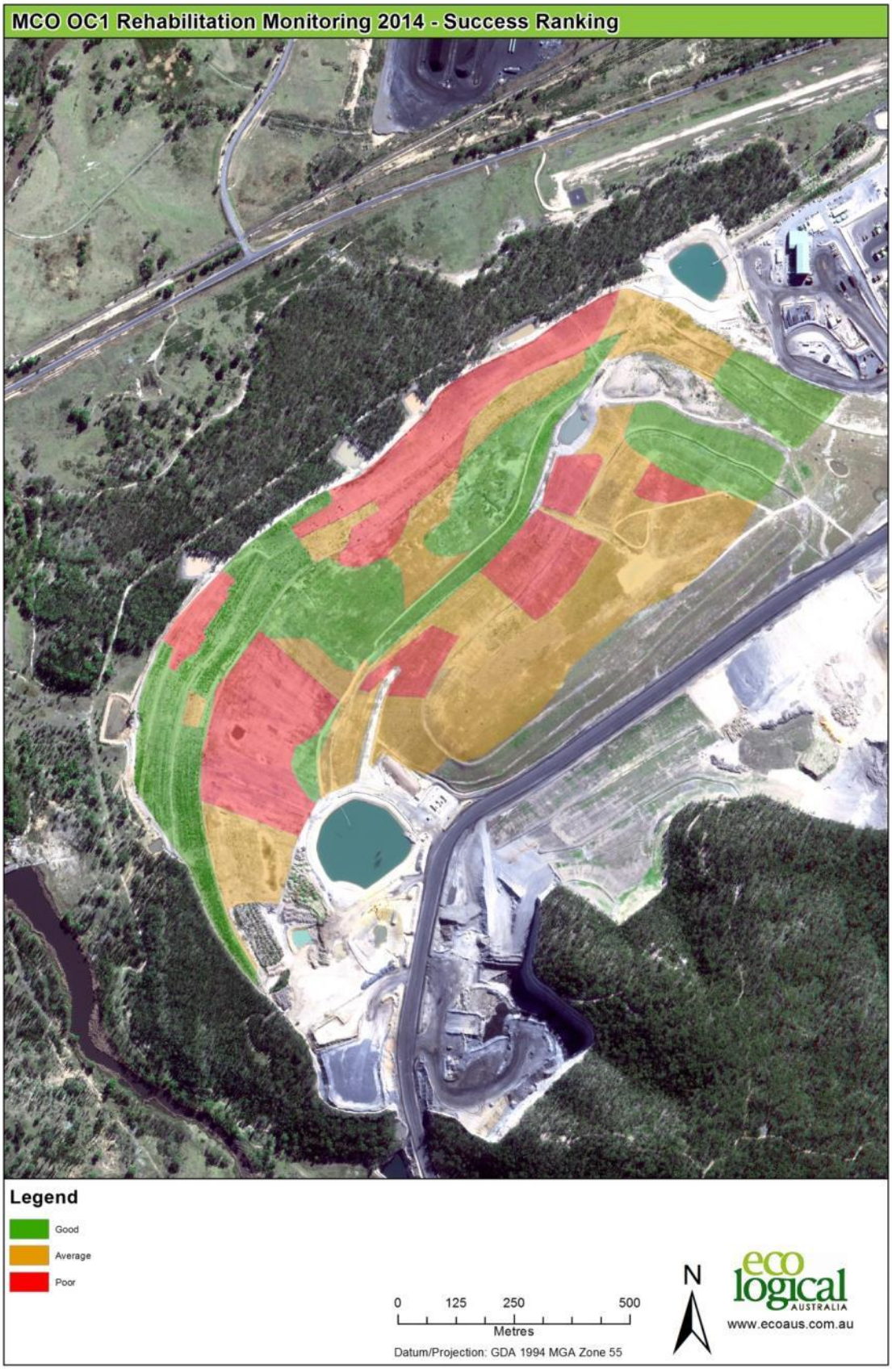


Figure 64: Success Ranking of OC1 Rehabilitation Monitoring 2014

5.2.3 Activities Next Reporting Period

During the next reporting period MCO plan to rehabilitate approximately 9ha of land in OC1 and 9ha in OC2. This rehabilitation will take place on overburden with the final land use proposed to be native vegetation (OC1) or agricultural use (OC2). The proposed areas to be disturbed and the proposed areas to be rehabilitated are shown in **Figure 69**. This figure shows disturbance activities occurring outside of the currently approved Mining Operations Plan (MOP). MCO will update the MOP and have it approved prior to this disturbance occurring.

The rehabilitation monitoring program will continue to be implemented during the next reporting period with the results reported in next year's AEMR.

5.3 REVEGETATION OF DISTURBED LAND – OFFSET AREAS

5.3.1 Activities This Reporting Period

During the reporting period on ground revegetation works continued in the Offset Areas. These works focused in the "Red Hills" area off Ulan-Wollar Road. Follow up planting and maintenance was carried out between July 2014 and September 2014. 5293 trees were replanted during this period.

A third area above "UG4" consists mostly of native vegetation with only minor revegetation works undertaken during the reporting period. 128 trees were planted in September 2014 along with minor weed spraying activities. Propagation of seedlings was undertaken by a local nursery using provenance seed drawn from MCO's native plant seed bank.

The project approval requirements for these areas are:

- Condition 42 (b) conserve and enhance at least 2.6 hectares of regenerating White Box Yellow Box Blakely's Red Gum Grassy Woodland endangered ecological community on Property 6 ("Dexter Mountain");
- Condition 42 (c) revegetate disturbed land with at least 48 hectares of White Box Yellow Box Blakely's Red Gum endangered ecological community on Properties 6, 10, 12, 13, 14 and 15 ("Red Hills", "UG4", and "Dexter Mountain"); and
- Condition 42 (d) revegetate at least 153 hectares of cleared land on the Properties 12, 13, 14 and 15 ("Red Hills").

At the end of the reporting period the following percentages of these requirements had been met:

- Condition 42 (b) = 112%
- Condition 42 (c) = 96.9% (inclusive of natural regeneration)
- Condition 42 (d) = 69.0% (inclusive of natural regeneration)

Table 102 lists the species and quantities planted to date. The species totals shows weighting toward the use of *Eucalyptus albens*, *Eucalyptus melliodora*, *Eucalyptus blakelyi*, *Eucalyptus crebra* and *Angophora floribunda*, as these are the dominant species found in the White Box Yellow Box Blakely's Red Gum Grassy Woodland endangered ecological community. All other species have been chosen to blend with and complement the existing native vegetation occurring within or adjacent to the planting area.

Table 102: Species Used in the Biodiversity Revegetation Program

Genus	Species	Number Planted Previous Reporting Period	Number Planted this Reporting Period
Acacia	*decora*	6	0
	implexa	712	17
Allocasuarina	*diminuta*	240	0
	luehmanii	511	0
Angophora	*floribunda*	917	1483
Callistemon	*pinifolious*	1,047	0
Dodonaea	*cuneata*	415	0
Eucalyptus	*albens*	402	389
	agglomerata	217	0
	blakelyi	1,731	2635
	bridgesiana	1,041	0
	crebra	569	242
	dealbata	34	0
	fibrosa	524	77
	melliodora	1,185	318
	molucanna	1,501	85
	punctata	115	0
Hakea	*dactyloides*	34	0
Leptospermum	*continentale*	731	0
	polygalifolium	992	24
Lomandra	*longifolia*	58	0
Melaleuca	*erubescens*	582	0
	thymifolia	933	23
Kunzea	*ambigua*	497	0

Protection of 1,282ha of existing native vegetation and 6ha of White Box Yellow Box Blakely's Red Gum Grassy Woodland endangered ecological community continued during the reporting period by limiting access through locked gates and fencing.

5.3.2 Activities Next Reporting Period

Physical protection and revegetation maintenance of the offset areas will continue during the next reporting period. Arrangements for the long-term protection and management of additional offset areas will also continue.

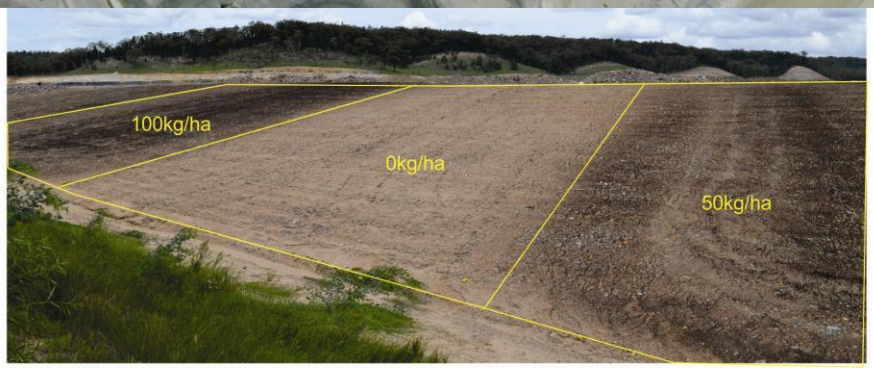
5.4 OTHER INFRASTRUCTURE

No infrastructure was required to be rehabilitated during the reporting period.

5.5 REHABILITATION TRIALS OR RESEARCH

Monitoring continued monitoring at one rehabilitation trial area during the reporting period. In 2013 a compost trial was set up near Sediment Dam 7 over an area of approximately 3 ha (Figure 71). Soils were tested prior to the trial and can be summarised as being of moderate fertility, magnesic, strongly acidic, low available phosphorus and low to high sodium (dispersive).

Varying rates of compost (Nitrohumus) were applied to provide insight to the effectiveness of control ($0m^3$/ha), $50m^3$/ha and $100m^3$/ha. Seed, fertiliser application and ground preparation remained constant across all plots.



North west facing slope

West facing slope

Figure 65: Rehabilitation Trial Location and Set Up

A total of 15kg of native tree and shrub seed was applied at a rate of 6kg/ha. The seed mix is shown in Table 101. Twenty five per cent of Acacia seed was heat treated to induce early germination. Seed oats was also sown at a rate of 30kg/ha. Inorganic (quick release) and organic (slow release) fertiliser were also applied at a total combined rate of 400kg/ha. Gypsum was also spread at a rate of 2 tonne/ha.

Table 103: Box Gum Woodland Mix – Trial Area

Genus	Species	Box-Gum Woodland Association (g)
Acacia	*decora*	53
	Polybotrya	684
	Verniciflua	1,200
	Implexa	1,000
	Spectabilis	1,000
Allocasuarina	*luehmanii*	79
Angophora	*floribunda*	300
Callistemon	*Linearis*	47
Dodonaea	*cuneata*	400
	Viscosa	195
Eucalyptus	*Blakelyi*	4,000
	crebra	1,000
	dealbata	500
	melliodora	1,500
	molucanna	1,500
	Sideroxylon	400
Kunzea	*ambigua*	200
Leptospermum	*polygalifolium*	300
Melaleuca	*thymifolia*	343
Indigofera	*Australis*	275
Bursaria	*Spinosa*	24
	Total	15,000

Monitoring of the trial has been undertaken since May 2013 and has consisted of six monitoring periods, four of which were undertaken between September 2013 and October 2014.Monitoring of the trial consisted of two methods, twenty 1m x 1m quadrats randomly selected in each

treatment area and two 5m x 5m quadrats randomly selected in each treatment area. The total number of germinates from each species present were recorded, along with the average height of germinates and any other opportunistic observations. The process of randomly selecting quadrats was intended to allow a representative number of upslope, mid-slope and down-slope quadrats within each treatment area.

Monitoring provided a picture of three key elements over this period, groundcover, acacia germination and eucalypt germination. It is the eucalypt germination that will define the long term character of the vegetation community established on the rehabilitation area.

In the first season (2013) groundcover density was positively correlated with the application rates of mulch. In the second season (2014) there was a self-sown emergence of oats, whose correlation with mulch application rates was less clear, so that in October 2014, the lowest rate of application was ranked second out the three rates. However, whether as dry matter or living plants, the covercrop of oats (Avena sp) provided good groundcover throughout the monitoring period.

Acacias were the first shrub/tree species to appear in numbers, and were present at approximately 1000 stems/ha in the first survey in May 2013. Acacia presence continued to increase through the time of the trial. Acacias in the first 18 months of the trial achieved greater heights than eucalypts. Although long term it is expected that eucalypts will form the upper canopy.

Whilst no eucalypts were recorded in the survey plots during the first assessment in May 2013, individuals in very low numbers were observed outside the survey quadrats. Eucalypts first appeared in counts during the June 2013 monitoring at a rate of 200 stems/ha, and this increased to 600 stems/ha by February 2014, almost a year after the trial had commenced. By February 2014, the tops of eucalypt species were seen appearing above the covercrop (0.3m-0.5m). There appeared to have been a significant pulse of eucalypt germination in the first late spring-summer following the application of the mulch. In May 2014, eucalypt stem density had increased to 1,000 stems/ha and this count was maintained until the last monitoring in October 2014, with the main change being heights rather than numbers.

At the completion of the mulching trial monitoring in October 2014, the 100m3/ha treatment class had the greatest success in average stems per m2 (**Figure 72**), average height of the stems (**Figure 73**) and overall average ground cover (**Figure 74**). The 0m3/ha treatment class had the second greatest success, followed by the 50m3/ha treatment class. Native mid-storey and canopy species were observed across all treatment classes, with Acacia spp. and Eucalyptus spp. being dominant.

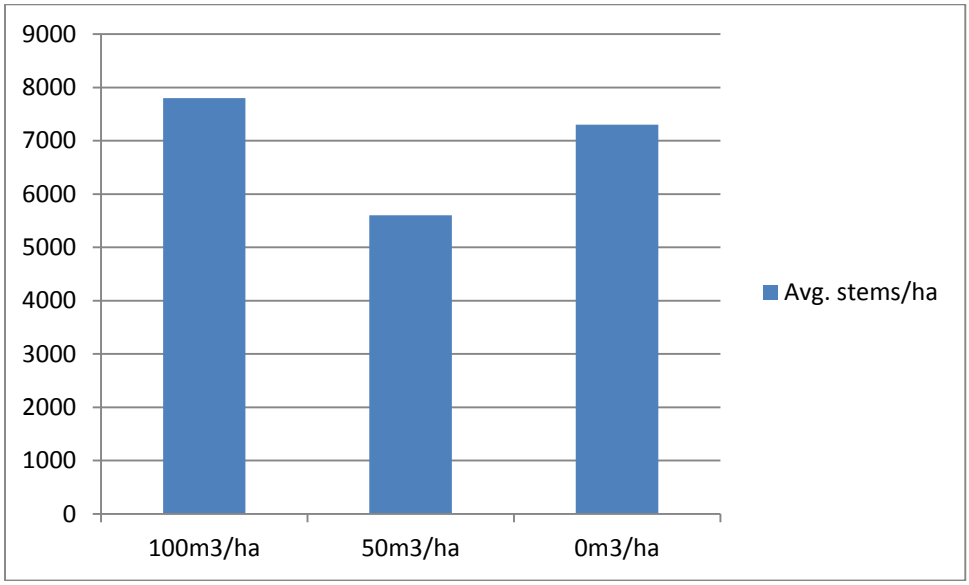


Figure 66: Average stem counts between treatment classes (October 2014)

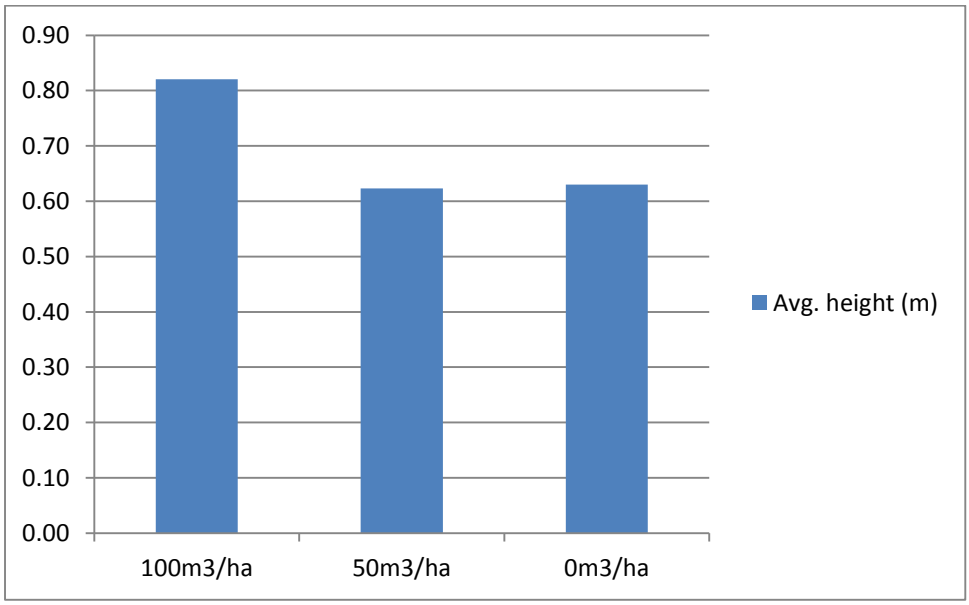


Figure 67: Average height of the stems between treatment classes (October 2014)

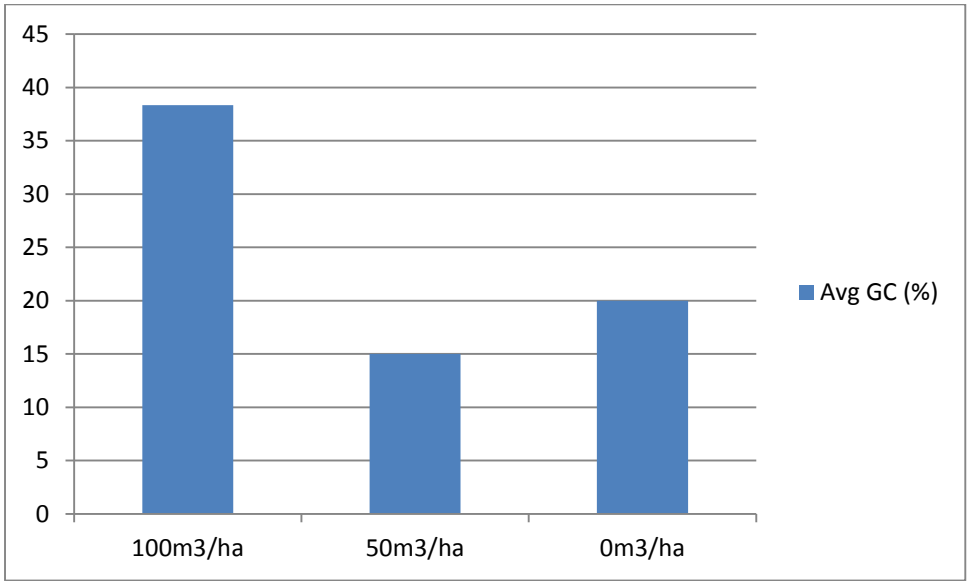


Figure 68: Average groundcover between treatment classes (October 2014)

The mulching trial area will be incorporated into the OC1 Rehabilitation area monitoring from spring 2015 onwards

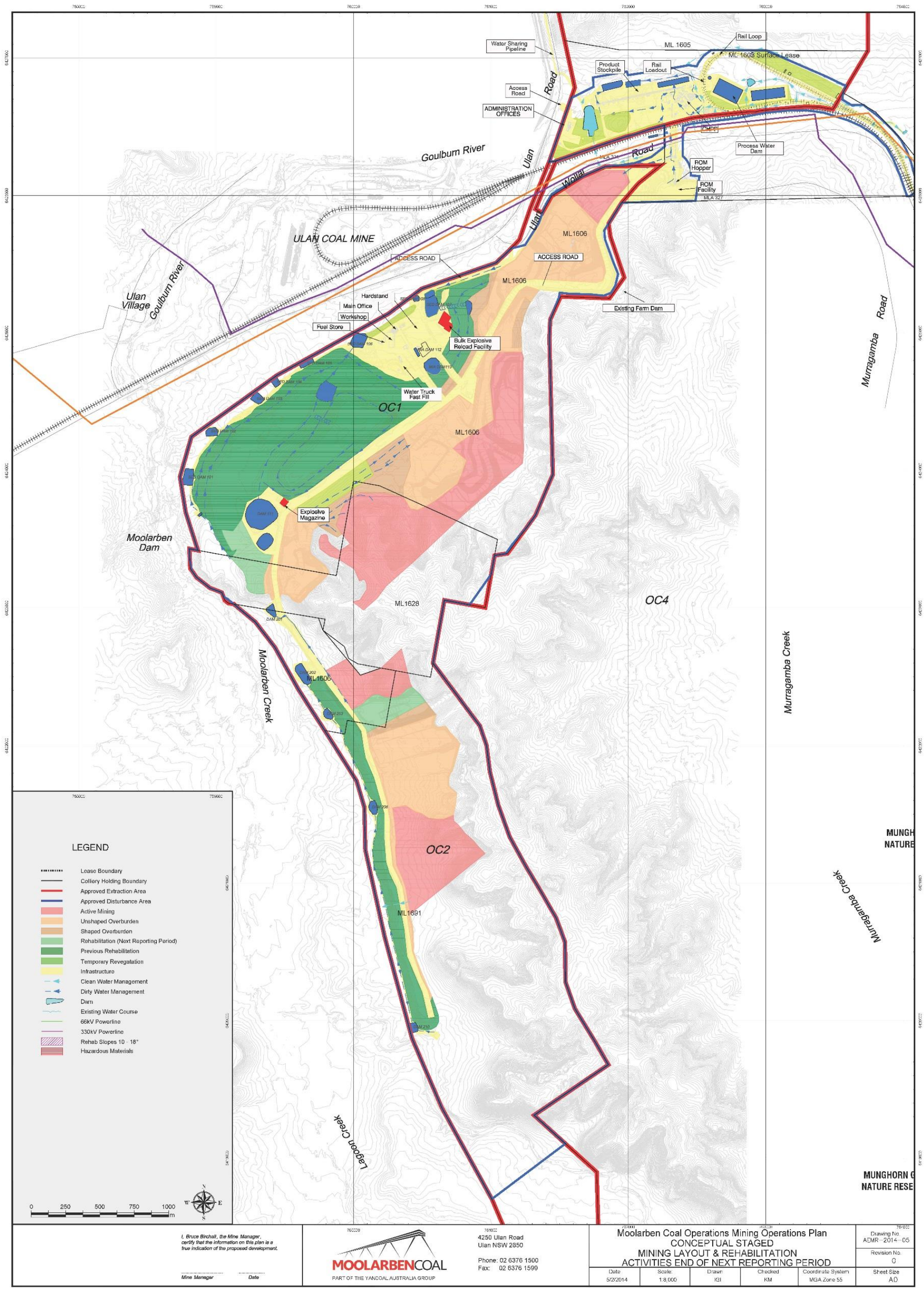


Figure 69: Proposed Disturbance Areas

5.6 REHABILITATION SUMMARY

Table 104: Rehabilitation Summary 2013-2014

	Area Affected / Rehabilitated (hectares)		
	To Date	Last Report	Next Report (estimated)
A: MINE LEASE AREA			
Mine Lease 1605	1,099.6		
Mine Lease 1606	495.4		
Mine Lease 1628	152.7		
Mine Lease 1691	902.5		
Total	**2,650.2**		
B: DISTURBED AREAS			
B1 Infrastructure area	164.0	146.0	163.8
B2 Active Mining Area (Excluding B3 – B5)	106.0	61.7	130.0
B3 Waste Emplacement (Active / unshaped)	83.7	88.6	131.0
B4 Tailings emplacements (active / uncapped)	0.0	0.0	0.0
B5 Shaped waste emplacement (awaits final vegetation)	15.0	14.6	26.3
ALL DISTURBED AREAS	**368.7**	**310.9**	**451.1**
C. REHABILITATION PROGRESS			
C1 Total Rehabilitated Area (except for maintenance)	130.2	25.7	16.9
D. REHABILITATION ON SLOPES			
D1 10 to 18 degrees	130.2	25.7	16.9
D2 Greater than 18 degrees	0	0	0
E. SURFACE OF REHABILITATED LAND			
E1 Pasture and grasses	22	22	8.1
E2 Native forest / ecosystems	108.2	3.7	8.8
E3 Plantations and crops	0	0	0
E4 Other (temporary rehabilitation)	0	0	0

Note; figures in previous AEMR were reported incorrectly

Table 105: Maintenance Activities on Rehabilitated Land

NATURE OF TREATMENT	Area Treated (ha)		Comment / control strategies / treatment detail
	Report Period	Next Period	
Additional erosion control works (drains re-contouring, rock protection)	0.0	0.0	None - Erosion control works will depend on monitoring of rehabilitation areas throughout the reporting period.
Re-covering (detail – further topsoil, subsoil sealing, etc)	0.0	0.0	None– Re-covering works will depend on monitoring of rehabilitation areas throughout the reporting period.
Soil treatment (detail – fertiliser, lime, gypsum, etc)	25.0	20.0	25 ha of the OC1 environmental bund was aerial fertilised in spring 2014.
Treatment / Management (detail – grazing, cropping, slashing, etc)	0.0	0.0	Not applicable - Lands rehabilitated to date do not include grazing or cropping lands.
Re-seeding / Replanting (detail – species density, season, etc)	2.0	0.0	Various locations in OC1 were targeted for tube stock planting in 2014. The species mix comprised of Box Gum Woodland species.
Adversely Affected by Weeds (detail – type and treatment)	0.0	0.0	None – Weed control works will depend on monitoring of rehabilitation areas throughout the reporting period.
Feral animal control (detail – additional fencing, trapping, baiting, etc)	0.0	0.0	None – Feral animal control works will depend on monitoring of rehabilitation areas throughout the reporting period.

6.0 ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

Various activities are proposed to be undertaken during the next reporting period and are anticipated to include:

- Ongoing Exploration Activities;
- Open Cut mining operations will continue in Open Cut 1 and 2; and
- Continuous improvement of the environmental management system.
- Completion of the water infrastructure upgrades within the CHPP
- Revegetation and maintenance works in the Vegetation Offset Areas will continue during the next reporting period.
- The flora and fauna monitoring program will expand into additional offset areas during the next reporting period.
- Stream health monitoring will continue to be undertaken with the results to be provided in the next AEMR.
- Weed and feral animal control will continue to be conducted during the next reporting period.
- MCO will also undertake predictive blast modelling on rock shelters near Open Cut 2 and Open Cut 4 with results to be provided in next year's AEMR.
- Attended noise monitoring results will be provided in the next AEMR
- MCO will continue to engage Registered Aboriginal Stakeholder Organisations with regards to aboriginal heritage and salvage.
- During the next reporting period MCO will continue to maintain Site 20.
- MCO will continue to implement the Community engagement strategy
- Physical protection and revegetation maintenance of the offset areas will continue during the next reporting period.
- Arrangements for the long-term protection and management of additional offset areas will also continue.
- Revision of all site Management Plans;

Appendix

Appendix 1: Community Complaints

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
1.	14th September 2013	00:18am	Ridge Road	Noise	Yes	E	Yes	The MPEA attended the complaint location and observed wind as the only sound audible. The MPEA had relocated to Lagoons Road where machinery and banging noises were audible from a westerly non MCO direction. The ECRC contacted the complainant on the 16/09/13 to discuss the MPEA's observations
2.	14th September 2013	12:33am 01.33am and 02:36am	Ulan Road	Noise	Yes – Each time	E	No	Multiple complaints. No action required.
3.	15th September 2013	11:37pm 02:22am	Ulan Road	Noise	Yes – Each time	E NE-SE		Multiple complaints. No action required.
4.	15th September	11:48pm	Winchester Crescent	Noise	Yes	E	Yes	The MPEA attended the complaint location and observed wind as the dominant sound. A barking dog was faintly audible. No mine noise was heard. The ECRC contacted the complainant on the 16/09/13 and discussed the noise and observations of the MPEA.
5.	4th October 2013	2:35pm	Ulan Road	Noise	N/A	N/A	N/A	Complainant spoke with CRC about general traffic noise. The complainant also mentioned they had spoken with neighboring operations regarding the same matter. No action required.
6.	13th October 2013	3:07am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA was in the general area around time of complaint and had observed faint mining hum from the

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								North. Wind was found to be the dominant sound. Birds were also audible. No action required.
7.	19th October 2013	1:49am	Ridge Road	Noise	Yes	Still	Yes	The MPEA attended the complaint location and observed audible mine noise although it remained under MCO's noise criteria. The CRC spoke with the complainant and discussed the noise environment at the time of the complaint.
8.	9th November 2013	4:14am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA was in the general area around time of complaint and had observed general mine noise from the North. Occasional road traffic was found to be the dominant sound. Crickets were also audible. The MPEA Continued to monitor noise levels.
9.	28th November 2013	2:17am	Ulan Road	Noise	Yes		Yes	The MPEA was in the general area around the time of the complaint and had observed a faint mine noise from the North, occasional road traffic was found to be the dominant noise. A barking dog was also audible. Monitoring continued in the area.
10.	12th December 2013	12.25pm	Ridge Road	Blast	N/A	N/A	N/A	CRC spoke with the complainant to discuss the complaint. No exceedance of criteria limits.
11.	21st December 2013	2:25am	Ridge Road	Noise	No	N/A	No	No Equipment was operating as MCO was shut down. The CRC spoke with the complainant to discuss the complaint. The CRC advised the complainant that MCO had shut down for the Christmas / New Year period at the time of the complaint and that the noise described was not from MCO.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
12.	10th January 2014	02:45am	Ulan Road	Noise	Yes		No	No action required
13.	10th January 2014	01:14am	Ridge Road	Noise	Yes		Yes	The MPEA attended the complaint location and observed mining hum audible from MCO direction. Occasional wind gusts and wind in trees audible. No distinct equipment identified. The CRC spoke with the complainant to discuss the noise environment at the time of the complaint.
14.	15th January 2014	01:47am	Ridge Road	Noise	Yes	WNW	Yes	The MPEA attended the complaint location and observed mining noise audible from MCO direction. Barking dog was also faintly audible. MPEA then drove to Lagoons Rd, where the mining noise was the dominant sound audible from MCO direction. Notified OCE. OCE relocated the loader circuit. CRC contacted the complainant and discussed the noise environment at the time of the complaint.
15.	18th January 2014	03:15am	Ulan Road	Noise	Yes		Yes	MPEA observed very faint mining hum audible from Winchester Crescent area, however inaudible when road traffic present, aircraft and dogs barking were also audible.
16.	24th January 2014	03:15am	Ulan Road	Noise	Yes		Yes	MPEA was in the area 15 minutes prior to receiving the complaint. Faint mining hum was audible from North. Dozer noise echoing from a westerly non MCO direction was found to be the dominant noise. MCO dozers were pulled up for 5 minutes, but dozer noise could still be heard. No further action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
17.	31st January 2014	03:45am	Ulan Road	Noise	Yes	SSW-SW	Yes	The MPEA was in the area approximately 45mins prior to the complaint. Low mine hum was faintly audible from MCO/non MCO direction. No action was taken.
18.	3rd February 2014	04:10am	Ulan Road	Noise	Yes		No	No action required
19.	3rd February 2014		Old Bobadeen Road	Exploration	N/A	N/A	N/A	Complainant called to discuss Spiny Burr Grass possibly on an exploration drill site and the likelihood of it being spread by light vehicles. ECRC informed the complainant of MCO'S exploration weed hygiene procedures and final rehab procedures for drill sites. No action further required
20.	3rd February 2014	3:53pm	Ridge Road	Noise and Blasting	Yes		Yes	The complainant rang the hotline to complain about a blast and mine noise No exceedance of blast criteria limits The ECRS spoke with the complainant to discuss their complaint. The new operations in OC2 were discussed with the complainant. No further action required
21.	7th February 2014	02:01am 4:47am	Ulan Road	Noise	Yes	NE	Yes	MPEA observed mining hum faintly audible with no distinct equipment identified. Advised OCE, continue to monitor Sentinex noise levels throughout shift.
22.	8th February 2014	04:26am	Ulan Road	Noise	Yes	SE-SW	Yes	The MPEA had visited the area throughout the night, most recently 30 minutes prior to the complaint. No mine noise was audible in the area of the complaint. No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
23.	14th February 2014	10:29pm	Ridge Road	Noise	Yes	ESE	Yes	MPEA arrived at complaint location at 10:42pm. Mining hum fluctuated between audible and inaudible. Advised OCE of observations. MPEA continued to monitor noise levels. The CRC spoke with the complainant and discussed the noise environment at the time of the complaint.
24.	18th February 2014	10:45am	Moolarben Road	Noise	Yes	ESE	Yes	MPEA was at Winchester South Parking Bay at 10:35am to observe noise. Occasional road traffic was found to be the dominant noise source. Machinery noise from roadwork's on Ulan Rd could be heard when no traffic was present. MPEA advised OCE of findings and continued to monitor noise throughout the shift. ECM discussed the complaint with the complainant.
25.	18th February 2014	09:53am	Ulan Road	Noise	Yes	ESE	Yes	MPEA drove to complaint location at 10:35am. Occasional road traffic was found to be the dominant noise. Machinery noise from roadwork's on Ulan Rd could be heard when no traffic was present. MPEA advised OCE of findings and continued to monitor noise throughout the shift.
26.	19th February 2014	02:30am	Ulan Road	Noise	Yes	ESE	Yes	The MPEA was in the area at the time of complaint. Low pitched mine hum was faintly audible from NE direction. Birds and TV noise was also audible. The OCE was notified of the findings and no further actions was taken. Noise was monitored throughout the remainder of the shift.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
27.	20th February 2014	02:20am	Ulan Road	Noise	Yes	WSW	Yes	The MPEA was in the area 30 minutes prior to complaint. Non-MCO mining hum from North fluctuated between inaudible and faintly audible. Occasional banging was heard from non-MCO mining source North of location.
28.	21st February 2014	12:17pm	Winchester Crescent	Blasting	N/A	N/A	N/A	The CRC made initial contact with the complainant to discuss the complaint. No exceedance of blast criteria limits
29.	24th February 2014	01:42am	Winchester Crescent	Noise	Yes		Yes	The MPEA attended the complaint location and observed audible mine hum from MCO direction. Dogs barking frequently close by, crickets, isolated traffic and wind were also audible at location. When isolated traffic was present, mine hum dropped to faintly audible, however stayed audible at all other times. Notified OCE. Coal circuit in OC2 was shut down at 2:40am. The CRC called the complainant to discuss the noise environment and to provide feedback on the MPEA observations.
30.	25th February 2014	1:37am 3:58am	Ulan Road	Noise	Yes – Each time	NE	No	Multiple complaints. No action required.
31.	26th February 2014	1:51am	Winchester Crescent	Noise	Yes	SSW	Yes	The MPEA visited the location of the complainant to observe the noise. They observed faintly audible mine

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								hum with birds, dogs and road traffic being the dominant noises. The CRC called the complainant to discuss the noise environment.
32.	27th February 2014	9:06am	Winchester Crescent	Noise and Dust	N/A	N/A	Yes	Complainant approached MPEA when monitoring at Winchester Crescent. The complainant was directed to the Community Hotline. The CRC contacted the complainant to discuss the complaint. The CRC provided the complainant with the complaints hotline phone number for future reference.
33.	28th February 2014	07:30pm	Ridge Road	Noise and Blasting	Yes	ESE	Yes	No exceedance of blast criteria limits MPEA attended complaint location. No mine noise was heard. Wind and rain were the only sounds audible. CRC called the complainant to discuss the environment at the time of the complaint.
34.	1st March 2014	9:53pm	Ridge Road	Noise	Yes	ENE	Yes	MPEA attended complaint location. Mining hum fluctuated between inaudible and audible. No distinct equipment was heard. Wind and frequent road traffic were observed to be the dominant noises and were consistently audible throughout monitoring. The OCE was notified of the observations. The CRC contacted the complainant to discuss the noise environment at the time of the complaint.
35.	1st March 2014	11:11pm	Winchester Crescent	Noise	Yes	ENE	Yes	MPEA attended complaint location. Mining hum fluctuated between inaudible and faintly audible. No distinct equipment was heard. Wind, rain and frequent

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								road traffic were observed to be the dominant noises and were consistently audible throughout monitoring. Rain became increasingly heavier during monitoring. The OCE was notified of the observations. The CRC contacted the complainant to discuss the noise environment at the time of the complaint.
36.	5th March 2014	12:39am	Ridge Road	Noise	Yes	NEN	Yes	The MPEA attended the complaint location. Mining hum was audible from MCO direction, no distinct machinery was heard, however a brief engine revving sound was present. Regular traffic passing on Ulan Rd was the dominant noise when present; mine noise became inaudible at this time. Crickets were constantly audible as well as birds and a horse in nearby paddock. The OCE was notified of observations at 01:25am. 2 x dozers shut down in OC2 to reduce noise coming from this area. The CRC contacted the complainant to discuss the noise environment. The CRC discussed the MPEA's observations and changes. The CRC will meet with the complainant on 10/03/2014 at the complainants address to hold further discussions.
37.	6th March 2014	1:46am	Ulan Road	Noise	Yes	SW	Yes	The MPEA was observing noise prior to the complaint with mining hum and slight dozer noise audible from Winchester Crescent area. No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
38.	8th March 2014	12:06am	Ulan Road	Noise	Yes	WSW	Yes	The MPEA was observing noise in the area around the time of complaint. Music from a local residence was the dominant noise. Low pitched mine hum was faintly audible from MCO/Ulan direction. No action was taken.
39.	9th March 2014	07:53am	Winchester Crescent	Noise	Yes		Yes	General mining hum was audible from MCO direction. Dozer track, revving noises and first loads were heard on occasion. Wind, birds and occasional road traffic were the dominant noises MPEA notified OCE of observations, Sentinex levels. OCE had recently swapped trucks operating in OC2 to Duratrays and instructed OC2 dump dozer to use first gear. The CRC contacted the complaint to discuss the noise environment
40.	9th March 2014	07:59am	Winchester Crescent	Noise	Yes		Yes	Faint mining hum was audible from MCO direction. No distinct equipment was heard. Birds, wind and frequent road traffic on Ulan Road were the dominant noises heard. MPEA notified OCE of observations and Sentinex levels. OCE had recently swapped trucks operating in OC2 to Duratrays and instructed OC2 dump dozer to use first gear. The CRC contacted the complainant to discuss the noise environment
41.	9th March 2014	09:21am	Winchester Crescent	Noise	Yes	SE	Yes	No action taken

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								The CRC contacted the complainant to discuss the noise environment
42.	10th March 2014	01:20am	Ulan Road	Noise	Yes	S-SW	Yes	The MPEA was in the area prior to complaint and observed dog barking, TV noise from local residence and breeze in trees as audible. Indistinct, low pitched mine hum ranged from inaudible to faintly audible from MCO/Ulan direction. No action was taken.
43.	10th March 2014	09:07am	Ulan Road	Noise	Yes	ESE-SE	Yes	The MPEA attended the complaint location at 09:29am and observed constant road traffic (including multiple trucks) passing on Ulan Rd as the dominant noise. Birds were also audible throughout the entire monitoring time. From the complainant location, no visible dust was observed coming from MCO mining operations and a dust haze over MCO and non MCO-north mine was only noticed once relocating to Winchester Cr monitor location. The CRC called the complainant to discuss the complaint.
44.	11th March 2014	01:21am 03:28am	Ulan Road	Noise	Yes		No	No action required
45.	11th March 2014	02:03am	Ridge Road	Noise	Yes		Yes	Mining noise audible from MCO direction. Isolated road traffic on Ulan Rd, crickets and barking dog were also audible.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								Notified OCE of observations. OCE pulled up one dozer in OC2. Other dozer operator was instructed to use first gear. The CRC contacted the complainant to discuss the environment.
46.	11th March 2014	11:06 am	Winchester Crescent	Blasting (non MCO related)	N/A	N/A	N/A	The CRC called the complainant to discuss the complaint. The CRC advised the complainant that MCO did not have a blast at that time.
47.	11th March 2014	12:02pm	Ridge Road	Blasting	N/A	N/A	N/A	No exceedance of blast criteria limits CRC called the complainant to discuss the blast.
48.	11th March 2014	12:52pm	Ridge Road	Blasting	N/A	N/A	N/A	No exceedance of blast criteria limits The CRC called the complainant to discuss the blast.
49.	11th March 2014		Ridge Road	Blasting	N/A	N/A	N/A	No exceedance of blast criteria limits The CRC contacted the complainant to discuss the complaint.
50.	11th March 2014	10:46pm 2:41am	Ulan Road	Noise	Yes		Yes	The MPEA attended the complaint location. General mine noise was faintly audible from MCO direction. Occasional road traffic on Ulan Rd was the dominant sound when heard. Mine noise became inaudible when traffic was present. Wind and barking dogs were also audible. Notified OCE. No action required
51.	13th March 2014	02:31am	Ulan Road	Noise	Yes		Yes	The MPEA was at the complaint location and observed a slight breeze, dogs barking and a car passing on Winchester Cr as the dominant noises. No mine noise was audible.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								The MPEA attended the complaint location at 03:25am and observed mine noise fluctuating between inaudible and audible. Car passing on Ulan Rd dominant noise, bugs and crickets also audible. At 03:20am OCE notified digger 1 circuit in OC2 to shut down to reduce noise.
52.	13th March 2014	08:47pm	Ulan Road	Noise	Yes	ENE-E	Yes	The MPEA was in the area at the time of the complaint. Road traffic was the dominant noise at the complaint location. Mine hum was faintly audible on occasion when road traffic was absent. No action required
53.	13th March 2014	10:17pm	Ulan Road	Noise	Yes	NNE-ENE	Yes	The MPEA attended the complaint location and observed frequent road traffic as the dominant noise. When road traffic was absent mine hum was faintly audible. Dogs and livestock were also audible.
54.	14th March 2014	12:47am	Ridge Road	Noise	Yes	NE-ENE	Yes	The MPEA was in the area prior to the complaint, and observed road traffic as the dominant noise. Mine noise from both MCO and non MCO sources was audible. Birds, wind and crickets were also audible. The MPEA attended the complaint location immediately after the complaint was made and observed wind as the dominant noise. Road traffic was clearly audible and when the wind dropped mine noise was faintly audible and indistinct. No action was taken. The CRC called the complainant to discuss the noise environment.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
55.	14th March 2014	08:28am	Ulan Road	Noise	Yes	NNW-NNE	Yes	The MPEA was in the area at the time of the complaint and observed frequent road traffic as the dominant noise. No mine noise was audible. The MPEA attended the complaint location 5 minutes after complaint was made and observed frequent road traffic as the dominant noise. Birds were also dominant and constant. Brief gaps in traffic allowed mine noise to be audible with occasional thud noises and dozer track noticed. The OCE was notified and the dozers in OC2 were put in first gear.
56.	14th March 2014	09:02am	Ulan Road	Noise	Yes	NNW-NE	Yes	The MPEA was in the area at the time of complaint and observed frequent road traffic and birds as the dominant noises. Mine noise was audible at times when road traffic was absent. The MPEA attended the complaint location after the complaint was made and observed regular road traffic as the dominant noise with consistent bird noises also dominant. The CRC called the complainant to discuss the noise at the time of the complaint.
57.	15th March 2014	02:20am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed dog barking as the dominant noise. General mine noise was audible from MCO direction with dozer tracks faintly audible. Regular road traffic was also audible. No action was taken.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
58.	15th March 2014	09:00am	Winchester Crescent	Noise	Yes	NNE	Yes	The MPEA was in the area prior to the complaint and observed low pitched mine hum audible on occasion and only when road traffic was absent. Regular road traffic was the dominant noise with birds and planes also audible. No dozer track was heard. The MPEA attended the complaint location and observed lawn mower noise, dog barking, birds, motorbike noise and occasional to regular road traffic. No mine noise was audible The CRC called the complainant to discuss the noise environment.
59.	16th March 2014	12:26am	Ulan Road	Noise	Yes	SW	Yes	The MPEA was in the area prior to the complaint, and observed mining hum from both MCO and non MCO sources- neither were dominant noises. Dogs, birds and faint music were audible. The MPEA attended the complaint location and observed non MCO mine hum, with constant dog barking, birds and car revving noises audible. No action was taken.
60.	18th March 2014	8:51am	Moolarben Road	Noise	Yes	NE	Yes	The MPEA and ECRC attended the complaint location. General mine noise was audible from MCO OC2 direction. Dozer noise and engine noise was distinct throughout recording. Frequent birds calling were the dominant sounds when heard. Plane, isolated road traffic and a dog was also heard. ECRC spoke with OCE. The observations were discussed and the OCE instructed

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								the dozer operator to work in first gear. This action reduced the dozer noise. The CRC called the complaint to discuss the noise environment.
61.	19th March 2014	9:19am	Ridge Road	Blasting (non MCO related)	N/A	N/A	N/A	The CRC called the complainant to discuss the complaint. The CRC advised the complainant that there was no MCO blast at that time.
62.	20th March 2014	3:47am	Ulan Road	Noise	Yes	SE	Yes	MPEA attended complaint location. Slight mine hum could be heard from non-MCO direction. No action required
63.	20th March 2014	11:04pm	Ulan Road	Noise	Yes	NE	Yes	Attended noise monitoring was being conducted around the time of the complaint. Mining noise levels were compliant MPEA visited the complaint location at 11:30pm. They observed general mine noise from MCO with no distinct mine equipment heard. Birds were the dominant noise. The CRC called the complainant to discuss the noise
64.	21st March 2014	1:57am	Winchester Crescent	Noise	Yes	NE	Yes	Attended noise monitoring had been conducted earlier in the night. Mining noise levels were ~29dB at Ridge Road and ~27dB at Winchester Crescent The MPEA visited the complaint location. Wind, dogs barking, mine hum were audible. The CRC called the complainant to discuss the noise environment.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
65.	21st March 2014	8:43am	Ulan Road	Noise	Yes	ENE	Yes	The MPEA attended the complaint location. Road noise dominant. Birds audible. Intermittent mine noise from MCO direction -faintly heard. No action required
66.	21st March 2014	9:44am	Ulan Road	Noise	Yes	NE	Yes	The MPEA attended the complaint location. No mine noise was audible, Strong winds present and Dog audible. Dominant road noise. The CRC called the complainant to discuss the noise environment. The CRC discussed the MPEA's observations.
67.	21st March 2014	10:23pm	Ridge Road	Noise	Yes	ESE	Yes	The MPEA was near the complaint location at time of complaint. Traffic passing on Ulan Road was observed as the dominant noise, crickets, kangaroo and a slight breeze was present with faint wind gusts audible. Notified OCE of observations, continue to monitor the noise environment. CRC spoke to the complainant to discuss the noise environment. The CRC advised the complainant of the MPEA and OCE's observations.
68.	22nd March 2014	01:15am	Ulan Road	Noise	Yes	SW	Yes	The MPEA attended the complaint location and observed audible mine rumble from MCO & non MCO-north mine direction as being the dominant noise. Occasional banging noises were identified (source unclear) as well as a constant low pitch hum. Notified OCE, no action taken.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
69.	22rd March 2014	08:13am	Moolarben Road	Noise	Yes	NNE	Yes	The MPEA attended the complaint location and observed audible mine noise coming from MCO OC2 direction. Birds were very dominant at location and a tractor, dogs, plane & digger moving could also be heard. CRC called the complainant. No action required
70.	23rd March 2014	08:19am	Ulan Road	Noise	Yes	NNE	Yes	The MPEA attended the complaint location and observed constant traffic, birds and a banging noise coming from a nearby residence as the dominant noises. No mine noise was audible.
71.	24th March 2014	00:25am	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed audible mine noise as the dominant noise, from MCO & non MCO east direction. Isolated crashing noises were heard throughout recording, source unclear & did not appear to be coming from MCO direction. Notified OCE, OCE attempted to determine the crashing noise, noise was not identifiable in MCO pit MPEA went to Lagoons Rd & no crashing noises could be heard from this location, just a constant low pitched hum from in pit MCO. CRC spoke to the complainant to discuss the noise environment. The CRC advised the complainant of the MPEA and OCE's observations.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
72.	24th March 2014	02:33am	Winchester Crescent	Noise	Yes	SSW	Yes	MPEA attended the complaint location and observed a constant low pitch mine hum coming from both MCO & non MCO -East direction. Dozer tracks were occasionally heard from MCO direction & constant crashing/banging sounds heard from non MCO source. Dogs howling and barking, birds and car passing on Ulan Rd were also audible. OCE relocated grader from OC2 & shut down dozer. The CRC called the complainant to discuss the noise environment. The CRC provided the complainant with the MPEA's observations.
73.	24th March 2014	02:38am and 03:38am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA observed a constant low pitch mine hum coming from both MCO & non MCO -East direction. Dozer tracks were occasionally heard from MCO direction & constant crashing/banging sounds heard from non MCO source. Dogs howling and barking, birds and car passing on Ulan Rd were also audible. OCE relocated grader from OC2 & shut down dozer. No OC2 operations at time of second complaint. The MPEA attended the complaint location and observed wind gusts & wind in trees, light rain and crickets' audible. There was no mine noise audible. The CRC called the complainant to discuss the noise environment. The CRC provided the complainant with the MPEA's observations.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
74.	24th March 2014	11:55am	Ulan Road	Noise	Yes	NE	Yes	MPEA was in the area and observed dominant, frequent road traffic, light breeze and Birds audible. Indistinct mine hum from MCO/no MCO north direction when no road traffic. The CRC called the complainant and discussed the MPEA's observations.
75.	25th March 2014	01:48am and 03:06am	Ulan Road	Noise	Yes	ENE - E	Yes	The MPEA attended the complaint location after each complaint. Slight mine hum and infrequent dozer tracks were heard with the dominant noise. No action required
76.	25th March 2014	03:54am	Ridge Road	Noise	Yes	ESE-SSW	Yes	The MPEA attended the complaint location and observed mining noise from MCO/non MCO North direction. A train could be heard leaving non MCO North Mine and dozer track was audible but not the dominant noise. The CRC called the complainant to discuss the noise environment and the MPEA's observations.
77.	26th March 2014	12:06am	Winchester Crescent	Noise	Yes	NE	Yes	The MPEA attended the complaint location and observed a hum from non MCO direction. No MCO mine noise was heard. Little sprinkling of rain present. The CRC called the complainant to discuss the noise environment and advised the complainant of the MPEA's observations.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
78.	27th March 2014	10:47pm	Ulan Road	Noise	Yes		Yes	The MPEA observed low pitched mine hum from MCO/Non-MCO direction, with a breeze and dog barking also audible. The MPEA observed wind and regular road traffic as the dominant noises at the complaint location. Low pitched mine hum fluctuated between faintly audible and audible when road traffic was not present. Wind gusts, horse noises and insects were also audible. The CRC called the complainant to discuss the noise environment and advised the complainant of the MPEA's observations.
79.	1st April 2014	01:05am and 03:24am	Ridge Road	Noise	Yes		Yes	The MPEA attended the complaint and observed constant mine hum coming from non MCO- north direction & crickets as the dominant noises. Crashing noises, engine whine, loud banging and clanking and dozer tracks were heard throughout the observation, coming from both a north and east direction of the location. OCE was notified of observations made by MPEA. The MPEA attended the complaint location again at 03:24am and observed very loud, audible mine noise coming from both non MCO – north direction and MCO direction (OC2). Constant loud rumbling sound & dozer tracks from the north and isolated banging and crashing, engine revving, dozer tracks, reversing alarms of LV and rumble from MCO OC2. MPEA phoned the OCE and

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								notified of noise environment at location and MCO OC2 operations were shut down immediately. The CRC called the complainant and left a message on their answering machine.
80.	2nd April 2014	02:18am and 03:12am	Ulan Road	Noise	Yes	SSE	Yes	MPEA attended complaint location and observed faintly audible mine rumble in MCO direction, no distinct machinery was observed. MPEA spoke with OCE and discussed observations. OCE changed dump location.
81.	2nd April 2014	08:26am	Moolarben Road	Noise	Yes		Yes	MPEA attended complaint location and observed indistinct mine hum ranging from audible to faintly audible from the north. The CRC called the complainant to discuss the noise environment and the MPEA's observations.
82.	3rd April 2014	12:30pm	Ulan Road	Driving	N/A	N/A	N/A	The complainant visited the Main Administration offices to discuss a dangerous driving incident they witnessed on the roads earlier that day. No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
83.	4th April 2014	09:29am	Ulan Road	Noise	Yes	NE	Yes	The MPEA attended the complaint location. General mine noise audible from North of location - digger engine whine distinct. Machinery noise and banging was heard from nearby properties. Frequent road traffic dominant sound. Mine noise became inaudible when road traffic present. Notified OCE of observations. No changes were made to the operation. Noise was monitored throughout the remainder of the shift. The CRC called the complainant to discuss the noise environment and advised the complainant of the MPEA's observations.
84.	4th April 2014	12:07pm	Winchester Crescent	Blasting	N/A	N/A	N/A	No exceedance of blast criteria limits CRC called the complainant to discuss the blast.
85.	7th April 2014	12:44am	Wonga Roo Rd - Bungaba	Noise Complaint - Non MCO related	No		Yes	The MPEA observed the noise environment between MCO and the complaint location. No mine noise from MCO was audible. Non-MCO CHPP operational noise was audible. The CRC called the complainant to discuss the complaint. The complainant advised the CRC that the noise was not MCO related. They couldn't find the number for the mine site that they wanted to call.
86.	7th April 2014	11:39pm	Ulan Road	Noise	Yes	E	No	No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
87.	8th April 2014	01:44am	Ridge Road	Noise	Yes	E	Yes	MPEA attended complaint location. General mine noise was audible from MCO and non-MCO mining sources, North of location. MCO dozer was heard on occasion. Notified OCE. The CRC called the complainant to discuss the noise environment and advised the complainant of the MPEA's observations.
88.	8th April 2014	7:06am	Ulan Road	Noise	Yes	NE	Yes	From 7am - 7:30am there were no open cut operations due to Monthly Toolbox Talk. The MPEA attended the complaint location and observed an audible mine hum coming from MCO & non MCO direction. Dozer tracks were briefly present and faintly audible from MCO direction. Heavy traffic on Ulan Road was the dominant noise (mine hum inaudible when present), dogs barking, sheep, cockatoos, birds & wind constantly audible. The CRC called the complainant to discuss the noise environment and the MPEA's observations.
89.	8th April 2014	07:57am	Ulan Road	Noise	Yes	ENE	Yes	The MPEA attended the complaint location. Audible mine hum from MCO direction was present but not very loud. Heavy traffic on Ulan Rd (dominant noise, mine hum inaudible when present), cockatoos, wind, plane & gate swinging was audible. Towards the east of the location on a nearby property, machinery noise was audible & brief banging noises were heard.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								MPEA observed mine noise at Lagoons Road monitor location at 08:45am and audible mine rumble was present, brief banging noises, dozer tracks and haul truck engine noise. OCE notified. The CRC called the complainant to discuss the noise environment and advised the complainant of the MPEA's observations.
90.	9th April 2014	10:07pm, 2.12am, 3.39am, 4.31am, 8.06am, and 10.17am	Ulan Road	Noise	Yes on all occasions	NNE - SSW	Yes	The MPEA attended the complaint location and observed a very, very faint mine hum from MCO direction with faint dozer tracks briefly heard. Regular traffic was the dominant noise and mine noise inaudible when this was present. Crickets also audible. No action taken The MPEA attended the complaint location at 2:20am and observed a faint, general mine hum from MCO direction. Dozer tracks were briefly audible. Crickets and frogs were audible. MPEA notified the OCE of observations. The loader circuit was shut down and a 4th truck was placed on EX103 circuit to allow trucks to go into slow mode to reduce noise. Sentinex was monitored to observe reductions in noise. OCE shutdown EX103 circuit in OC2 at approximately 4:30am. No further action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
91.	10th April 2014	01:26am	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed audible mine hum from MCO direction. Occasional dozer tracks, digger engine whine and banging noises heard but not very loud. MPEA notified observations to OCE and loader circuit shutdown in OC2, 4th truck put into 103 circuit to allow slow mode for trucks in OC2 to reduce noise. The CRC called the complainant and left a message for the complainant to call back.
92.	10th April 2014	08:11am	Ulan Road	Noise	Yes	NNE	Yes	The MPEA attended the complaint location and noted that machinery noise was audible. Roadworks were operating at Ulan and Lagoons rd. The OCE was notified of the MPEA's observations and the OC2 circuit was pulled up for 30mins, machinery could still be heard. The CRC call the complainant to discuss the noise environment.
93.	10th April 2014	6:46pm	Ulan Road	Noise	Yes	NNE	Yes	The MPEA attended the complaint location and observed faint mine hum audible from MCO direction. No distinct machinery heard. Regular traffic dominant. No action required The CRC called the complainant to discuss the noise environment and advised the complainant of the MPEA"s observations.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
94.	10th April 2014	6:52pm	Moolarben Road	Noise	Yes	NE	Yes	The MPEA attended the complaint location and observed a constant faint mine hum present from MCO OC2 direction. Dozer tracks, digger whine and a brief first load thud could be faintly heard. Crickets were dominant noise and constantly audible. 3 planes flying over and birds also audible. Notified OCE of observations. The CRC called the complainant to discuss the noise environment and advised of the MPEA's observations.
95.	13th April 2014	01:41am	Ridge Road	Noise	Yes	SE-SW	Yes	The MPEA attended the complaint location and observed audible mine hum from MCO direction. Occasional dozer track and first loading of trucks was heard. Birds and dogs were also audible. The CRC called the complainant to discuss the noise environment and the MPEA's observations.
96.	15th April 2014	12:05am	Ridge Road	Noise	Yes	ENE	Yes	The MPEA attended the complaint and observed breeze in trees and general mine noise with occasional first load bang and excavator engine noise audible. Intermittent dozer track was also audible. Crickets were faintly audible. The dump dozer in OC/2 was shutdown in response to the complaint. Trucks were swapped out for duratrays and excavator operation was modified to exclude blocky material to reduce noise of loading activities. Noise reduced after changes with first loads and dozer track less frequent and less noticeable.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								The CRC called the complainant to discuss the noise environment and advised the complainant of the MPEA's observations and the changes that were made to the operation.
97.	15th April 2014	03:05am	Ulan Road	Noise	Yes	SE	Yes	The MPEA observed indistinct, faint mine hum from OC2. Birds were audible and TV noise from local resident was faintly audible. No action required
98.	17th April 2014	01:41am	Ridge Road	Noise	Yes	S	Yes	The MPEA attended the complaint and observed general mine noise from MCO direction. Occasional dozer track, first load bang and digger engine could be clearly heard. Crickets faintly audible. MPEA notified OCE of findings. Dozer in OC2 was shutdown in response to the complaint. The CRC called the complainant and left a message for the complainant to call back.
99.	18th April 2014	03:52am	Ulan Road	Noise	Yes	SSW	No	No action required
100.	20th April 2014	01:46 am	Ulan Road	Noise	Yes	SSE	Yes	The MPEA was in the general area prior to the complaint and observed a faint mine hum and isolated road traffic. No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
101.	20th April 2014	02:37am	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed general mine noise. Dozer tracks were clearly audible and dominant. Digger engine whine audible. Dogs barking. Birds and crickets audible. Monitoring was stopped due to a vehicle pulling up behind the MPEA CRC called the complainant to discuss the noise environment and the MPEA's observations.
102.	20th April 2014	08:33am	Ulan Road	Noise	Yes	NNE	Yes	The MPEA observed mine rumble ranging from faintly audible to audible from predominantly non MCO north direction & MCO direction, no distinct machinery was identified. Isolated traffic & birds were also audible. No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
103.	20th April 2014	09:25am	Ulan Road	Dust	N/A	NNE	Yes	No exceedance of criteria limits. The MPEA attended Lagoons Rd before going to the complaint location. There was no visible dust coming from any MCO operations in OC2 & the faint haze that was visible earlier in the morning was no longer visible. Foggy morning, dew still observed on the grass. The MPEA then attended the complaint location and observed a faint, general haze sitting over the distant mountains. No mine related dust was observed coming from any MCO operations. No dust was noticed in or around the complainant's area or surrounding properties. The OCE was notified of the observations CRC called the complainant to discuss the environment and the MPEA's observations.
104.	21st April 2014	04:17am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed a constant general mine noise audible from MCO direction. Dozer tracks were dominant when road traffic was not present. Occasional road traffic audible and dominant when present. Dogs barking, crickets, bird and horse audible. No action required The CRC called the complainant to discuss the noise environment and advised the complainant of the MPEA's observations.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
105.	21st April 2014	9:40pm	Ridge Road	Noise	Yes	SSW	Yes	The MPEA observed a faint mine hum from MCO & non MCO-north direction, no distinct machinery heard. Dog barking was the dominant noise. The MPEA attended Winchester Cr after the complaint was made and observed a very, very faint mine hum from non MCO-north direction & faint dozer tracks were briefly heard (non MCO). Isolated traffic was dominant noise, mine hum inaudible when present, crickets & dog barking also audible. No action required
106.	22nd April 2014	08:26am	Ulan Road	Noise	Yes	ENE	Yes	The MPEA attended the complaint location and observed numerous birds squawking, occasional to regular road traffic (dominant when present) and general mine hum from OC2. The ECRC contacted the complainant to discuss the noise environment and advised the complainant of the MPEA's observations.
107.	22nd April 2014	09:00am	Ulan Road	Noise	Yes	NNE	Yes	The MPEA observed numerous birds squawking, occasional to regular road traffic (dominant when present) and general mine hum from OC2. No action required
108.	23rd April 2014	07:58am	Ulan Road	Noise	Yes	ESE	Yes	MPEA attended complaint location. Frequent road traffic and birds were found to be the dominant noises. Machinery noise from a property East of location, was heard on occasion. Noise could be heard from North but MPEA could not ascertain whether source of noise was

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								mine related or from oncoming traffic. OCE notified of observations. The ECRC contacted the complaint to discuss the complaint.
109.	24th April 2014	12:21am	Ulan Road	Noise	Yes	SSW	No	No action required
110.	24th April 2014	03:36am	Ridge Road	Noise	Yes	SSW	Yes	MPEA observed consistent low mine hum. Traffic and animal noises were observed to be louder than any mine noise being produced. The ECRC contacted the complainant to discuss the complaint. The ECRC informed the complainant of the MPEA's observations.
111.	24th April 2014	09:18am	Moolarben Road	Noise	Yes	NE	Yes	MPEA attended complaint location. Mine hum, horn and dozer were faintly audible from MCO direction. Digger engine whine was distinctly heard on occasion. Road traffic, birds and planes were the dominant noises. Notified OCE. No further action required The ECRC contacted the complainant to discuss the complaint. The ECRC informed the complainant of the observations and operations at the time of the complaint.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
112.	25th April 2014	02:25am	Ridge Road	Noise	Yes	SW	Yes	The MPEA attended the complaint location and observed general mining hum with regular dozer track audible. Crickets and breeze in trees audible. Intermittent rumbling of thunder and isolated road traffic audible. OCE notified of observations and dozer on topsoil in OC2 put in first gear. Dozer track no longer audible. The ECRC contacted the complainant to discuss the complaint. The ECRC explained the actions taken at the time of the complaint and the observations of the MPEA
113.	25th April 2014	07:38pm, 11:37pm, and 05:25am	Ulan Road	Noise	Yes	NE - NW	No	No action required
114.	28th April 2014	7:43pm	Ulan Road	Noise & Lighting (non-MCO)	N/A	N/A	Yes	The MPEA attended the complaint location and observed large non MCO mining equipment on the property across the road from the complainant's location. Machinery was audible and moving across the property. Non MCO lighting plants were in operation on the property and shining directly towards the complainant's home. The CRC called the complainant to discuss the complaint. The CRC advised the complainant that the property, machinery and other equipment was not owned by or related to MCO.
115.	29th April 2014	3:03am	Ulan Road	Noise	Yes	SSW	No	No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
116.	1st May 2014	02:42am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA was in the General area at the time of the complaint and observed general mine noise audible from the north with no distinct equipment, isolated road traffic was the dominant sound. No action required
117.	1st May 2014	8:17pm	Ulan Road	Noise	Yes	SW	Yes	The MPEA attended the complaint location and observed general mine hum with regular dozer track from north direction. Digger whine heard on occasion. Regular road traffic on Ulan Road was the dominant sound when present. MPEA notified OCE of observations. OCE instructed dozer operators to use first gear. MPEA continued to monitor noise levels via Sentinex throughout the evening. The CRC called the complainant to discuss the complaint. The CRC advised the complainant of the MPEA's observations.
118.	2nd May 2014	7:01am	Ulan Road	Noise	Yes	NNW	Yes	No equipment operating at time of complaint due to pre-shift meeting. At time of investigation operations had commenced. MPEA observed heavy traffic, bird and dogs barking. As operations commenced a low rumble could be heard from both MCO and non MCO sources. MPEA communicated observations to OCE. The CRC called the complainant to discuss the complaint.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
119.	7th May 2014	02:15am	Ulan Road	Noise	Yes	SSW	No	No action required
120.	9th May 2014	09:45am	Ulan Road	Noise	Yes	ENE	Yes	The MPEA attended the complaint location and observed occasional road traffic as the dominant noise. Windy conditions with regular gusts were dominant when road traffic absent. Birds were audible. No mine noise was heard. The CRC called the complaint and left a message.
121.	10th May 2014	04:17am, and 9:10am	Ulan Road	Noise	Yes on both occasions	SSW-E	Yes on both occasions	The MPEA was at the complaint location and observed a faint mine hum from MCO direction, dozer tracks heard occasionally and an isolated banging noise heard once. Isolated traffic was the dominant noise and mine noise inaudible when present. Birds were also audible. No action required
122.	11th May 2014	03:49am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA observed a faint mine hum from both MCO & non MCO-north direction and dozer tracks were heard from MCO occasionally. Isolated traffic, when present, was the dominant noise and mine noise was inaudible at this time. No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
123.	11th May 2014	09:51pm	Ridge Road	Noise	Yes	SW	Yes	The MPEA attended the complaint location and observed constant dozer tracks as the dominant noise, a faint mine hum and an occasional whine noise from MCO direction. Crickets were constantly audible and kangaroo, bird, isolated traffic on Ulan Rd. Dozer tracks became inaudible. MPEA notified OCE and monitored other locations and then proceeded back to complaint location where a faint mine hum from MCO & crickets audible, dozer tracks heard briefly. CRC called the complainant to discuss the complaint. The CRC advised the complainant of the MPEA's observations.
124.	12th May 2014	02:08am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA observed a faint mine hum and brief dozer tracks from MCO direction. Crickets and dog barking was also audible in the area. No action required
125.	16th May 2014	03:42am	Ulan Road	Noise	Yes	SSW	No	No action required
126.	17th May 2014	08:54am	Ulan Road	Noise	Yes	NNE	Yes	The MPEA attended the complaint location and observed a faint mine hum present in the area coming from MCO and non MCO-North direction. No distinct machinery noises were heard from MCO, isolated engine whine heard from North direction. Constant traffic dominant noise (mine noise inaudible when present), cockatoos screeching constantly, birds,

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								plane & dog barking briefly also audible. OCE notified MPEA continued to monitor. CRC called the complainant to discuss the complaint. The CRC advised the complainant of the MPEA's observations.
127.	18th May 2014	01:43am , and 04:11am	Ridge Road	Noise	Yes on both occasions	SSW	Yes	The MPEA attended the complaint location around the time of the complaint and observed general mine noise from MCO. Dozer tracks regular, audible and the dominant sound. Digger engine whine audible. Isolated banging noise. Crickets audible. Isolated road traffic audible. Notified OCE of complaints and observations. The MPEA attended the complaint location at 4:20am and observed general mine noise from MCO/non MCO direction. Dozer tracks and digger engine hum audible. Isolated road traffic audible and dominant when present. Birds and rooster audible. Advised OCE of observations. Shut down 1 dozer and digger continued to monitor. The CRC called the complainant and advised the complainant of the MPEA's observations and the changes made to the operation.
128.	18th May 2014	04:18am	Ulan Road	Noise	Yes	SSW	No	No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
129.	19th May 2014	08:40am	Ulan Road	Noise & Dust	Yes	N	Yes	No exceedance of criteria limits. The MPEA attended the complaint location and observed occasional to regular road traffic as the dominant noise. In the absence of traffic noise, birds squawking and breeze/wind gusts were the dominant noises. General mine hum was audible from MCO/Ulan direction with no distinct sounds and source unclear. No dust was visible, light haze on horizon. The CRC called the complainant to discuss the complaint.
130.	21st May 2014	10:30am	Ulan Road	Traffic noise	Yes		No	The CRC called the complainant to discuss the traffic noise. No action required
131.	26th May 2014	08:16am	Ulan Road	Noise	Yes		Yes	The MPEA attended the complaint location and observed constant traffic on Ulan Road to be the dominant noise, loud echoing sounds of traffic were present at times well before seeing cars/trucks go past on Ulan Rd. Birds, dog barking briefly & banging noise from nearby residence was also audible. OCE was notified, MPEA continued to monitor noise The ECRC left a message on the complainant's phone.
132.	29th May 2014	9:54pm, 11:50pm, and 3:35am	Ulan Road	Noise	Yes on all occasions	SW-SSE	No	No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
133.	31st May 2014	7:50pm, 11:05pm	Winchester Crescent	Noise	Yes on both occasions	ENE-E	Yes	The MPEA attended the complaint location and observed windy conditions, with wind being the dominant noise. Occasional road traffic, wind chimes at local residence and crickets were also audible. No mine noise was audible. The MPEA attended the complaint location for the second complaint and observed constant wind and frequent road traffic as the dominant noises. Mine hum including occasional dozer track and thump sound audible (when wind died down and road traffic ceased). OCE notified and instructed excavator in OC2 to minimize first load noise through placement of loads. The CRC called the complainant to discuss the complaint. The CRC advised the complainant of the MPEA's observations.
134.	1st June 2014	02:20am	Ulan Road	Noise	Yes	E	Yes	The MPEA observed no mine noise with wind dominant. No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
135.	3rd June 2014	12:02am	Ridge Road	Noise	Yes	SSW	Yes	MPEA attended complaint location. No mine noise could be heard from location. Wind and crickets were consistently audible throughout monitoring period. Notified OCE of observations. The CRC advised the complainant of the MPEA's observations.
136.	4th June 2014	03:58am	Ulan Road	Noise	Yes	SSE	No	No action required
137.	5th June 2014	01:26am	Ulan Road	Noise	Yes	SSW	No	No action required
138.	7th June 2014	04:20am	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed an audible mine hum from both MCO & non MCO- north direction. Dozer tracks from non MCO source were heard regularly. Isolated traffic was dominant noise when present (mine noise inaudible) MPEA parked at parking bay off Ulan Rd and observed audible mine noise and dozer tracks from non MCO source CHPP. MPEA notified OCE and drill in OC2 was shut down at 5am to reduce noise coming from MCO. CRC called the complainant to discuss the complaint. The MPEA's observations were also discussed.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
139.	7th June 2014	8:46am	Ulan Road	Noise	Yes		Yes	The MPEA attended the complaint location and observed constant traffic on Ulan Rd. Vehicle traffic was the dominant noise source. Faint mine hum was audible when traffic was less regular. OCE was notified of observations and MPEA continued to monitor noise throughout shift. The CRC called the complainant to discuss the complaint. The CRC advised the complainant of the MPEA's observations.
140.	8th June 2014	2:49am, and 03:43am	Ulan Road	Noise	Yes on both occasions	SSW	No	Dozer 322 was shut down in OC2 at 03:00am to reduce dozer noise coming from MCO.
141.	8th June 2014	8:33am	Ulan Road	Noise	Yes	SSW	No	The CRC called the complainant to discuss the noise environment at the time of the complaint. No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
142.	11th June 2014	02:25am	Ridge Road	Noise	Yes	SW	Yes	The MPEA attended the complaint location and observed mine noise with excavator whine, dozer track and first load thumps. Excavator whine was particularly noticeable. A breeze was consistently audible in the trees. The OCE was notified and EX102 was shutdown. Excavator whine was no longer audible. The CRC called the complainant and discussed the MPEA's observations.
143.	11th June 2014	03:55am, and 04:13am	Ulan Road	Noise	Yes on both occasions	SW-WSW	Yes	The MPEA observed general, low pitched mine hum and breeze in trees. Isolated road traffic was dominant when present. No action required
144.	12th June 2014	04:05am	Ulan Road	Noise	Yes		No	No action required
145.	13th June 2014	09:44am	Ulan Road	Noise	Yes		No	The CRC called the complainant to discuss the complaint. No action required
146.	13th June 2014	9:56am	Ulan Road	Noise	Yes		No	No action required
147.	13th June 2014	10:15am	Moolarben Road	Noise	Yes		No	The CRC called the complainant to discuss the noise at the time of the complaint. The complainant was advised that the excavator and haul trucks were relocated to the OC1 area shortly after the complaint.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
148.	17th June 2014	10:12pm	Ulan Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed audible mine hum from MCO, digger whine and dozer tracks heard on occasion. Dogs barking regularly throughout monitoring & truck passing and plane flying over were very audible, mine noise inaudible when truck & plane audible. OCE was notified, digger 103 trucks dump changed from OC2 out of pit dump to OC1 dump at 11:10pm to reduce noise coming from OC2 area. Continue to monitor levels on Sentinex to observe any changes in noise levels. The CRC called the complainant to discuss the noise The CRC explained the role of the MPEA and the observations and changes made as a result of the MPEA attending.
149.	17th June 2014	10:58pm	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed audible, constant mine hum from MCO direction, digger whine and dozer tracks heard on occasion. Constant traffic on Ulan Rd audible throughout most of the monitoring, mine noise at times faint when traffic present. OCE was notified, Drill 192 was the shutdown at 11:50pm and Dozer on Excavator 103 floor put into 1st gear and lighting plants on the out of pit dump were turned off. Loader 121 circuit shut down at 11:55pm. Continue to monitor levels on Sentinex to observe any changes in noise levels

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								The CRC called the complainant and advised the complainant of the MPEA's observations.
150.	18th June 2014	02:01am	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed audible MCO mine hum and non MCO -north hum. Dozer tracks from both mine sources were heard on occasion and isolated engine revving & digger whine heard from MCO. Isolated traffic on Ulan Rd dominant noise, mine hum becoming faint when present, dogs barking from south direction & ducks and plane also audible. Notified OCE of observations- Continue to monitor MCO noise. The CRC called the complainant and left a message.
151.	18th June 2014	08:50am	Moolarben Road	Noise	Yes	NNE	Yes	General mine noise could be heard from MCO direction with occasional dozer track faintly audible. Birds and isolated road traffic were the dominant noises. Localized dust was visible around the drill working in OC2. Low blanket of fog towards MCO was also visible. The ECRC spoke with the complainant about the complaint and noise monitoring process undertaken by MCO.
152.	20th June 2014	08:55am	Winchester Crescent	Noise	Yes		Yes	The MPEA attended the complaint location and observed occasional to regular road traffic and birds as the dominant sound. A very noisy environment with birds, a rooster, sheep, a plane and dogs barking from different properties, all audible. Faint mine noise was

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								audible from the North when no other sounds were present. The CRC called the complainant to discuss the noise environment at the time of the complaint.
153.	22nd June 2014	09:38am	Ulan Road	Noise	Yes	NNE-NE	Yes	The MPEA attended the complaint location and observed occasional road traffic and loud squawking birds as the dominant sound. A general, faint mine hum was audible from the East at times, when no other sounds were present or were muted. Isolated dozer tracks were faintly audible. No visible dust noticed. Plane noise overhead clearly audible. The CRC called the complainant and discussed the MPEA's observations.
154.	23rd June 2014	9:00am	Moolarben Road	Noise	Yes		No	The ECRC discussed the noise environment with the complainant and outlined steps taken to assist in managing noise from OC2 in the early hours of the morning.
155.	02-July-2014	09:29am	Ulan Road	Noise	Yes	NE	Yes	The MPEA attended the complaint location and observed a faintly audible to audible at times, mine hum present from MCO direction, no distinct machinery heard. A small plane was flying over on occasion, regular traffic & cockatoos were audible constantly. Mine hum was either faint or inaudible when other noises mentioned were present. OCE was notified. The CRC called the complainant to discuss the noise

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								environment at the time of the complaint. The CRC advised the complainant of the MPES's observations.
156.	03-July-2014	02:09am	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed a faint audible mine hum present from MCO/non MCO direction. No distinct machinery heard. Dogs were barking from multiple properties. The CRC called the complainant to discuss the complaint and advised the complainant of the MPEA's observations.
157.	03-July-2014	03:48am	Ulan Road	Noise	Yes	SSW	No	No action required
158.	02-July-2014	03:26am	Ulan Road	Noise	Yes	SSW	No	No action required
159.	04-July-2014	02:18am	Ulan Road	Noise	Yes	SW	No	No action required
160.	14-July-2014	01:43am	Ulan Road	Noise	Yes	SSW	No	No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
161.	14-July-2014	02:53am	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed constant, general mine hum from MCO. Digger engine whine and dozer tracks heard frequently but not loud. Isolated 1st pass audible. Isolated road traffic on Ulan Rd the dominant sound when present. Dog barking from nearby property. Crickets. Very clear, crisp night. Loader 121 circuit was stopped to assist with noise management The CRC called the complainant to discuss the complaint and the MPEA's observations.
162.	14-July-2014	09:35am	Ulan Road	Noise	Yes	NE	Yes	The MPEA had been in the area since 9am and attended the complaint location. Regular to frequent road traffic was the dominant noise. Breeze/wind in the trees and birds were audible. Indistinct mine hum from OC2 was heard twice during the recording for short periods of time at the complaint location. The CRC called the complainant to discuss the noise environment at the time of the complaint.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
163.	15-July-2014	09:00am	Ulan Road	Noise	Yes	NE	Yes	The MPEA attended to complaint location and observed frequent road traffic as the dominant noise. General mine hum with occasional first load thump and occasional excavator whine was audible when road traffic was absent, and on occasion audible in the background when road traffic was present. Birds were audible throughout. The OCE was notified of the observations and EX103 was asked to lower and place loads in truck trays to reduce/eliminate first load noise. The MPEA revisited the complaint location approximately 1 hour later and observed plane flying over and road traffic as dominant, with no mine noise audible. The CRC called the complainant to discuss the complaint and the MPEA'S observations changes.
164.	15-July-2014	10:38pm	Ulan Road	Noise	Yes	NW	Yes	The MPEA attended the complaint location and observed regular traffic on Ulan Rd as the dominant noise. An audible mine hum from both MCO and non MCO/North was present and 1st load thudding sound was heard twice from MCO. When traffic was present, mine noise was faintly audible and inaudible at times. Notified OCE. MPEA continued to monitor Sentinex Levels. The CRC called the complainant to discuss the noise at the time of the complaint. The CRC advised the complainant of the MPEA'S observation.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
165.	19-July-2014	11:05pm and 4:01am	Ulan Road	Noise	Yes	SSW	No	No action required
166.	20-July-2014	04:00am	Ridge Road	Noise	Yes	SSW	Yes	General mine noise could be heard from MCO and non MCO mining sources, north of location. Mine noise became increasingly louder. Occasional dozer track, digger whine and first loads could be heard from MCO direction. Rooster crowing and dog barking were frequently heard and were dominant sounds when audible. Notified OCE. OCE pulled up excavator 103 and Loader 121 circuits in OC2 at 04:40am. MPEA returned to complaint location at 05:00am - General mine noise could be heard from non MCO source, north of location. Consistent road traffic became dominant sound. The CRC called leaving a message for the complainant to call back.
167.	24-July-2014	08:45am	Ulan Road	Noise	Yes		Yes	The MPEA attended the complaint location and observed regular to frequent road traffic as the dominant noise. Bird noise was constant. General mine hum was audible at times when there were breaks in traffic from MCO/Ulan direction. Non- MCO machinery noise was also audible from NW of location. The CRC called the complainant and discussed the MPEA's observations.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
168.	24-July-2014	10:30am	Moolarben Rd	Noise	Yes	NNE	Yes	MPEA attended complaint location. General mine noise could be heard from MCO direction. First load was heard. Sheep, wind, birds, and road traffic were all audible over mine noise. Stopped monitoring due to heavy rainfall. The CRC called the complainant and the MPEA's observations were discussed with the complainant.
169.	24-July-2014	12:00 PM	Winchester Cres	Blasting	N/A	N/A	N/A	No exceedance of blast criteria limits The CRC contacted the complainant to discuss the complaint.
170.	26-July-2014	02:06am	Winchester Cres	Noise	Yes	NE	Yes	The MPEA attended the complaint location and observed isolated road traffic as the dominant noise when present. Light rain was audible, having commenced shortly before the complaint was made. Indistinct mine hum was faintly audible. Rain got progressively heavier and mine hum was no longer audible. The CRC called the complainant to discuss the MPEA's observations.
171.	30-July-2014	02:35am	Ridge Road	Noise	Yes	WSW	Yes	MPEA attended complaint location and observed Faint mine hum audible from northeast direction-MCO and non-MCO. No distinct equipment heard. Isolated road traffic passing on Ridge Rd was the dominant sound. Birds and crickets were also audible. The CRC called the complainant to discuss the MPEA's observations.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
172.	02-August-2014	08:01pm	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed general mine noise from MCO OC2 direction, constant hum present, occasional 1st load thud and faint dozer tracks heard once while monitoring. A plane flying over and regular traffic on Ulan Rd were dominant noise when present (mine noise inaudible at these times) and dogs barking audible throughout. OCE notified - 103 operator instructed to lower bucket height when releasing loads & dozers in OC1 & OC2 into 1st gear. Continue to monitor. The CRC called the complainant and discussed the MPEA's observations as well as the changes that were made to the operation.
173.	03-August-2014	12:41am	Ridge Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location and observed general mine noise from MCO, digger whine, dozer tracks and 1st load thuds could be heard occasionally. A constant mine hum was present. Crickets and dog barking close by audible. OCE notified- continue to monitor. OCE turned off any unused lighting plants to reduce noise. CRC called the complainant to discuss the MPEA's observations and the changes made to the operation.
174.	03-August-2014	03:18am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA was in the general area around the time of complaint and observed a faint mine hum from MCO direction & brief faint 1st load thudding sound. Isolated

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								traffic was dominant noise when present (mine noise becoming inaudible). No other noises audible. No action required
175.	03-August-2014	09:12am	Winchester Cres	Noise	Yes	NNE	Yes	The MPEA attended the complaint location and observed occasional to frequent road traffic as the dominant noise. Frequent dog barking and birds were audible. Constant wind, picking up towards the end of the reading became dominant. Mine hum was faint and indistinct except for isolated thumps from OC2. Mine hum was only audible occasionally, at times when road traffic was absent and wind had died down. The CRC advised the complainant of the observations made by the MPEA's.
176.	03-August-2014	10:22pm	Winchester Cres	Noise	Yes	S	Yes	The MPEA attended the complaint location and observed audible mine noise present from MCO direction, banging and revving. Strong winds present, plane flying over dominant when present, dog barking. OCE notified, continue to monitor, 112 circuit reminded to be mindful of noise- less truck revving, careful placement of loads & shutting shovel clam. The MPEA attended the general area again at 12:11pm and observed a faint hum present from the MCO & non MCO/north mine area, source unclear. Wind also audible at this time.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								The CRC spoke to the complainant and advised the complainant of the observations made by the MPEA.
177.	03-August-2014	10:23pm	Ulan Rd	Noise	Yes	S	Yes	The MPEA attended the complaint location and observed audible mine hum present from MCO, banging heard occasionally. Winds present, dogs barking and traffic audible. OCE notified- monitor other locations where wind is not as strong and report observations to OCE. The CRC called the complainant and left a message.
178.	03-August-2014	11:21pm	Ridge Road	Noise	Yes	WSW	Yes	The MPEA attended the complaint location and observed audible mine hum from MCO direction, occasional banging heard. Wind was present, crickets & isolated traffic audible also. Notified OCE- Shovel 112 shutdown at 12am for 1 hour to determine noise impact on locations. The MPEA attended the complaint location again at 12:20pm and observed a faint mine hum from MCO direction, no distinct machinery, light wind and crickets audible. The CRC advised the complainant of the MPEA's observations and the changes made to the operation.
179.	03-August-2014	11:32pm	Winchester Cres	Noise	Yes	WSW	Yes	The MPEA attended the complaint location and observed inaudible mine noise, strong wind & gusts present, wind in trees very audible. Notified OCE- Shovel 112 circuit shut down at 12am for 1 hour to determine noise impact on locations. Continue to monitor location. The MPEA was in the general area of the complaint

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								location at 12:45am and observed a very faint mine hum from MCO & non MCO/north mine area, source unclear. Wind was also audible at this time. The CRC advised the complainant of the MPEA's observations and the changes made by the OCE.
180.	04-August-2014	03:10am	Ridge Road	Noise	Yes	N	Yes	The MPEA attended the complaint location and observed audible mine noise from MCO and non MCO/north direction, constant hum present from both sources, banging sounds from both sources and dozer tracks heard on occasion from non MCO/north direction. Isolated traffic dominant when present, tapping sound from neighboring property heard. OCE notified of observations, Shovel 112 circuit shut down at 03:30am in OC2. The CRC advised the complainant of the MPEA's observations.
181.	04-August-2014	08:54am	Old Bobadeen	Noise	Yes	NNE	Yes	The MPEA attended the complaint location and observed general mine noise from MCO direction. First loads, shovel clam and engine whine were distinctly audible. Frequent road traffic was the dominant sound, with mine noise becoming faintly audible to inaudible when road traffic present. Birds, light breeze, train and plane were also audible. Notified OCE. OCE instructed shovel operator to lower placement of loads and to be mindful when closing clamshell bucket. Continue to monitor. The MPEA was monitoring in the area at 11am

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								and mine noise was no longer heard. The CRC called the complainant to discuss the noise levels at the time of the complaint. The CRC advised the complainant of the MPEA's observations.
182.	09-August-2014	04:22am	Ulan Road	Noise	Yes	SSW	No	No action required
183.	09-August-2014	09:51am	Ulan Road	Noise	Yes	ENE	Yes	The MPEA was in the area at 08:35am and observed a very faint mine hum from MCO, no distinct machinery heard. Regular traffic was the dominant noise, with mine noise inaudible when traffic present. Heavy fog was also present in the area. No action required
184.	11-August-2014	10:11pm	Winchester Cres	Noise	Yes		Yes	The MPEA attended the complaint location and observed an audible mine hum from MCO direction & thudding sounds heard on occasion. Plane flying over was dominant when present (mine noise inaudible), sheep, cow & traffic also audible. Wind briefly present. OCE notified- continue to monitor. The CRC called the complainant and advised the complainant the MPEA's observations.
185.	12-August-2014	03:20am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA attended the complaint location at and observed a faint mine hum from MCO direction, no distinct machinery was identified. Birds were also audible. No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
186.	13-August-2014	9:40pm, 12:05am, 1:20am, and 4:00am	Ulan Road	Noise	Yes on all occasions	NNE	Yes	The MPEA attended the complaint location shortly after the complaint was made and observed occasional road traffic as the dominant noise when present. General mine hum was faintly audible with occasional thump sound also faintly audible. no action required
187.	14-August-2014	08:01am	Ulan Road	Noise	Yes	NNE	Yes	MPEA attended complaint location and observed road traffic to be the dominant sound when present. Frequent squawking birds and barking dogs could also be heard. Mine noise could be heard for most of the monitoring period but became less noticeable when road traffic was present. First loads and engine noise were also heard on occasion. OCE notified of observations. The CRC called the complainant and left a message for the complainant to call back.
188.	16-August-2014	03:50am	Ulan Road	Noise	Yes	NW-NE	No	No action required
189.	23-August-2014	08:25am	Ulan Road	Noise	Yes	ENE	Yes	MPEA attended complaint location and observed road traffic to be the dominant sound when present. Frequent squawking birds, barking dogs, cows and wind could also be heard. Mine noise could be faintly heard but became inaudible when road traffic was present. Faint first loads and dozer track were also heard on occasion. Observations were communicated to OCE, excavator 103 instructed to lower placement of loads.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								The CRC advised the complainant of the MPEA's observations and the OCE's changes.
190.	24-August-2014	8:38pm	Ulan Road	Noise	Yes	SSW	No	No action required
191.	24-August-2014	11:12pm	Ulan Road	Noise	Yes	SSW	No	No action required
192.	25-August-2014	08:53pm	Ulan Road	Noise	Yes	SSW	Yes	MPEA attended complaint location and observed frequent road traffic to be the dominant sound when present. Mine noise was only briefly heard when road traffic was absent at start of monitoring period. Plane and barking dogs were also heard above mine noise. Crickets also audible. No banging or bulldozer noise was heard throughout monitoring period. Notified OCE of observations. The CRC called the complainant and advised the complainant of the MPEA's observations.
193.	26-August-2014	12:46am	Ulan Road	Noise	Yes	SSW	No	No action required
194.	26-August-2014	03:19am	Ulan Road	Noise	Yes	SSW	No	No action required
195.	27-August-2014	02:05am	Ulan Road	Noise	Yes	SSE	No	No action required
196.	28-August-2014	01:43am	Ulan Road	Noise	Yes	S-SW	No	No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
197.	29-August-2014	12:27am	Ridge Road	Noise	Yes	S-SSW	Yes	MPEA observed faint mine operations and minor dozer track from location. OCE was notified of observations and OC2 circuit was shut down 15 minutes later for crib. MPEA continued to monitor throughout shift. The CRC called the complainant and left a message to return the call.
198.	29-August-2014	12:59am and 04:07am	Ulan Road	Noise	Yes on both occasions	S-SSW	No	No action required
199.	30-August-2014	04:19am	Ulan Road	Noise	Yes	S-SSW	Yes	The MPEA was in the general area before the complaint and observed a faint mine hum from non MCO/easterly direction, no distinct machinery was heard. Isolated traffic was dominant when present (mine noise inaudible), dogs howling and birds also audible. No action required
200.	06-September-2014	03:02am	Ulan Road	Noise	Yes	SW	No	No action required
201.	06-September-2014	10:44pm	Ridge Road	Noise	Yes	ESE	No	The CRC called the complainant and left messages for the complainant to call back.
202.	06-September-2014	11:10pm and 12:17am	Winchester Cres	Noise	Yes on both occasions	ESE	No	The CRC called the complainant and discussed the environment. The CRC advised the complainant of where the equipment was operating at the time of the complaint.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
203.	07-September-2014	12:59am and 03:52am	Ulan Road	Noise	Yes on both occasions	NW-SW	No	No action required
204.	07-September-2014	08:20am	Winchester Cres	Noise	Yes	E	Yes	The MPEA attended the complaint location and observed an audible mine hum from MCO direction, dozer tracks heard on occasion, digger whine & 1st load heard once. Wind was dominant noise and mine noise inaudible or very faint due to strong winds. Regular traffic, birds & dogs barking were also audible. Notified OCE of observations, continue to monitor. The CRC called the complainant and advised them of the equipment operating at that time and the MPEA's observations.
205.	07-September-2014	10:05pm	Winchester Cres	Noise	Yes	E	No	The CRC called the complainant and discussed the complaint. The CRC advised the complainant of where the equipment was operating at the time of the complaint.
206.	07-September-2014	10:22pm	Ulan Rd	Noise	Yes	E	No	The CRC called the complainant to discuss the complaint. The CRC advised the complainant of the operations details at that time.
207.	07-September-2014	11:44pm	Ulan Road	Noise	Yes	ESE	No	The CRC called the complainant to discuss the complaint. The CRC advised the complainant of where the mine was operating and the equipment in use at the time of the complaint.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
208.	07-September-2014	11:29pm	Ridge Road	Noise	Yes	ESE	No	The CRC called the complainant and discussed the location of the mine equipment at the time of the complaint.
209.	08-September-2014	02:52am	Ulan Road	Noise	Yes	SW	No	The CRC called the complainant and advised the complainant of the operation details at that time.
210.	08-September-2014	03:26am	Ulan Road	Noise	Yes	SW	No	No action required
211.	08-September-2014	09:25am	Ridge Road	Noise	Too Large of a time frame to analyze the noise data	Too Large of a time frame to analyze the noise data	Yes	The MPEA was in the area directly prior to the complaint, and no mine noise was observed. Wind and road traffic were audible. The CRC called the complainant.
212.	09-September-2014	8:17am	Moolarben Rd	Noise	Yes	NNW	No	The CRC called the complainant and discussed the equipment in operation at the time.
213.	08-September-2014	10:40pm	Ulan Road	Noise	Yes	E	Yes	The MPEA attended the complaint location and observed Ulan road traffic noise dominant. Mine noise audible. The CRC called the complainant and discussed the MPEA's observations and equipment location.
214.	08-September-2014	9:50pm	Winchester Cres	Noise	Yes	ENE	Yes	The MPEA attended the complaint location and observed birds, sheep and dogs as the dominant noises. Mining noise was audible including occasional dozer and occasional first buckets. Ulan Rd traffic was also audible.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								The CRC called the complainant and discussed the MPEA's observations.
215.	08-September-2014	10:50pm	Ridge Road	Noise	Yes	E	Yes	The MPEA attended the complaint location and observed Ulan Rd and Ridge Rd traffic, crickets and wind audible. A slight mine noise was audible. The CRC called the complainant and discussed the location of the mine equipment at the time of the complaint.
216.	09-September-2014	12:05am, 3:00am, 3:30am, 4:00am, and 4:30am	Ulan Road	Noise	Yes on all occasions	SW	No	No action required
217.	09-September-2014	07:30am	Ulan Rd	Noise	Too large of a time frame to analyze the noise data	Too large of a time frame to analyze the noise data	No	The CRC attempted to contact the complainant and left a message.
218.	09-September-2014	08:45am	Ulan Road	Noise	Too large of a time frame to analyze the noise data	Too large of a time frame to analyze the noise data	No	The CRC called the complainant to discuss the complaint. The CRC discuss the MPEA's observations and equipment location.
219.	11-September-2014	08:26pm and 10:14pm	Ulan Road	Noise	Yes on both occasions	SSW	No	No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
220.	14-September-2014	07:34am	Ridge Road	Noise	Yes		No	MPEA monitored noise conditions throughout the shift and notified OCE of findings. The CRC called the complainant and advised the complainant that MCO had no spontaneous combustion.
221.	16-September-2014	2:43am	Ulan Road	Noise	Yes	N-NNE	No	No action required
222.	22-September-2014	10:28pm	Ulan Road	Noise	Yes	E	Yes	MPEA was in the general area following the complaint and observed frequent road traffic and crickets to be the only sound audible. No mine noise was audible. No action required
223.	23-September-2014	12:30am	Ridge Road	Noise	Yes	SW	Yes	MPEA attended complaint location. General mine hum was observed from north-east of location. Faint dozer track was heard on occasion. First load and digger engine whine was also heard. Short period of road traffic travelling along Ulan Road was the dominant sound when heard. Crickets and barking dog were also audible. Notified OCE excavator 103 circuit was pulled up. The CRC called the complainant to discuss the complaint. The CRC advised the complainant of the MPEA's observations.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
224.	23-September-2014	04:00am	Ridge Road	Noise	Yes	SSW	Yes	MPEA attended complaint location and observed general mine noise from north-east. Occasional digger engine whine and dozer track could be heard. Rooster frequently crowing and road traffic were the dominant sounds when heard. Notified OCE, the dozers operating in OC2 were then shutdown. The CRC called the complainant to discuss the complaint.
225.	24-September-2014	12:57am and 4:03am	Ulan Road	Noise	Yes	SSW	No	No action required
226.	24-September-2014	1:31am	Ulan Road	Noise	Yes	SSW	Yes	MPEA attended complaint location. General mine noise could be heard from the North. First load, reverse beacon and dozer were all heard briefly on one occasion each. Birds calling and dogs barking were dominant sounds when heard. Frogs and crickets were also audible. Notified OCE, OCE directed EX103 operator to place loads.
227.	24-September-2014	12:00pm	Moolarben Rd	Noise	Yes	SSW	No	The CRC called the complainant to further discuss the complaint.
228.	24-September-2014	11:03pm	Ulan Road	Noise	Yes	ENE-N	No	No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
229.	28-September-2014	07:30am	Ulan Road	Noise	Yes	N-NNE	Yes	The MPEA was in the area at the time of the complaint and observed indistinct mine hum that was faintly audible with bird noise and occasional-regular road traffic as the dominant noises. No action required
230.	30-September-2014	03:50am	Ulan Road	Noise	Yes	SSW	Yes	The MPEA was in the area prior to the complaint and observed occasional road traffic as the dominant noise, with birds faintly audible. No mine noise was heard. No action required
231.	27-September-2014	3:45am	Ridge Road	Noise	Yes	NNE	Yes	The MPEA observed low mine hum. Actions had been taken throughout the shift and prior to the complaint to reduce noise from OC2. The CRC discussed the MPEA's observations and the changes made by the OCE.
232.	01-October-2014	8:26am	Saddlers Creek Road	Other	N/A	N/A	N/A	The CRC met with the complainant at the complainants address to discuss the complaint. No further action required.
233.	02-October-2014	03:34am	Ulan Road	Noise	Yes	NE	No	No action required
234.	12-October-2014	09:14am	Moolarben Road	Noise	Yes	NE	Yes	The MPEA observed a faintly audible general mine noise form the MCO/Non MCO direction with no distinct sounds. The OCE was advised of the observations and relocated loader 121 out of OC2 and into OC1. The CRC attempted to contact the complainant on multiple occasions.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
235.	13-October-2014	03:04am	Ulan Road	Noise	Yes	SSW	Yes	MPEA had been monitoring in the area at the time of the complaint and had observed general mine noise from the north. Barking dogs were the dominant sound with crickets also audible. No action required
236.	18-October-2014	10:40pm	Ridge Road	Noise	Yes	E	Yes	The MPEA attended the complaint location and observed wind as the dominant noise. Road traffic was audible. General mine noise was faintly audible - audible, with occasional dozer track and first load noise noticed. Mine noise was not audible when road traffic was present. Frogs also audible. The CRC called the complainant to discuss the MPEA's observations and the changes that were made to the operation.
237.	19-October-2014	07:46am	Ulan Road	Noise	Yes	NNE	Yes	MPEA attended complaint location and observed general mine noise, regular dozer track and first loads clearly audible from MCO direction. Birds were frequently heard. Occasional road traffic on Ulan Rd and plane were also audible. MPEA notified OCE of observations. OCE pulled up EX103 circuit operating in OC2. The CRC called the complainant to discuss the MPEA's observations and the changes that were made to the operation.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
238.	19-October-2014	08:22am	Winchester Crescent	Noise	Yes	NE	Yes	MPEA attended complaint location and observed general mine noise and occasional dozer track audible from MCO direction. Occasional road traffic on Ulan Rd and birds frequently squawking were the dominant noises. MPEA notified OCE. OCE pulled up dozer conducting roadworks in south of OC1. Drill 192 operating in OC2 was also pulled up as a precautionary measure. The CRC called the complainant to discuss the MPEA's observations and the changes made to the operation.
239.	27-October-2014	07:35am	Ulan Road	Noise/Dust	Yes	NNE	Yes	MPEA attended complaint location. Very faint digger whine was the only mine noise heard and only heard once briefly. Constant road traffic, pump at nearby property, birds squawking constantly and plane flying overhead were all audible. No dust was visible. Light smoke haze was visible across the area. Notified OCE and CRC of observations. The CRC arrived at the complaints property at 7:53am and discussed the smoke haze that could be seen in all directions.
240.	29-October-2014	02:44am	Ridge Road	Noise	Yes	SSW	Yes	The MPEA observed no mine noise from MCO direction, very faint mine hum coming from non-MCO direction. The CRC spoke with the complainant and discussed the MPEA's observations

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
241.	31-October-2014	11:20pm	Ridge Road	Noise	Yes	WSW-W	Yes	The MPEA attended the complaint location and observed general mine drone from MCO/non MCO direction and isolated faint dozer tracks from OC2. Regular road traffic was the dominant sound. Constant light rain was present during monitoring. The CRC advised the complainant of the MPEA's observations and the changes made to the operation by the OCE.
242.	04-November-2014	10:05am	Ulan Road	Dust	N/A		Yes	The MPEA was in the area directly prior to the complaint and noticed a smoky haze across the whole district. No dust was visible. Smell of smoke and nearby bushfires were noted by previous nightshift MPEA. The CRC called the complainant, leaving a message for them to call back on each occasion.
243.	05-November-2014	08:04am	Moolarben Road	Noise	Yes		Yes	MPEA attended complaint location. General mine noise and occasional digger whine were heard from MCO direction. Frequent road traffic on Ulan Rd, isolated road traffic on Moolarben Rd, planes, wind and frequent squawking birds all heard above mine noise. Notified OCE. OCE shutdown wheel dozer operating in OC2. The CRC called the complainant to advise the complainant of the MPEA's observations and the change made by the OCE.
244.	08-November-2014	12:21am	Ridge Road	Noise	Yes	ENE	Yes	MPEA attended complaint location and observed strong wind to be the dominant noise throughout monitoring period. Mine noise and digger whine were very faint

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								when heard. Crickets were also heard above mine noise. Notified OCE. The CRC called the complainant and advised the complainant of the MPEA's observations.
245.	19-November-2014	12:34pm	Ulan Road	Blasting	N/A		N/A	No exceedance of blast criteria limits The CRC contacted the complainant to discuss the complaint.
246.	19-November-2014	12:35pm	Ridge Road	Blasting	N/A		N/A	No exceedance of blast criteria limits The CRC contacted the complainant to discuss the complaint.
247.	23-November-2014	9:15am	Ulan Road	Noise	Yes	N-NE	Yes	The MPEA attended the complaint location at 8am, and after the complaint was made. Road traffic (occasional - regular, dominant when present), birds, dog barking and insects were audible. A low pitched, indistinct mine hum ranged from inaudible to faintly audible. MPEA notified OCE of observations. The CRC called the complainant to discuss the noise environment and the MPEA's observations.
248.	29-November-2014	01:25am	Ridge Road	Noise	Yes	ENE-E	Yes	The MPEA attended the complaint location and observed gusty constant wind throughout most of the observation. Digger engine whine was constant with isolated digger track screeching. Dozer tracks were heard occasionally but not loud and isolated 1st pass was audible. Notified OCE of observations. Digger operator advised to place loads with care to minimise noise and confirm dozer operating in 1st gear. OCE

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
								advised that EX103 circuit had been shut down. MPEA continued to monitor throughout shift. The EC called the complainant to discuss MPEA observations and actions taken by MCO.
249.	29-November-2014	02:36am	Winchester Crescent	Noise	Yes	NE-ENE	Yes	The MPEA attended the complaint location and observed general mine noise. Dozer tracks and digger track screech heard on occasion but not loud. Isolated road traffic also audible. MPEA advised OCE of observations. Continue to monitor. Operations in OC2 were shut down at 02:40am. The EC contacted the complainant to discuss observations and actions taken by MCO.
250.	30-November-2014	10:38pm, and 02:20am	Ulan Road	Noise	Yes	SSW-WSW	Yes	The MPEA attended the complaint location and observed heavy rain as the dominant and only sound. Advised OCE of observations. Continue to monitor. The MPEA attended the complaint location and observed digger engine noise audible, constant and the dominant sound. Isolated 1st pass heard at times. Isolated road traffic audible and dog barking from property nearby. Light breeze. MPEA notified OCE of observations immediately and EX103 circuit in OC2 was shutdown. MPEA continued to monitor The EC contacted the complainant and left a message.
251.	01-December-2014	02:55 am	Ulan Road	Noise	Yes	ESE-S	No	No action required

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
252.	01-December-2014	10:46pm	Ridge Road	Noise	Yes	ESE	Yes	The MPEA attended the complaint location and observed audible mine noise from MCO, constant hum and 1st load heard on occasion. Crickets were heard constantly. Regular traffic present (mine hum faint), birds and plane flying over also heard. OCE notified-excavator 103 circuit shut down in OC2 at 11:45pm. The EC called the complainant and discussed the actions taken by MCO to reduce noise throughout the shift and the activities proposed over the next two weeks.
253.	07-December-2014	7:48am	Winchester Crescent	Noise	Yes	NE	Yes	General mine hum/rumble audible. Dominant noise was from traffic regularly travelling on Ulan Rd and from bird calls. The EC attempted to contact the complainant to discuss the complaint and left a message.
254.	07-December-2014	8:16am	Winchester Crescent	Noise	Yes	NE	Yes	General mine hum audible. Most dominant sounds coming from birds calling and Ulan Rd traffic. Noise from other animals also recorded. Notified OCE of findings, continue to monitor. The EC contacted the complainant to discuss the noise environment.
255.	10-December-2014	4:40pm	Moolarben Road	Noise	Yes	ESE	No	The EC contacted the complainant and discussed the noise environment.

No.	Date	Time	Location	Issue	Real-time Noise Reviewed	Wind Direction	MPEA Attended	Investigation and Follow Up
256.	11-December-2014	4:10:am	Ulan Road	Noise	Yes	SSE	No	Excavator 103 circuit in OC2 was shut down at 02:30am due to noise.