ASHTON COAL PROJECT

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT 2013

Bowmans Creek Diversion

Ashton Coal
PART OF THE YANCOAL AUSTRALIA GROUP

Ashton Coal AEMR 2013

Title Block	
Name of Mine	Ashton Coal
Mining Operations Plan Commencement Date	28 March 2013
Mining Operations Plan Completion Date	31 December 2017
AEMR Commencement Date	1 January 2013
AEMR Completion Date	31 December 2013
Name of Leaseholder	Ashton Coal Pty Ltd
Reporting Officer Name	Brian Wesley
Reporting Officer Title	General Manager
Reporting Officer Signature	
Date	

DISTRIBUTION

Department of Trade and Investment, Regional Infrastructure and Services - Division of Mining & Energy

Department of Planning &Infrastructure

NSW Office of Water

Office of Environment and Heritage

Environment Protection Authority

Singleton Shire Council

Ashton Coal Community Consultative Committee Members

Executive Summary

This Annual Environmental Management Report (AEMR) details the Ashton Coal Projects (ACP) environmental and community performance for the period from 1 January 2013 to 31 December 2013. This report addresses mining and related operations for the ACP, which includes the Ashton Coal North East Open Cut Project and the Ashton Coal Underground Project. No open-cut mining activity was undertaken during the reporting period.

The AEMR has been written in accordance with the 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.*

During the reporting period, coal was mined from the Pikes Gully (LW6B), Upper Liddell (LW101) & Upper Liddell (LW102) coal seams. Approximately 2.8 million tonnes of run-of-mine coal was mined from the underground operations, which is 15 per cent below than the 3.2 million tonnes that was planned for 2013 in the MOP. This is in accordance with the 5.45 million tonnes of maximum ROM extraction allowed by the project approval.

Environmental performance is reported in Section 3 of this AEMR. Overall, environmental management during 2013 was effective with general compliance with consent conditions and Environmental Assessments (EA) predictions.

Air Quality

There were three offsite depositional dust gauge sites (D2, D6 and D9) which exceeded the annual average of 4g/m²/month for the reporting period.

During the reporting period Ashton Coal's statutory HVAS monitors remained below the long-term annual impact assessment criteria, with the exception of Site 1 – Camberwell village north. The long term trends for HVAS results indicate that the trends recorded from all sites during 2013 remain below the long-term trends indicating influences beyond Ashton Coal activities.

During 2013 the short term 24-hour impact assessment criteria of 50 µg/m^3 was exceeded 68 times on 39 different days at statutory TEOM monitoring sites (sites 1, 2, 3, and 8). Following investigations it was found that on all occasions Ashton Coal's contribution was likely to be less than 50 µg/m^3. During the reporting period Ashton Coal's statutory TEOM monitoring sites remained below the long-term annual impact assessment criteria.

There were no air quality related complaints or incidents during 2013.

Noise

During the 2013 attended noise monitoring program all noise monitoring results were under consent criteria, and either consistent with or lower than predictions outlined in the EA. There were six complaints from one complainant related to noise in the reporting period.

Water

During the reporting period there were no material variations from the MOP related to water management activities. Ashton Coal used approximately 1,303 ML of water for coal handling and processing, dust suppression and irrigation of rehabilitation. Due to higher than average rainfalls in January to June (445mm compared to average 340mm) and November (175mm compared to average 60mm) there was substantial surface water runoff. During the reporting period, the net water make from the underground was moderately below historic rates of 12 to 15ML/month during the first nine months, but increased markedly to between 70 to 75ML/month in November and December.

Ashton Coal pumped water from the Glennies Creek and Hunter River as per licence entitlements during 2013. The water withdrawn with Glennies Creek licence includes underground seepage and surface water extraction and for the calendar period of 2013 totalled 253 ML of 445 ML entitlement. Ashton Coal also withdrew 145 ML from the Hunter River (licence for 338ML) mainly for irrigation of Bowmans Creek diversion rehabilitation.

There were no complaints or reportable incidents relating to water in 2013.

Heritage

During 2013, Aboriginal and European heritage items were managed as per requirements of the relevant management plans. There were no complaints or reportable incidents relating to heritage during the reporting period.

Rehabilitation and Land Management

The Bowmans Creek Diversion's (BCD) engineering works were completed in November 2012 with rehabilitation beginning soon after. The rehabilitation program is currently in the start of the second year which is approximately the midway point of Phase 1: Bank Stabilization. Progress is currently ahead of schedule due to the installation of an irrigation system on both the Eastern and Western diversions leading to high rates of rehabilitation success. The irrigation system has allowed for prolonged periods of planting to take place (Autumn & Spring 2013) without relying solely on rainfall to maintain soil moisture and plant survival rates.

In November 2013 the first annual monitoring event was conducted on the BCD rehabilitation. Results indicate the rehabilitation is progressing as outlined in the Environmental Assessment for this stage in the revegetation process.

There were three distinct flood events in January to March 2013, with the most significant event occurring between 28th February and 2nd March, where mean daily flow rates peaked at 6017 ML/day. This flood resulted in impacts to channel banks and drainage channels throughout the natural Bowmans Creek study area, including scouring, mobilisation and deposition of stream sediments, cobbles and organic matter, uprooting and deposition of large riparian trees and creation of new flow paths. The diversion channels were not adversely impacted by the high flow events and there were no indications of any significant scouring of the two engineered channels and no end channel scouring impacts.

All rehabilitation activities at the North East Open Cut were completed during 2012. During 2013, minor maintenance activities, such as slashing were undertaken to increase vegetation cover and diversity, and annual monitoring was conducted, indicating some progress towards completion criteria.

There were no reportable incidents or complaints relating to land management occurring in the reporting period

Proposed actions in 2014

Ashton Coal is committed to delivering a high standard of environmental and social performance into the future and has established targets for the next reporting period. These targets will be closely monitored and an update on the status of each will be reported in the next AEMR.

Ashton Coal has established the following targets for the next reporting period, calendar year 2014:

- Commence preparation of Subsidence Management Plan / Extraction Plan lodgement ULD105-108
- Implementation of CMO compliance system
- Review of key Management Plans for ACOL and SEOC
- Archaeological Clearance for Oxbow Area
- Revised water balance model implemented

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1 Introduction

1.1 Scope of AEMR

The Ashton Coal Project (ACP) is an underground coal mine located approximately 14 kilometres north-west of Singleton in the Upper Hunter Valley in New South Wales (NSW). The Ashton Coal Project is adjacent to the Open-Cut mines of Glendell (Glencore), Camberwell (Vale), Hunter Valley Operations (Rio Tinto) and Ravensworth Operations (Glencore). Adjacent Underground mines include Glennies Creek (Vale) and Ravensworth Underground Mine (Glencore).

The project includes a decommissioned open cut coal mine, an underground coal mine, a Coal Handling and Preparation Plant and a rail siding. The Ashton Underground Coal Mine has a current approved production capacity of approximately 3.9mtpa of high quality Semi-Soft Coking Coal. This coal is predominantly exported through the Port of Newcastle, New South Wales.

The ACP is an unincorporated Joint-Venture between Yancoal Australia Ltd (90%) and Itochu Corporation of Japan (10%) and operated by Ashton Coal Operations Pty Limited (ACOL).

This Annual Environmental Management Report (AEMR) details the ACP's environmental and community performance for the period from 1 January 2013 to 31 December 2013. This report addresses mining and related operations for the Ashton Coal Project, which includes the Ashton Coal North East Open Cut Project and the Ashton Coal Underground Project. No active open-cut mining activity was undertaken during the reporting period. The underground operational area is shown in Figure 1.

ACOL also have the South East Open Cut Project (SEOC), to the South East of current operations. This project was approved by the Department of Planning and Infrastructure on the 4 October 2012, however was subsequently appealed. The appeal is still pending through the Land and Environment Court, and a decision is expected in the first quarter of 2014. The SEOC is not within the scope of this AEMR.

This AEMR is a statutory approval requirement and has been prepared in accordance with the NSW Department of Trade and Investment - Division of Resources and Energy (DRE) *EDG03 Guidelines to the Mining, Rehabilitation and Environmental Management Process* (2012) and with the Ashton Coal Mine Project Approval (DA No. 309-11-2001-i; including modifications, condition 9.2), referred to hereafter as the project approval. Table 1 is a brief summary of the conditions of the consent relevant to this annual review, and a reference to where each aspect is addressed within the AEMR.

This report was prepared in consultation with the DRE, NSW Department of Planning and Infrastructure (DP&I) and Singleton Shire Council (SSC) and includes all additional reporting requirements requested.

The AEMR is distributed to a range of stakeholders that include government authorities, the Community Consultative Committee (CCC) and neighbouring mines. The report is also available on the Ashton Coal website at http://www.ashtoncoal.com.au/.

Table 1: AEMR requirements

Reference	Condition	AEMR section
EDG03 Guidelines	a) The current status of approvals leases and licences. b) A list of mine contacts. c) Actions arising from the previous AEMR review. d) Environmental risk management and control strategies.	a) Section 1.3 b) Section 1.4 c) Section 1.5 d) AEMR
EDG03 Guidelines	For the previous 12 month period: a) Mining, mine development, and rehabilitation in relation to the Mining Operations Plan; b) Environmental performance in relation to the collective conditions of approvals, leases and licences; and c) Community relations and liaison.	a) Section 2 and 5 b) Section 3 and 1.1 c) Section 4
EDG03 Guidelines	It also looks to the next 12 months by: a) Proposing improvements in environmental performance and management systems; and b) Specifying environmental and rehabilitation targets to be achieved.	Section 3 Section 6
Condition 3.31 of the project approval	The Applicant shall report on results of cultural heritage surveys and monitoring of the site before, during, and after mining operations annually in the AEMR. The purpose of the reporting shall be to identify new areas or increases to the area identified in condition 3.30 for the establishment of Conservation Agreements as defined in condition 3.30. The Applicant shall submit AEMRs to EPA and the Director-General for consideration. Following evaluation of the reporting in the AEMRs, the Director-General may, in consultation with EPA, request the Applicant to establish a Conservation Agreement following the procedure in condition 3.30.	Section 3.12.2
Condition 3.35 of the project approval	The Applicant shall consult regularly with the local Aboriginal community using consultation principles and strategies consistent with those outlined in the "Guidelines for best practice community consultation in the NSW Mining and Extractive Industries" or relevant OEH guidelines when available. The results of these consultations shall be documented in the AEMR.	Appendix 3
Condition 3.37 of the project approval	The Applicant shall monitor the effectiveness of the measures outlined in the Archaeology and Cultural Management Plan (Condition 3.36). A summary of monitoring results shall be included in the AEMR.	Section 3.12.2
Condition 3.48 of the project approval	The Applicant shall prepare a detailed monitoring program of habitat areas on the site, including any wetlands and aquatic habitats, during the development and for a period after the completion of the development to be determined by the Director- General in consultation with OEH. The monitoring program shall be included in the FFMP and a summary of the results shall be provided in the AEMR.	Section 3.7.2
Condition 6.12 of the project approval	The Applicant shall: a) establish real-time ambient monitoring stations to provide continuous measurements of PM10 concentrations at the closest residences for which no agreements have been negotiated. b) provide quarterly reporting during operation and rehabilitation of the open cut mine on the performance of the control measures and results of the ambient air quality monitoring system, unless otherwise agreed by the Director-General. The reports shall be provided to the Director-General, CCC and SSC within seven days of completion of the report; and c) provide all results and analysis of air quality monitoring in the AEMR.	Section 3.2 Analysis of air quality monitoring is also available at: www.ashtoncoal.com.au

Reference	Condition	AEMR section
Condition 6.28 of the project approval	To determine compliance with airblast overpressure and ground vibration criteria: a) Airblast overpressure and ground vibration levels must be measured at the most potentially affected residence or other noise sensitive receiver for all blasts carried out at the development; and b) Instrumentation used to monitor compliance must meet the requirements of Australian Standard 2187.2 of 1993. The results of the blast monitoring must be submitted to EPA at the end of each reporting period and be summarised and interpreted in the AEMR.	Section 3.9
Condition 6.43 of the project approval	6.43 The Applicant shall prepare and implement a Noise Management Plan (NMP) for the ACP mine, to the satisfaction of the Director-General. The Plan shall include: e) redefine both the acquisition and management zones on a yearly basis in the AEMR, unless otherwise agreed by the Director-General. This review shall draw upon the noise monitoring results obtained during the previous year and incorporate noise modelling to provide a forward plan of predicted noise levels for the year ahead; m) survey and investigate noise reduction measures from plant and equipment annually, subject to noise monitoring results and/or complaints received, and report in the AEMR at the conclusion of the first 12 months of operations and set targets for noise reduction taking into consideration valid noise complaints in the previous year;	Section 3.10
Condition 6.45 of the project approval	A noise compliance assessment report shall be submitted to EPA and the Director-General within three months of commencement of normal operations at the premises and on an annual basis thereafter. The report shall be prepared by an accredited acoustical consultant and shall determine compliance with the noise limits in condition 6.34. Annual noise compliance reports may be incorporated into the AEMR.	Section 3.10.2
Condition 6.57 of the project approval	The Applicant shall report on the effectiveness of the lighting emission controls in the AEMR.	3.11
Condition 9.2 of the project approval	The Applicant shall, throughout the life of the mine and for five years after completion of mining in the DA area, prepare and submit an Annual Environmental Management Report (AEMR) to the satisfaction of the Director-General and DRE. The AEMR shall review the performance of the mine against the Environmental Management Strategy and the relevant Mining Operations Plans, the conditions of this consent, and other licences and approvals relating to the mine. To enable ready comparison with the predictions made in the EIS, diagrams and tables, the report shall include, but not be limited to, the following matters: a) an annual compliance audit of the performance of the project against conditions of this consent and statutory approvals; b) assess the development against the predictions made in the EIS and the terms and commitments made in the documents listed in condition 1.2; c) (Deleted); d) Groundwater Management Report prepared by an independent expert to the satisfaction of NoW, addressing: (i) work done under and the level of compliance with, the groundwater management measures defined in the Groundwater Management Plan; and (ii) identification of trends in groundwater monitoring data and comparison with predictions, in documents referred to in condition 1.2 and any previous SMPs, over the life of mining operations. e) a review of the effectiveness of the environmental management of the mine in terms of OEH, EPA, NoW, DRE, and SSC requirements;	This report for the period 1 January 2013 – 31 December 2013 Specifically; a) Table 2 b) Table 2 c) n/a d) Appendix 2 e) Section 3 f) Section 3 g) Section 3 h) Section 3 i) Section 5.3 j) Table 3, Table 4 and Table 5 k) Table 11 l) Section 5 m) Section 6

Reference	Condition	AEMR section
	f) results of all environmental monitoring required under this consent or other approvals, including interpretations and discussion by a suitably qualified person; g) reporting requirements under condition 3.31; h) identify trends in monitoring results over the life of the mine; i) an assessment of any changes to agricultural land suitability resulting from the mining operations, including cumulative changes; j) a listing of any variations obtained to approvals applicable to the DA area during the previous year; k) the outcome of the mine water balance for the year; l) status of rehabilitation and revegetation works; and m) environmental management targets and strategies for the next year, taking into account identified trends in monitoring results.	
Condition 9.3 of the project approval	In preparing the AEMR, the Applicant shall: a) consult with the Director-General during preparation of each report; b) comply with any reasonable requirements of the Director-General or other relevant government agency;	Appendix 6
Condition 9.4 of the project approval	The Applicant shall ensure that copies of each AEMR are submitted at the same time to the Director-General, DRE, OEH, EPA, NoW, SSC and the CCC, and made available for public information at SSC within fourteen days of submission to these authorities	noted
Condition 10.3 of the project approval	The Environmental Officer(s) employed by the mine (refer condition 3.1) shall be responsible for: b) for providing a report of complaints received with respect to the construction and operation of the mine, every six months throughout the life of the project to the Director-General, SSC, OEH, EPA, DRE, and the CCC, or as otherwise agreed by the Director-General. A summary of this report shall be included in the AEMR (conditions 9.2-9.4);	Section 4.1
Statement of Commitment 13.2	An Annual Environmental Management Report (AEMR) will be prepared and forwarded to relevant government departments, including DP&I. The AEMR will include a summary of all monitoring undertaken during the year, including a discussion of any exceedances and responses taken to ameliorate these exceedances.	This report for the period 1 January 2013 – 31 December 2013 this AEMR

1.2 Statement of Compliance

Table 2 is a brief summary of the conditions of the consent relevant to this annual review, and a reference to where each aspect is addressed within the AEMR.

Table 2: Compliance Quick Reference Guide

Environmental performance condition	AEMR Section reference	
	Compliance with Project Approval conditions and MOP *	Compliance with EA/EIS prediction *
Meteorological monitoring	3.1	3.1
Air quality	3.2.2 and 3.2.3	3.2.2
Erosion and sediment control (soil)	3.3.3	3.3.2
Surface water	3.4.3	3.4.2

Environmental performance condition	AEMR Section reference	
	Compliance with Project Approval conditions and MOP *	Compliance with EA/EIS prediction *
Ground water	3.5.3	3.5.2
Biodiversity and Land Management	3.7.2	3.7.2
Blasting and vibration	3.9.2	3.9.2
Noise	3.10.3	3.10.2
Visual amenity	3.11.3	3.11.2
Aboriginal and European heritage	3.12.3	3.12.2
Bushfire	3.15	3.15.2
Waste	3.17	3.17
Mine Subsidence	3.18	3.18
Rehabilitation	5.1	5.1

*Legend

Compliant	
Condition/impact criteria non-compliance	
Administrative Non-Compliance	

Figure 1: Location of the Ashton Coal Operations Project Area

1.3 Consents, Leases, Licences and Management Plans

ACP has a number of statutory approvals that regulate activities on site. Each of these approvals has conditions that are derived from a range of aspects, including the nature and size of the operation, the diversity and sensitivities of local land use and the environment, the existing cumulative level of impact from mining and other industries, the close proximity to private residences and the comprehensive regulatory approvals process in NSW. Details on Ashton Coal's existing statutory approvals as at 31 December 2013 are provided in Table 3 Table 4 and water related licences in Table 5.

A Conservation Agreement (dated 16 September 2010) was made between ACOL and the NSW Minister for the Environment under the National Parks and Wildlife Act 1974 (NP&W Act). The Conservation Agreement covers a parcel of land equal to 65.66 hectares in the south east of the ACP site (the southern woodland conservation area) and in accordance with Consent Condition 3.30 "...shall be to protect and conserve Aboriginal cultural heritage, and biodiversity, within the conservation area". The Conservation Agreement, together with the environmental management plans for the ACP site, constitutes the Plan of Management for the conservation area.

There has recently been changes to the NSW Radiation Regulations which came into force from 1 July 2013 (http://www.epa.nsw.gov.au/radiation/regchanges.htm). The main change is that the site licence to sell/possess radioactive materials will change to a Radiation Management Licence whereby the licence will show the details of all gauges registered to a site. At the time of expiry where individual entities hold multiple management licences these will be rolled up into a single management licence. A Radiation Management Licence is currently pending for the ACP.

Table 3: Ashton Coal's existing statutory approvals as at 31 December 2013

Approval	Description	Issue date	Expiry date
Development consents or project approvals issued by the DP&I			
DA 309-11-2001-i	Development Consent for the ACP (as modified from time to time)	11/10/2002 Last modified 12/12/12	11/10/2023
Mining leases and exploration licences issued by the DRE			
ML 1533	Mining Lease	26/02/2003	26/02/2024
ML 1529	Mining Lease	17/09/2003, renewed 9/11/2011#	
ML 1623	Mining Lease	30/10/08	30/10/2029
EL 5860	Exploration Licence (EL)	21/05/2012	21/05/2015
EL 4918	Exploration Licence	17/12/2010	17/12/2015
EPL issued by the EPA			
EPL 11879	Environmental Protection Licence (EPL)	02/09 (anniversary date)	Not specified

Executed title offer, DRE to finalise

Table 4: Ashton Coal's other statutory approvals as at 31 December 2013

Approval	Description	Expiry date
Radiation Licences		
License # 29720 RL 28485	Radiation Licence (RL) Licence to Sell/Possess Radioactive Substances	18/06/2015
Radiation Registration 12903	CPP - module 2 thickener underflow Issued - 17/01/2010	16/01/2014
Radiation Registration 12905	CPP - module 1 thickener underflow Issued - 17/01/2010	16/01/2014
Radiation Registration 12906	CPP - module 2 dense medium Issued - 17/01/2010	16/01/2014

Approval	Description	Expiry date
Radiation Registration 21160	CPP- combined thickeners tailings sump Issued - 10/12/2009	9/12/2013 (renewal pending)
Radiation Registration 22922	CPP-module 1 dense medium feed Issued - 16/01/2012	15/01/2014
Crown Lands Permits		
Crown Lands LI354487	Pipeline permit Issued - 18/09/2003	Annually 15 January
Crown Lands LI363792	Pipeline permit Issued - 16/01/2004	Annually - 5th November
Crown Lands LI370218	Pipeline permit	Annually - 16th April
Crown Lands LI386385	Pipeline permit Issued - 16/09/2008	Annually - 6th September
Crown Lands LI408628	Pipeline permit Issued - 04/07/2008	Annually - 4th July
Crown Lands LI450779	Licence Permit	Annually - 24th December
Crown Lands LI454691	Licence Permit	Annually - 30th July
Aboriginal heritage		
Section 90 Consent Permits AHIP 1131017 AHIMS Permit ID 3436	Longwalls 1-4: Salvage excavations. Community collection. Harm to certain Aboriginal objects through proposed works. Certain Aboriginal objects must not be harmed	23/12/21
Section 90 Consents Permits AHIP 1130976	Longwalls 5-8: Movement only of certain Aboriginal objects. Test excavations. Salvage excavations. Community collection. Harm to certain Aboriginal objects through proposed works. Certain Aboriginal objects must not be harmed	26/08/31
Voluntary Conservation Agreement		
Conservation Agreement	Conservation agreement over the southern conservation area. Agreement between The Minister administering the NPW Act 1974 and Ashton Coal Mines Limited for Ashton Coal Mine.	Perpetuity
Coal Mines Health and Safety Regulation 2006 (Clause 88 approval)		
Clause 88(1) approval	For safe operations and stability of workings and resource recovery longwall mining (ULD LW 101-103)	19/04/12
Tailings Emplacement approval		
S126 Approval	Emplacement of carbonaceous materials Ashton NEOC Issued 08/04/04	Perpetuity
S126 Approvals	Emplacement of carbonaceous materials Ravensworth Void 4 Issued 17/01/07	Perpetuity
S100 Approval	Emplacement of coarse rejects materials in the NEOC void Issued 01/03/12	Perpetuity
S100 Approval	Emplacement of fine rejects in the Ravensworth Void No 4 Issued 2/01/2007	Perpetuity

Table 5: Water Related Licences

Approval	Description	Expiry date	Extraction
Controlled works approval			
Permit 20CW802609 under Part 8 of the Water Act 1912	To construct levee bank on Bowmans Creek	07/09/18	n/a
Work Approvals			
20CA201565 Glennies Creek	Combined water supply works / water use approval	11/03/19	n/a
20WA203882 Glennies Creek	Combined water supply works / water use approval	13/12/17	n/a
20CA201626 Hunter River	Combined water supply works / water use approval	07/04/19	n/a
Surface Water licences			
WAL1358 Glennies Creek Supplementary 4ML	Water Access Licence	Perpetuity	0 ML
WAL15583 Glennies Creek General Security 354ML	Water Access Licence	Perpetuity	253 ML
WAL8404 Glennies Creek High Security 80ML	Water Access Licence	Perpetuity	0 ML
WAL997 Glennies Creek High Security 11ML	Water Access Licence	Perpetuity	0 ML
WAL1120 Hunter River High Security 3ML	Water Access Licence	Perpetuity	0 ML
WAL19510 Hunter River High Security 130ML	Water Access Licence	Perpetuity	0 ML
WAL1121 Hunter River General Security 335ML	Water Access Licence	Perpetuity	145 ML
WAL6346 Hunter River Supplementary 15.5ML	Water Access Licence	Perpetuity	0 ML
WAL23912 Bowmans Creek 14ML	Water Access Licence	Perpetuity	0 ML
WAL29565 Bowmans Creek 266ML	Water Access Licence	Perpetuity	0 ML
WAL654 Stock & Domestic 8ML	Water Access Licence	Perpetuity	N/A*
WAL660 Stock & Domestic 6ML	Water Access Licence	Perpetuity	N/A*
WAL665 Stock & Domestic 3ML	Water Access Licence	Perpetuity	N/A*
WAL738 Stock & Domestic 3ML	Water Access Licence	Perpetuity	N/A*
WAL811 Stock & Domestic 3ML	Water Access Licence	Perpetuity	N/A*
WAL872 Glennies Creek General Security 12ML	Water Access Licence	Perpetuity	
WAL873 Stock & Domestic 8ML	Water Access Licence	Perpetuity	N/A*
WAL896 Stock & Domestic 3ML	Water Access Licence	Perpetuity	N/A*
WAL984 Glennies Creek General Security 9ML	Water Access Licence	Perpetuity	
WAL985 / 20AL201283 Stock & Domestic 8ML	Water Access Licence	Perpetuity	N/A*
WAL1157 Stock & Domestic 3ML	Water Access Licence	Perpetuity	N/A*
WAL1190 Stock & Domestic 1ML	Water Access Licence	Perpetuity	N/A*
WAL9515 Stock & Domestic 12ML	Water Access Licence	Perpetuity	N/A*
WAL10532 Stock & Domestic 3ML	Water Access Licence	Perpetuity	N/A*

Approval	Description	Expiry date	Extraction
Groundwater Licences			
WAL29566 Alluvial (aquifer) 358ML	Water Access Licence	Perpetuity	123 ML
20BL136766 Stock Domestic	Bore	Perpetuity	N/A*
20BL168848 Test Bore	Bore	Perpetuity	N/A
20BL168849 Test Bore	Bore	Perpetuity	N/A
20BL169508 Mining (dewatering) 100ML	Bore	14/03/15	
20BL170596 Monitoring	Bore	Perpetuity	N/A
20BL171364 Mining (dewatering) 230ML (in conjunction with 20BL169937)	Bore	Renewal application submitted	96ML
20BL172482 Mining (dewatering) 230ML (in conjunction with 20BL171364 and 20BL169937)	Bore	20/02/2017	0
20BL172142 Test Bore	Bore	Perpetuity	N/A
20BL172143 Test Bore	Bore	Perpetuity	N/A
20BL172757 Test Bore	Bore	Perpetuity	N/A
20BL173193 Test Bore	Bore	Perpetuity	N/A
20BL172144 Test Bore	Bore	Perpetuity	N/A
20BL172138 Test Bore	Bore	Perpetuity	N/A
20BL172139 Test Bore	Bore	Perpetuity	N/A
20BL172140 Test Bore	Bore	Perpetuity	N/A
20BL172141 Test Bore	Bore	Perpetuity	N/A
20BL172433 Test Bore	Bore	Perpetuity	N/A
20BL172434 Test Bore	Bore	Perpetuity	N/A
20BL173302 Mining (dewatering) 230ML	Bore	13/01/2018	0
20BL173418 Mining (dewatering) 230ML	Bore	13/01/2018	0

** No stock and domestic water was used on site the Ashton Coal project. These licences may have been used by the residents of Camberwell for domestic purposes.*

1.3.1 Mining Operations Plan

Ashton Coal has an approved mining operations plan (MOP) in place that covers a five year period from 28 March 2013 to 31 December 2017. This MOP was approved by the DRE on 28 March 2013.

1.3.2 Environmental Management Plans

ACP has developed a range of environmental management plans to meet the requirements of DA 309-11-2001-i and these are required to be reviewed and maintained regularly (Condition 1.21). A summary of the status of the management plans is provided in Table 6. These plans are published on http://www.ashtoncoal.com.au.

Table 6: Status of environmental management plans as at 31 December 2013

Environmental management plan	Condition	Approval date	Comment
Environmental Management Strategy	3.3	19/08/2006	
Noise	6.43	19/08/2006	Reviewed in 2013 and will submit for approval Q1 2014
Air Quality	6.10	19/08/2006	Reviewed in 2013 and will submit for approval Q1 2014
Lighting	6.56	23/12/2003	Reviewed in 2013 and will submit for approval Q1 2014
Waste	5.3	04/09/2003	Reviewed in 2013 and will submit for approval Q1 2014
Spontaneous Combustion	2.6	12/12/2003	Reviewed in 2013 and will submit for the satisfaction of DRE Q1 2014
Archaeology and Cultural Heritage management plan	3.36	01/08/2012	Minor review of methodology undertaken in 2013 in consultation with the Aboriginal Community Consultation Forum, with no changes required.
Bushfire	3.57	09/05/2005	Reviewed in 2013 and will submit for approval Q1 2014
Flora and Fauna	3.46	01/08/2012	
Water	4.7	10/08/2012	
Tailings Emplacement Operation Plan	2.5C	13/09/2013	Reviewed and submitted for the satisfaction of DRE in September 2013. Upon the satisfaction of DRE, the TEOP will be appended to the MOP.

1.4 Mine Contacts

Ashton Coal environment team contacts can be found in Table 7.

Table 7: Ashton Coal management contact details

Name	Role	Phone contact details
B. Wesley	General Manager	(02) 6570 9104
D. Gibson	Underground Mine Manager	(02) 6570 9260
I. McTaggart	CHPP Manager	(02) 6570 9148
L. Richards (Jan 2013 – Apr 2013), and J McNaughton (Acting: Apr 2013 - Dec2013)	Environment and Community Relations Manager	(02) 6570 9219
Environmental Contact Line	n/a	1800 657 639

1.5 Actions Required at Previous AEMR Review

A review of compliance against legal requirements is required on an annual basis during the preparation of the AEMR. During the reporting period, Ashton Coal achieved a high level of compliance against approval conditions and legislation applicable to the operation. Ashton Coal maintains regular communication with government agencies to ensure that improved levels of effective assessment and reporting continue.

The DRE and DP&I conducted a review of the 2012 AEMR, including attending a site meeting at Ashton Coal on 17 July 2013. The 2012 AEMR contained various commitments made by Ashton Coal that would be undertaken in 2013 that assist in continually improving the environmental performance of the mine and these are summarised in Table 8.

Table 8: Actions from previous AEMR Review

AEMR period/ Dept. reference - Action No.	Issue / Observation	Source	Action	Due	Status as at 31/12/13
2012/1 - 2	Ashton coal continues to place fine reject in the Ravensworth void 4, since the NEOC is now potentially available for disposal. DRE has received an outline of the tailings emplacement strategy, dated 24/7/13 and is waiting for the submission of the TEOP by 30/9/13	DRE Inspection Letter dated 02/08/13	The tailings emplacement operation plan was submitted on the 27 September 2013. The NEOC is not yet ready for emplacement of tailings.	30/09/13	Complete.
2012/1 - 3	Water was observed in the Ravensworth void and the NEOC. The water is to be pumped.	DRE Inspection Letter dated02/08/13	NEOC pump is operational. Water is stored in NEOC occasionally, in accordance with the approved Site Water Management Plan. Two ramps have been established at Ravensworth void to allow pumping (Sept 2013)	Ongoing	Complete.
2012/2 - 1	Ponding were observed. Needs to be remediated and reported in the next AEMR.	DRE Inspection Letter dated 02/08/13	ACOL is a multi-seam underground operation. Ponding caused by subsidence is remediated if determined necessary and/or is not predicted to recur in subsequent seams.	31/03/14	See Section 3.18 of this AEMR Remediation of ponding was not considered necessary during this reporting period, and was discussed with DRE.
2012/3 - 1	Bowmans Creek Diversion – rehabilitation progress to be reported in the AEMR	DRE Inspection Letter dated02/08/13		31/03/14	See Section 3.4.5 of this AEMR
2012/3 - 2	Repair work to be reported (Photo 6)	DRE Inspection Letter dated02/08/13	Repairs completed in May/June 2013 and inspected by suitably qualified engineer.	31/03/14	See Section 3.4.5 of this AEMR
2012/4 - 1	Galenia was observed in some rehabilitation areas Weed infestations need to be controlled and reported in AEMR	DRE Inspection Letter dated02/08/13	Areas identified on inspection were sprayed immediately after inspection Weed management is ongoing	31/03/14	See Section 3.8 Complete (overall weeds management is ongoing)

AEMR period/ Dept. reference - Action No.	Issue / Observation	Source	Action	Due	Status as at 31/12/13
2012/4 - 2	Xanthium sp. Were observed on the creek banks. Weed infestations need to be controlled and reported in AEMR	DRE Inspection Letter dated02/08/13	Area has been sprayed and is due to be slashed in January 2014Weed management is ongoing	31/03/14	See section 3.8 Complete (overall weeds management is ongoing)
2012/5 - 1	Reported numbers were not consistent with MOP and previous AEMR	DRE Inspection Letter dated 02/08/13	AEMR related to a 16 month period, which may make it difficult to compare results to previous periods or MOP.	31/03/14	See section 5 for rehabilitation statistics.
2012/5 - 2	Explanation required for the change in strategy in rehabilitation. More grass and less woodland was planted that predicted in MOP.	DRE Inspection Letter dated 02/08/13	Trees have been planted over grasses in some areas, in some instances with very low germination rates. A maintenance program has commenced.		See section 5 for further detail.
2012/6-1	Water storage observed was almost at full capacity. Close monitoring required and to be reported on the next AEMR.	DRE Inspection Letter dated02/08/13	Water level monitoring is undertaken regularly by CHPP control room staff using real time sensors.		See section 3.4 for further information on surface water monitoring.
2012/1	Use of river water for the irrigation of Bowman's Creek diversion re-vegetation works	DP&I Inspection Letter dated 26/07/13	Nil. Clean river water only used for irrigation.		Ongoing. This is consistent with BCD rehabilitation strategy.
2012/2	Analysis of Ashton Coal's contribution to the air quality monitoring results and review of trending and EIS predictions	DP&I Inspection Letter dated 26/07/13	To be reported in the 2014 AEMR		See section 3.2 for detail on Air Quality monitoring.
2012/3	Justification of weed management strategy for the Southern Conservation Area	DP&I Inspection Letter dated 26/07/13	To be reported in the 2014 AEMR		See section 3.8 for further detail on weed management onsite and in the Southern Conservation Area.
2012/3	Management of cotton bush in the Bowman's creek diversion area	DP&I Inspection Letter dated 26/07/13	Area has been boom sprayed and is due to be slashed in January 2014		Complete (overall weeds management is ongoing)

1.6 Ashton Coal Environmental Management System

Ashton Coal has implemented an environmental management system (EMS) that provides a framework to manage compliance with relevant legislation and statutory approvals and conforms to organisational objectives and community expectations.

Ashton Coal's EMS is consistent with the international standard 14001:2004 and is based on a 'plan, do, check and act' cycle that encourages continual improvements in performance. It uses a suite of procedures for key activities that have the potential to generate environmental and social impacts. These procedures are regularly reviewed, communicated to employees and audited for compliance.

2 Operations

2.1 Exploration

During the reporting period, Ashton Coal conducted exploration drilling activities within the underground area, specifically designed to investigate subsidence and water management issues and to provide baseline geological and coal quality data for modelling and planning purposes. Currently exploration projects at the ACP include seam continuity and splitting exploration.

During the reporting period the ACP completed the following drilling activities:

- eight partly cored holes (six for coal quality, with one abandoned hole which had rods jammed and no samples taken and a re-drill of this abandoned hole for gas samples). A piezometer was installed in one of these partly cored holes.
- two open chip holes drilled purposely to install piezometers
- four open chip holes for goaf inspections.
- three gas drainage holes.

Rehabilitation and sealing of completed boreholes was completed, with rehabilitated sites monitored in accordance with Ashton Coal's procedures. Boreholes that are yet to be grouted or that require additional testing have been secured with borehole caps.

No exploration activities were undertaken in the NEOC area during the reporting period.

During the reporting period there were no material variations from the MOP related to exploration activities.

Proposed drilling and exploration activities for 2014 includes drilling up to seven partly cored exploration holes and three gas drainage holes over the underground workings, along with a number of piezometers that will be drilled to better understand mine water inflows.

2.2 Land Preparation

During the reporting period there were no material variations from the MOP related to land preparation activities.

2.3 Construction

During 2013, two minor construction projects were commenced:

- Construction of the Gas Drainage facility. It is envisaged that this will be completed and commissioned in the first quarter of 2014.
- Construction of the 5.5m ventilation fan. Completion of construction and commissioning occurred in late 2014.

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

2.4 Mining

The North East Open Cut ceased mining operations with the last of the Hebden seam mined on the 24th September 2011. The underground mine is approved to extract coal from the Pikes Gully (PG), Upper Liddell (ULD), Upper Lower Liddell (ULLD) and Lower Barrett (LB) coal seams. The underground mine utilises the longwall method of coal extraction, following continuous miner development of main headings and twin heading gate-roads. Seam thickness varies from about 1.8 m to 2.8 m high. All underground roadways will be driven at

approximately 2.6 m mined height. The longwall has been designed to allow extraction of the full seam thickness. The expected underground mine life is until 2027.

During the reporting period, coal was mined from the Pikes Gully (LW6B), Upper Liddell (LW101 & LW102) coal seams. Approximately 2.8 million tonnes of run-of-mine coal was mined from the underground operations, which is 15 per cent below the 3.2 million tonnes that was planned for 2013 in the MOP. This is also in accordance with the 5.45 million tonnes of maximum ROM extraction allowed from the project approval. Table 9 provides a summary of Ashton Coal's mine performance figures for 2013.

Ashton Underground Mine has approval and operates 24hrs a day 7 days a week.

During the reporting period there were no material variations from the MOP related to mining activities.

Table 9: Mine performance figures for 2013

Category	Unit	This reporting period (January 2013 to December 2013)	MOP prediction for Year 1 (2013)	Estimated for next reporting period (January 2014 to December 2014)
Topsoil stripped	bcm	0	0	0
Topsoil used/spread	bcm	0	0	0
Overburden	bcm	0	0	0
Run-of-mine coal mined	tonnes	2,751,926	3,179,490	3,273,676
Coarse reject	tonnes	1,008,915	884,432	905,506
Product (saleable) coal	tonnes	1,286,176	1,705,436	1,764,500

2.4.1 Equipment Fleet

The mining equipment used in 2013 was unchanged from previous periods and was as described in the MOP.

Table 10 provides a list of the underground mine equipment and equipment used in the rehabilitation maintenance program for the NEOC used during 2013.

Table 10: Mining equipment

No	Description	No.	Description
Underground mining equipment			
4	12CM 12 Continuous Miners	8	PJB Mk4.5
4	10SC32 Shuttle Cars	7	Juganaut V2
4	21m³/s auxiliary ventilation fans	1	Flakt Woods 110kW centrifugal fan
4	1000 cfm air compressors	2	Flakt Woods 315kW centrifugal fans
2	1050mm temporary conveyors (Jiffy drivers)	3	1400mm conveyors (two VVVF drives each)
5	1600mm Conveyors (two VVVF drives each)	1	1600mm stacker conveyor (single VVVF Drive)
NEOC Rehabilitation Program			
2	D6 Dozer	1	Excavator
2	Articulated Dump truck		

2.5 Mineral Processing

The Ashton Coal Handling and Preparation Plant (CHPP) has a total designed throughput of 1000tph. The associated materials handling is designed for 1000tph and includes two rotary breakers on the ROM coal side, one capable of feeding Open Cut coal and the other Underground, and a skyline conveyor on the product coal side. Product coal is recovered through a series of coal valves and conveyed to a Train Loading Station mounted over a dedicated rail siding.

The CHPP is operated by ACOL and manned on a 24 hours a day 5 days per week basis. If required, the CHPP has the ability and approval to operate 24 hours a day 7 days a week. Train loading may operate 7 days a week and is dependent on the rail schedule. Consistent with the project approval, no product coal was transported from site by public or private road.

During the reporting period approximately 1.3 million tonnes of total saleable product was produced by Ashton Coal, which is generally in line with the 1.7 million tonnes that was planned for 2013 in the MOP. During the reporting period there were no material variations from the MOP related to coal processing activities.

2.6 Tailings Management

All coarse reject material is disposed of within the North East Open Cut void, and fine rejects (tailings) is disposed of in Ravensworth Void 4.

A revised Tailing Emplacement Operational Plan (TEOP) was submitted to the DRE for approval on 27 September 2013. Consistent with the currently approved TEOP, the revised TEOP continues to utilise the Ravensworth Void 4 tailings emplacement area until it reaches capacity, followed by utilisation of the NEOC void.

2.7 Water Management

Ashton Coal is situated between Betty's Creek in the north, the Hunter River in the south, Glennies Creek in the east and Bowmans Creek and its associated floodplain in the west. Bowmans Creek and Glennies Creek are tributaries of the Hunter River, while Bettys Creek is a tributary of Bowmans Creek. Ashton Coal's water management system includes monitoring surface and ground water sites according to an approved monitoring program.

In addition to water quality monitoring, Ashton Coal also regularly monitors the water balance for the operation to assist forecasting and modelling for different climatic and site scenarios. A series of flow meters and surveyed volumes are utilised to monitor the use and transfer of water between key water storages. Water storages are surveyed on a regular basis to ensure the accuracy of water volume data. A schematic overview of the site's water management system can be found in Figure 2 .

During the reporting period Ashton Coal implemented a site quantitative water model, which will continue to be calibrated with data throughout 2014. An overview of key inputs and outputs for Ashton Coal's water balance for the reporting period is provided in Table 11. A summary of Ashton Coal's water inflows and outflows are provided in Figure 3 and Figure 4, respectively. The water model will assist Ashton Coal to predict the mine water balance and to provide a snapshot of available water at a given point in time based on a number of variables. Model predictions are then used to assist in operational planning and determination of future water quantity storage requirements.

During the reporting period there were no material variations from the MOP related to water management activities. Due to higher than average rainfalls in January to June (445mm compared to average 340mm) and November (175mm compared to average 60mm) there was substantial surface water runoff. During the reporting

period, the net water make from the underground was moderately below historic rates of 12 to 15ML/month during the first nine months, but increased markedly to between 70 to 75ML/month in November and December.

Ashton Coal pumped water from the Glennies Creek and Hunter River as per licence entitlements during 2013. The water withdrawn with Glennies Creek licences includes underground seepage and surface water extraction and for the calendar period of 2013 totalled 253 ML of 445 ML entitlement. Ashton Coal also withdrew 145 ML from the Hunter River (licenced for 338ML) mainly for irrigation of Bowmans Creek diversion rehabilitation.

During the reporting period Ashton Coal used approximately 1,303 ML of water for coal handling and processing, dust suppression and irrigation of rehabilitation. Similar to results in recent years, the CHPP was the main consumer of water at Ashton Coal as shown in Figure 4. Water use at the CHPP was consistent over the year, with the exception of June and July, where consumption was reduced due to shut down. Estimated water use volumes for dust suppression were higher than previous years. Table 11 provides a surface water inventory for the reporting period.

Ashton Coal did not discharge any water to the Hunter River as it has no licensed discharge point under the Hunter River Salinity Trading Scheme (HRSTS).

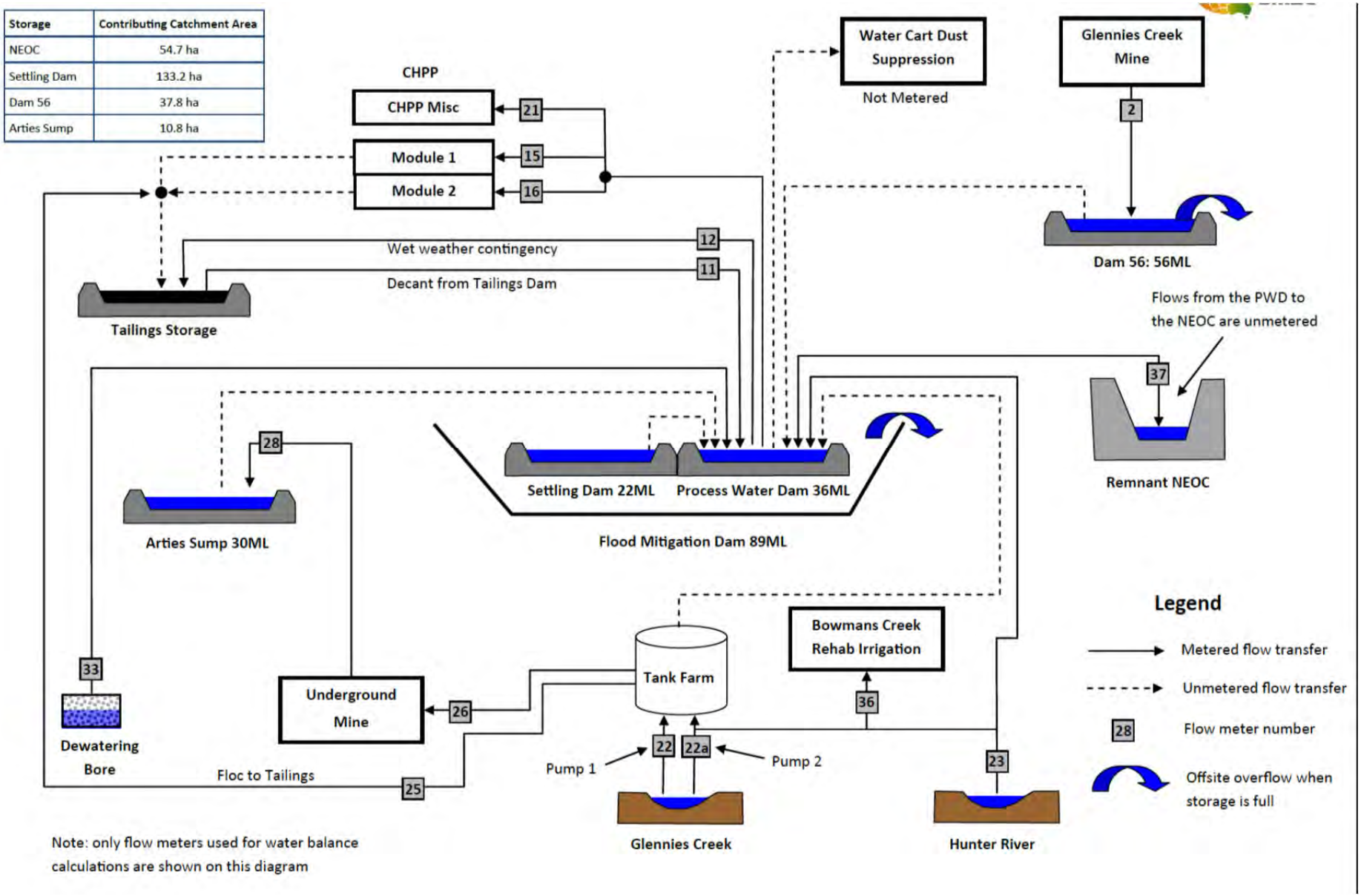


Figure 2: Schematic of water structures

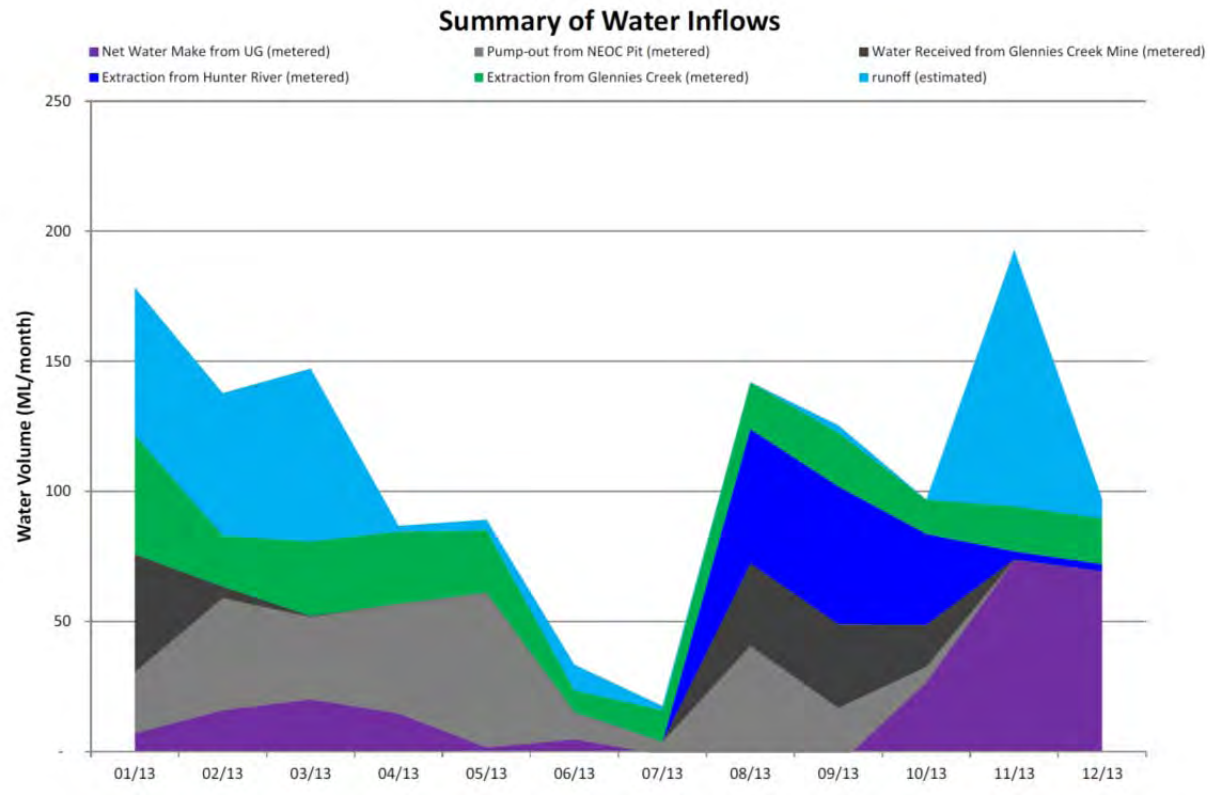


Figure 3: Summary of Ashton Coal's water inflows for 2013

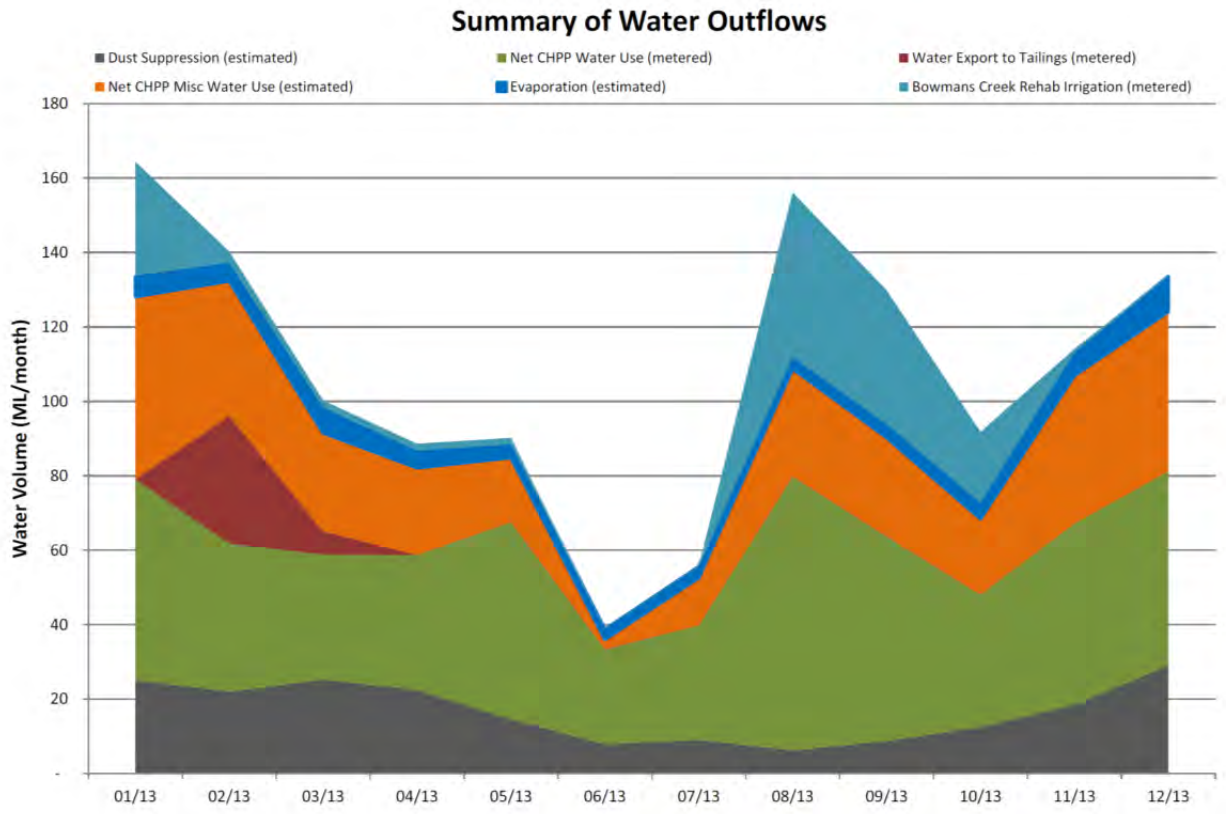


Figure 4: Summary of Ashton Coal's water outflows for 2013

Table 11: Ashton Coal's site water balance for the reporting period

Water Balance Results		
Rainfall over period (Ashton - Repeater)	690	
Stored Water at 1 January 2013	96 ML	
Stored Water at 31 December 2013	136 ML	
Change in Storage over the period	+ 40 ML	
Input-output	**Water Movements**	**Total Flow over period (ML)**
Inflows	Precipitation and runoff (estimated)	305
	Hunter River extraction (metered)	145
	Glennies Creek Extraction (metered)	253
	Inflow from Glennies Creek Mine (metered)	130
	Pump out from NEOC (metered)	291
	Net water make from underground operation (metered)	219
TOTAL INFLOWS		1343
Outflows	Dust suppression - Water cart (estimated)	201
	CHPP (metered)	859
	Export to tailings	41
	Water pumped to NEOC (estimated)	5
	Irrigation of Bowmans Creek Rehabilitation (metered)	140
	Evaporation Losses (estimated)	58
TOTAL OUTFLOWS		1303

2.8 Hazardous Material Management

Ashton Coal has an existing hazardous materials management procedure to ensure all risks associated with the use of hazardous materials are managed in accordance with occupational, health and safety procedures, relevant standards and legislation. During the reporting period there were no material variations from the MOP related to hazardous materials management activities

All hazardous substances and dangerous goods stored and used at Ashton Coal are maintained in a register with their associated material safety data sheets. To maintain the integrity of the hazardous materials management system, all work areas are inspected by supervisors on an ongoing basis as part of their general area inspections and safety observations. Handling, transportation and disposal of hazardous materials are undertaken in accordance with relevant standards and approvals.

3 Environmental Management and Performance

Ashton Coal is committed to delivering the highest standards of environmental performance to meet or exceed legal and other requirements. This commitment extends to utilising initiatives to minimise and mitigate the impact of our operations on the environment and community.

The implementation and effectiveness of the control strategies for risks identified in the MOP, previous AEMR's and management plans are outlined in the following section, as detailed below.

- Environmental management:
    - the adequacy of the proposed control strategies to manage risks associated with operations during the reporting period;
    - variations from proposed control strategies implemented during the reporting period and the reasons for them; and
    - the works carried out during the reporting period and proposed to be carried out over the next reporting period.

- Environmental performance:
    - monitoring results and complaints records during the reporting period, including a comparison of these results against the:
        - relevant statutory requirements, limits or performance measures/criteria;
        - monitoring results of previous years;
        - relevant predictions in the relevant environmental assessment;
    - performance outcomes;
    - long-term trends in monitoring data; and
    - any discrepancies between the predicted and actual impacts of the operation and analysis of the potential cause of any significant discrepancies.

- Reportable incidents and community complaints:
    - incident reporting as required by conditions of lease, licence or risk management and monitoring strategies;
    - incidents which led to non-compliance with conditions of a mining lease, development consent or other licence over the reporting period and description of what actions were or are being taken to ensure compliance; and
    - reference to incident report documents previously provided to DP&I or another agency.

- Further improvements:
    - initiatives proposed for the next reporting period to improve or further assure acceptable performance.

3.1 Meteorological Data

3.1.1 Environmental Management

Ashton established two meteorological monitoring stations prior to the commencement of construction and operation activities on site. These are located at Monitoring Location 1 (Figure 9) in the village of Camberwell and at the Repeater Station on the ridge in between the village and the NEOC. The repeater station is the primary meteorological station from which wind direction and speed are assessed for mine operation purposes, whilst Location 1 is used in combination with the repeater station to measure temperature inversions. These weather stations are calibrated annually.

3.1.2 Environmental Performance

A summary of meteorological data recorded at the Repeater monitoring station during the reporting period is provided in Table 12, along with a comparison to monitoring results from 2011 and 2012. Meteorological data capture rates for the reporting period were 100 per cent.

The initial 6 month period experienced above average rainfall with 445mm recorded at Ashton Coal operated weather station (average rainfall between January and June is approximately 340mm). The second half experienced dry conditions, with the exception of November when 175mm was recorded. However, the annual rainfall in 2013 is consistent with the long term annual average rainfall of 643.7mm recorded at the Jerrys Plains weather station. Overall, 2013 was characterised by above average temperatures and evaporation rates.

Table 12: Summary of meteorological results from the Repeater monitoring station

Parameter	Units	2013	2012	2011
Total rainfall	mm	690.4 in 97 rain days^	493 in 105 rain days^	856.6
Maximum monthly rainfall	mm	175.2 (recorded in November 2013)	142.6 (recorded in February 2012)	155.2 (recorded in November 2011)
Minimum monthly rainfall	mm	4.8 (recorded in October 2013)	3.2 (recorded in October 2012)	17.4 (recorded in July 2011)
Maximum monthly temperature	°C	44.3 (recorded in January 2013)	41 (recorded in December 2012)	43.9 (recorded in January 2011)
Minimum monthly temperature	°C	1.7 (recorded in August 2013)	1.3 (recorded in June 2012)	2.6 (recorded in July 2011)

^ A rain day includes days with >0.01mm

Similar to previous years, wind direction at the ACP during the reporting period was predominantly from the south east during summer and from the north north-west during winter. Seasonal wind roses, including a calculation of the percentage of calm winds are shown in Figure 5, Figure 6, Figure 7 and Figure 8.

3.1.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to meteorological data during the reporting period and there were no related reportable incidents.

3.1.4 Further Improvements

Ashton Coal will continue to operate and maintain a meteorological station.

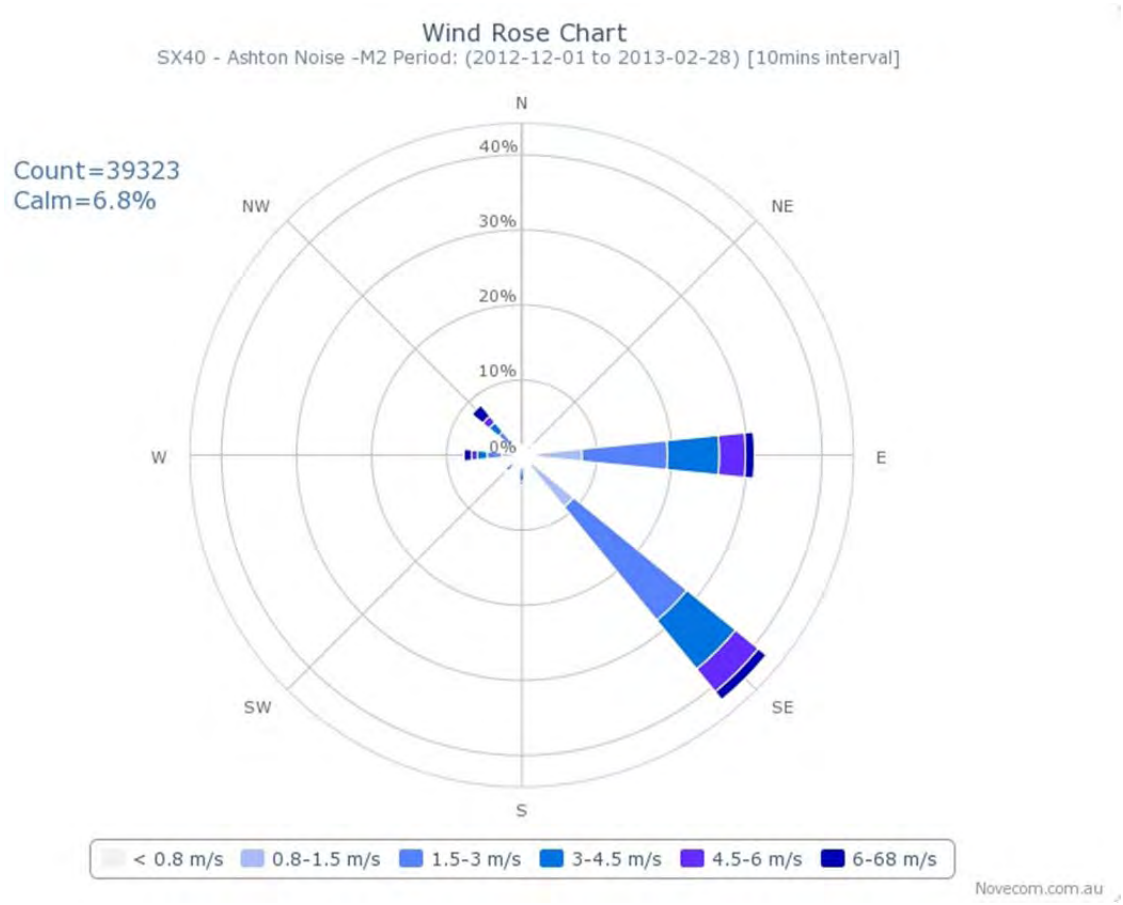


Figure 5: Ashton Coal summer wind roses for 2013

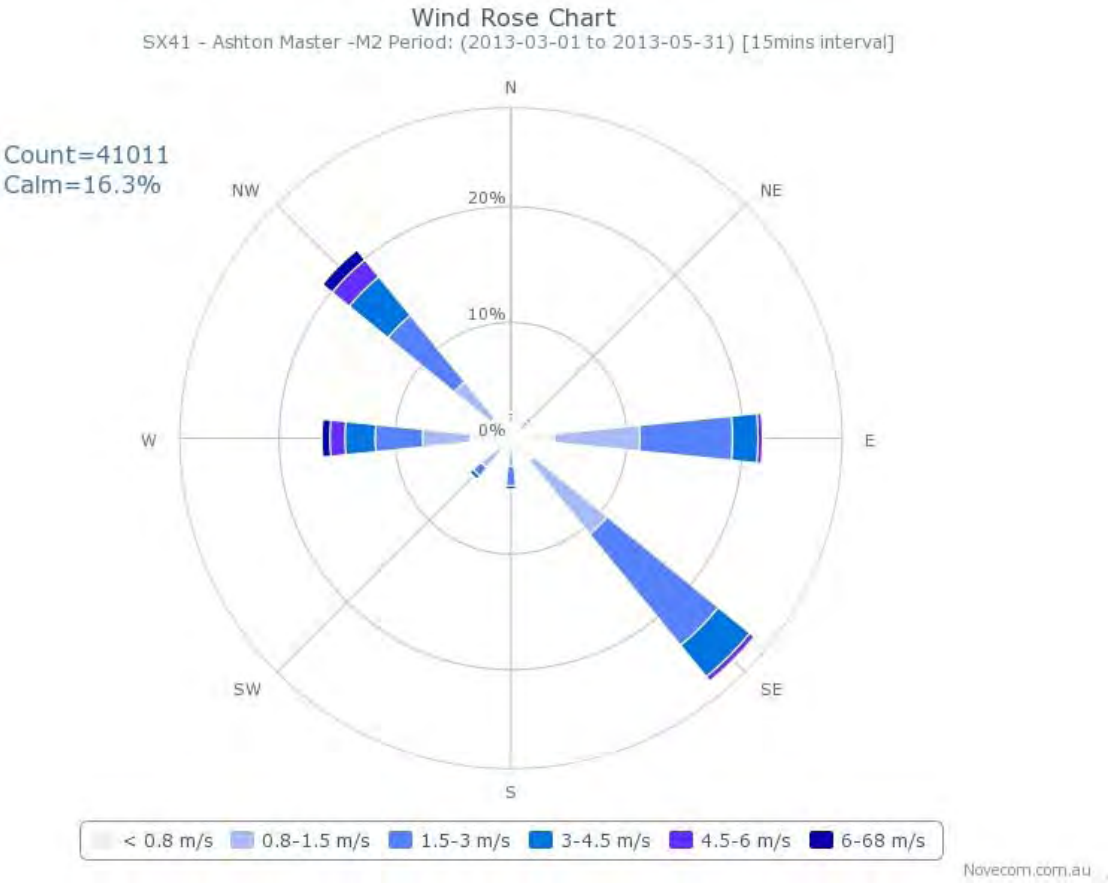


Figure 6: Ashton Coal autumn wind roses for 2013

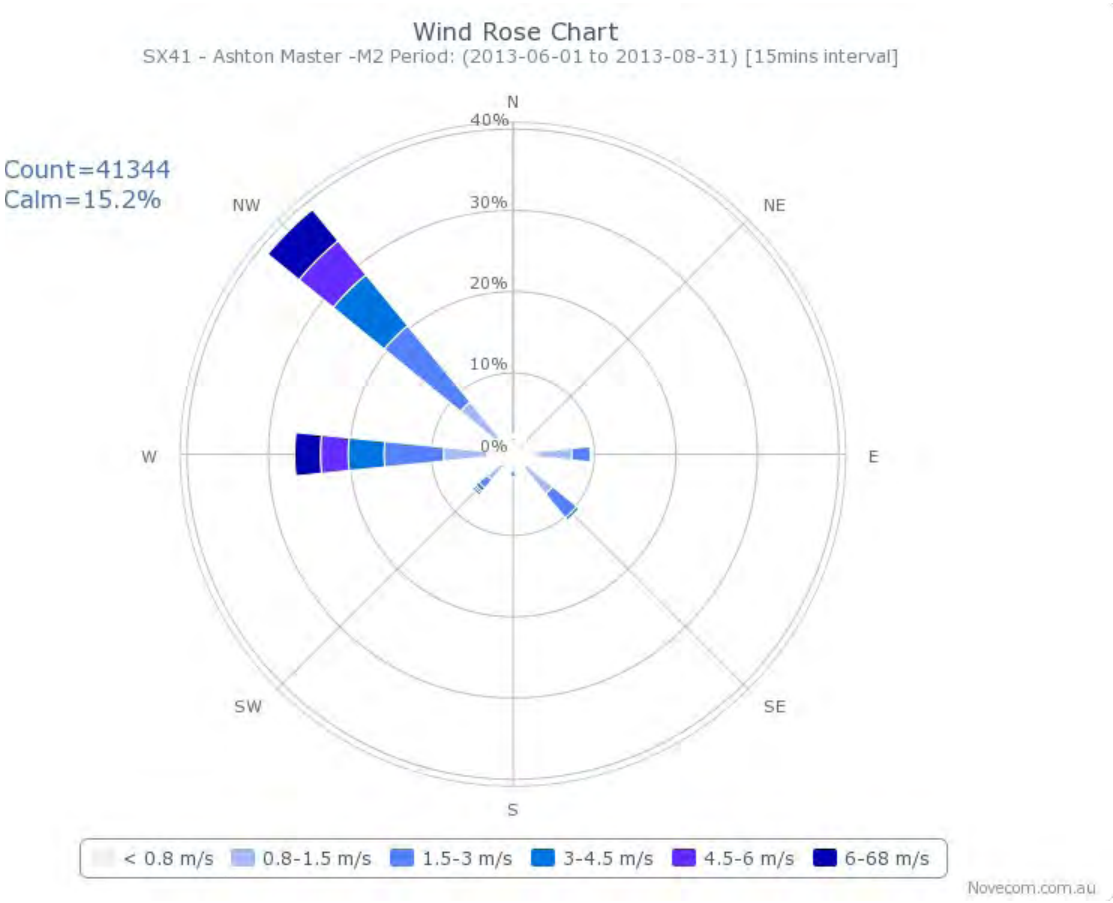


Figure 7: Ashton Coal winter wind roses for 2013

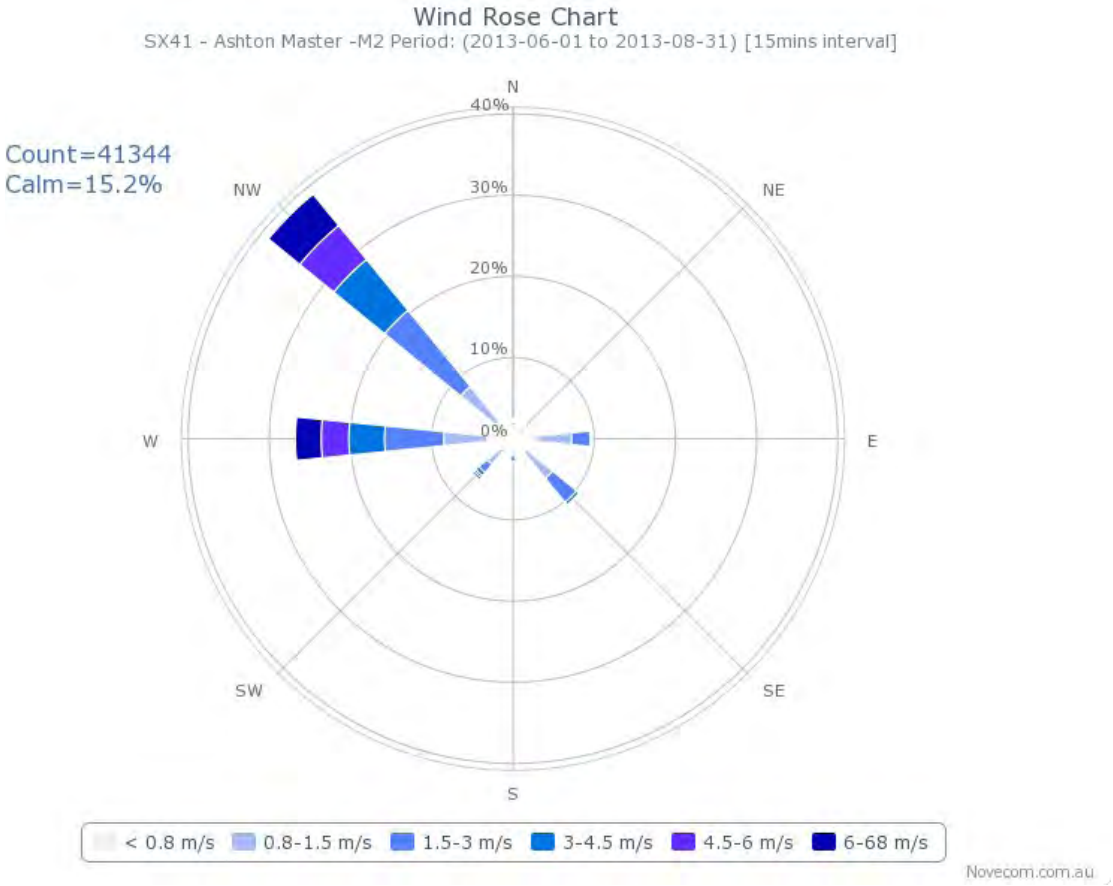


Figure 8: Ashton Coal spring wind roses for 2013

3.2 Air Quality

3.2.1 Environmental Management

The currently approved Air Quality and Greenhouse Gas Management Plan was approved by the DP&I in August 2006. During 2013, the plan was reviewed and will be submitted for regulatory approval in Q1 of 2014.

The air quality monitoring network consists of depositional dust gauges, fine particle monitors that operate on a set schedule and real-time fine particulate monitors that operate continuously. The coupling of operational procedures and monitoring allows Ashton Coal to take a proactive approach to dust management where necessary.

Dust deposition gauges record dust fallout, which can be derived from mining or non-mining activities, and provide a useful measure of changing air quality over a long term. Compliance with air quality criteria is demonstrated through depositional dust monitoring by investigating the spatial representation of wind and operational activities for the monitoring period.

Depositional dust monitoring is carried out in accordance with Australian Standard 3580.10.1:2003 *Determination of particulates – Deposited matter – Gravimetric method* and analysed for insoluble solids and ash residue. Depositional dust samples are collected on a 30 day (plus or minus two days) basis from eleven depositional dust gauges surrounding Ashton Coal.

Total suspended particulate (TSP) matter are monitored using four high volume air samplers (HVAS). These monitors operate for 24-hours every six days in accordance with Australian Standard. HVAS measure cumulative dust levels from all sources.

In addition to the HVAS monitors, four statutory real-time dust monitors, referred to as tapered element oscillating microbalance samplers (TEOMs) were used to record fine dust particles (i.e. less than 10 microns in size and referred to as PM_{10}) on a continuous basis during the reporting period.

The locations of all HVAS and TEOM monitoring sites at Ashton Coal are shown in Figure 9.

Ashton Coal's cumulative reduction protocol includes maintaining an open dialogue with neighbouring mining operations, sharing data, maintaining dialogue on the Upper Hunter Mining Dialogue Emissions and Air Quality working groups.

Controls have been put in place in accordance with the management plan to reduce the potential for the generation and movement of dust from Ashton Coal's operation area. These controls are considered to have been adequate for the reporting period, and will continue to be applied during the next reporting period, until such time as the revised Air Quality Management Plan is approved, when controls will be updated accordingly. Current controls include:

- A network of real time environmental monitoring stations with operational controls and triggers to minimize the effect of emissions on the village of Camberwell.
- Large earth berms and tree plantations between the operations and the village have been constructed and planted;
- At the closure of the mining operations in the NEOC, all available overburden dumps were bulk shaped and then rehabilitated during autumn 2012.
- Roads are clearly delineated and maintained and water carts utilised around the site to keep trafficked areas in a damp condition;
- All stockpiles are kept damp by the use of fixed or mobile water sprays under dry and windy conditions;
- All diesel equipment used on site is maintained properly and fitted with appropriate pollution control devices.

During the reporting period Ashton Coal continued to be a signatory to the Upper Hunter Air Quality Monitoring Network (UHAQMN), which was established in October 2010 by the NSW Government in partnership with the coal and power industries. The network now continuously measures dust particles in the air at up to 14 sites throughout the region. The collected data is provided to the community and industry through the Office of Environment and Heritage website.

The Upper Hunter Air Quality Monitoring Network (UHAQMN) has measured elevated particulate matter ($PM_{2.5}$) concentrations in Muswellbrook and Singleton during winter ($PM_{2.5}$ is particulate matter with a diameter of less than 2.5 micrometres). As there are multiple sources of $PM_{2.5}$, including mining, coal-fired power generation, diesel vehicles, road and rail transport, solid fuel heaters and prescribed burning, NSW Health and OEH commissioned a research study to better understand the composition and sources of fine particles in the Upper Hunter. The study found that there was seasonal variations in the contributions from each Factor to $PM_{2.5}$ concentrations measured at Singleton and Muswellbrook, with Factor 1 (wood smoke) dominating at both sites during the winter, while Factor 3 (secondary sulfate) and Factor 5 (industry aged sea salt) make higher contributions during summer months. A copy of the summary report can be found at: http://www.environment.nsw.gov.au/resources/aqms/130722UHVPCSfact.pdf.

3.2.2 Environmental Performance

3.2.2.1 Depositional Dust Gauges

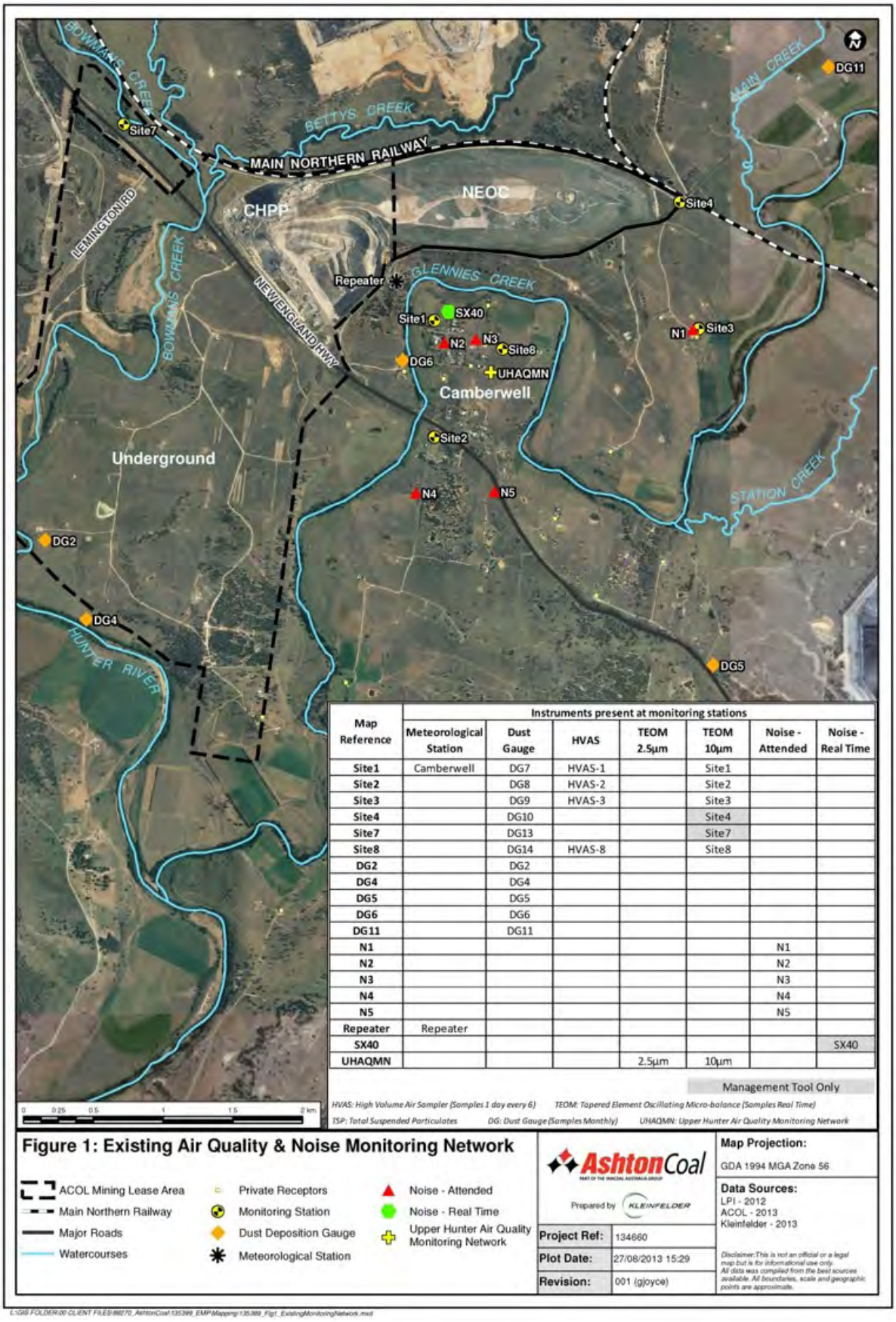
Depositional dust gauge data capture rates for the reporting period were 100 per cent at all statutory sites.

In accordance with the project approval, the criterion for the maximum total deposited dust level is 4 grams per square metre per month (g/m^2/month) over an annual averaging period. The criterion for the maximum increase in deposited dust levels due to Ashton Coal's operations over an annual averaging period at any one dust gauge is 2 g/m^2/month.

Table 13 shows the annual average insoluble solids for each gauge over the 2013 reporting period. There were three offsite depositional dust gauge sites (D2, D6 and D9) which exceeded the annual average of 4g/m^2/month for the reporting period.

Table 13: Comparison of annual average deposited dust results

Site reference	Location	2013 annual average g/m^2/month	2012 annual average g/m^2/month	Annual Average EIA Background Values g/m^2/month
D2	Ravensworth property west of open cut	5.16	4.73	3.5
D4	Ashton property near Hunter River	2.97	5.4	1.6
D5	New England Highway SE of Camberwell village	3.68	4.78	2.0
D6	St Clements Church	4.13	3.2	1.5
D7	TEOM site 1 – Camberwell Village	3.30	3.16	N/A
D8	TEOM site 2 – Camberwell Village	2.47	2.88	N/A
D9	TEOM site 3 – Property east of Camberwell	4.23	3.24	N/A
D10	Onsite - TEOM site 4 (near Dam 56)	4.09	4.39	N/A
D11	Northeast of Eastern Emplacement Area on Glennies Creek Rd	2.82	3.76	N/A
D13	Onsite – TEOM site 7	4.45	3.75	N/A
D14	TEOM site 8 – Camberwell Village	2.91	2.87	N/A



Map Reference	Instruments present at monitoring stations						
	Meteorological Station	Dust Gauge	HVAS	TEOM 2.5µm	TEOM 10µm	Noise - Attended	Noise - Real Time
Site1	Camberwell	DG7	HVAS-1		Site1		
Site2		DG8	HVAS-2		Site2		
Site3		DG9	HVAS-3		Site3		
Site4		DG10			Site4		
Site7		DG13			Site7		
Site8		DG14	HVAS-8		Site8		
DG2		DG2					
DG4		DG4					
DG5		DG5					
DG6		DG6					
DG11		DG11					
N1						N1	
N2						N2	
N3						N3	
N4						N4	
N5						N5	
Repeater	Repeater						
SX40							SX40
UHAQMN				2.5µm	10µm		

Management Tool Only

HVAS: High Volume Air Sampler (Samples 1 day every 6) TEOM: Tapered Element Oscillating Micro-balance (Samples Real Time)
TSP: Total Suspended Particulates DG: Dust Gauge (Samples Monthly) UHAQMN: Upper Hunter Air Quality Monitoring Network

Figure 9: Ashton Coal's meteorological, air quality and noise monitoring locations

Contamination by bird droppings, insects and vegetation is a common issue for depositional dust monitoring systems. During this reporting period there were a number of contaminated results recorded at the statutory dust deposition sites, as detailed in Table 14. A depositional dust gauge is deemed contaminated by an independent monitoring contractor or a National Association of Testing Authority (NATA) accredited laboratory. Results found to be contaminated are excluded from the annual average calculation.

Table 14: Summary of contaminated depositional dust results

Month	Site reference with contaminated result	Month	Site reference with contaminated result
Jan-13	D9, D14	Jul-13	D4
Feb-13	D9, D11, D13	Aug-13	nil
Mar-13	D4, D11	Sep-13	D9
Apr-13	D4	Oct-13	D2, D4, D9
May-13	D6	Nov-13	D4, D9
Jun-13	D4	Dec-13	D9

3.2.2.2 High Volume Air Samplers

A summary of the results from the four statutory HVAS TSP monitoring sites for the reporting period is provided in Table 15. HVAS data capture rates for the reporting period were 100 per cent at all statutory sites. In accordance with the project approval, the long-term annual impact assessment criteria is 90 µg/m^3 over an annual averaging period and there is no TSP short term 24-hour impact assessment criteria.

During the reporting period Ashton Coal's statutory HVAS monitors remained below the long-term annual impact assessment criteria, with the exception of Site 1 – Camberwell village north. The long term trends for HVAS results are presented in Figure 10 and indicate that the trends recorded from all sites during 2013 remain below the long- term trends indicating influences beyond Ashton Coal activities.

Table 15: Summary of HVAS TSP results

Site name	Site reference	Minimum 24-hour result µg/m^3	Maximum 24-hour result µg/m^3	Reporting period annual average µg/m^3	Long term (annual average) criteria µg/m^3
Camberwell village (north)	1	16	247	96	90
Camberwell village (south)	2	14	193	75	90
Property east of Camberwell village	3	13	196	80	90
Camberwell village (east)	8	11	209	79	90

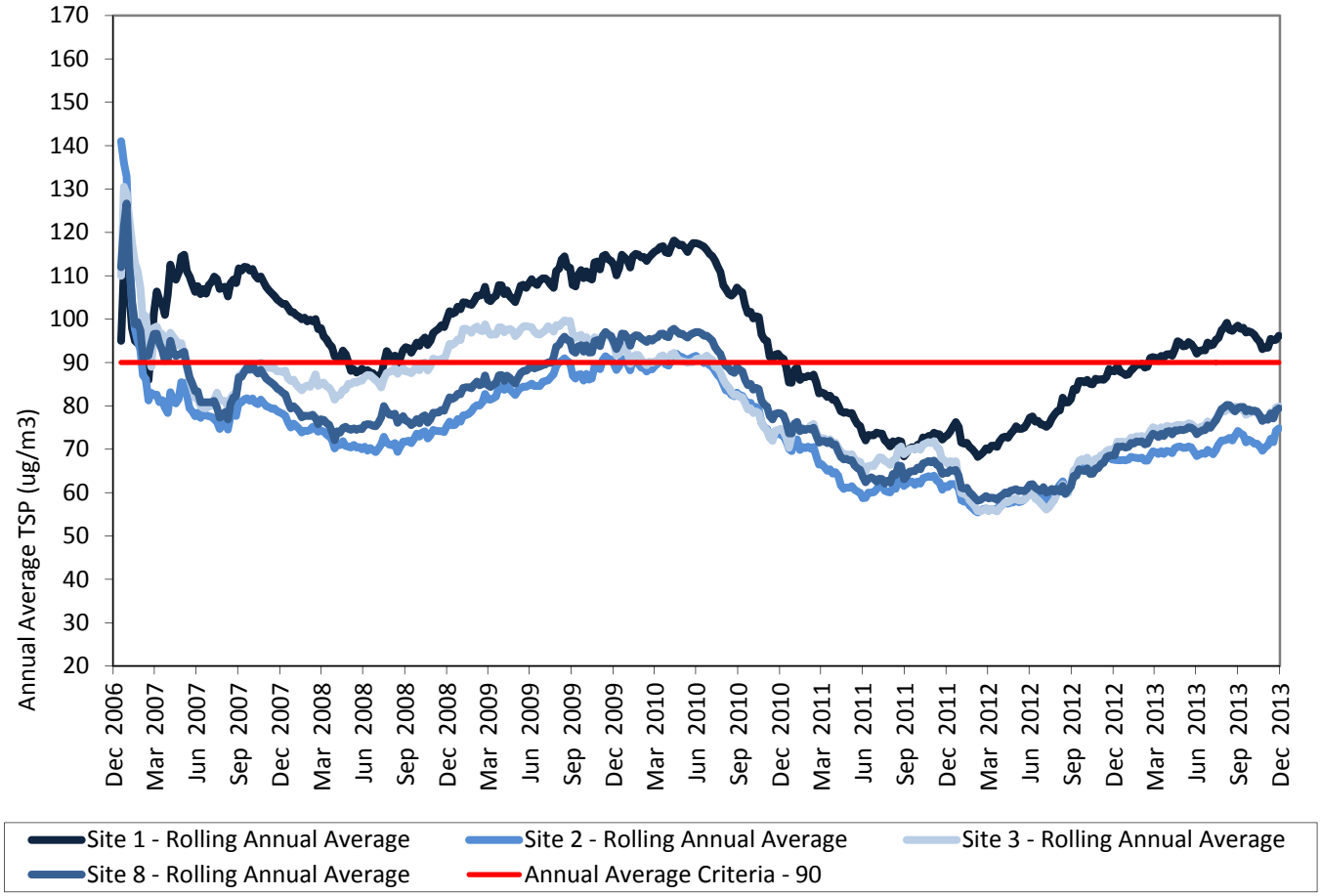


Figure 10: Long Term annual average TSP (HVAS) trends for all sites in the reporting period, 2013.

3.2.2.3 Tapered Element Oscillating Microbalance Samplers (TEOM)

Locations of PM_{10} monitoring stations are detailed in Table 16. Monitoring Locations 4 and 7 are situated to the north of mining operations, immediately south of the Main Northern Railway and are intended to monitor the incoming concentrations of PM_{10} dust when the prevailing winds are from the northwest, which is the wind direction that presents the greatest risk of Ashton pit top facilities impacting the village of Camberwell.

Table 16: Locations of TEOM sites, 2013.

Monitoring Station No	Monitor Purpose	Location
1	Community Site – statutory	Camberwell village (north)
2	Community Site – statutory	Camberwell village (south)
3	Community Site – statutory	Property east of Camberwell village
8	Community Site - statutory	Camberwell village (east)
4	Background (upwind) Site	Onsite near Dam 56
7	Background (upwind) Site	Onsite at north-western end of rail siding
9	Background (upwind) Site	Centre Rail

TEOM data capture rates in 2013 were mainly affected by external electricity service supply, as outlined in Table 17.

Table 17: Data capture rates and outage explanations for statutory TEOM sites, 2013.

Site	Outage	Reason	Data Capture %
Site 1	4 days in January	Filter issues	97
	1 day June and 1 day July 2013	Energy Australia power outage - replacing power poles in Camberwell village	
	1 day in September 2013	Power trip on circuit breaker	
	3 days in November 2013	Flow unit issues - invalid data	
Site 2	1 day in June, 1 day in July and 1 day in August 2013	Energy Australia power outage - replacing power poles in Camberwell village	99
Site 3	n/a	n/a	100
Site 8	1 day in June, 1 day July and 1 day in August 2013	Energy Australia power outage - replacing power poles in Camberwell village	99

A summary of the results from the statutory real-time PM_{10} TEOM monitoring sites for the reporting period is provided in Table 18. During the reporting period the short term 24-hour impact assessment criteria of 50 µg/m^3 was exceeded 68 times on 39 different days at statutory TEOM monitoring sites (sites 1,2,3,and 8), including air emissions from all sources. An investigation into each of these events was undertaken, including using wind directional data to ascertain the operation's contribution, and assessing regional air quality trends and localised influences or events at the time. On all occasions, results of the investigation showed that Ashton Coal's contribution was less than 50 µg/m^3. During the reporting period Ashton Coal's statutory TEOM monitoring sites remained below the long-term annual impact assessment criteria. Long term trends are shown in Figure 11, with seasonal high results evident during the strong winds of spring and high temperatures of summer months.

Table 18: Summary of TEOM PM_{10} results

Site reference	Minimum 24-hour result µg/m^3	Maximum 24-hour result µg/m^3	Short term Criteria µg/m^3	Reporting period annual average µg/m^3	Longterm Criteria annual average µg/m^3
1	2.3	99.3	50	24	30
2	3.9	54.9		17	
3	4.9	104.4		28	
8	4.3	101.6		24	

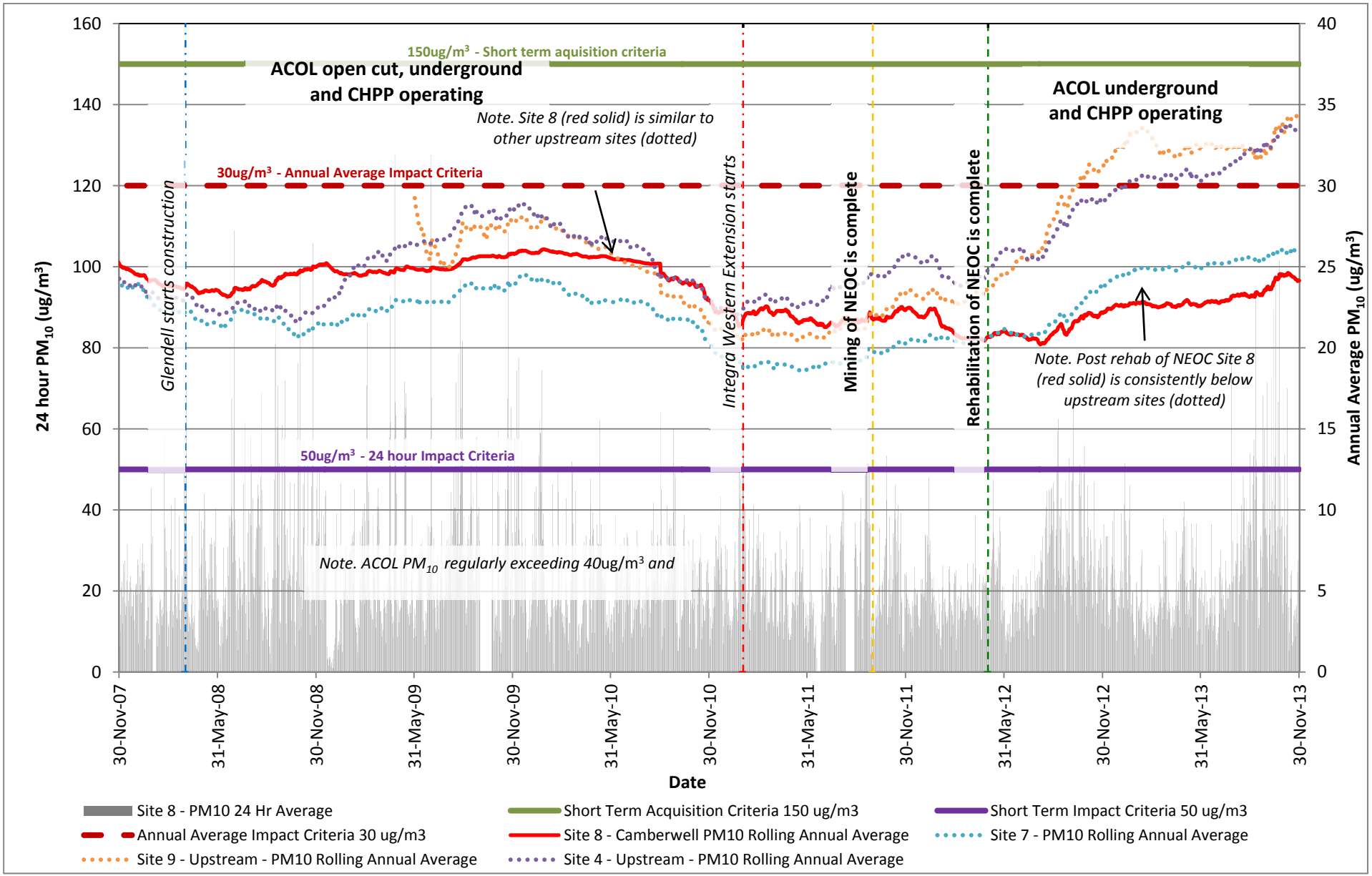


Figure 11: Long Term trend PM_{10}

3.2.3 Reportable Incidents

There were no reportable incidents or community complaints relating to air quality during the reporting period.

3.2.4 Further Improvements

Ashton Coal will continue to work with neighbouring mining operations to minimise cumulative impacts to the village by sharing relevant data and maintaining consultation with nearby mines as needed. The Air Quality Management Plan will be reviewed and updated in early 2014 to reflect the changes to ACP operations over the past two years.

3.3 Erosion and Sediment

3.3.1 Environmental Management

Ashton Coal employs a comprehensive set of both proactive and reactive control measures designed to minimise the impact of sediment on water sources. The primary management measure for erosion and sediment is the control of initial ground disturbance and timely land rehabilitation following disturbance. Where disturbance is unavoidable, erosion and sediment control structures are established. Major runoff storage dams are located in the following areas:

- On the north-west side of the CHPP (Process Water Dam and Settling Dam);
- On the eastern side of the Eastern Emplacement Area (Dam 56).

In addition, there are a number of minor runoff capture dams that intercept runoff water before it departs site.

3.3.2 Environmental Performance

In accordance with the erosion and sediment control plan, the impact assessment criteria applicable to Ashton Coal are based on the 80th percentile of baseline total suspended solids (TSS) results for samples collected as part of the surface water monitoring program. Visual inspections are undertaken on a regular basis and stream water quality results are presented in Section 3.4.

3.3.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to erosion and sediment during the reporting period.

3.3.4 Further Improvements

Consistent with commitments made in the approved MOP, water from all disturbed areas will continue to be collected in drainage structures and sediment dams. This water will either be recycled in the mine water management system or allowed to leave site following settlement of sediment. Sediment dams capturing runoff from areas of rehabilitation will be designed in accordance with the provisions for sediment retention basins in the *Managing Urban Stormwater Guidelines* (Landcom, 2004) and the ACP Water Management Plan.

3.4 Surface Water

3.4.1 Environmental Management

Surface water at Ashton Coal is managed in accordance with the approved Site Water Management Plan. Controls have been put in place in accordance with this plan to control potential causes of water pollution. These controls are considered to have been adequate for the reporting period.

Water quality for the creeks and rivers surrounding of Ashton Coal's operation is monitored by an independent consultant at 14 statutory monitoring sites. The location of the surface water monitoring sites is shown in Figure 12 and described in Table 19. Analysis of all water samples collected is undertaken by a NATA accredited laboratory. Monthly water samples were collected and analysed during the reporting period for pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Total Suspended Solids (TSS) Total Hardness ($CaCO_3$), and Oil and Grease (O&G).

Ashton Coal's site water management plan aims to minimise any adverse impacts on receiving waters downstream of Ashton Coal, including Glennies Creek, Bettys Creek and Bowmans Creek, all of which drain into the Hunter River. The plan also outlines measures for managing water on site. Ashton Coal's approved surface water monitoring program has established impact assessment criteria. Impact assessment criteria can be described as trigger values which, if activated, would lead to a response in terms of more intensive monitoring, investigation and if required, remedial action.

3.4.2 Environmental Performance

The location of surface water monitoring sites and data capture rates are provided in Table 19. Most of the time monitoring locations SM1 and SM2 in Betty's Creek were dry, which is typical for this watercourse. A summary of the surface water quality data for statutory sites during the reporting period is provided in Table 20.

Table 19: Surface water monitoring locations and data capture rates

Monitoring Station	Stream	Location	Data capture rate %
SM 1	Bettys Creek	Glendell land upstream of Ashton	17*
SM 2	Bettys Creek	Just upstream of confluence with Bowmans Creek	17*
SM 3	Bowmans Creek	Water pool at north west corner of mine lease	100
SM 4	Bowmans Creek	Water pool immediately downstream of New England Highway	100
SM 5	Bowmans Creek	Halfway down Ashton property	100
SM 6	Bowmans Creek	Just upstream of confluence with Hunter River	100
SM 7	Glennies Creek	Upstream of Ashton Mine	100
SM 8	Glennies Creek	Halfway down Ashton property	100
SM 9	Hunter River	Upstream of confluence with Bowmans Creek	100
SM10	Hunter River	Downstream of confluence with Bowmans Creek	100
SM 11	Glennies Creek	Upstream of confluence with Hunter River	100
SM 12	Hunter River	Downstream of confluence with Glennies Creek	100
SM 13	Hunter River	Upstream of confluence with Glennies Creek midway between Bowmans Creek and Glennies Creek	100
SM 14	Hunter River	Directly upstream of confluence with Glennies Creek	100

** SM1 and SM2 in Betty's Creek were dry.*

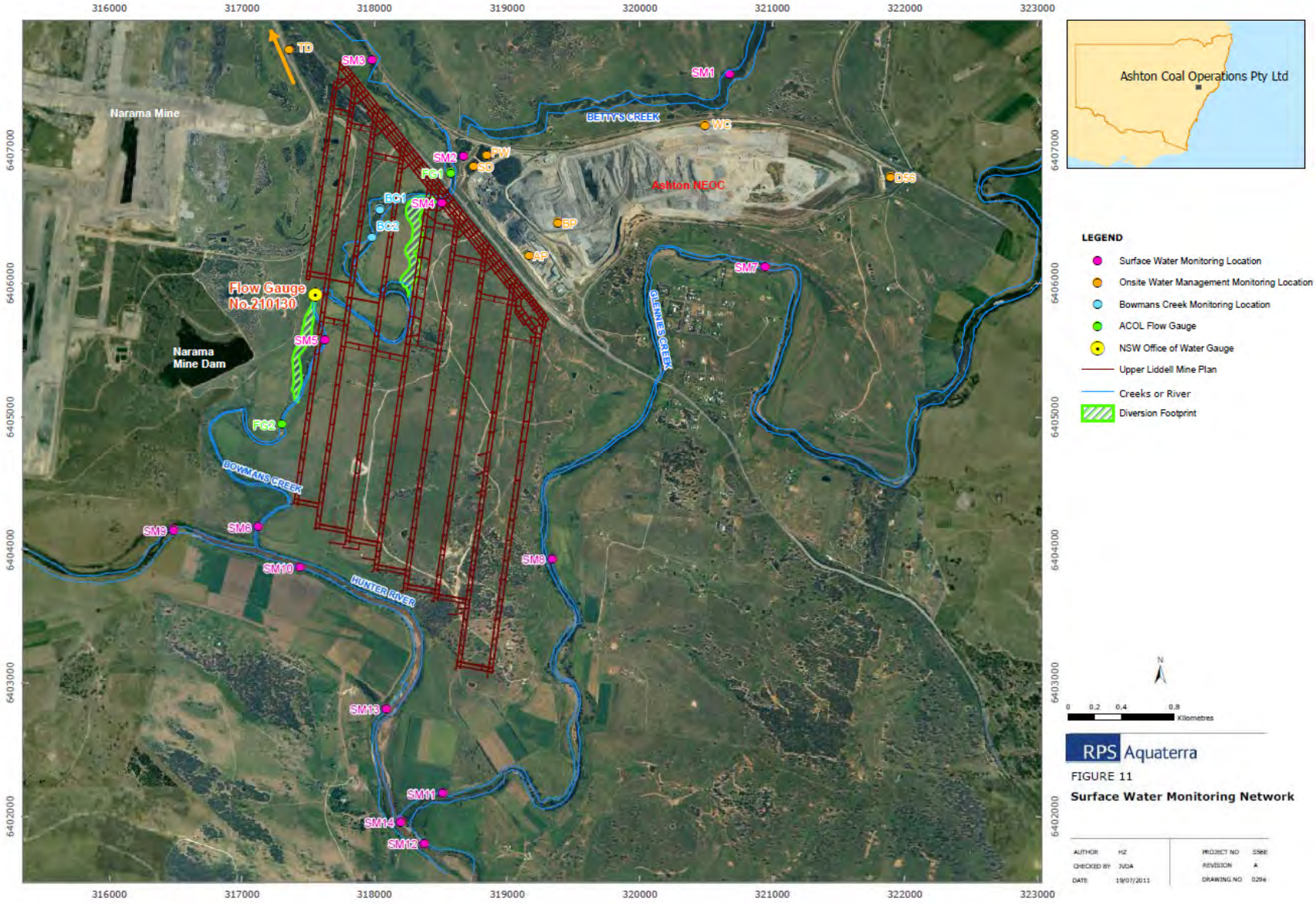


Figure 12: Ashton Coal's surface water monitoring locations

Table 20: Summary of surface water quality monitoring results

Creek System	2013	pH	EC µS/cm	TDS mg/L	TSS mg/L	Total Hardness mg/L
Bettys Creek	Minimum	7.5	701	448	10	151
	Maximum	8.0	2210	1440	36	654
	Average	7.8	1238	807	25	388
Bowmans Creek	Minimum	7.3	670	432	1	172
	Maximum	8.4	4060	2250	96	600
	Average	7.9	1148	660	19	280
Glennies Creek	Minimum	7.6	208	113	1	48
	Maximum	8.3	707	437	28	360
	Average	7.9	450	259	9	124
Hunter River	Minimum	8.0	447	248	4	127
	Maximum	8.6	1103	639	90	757
	Average	8.4	840	468	20	295

3.4.2.1 pH

Surface water pH measured in Bowmans Creek (SM3, SM4, SM5 and SM6) were slightly alkaline (ranging from 7.3 to 8.2) and remained within the acceptable pH range.

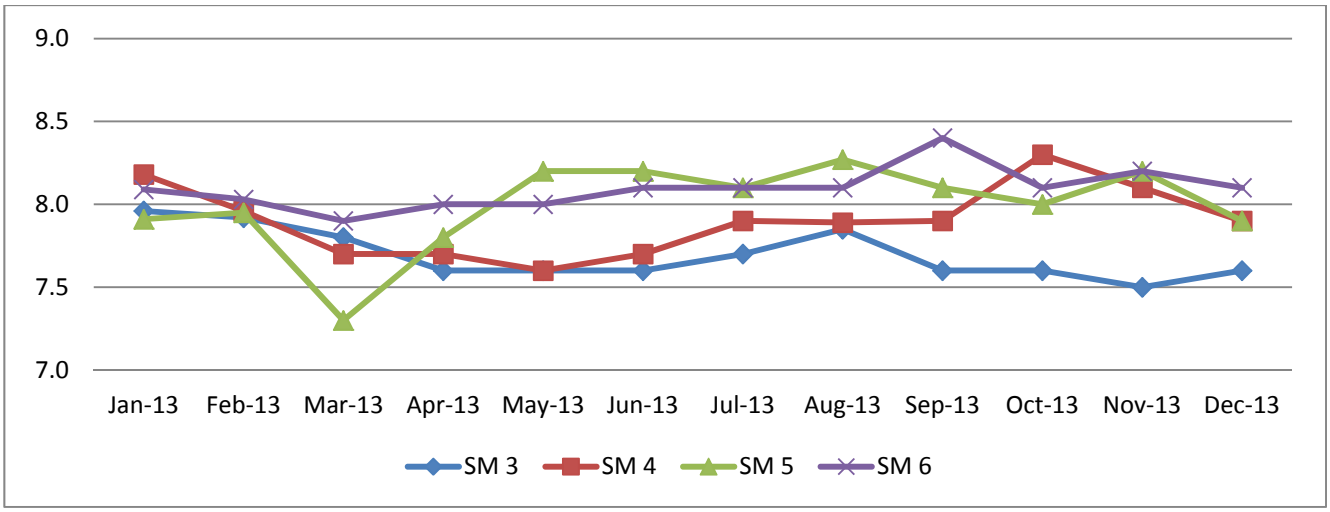


Figure 13: Bowmans Creek pH levels during 2013

Glennies Creek (SM7, SM8 and SM11) pH levels were slightly alkaline (ranging from 7.6 to 8.3) with little variation between sites for most of the year. The pH levels at this site were also very similar to 2012 levels. The pH levels remained within the acceptable recommended pH range.

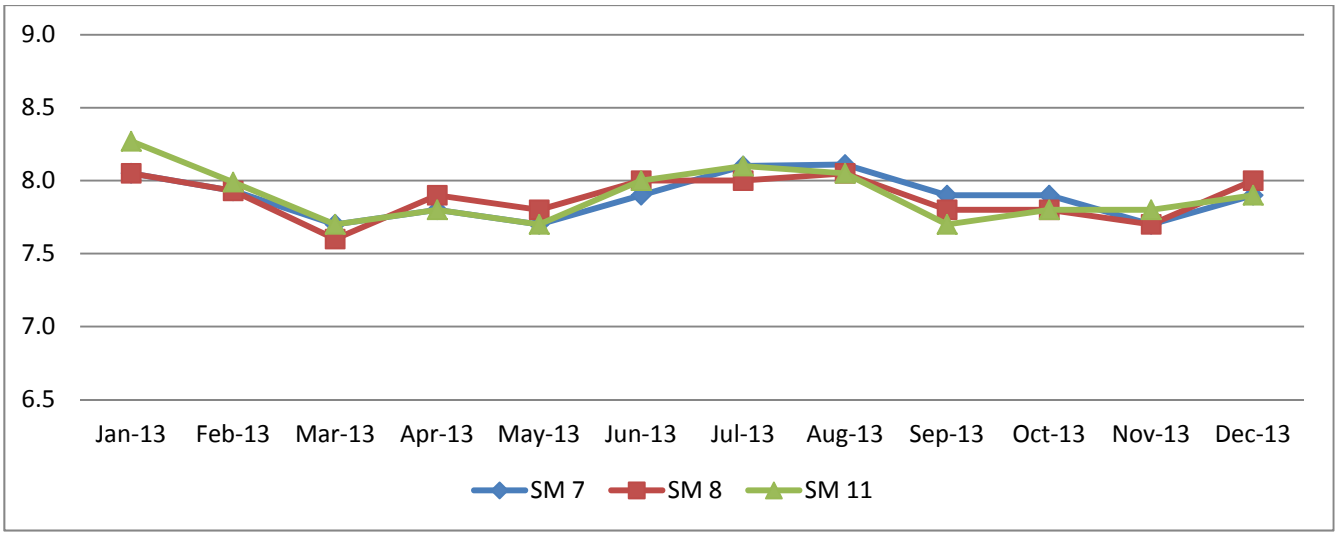


Figure 14: Glennies Creek pH levels during 2013 Figure 15: Bowmans Creek pH levels during 2013

pH levels in the Hunter River (SM9, SM10, SM12, SM13 and SM14) were neutral to slightly alkaline (ranging from 8.0 to 8.6) with minimal variation between sites, and remained within the acceptable recommended pH range. The pH levels at these Hunter River monitoring locations were comparable to 2012 levels.

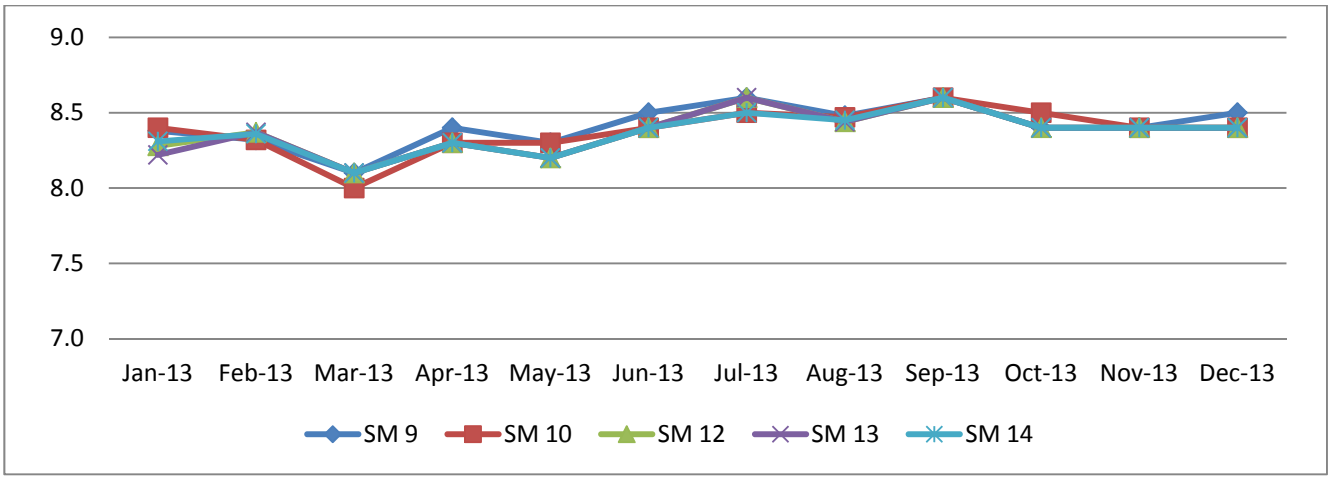


Figure 16: Hunter River pH levels during 2013

3.4.2.2 Electrical Conductivity (EC)

Surface water Electrical Conductivity (EC) results were generally higher during the reporting period in comparison to results from 2012. Maximum concentrations were generally consistent with results from 2012.

The EC trends in Bowmans Creek indicate there was pooling and little to no flow at the start of the reporting period, with flow returning during the latter part of the reporting period. Bowmans Creek sites (SM3, SM4, SM5 and SM6) generally experienced higher EC compared to other sites. This is due to an inflow of saline ground water which forms most of the flow during dry months and low surface flow periods, resulting in increased EC levels.

Bowmans Creek EC levels fluctuated between 670 - 4060µS/cm (Figure 17). Elevated levels in EC at SM4 have been observed previously and result from natural saline groundwater inflows to the pool. During periods of low flow in Bowmans Creek, the saline groundwater discharge becomes the dominant supply of water to the pool resulting in increasingly elevated EC levels. EC levels greater than 10,000 µS/cm have been historically observed at the site. Figure 17 illustrates the gradual increase in EC at SM4 during the latter half of the year as the creek gradually dries up and saline groundwater becomes the predominant water source for the pond,

followed by a rapid decrease after heavy rains in November, indicating that surface flow is the dominant water source during December.

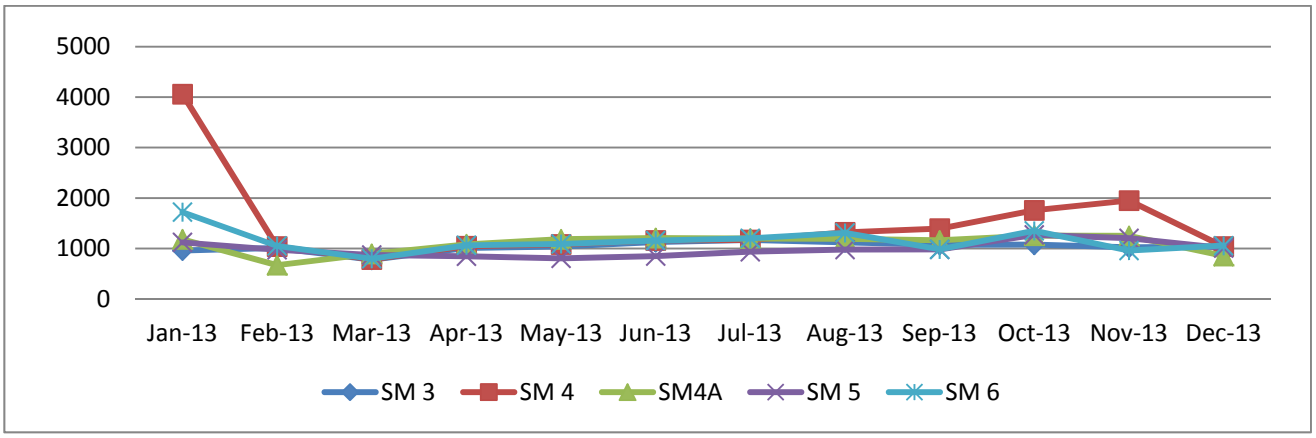


Figure 17: Bowmans Creek EC during 2013

Glennies Creek (SM7, SM8 and SM11) EC levels remained consistently low throughout the year and were similar in 2012. EC ranged between 208 and 707µS/cm.

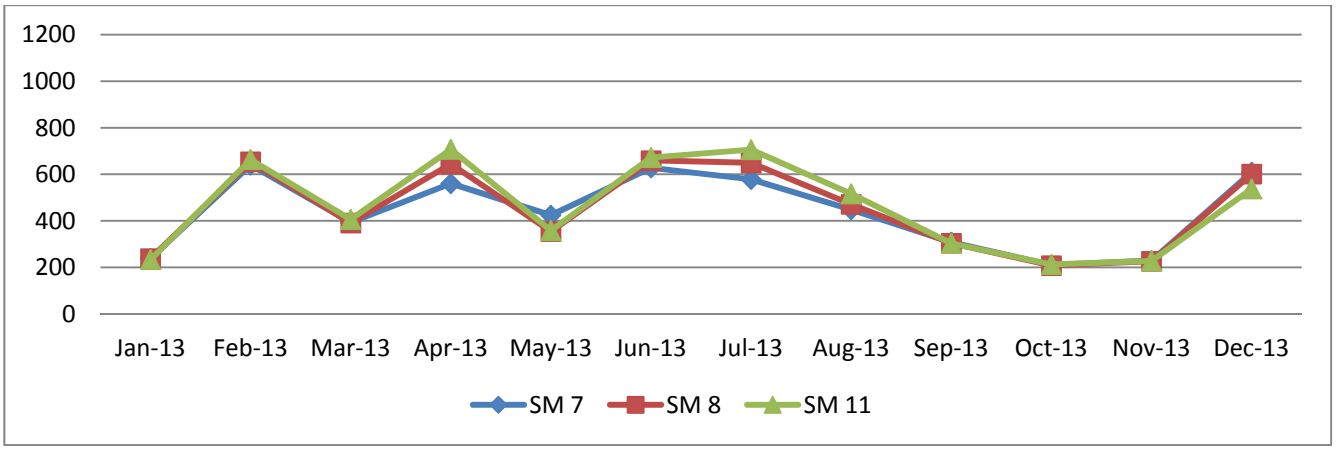


Figure 18: Glennies Creek EC during 2013

Hunter River (SM9, SM10, SM12, SM13 and SM14) EC levels were generally low throughout the year, as shown in Figure 19. An exception to this was from September 2013 onwards where SM12 exhibited lower EC readings compared to other monitoring locations. SM12 is downstream of the confluence with Glennies Creek and therefore receives the regulated flow from Lake St Clair during dry times.

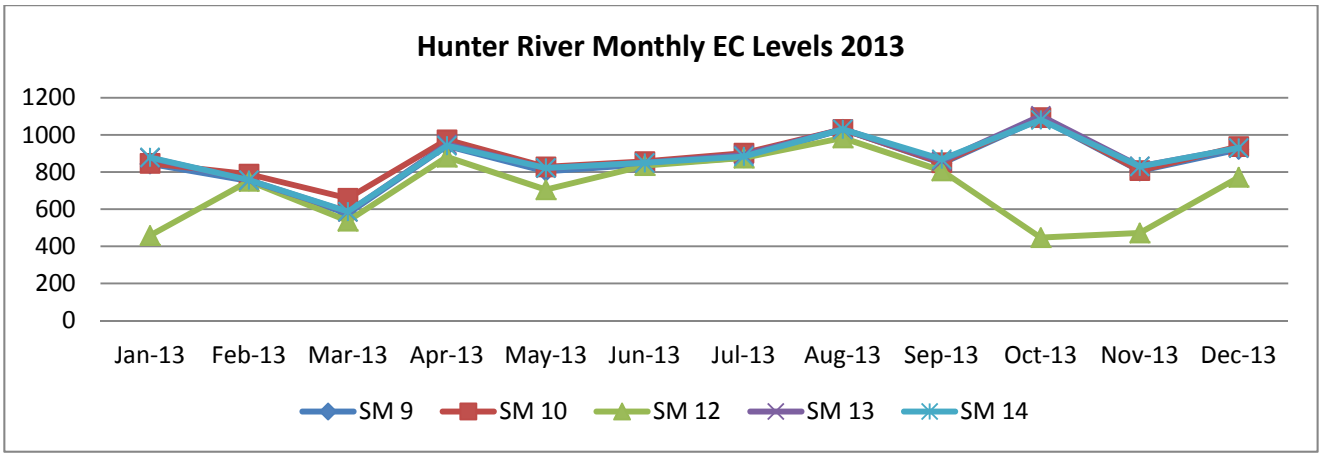


Figure 19: Hunter River EC during 2013

The monitoring data collected during the reporting period continued to indicate that there are no adverse impacts from mining on surface water quality around the mine site.

3.4.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to surface water during the reporting period.

3.4.4 Further Improvements

Ashton Coal will continue to manage the segregation and reuse of mine water to minimise impacts to the natural watercourses. Site water made from underground operations and stored in surface water storages will be used prior to the use of higher quality water from Glennies Creek or the Hunter River, with the exception of Bowmans Creek Diversion rehabilitation and potable water supply.

3.4.5 Bowmans Creek Diversion

Ashton Coal Operations Limited (ACOL) has committed to conduct a survey of the bed and bank of the diverted Bowmans Creek at six months, one year and two years, following the completion of the construction of the diversion channels (completed November 2012) as per the commitments (items 7.1 and 7.2) under Schedule C of the approved Development Application (DA) 309-11-2011-i.

The methodology applied for these surveys comprised the following components:

- Channel geometry survey of the creek diversions, including cross-sectional (bed and bank) and long-sectional (thalweg) surveys of the two creek diversions; and
- Wolman pebble count (Wolman, 1954), involving the measurement of the intermediate axis (i.e. width, or B-axis) dimension of 100 particles (or pebbles) selected at random from the surface of the creek bed following a step-toe procedure.

The eastern creek diversion results show that the majority of the diversion data were within the upper and lower tolerance levels of the natural range data. However, three of the five sample locations within the eastern diversion exceeded the limits at various grain classes. The grain classes exceeded were generally towards the smaller range (sand to coarse gravel), indicating a lack of fine sediment within the constructed channel. These results are not unexpected within a relatively recently constructed channel and it is anticipated that over time finer sediments would accumulate through natural geomorphic processes within the diversion channel. Although six exceedances were recorded at E4, no localised scour or visible avulsion was observed.

The western creek diversion results show that the majority of the diversion data were within the upper and lower tolerance levels of the natural range data. One site exceeded the limit in the small cobble grain class. Future monitoring activities will help determine whether this single exceedance is significant, given the relatively newly constructed status of the diversion channel.

No evidence of significant scour, accumulation of sediment or variation in levels was identified for either diversion.

Willow and poplar removal works were finalised on the northern section of Bowmans Creek during 2013 as part of the Bowmans Creek rehabilitation program. Ecological monitoring of the Bowmans Creek diversion rehabilitation was conducted during the reporting period (refer to Section 3.7.2.1). Tree planting in the Bowmans Creek diversions recommenced, with Wonnarua Mining Rehabilitation (WMR) now contracted to assist in these rehabilitation works. This is the first significant step in working together to fulfil obligations under the Supplementary Ancillary Deed related to Native Title.

3.5 Groundwater

3.5.1 Environmental Management

The location of the groundwater monitoring sites is displayed in Figure 20. The monitoring network is spatially distributed across the underground mining area. Monitoring coverage is focussed in areas within and adjacent to the mining associated subsidence footprint, notably:

- Saturated quaternary sediments (alluvium) including:
  - Bowmans Creek Alluvium (BCA)
  - Glennies Creek Alluvium (GCA)
  - Hunter River Alluvium (HRA).
- Shallow Permian sandstone and minor coal seams referred to in this report as coal measures overburden (CMOB).
- Permian coal measures of varying thickness targeted by mining.
- An identified Groundwater Dependent Ecosystem (GDE), a River Red Gum population.

Ashton Coal's site water management plan aims to minimise any adverse impacts on aquifers in proximity to the operation, including the two major aquifer areas, the hard rock coal measures and the shallow alluvial deposits associated with the Hunter River. The plan also outlines measures for managing water at the operation. The groundwater monitoring programme includes monitoring groundwater level, piezometric pressure and field water quality parameters and has been carried out in accordance with the 2012 Ashton Coal Water Management Plan and the requirements detailed under the conditions of Development Consent DA No. 309-11-2001-i and Environmental Protection Licence 11879.

Ashton Coal's approved groundwater monitoring program has established impact assessment criteria. Impact assessment criteria can be described as triggers values that, if exceeded, would lead to a response in terms of more intensive monitoring, investigation and ultimately if required remedial action.

Monitoring of water levels and water quality parameters is undertaken on a bi-monthly basis at monitoring bores, which generally consist of a small diameter observation well lined with plastic pipe. Chemical speciation is undertaken on relevant bores twice yearly, and permeability testing is undertaken during installation of new monitoring bores to determine local groundwater flow conditions.

During the review period the monitoring network was expanded with the addition of the following piezometers:

- A multi-level VWP (WMLC361) installed south of LW7B in September 2013 to increase the monitoring coverage in the area. Piezometers were installed in the Lemington, Arties and ULD seams.
- Three multi-level VWPs (WMLP362, WMLP363 and WMLC339) installed in December 2013 in chain pillars between completed PG longwalls to increase the understanding of the vertical propagation of depressurisation related to subsidence cracking.

All installed piezometers were completed in accordance with specifications outlined in the *Minimum Construction Requirements for Water Bores in Australia* (NUDLC, 2012).

Condition 9.2(d) of the development consent required the AEMR to contain a Groundwater Management Report. This is contained as Appendix 2 of this document, and details further information on Groundwater Management during the reporting period.

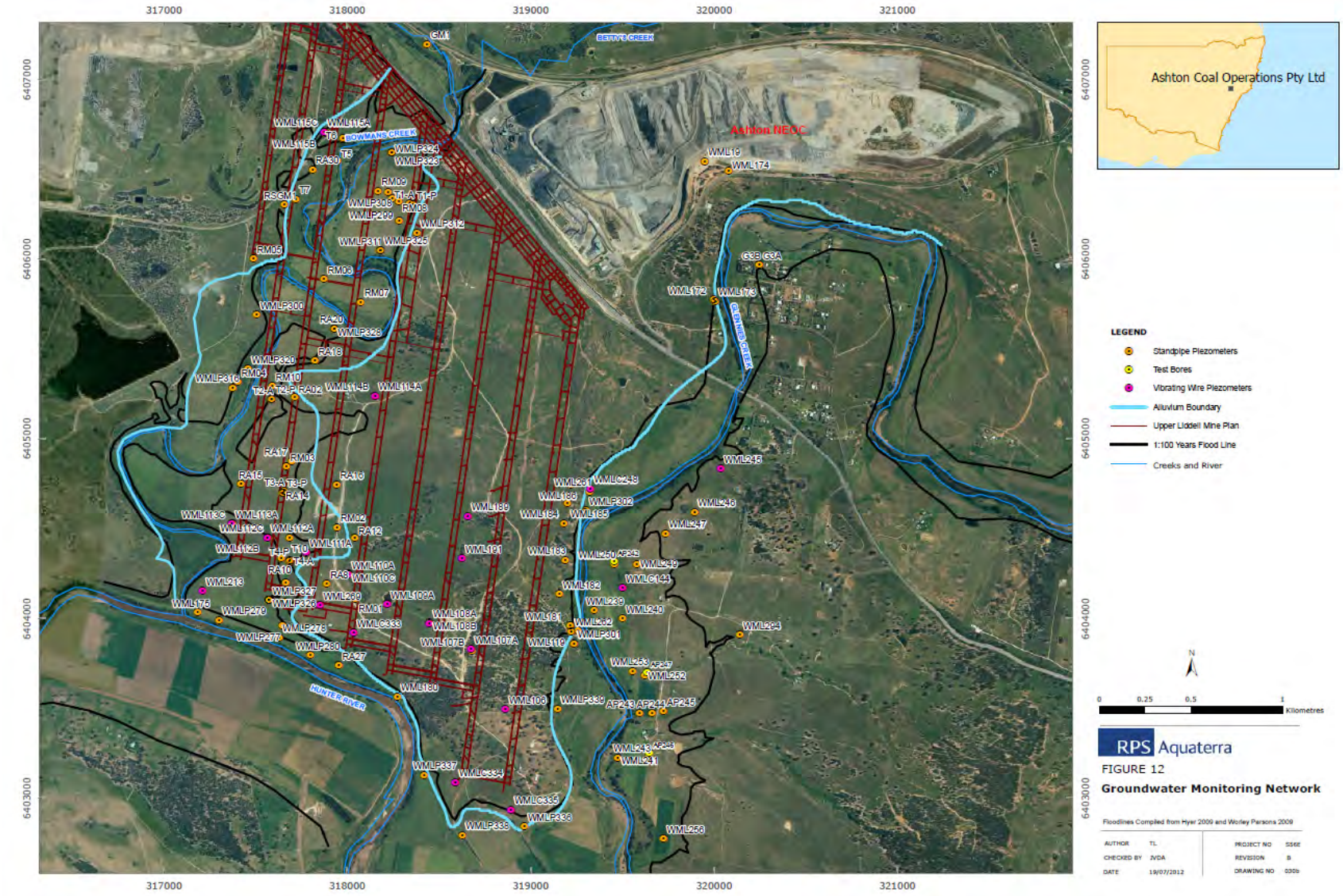


Figure 20: Ashton Coal's groundwater monitoring locations

3.5.2 Environmental Performance

Table 21 provides a comparison of the observed impacts over the 2013 review period and the predictions as detailed in the projects groundwater impact assessments (Aquaterra, 2009 and RPS Aquaterra, 2012).

Table 21: Summary of groundwater monitoring results

Impact	Description	Observed	Predicted [1]	Trigger Value
Glennies Creek Alluvium – Groundwater Drawdown	South of LW101	0m	0.11m	>0.11m
	East of central portion of LW01	0m	0.18m	>0.18m
Hunter River Alluvium – Groundwater Drawdown	South of LW104	0m	0.01m	>0.01m
	South of LW105-107	0m	0.01m	NA
Bowmans Creek Alluvium - Groundwater Drawdown	In the vicinity of the oxbow meander west of LW104B	NA[2]	0.5 to 2m	>0.5 to 2m
	Above LW6A and LW7A	0 to 3m	Partly dewatered	NA
	Groundwater dependant ecosystems south east of LW7A.	0m	>0.5m	0.5m
Reduction in Baseflow	Glennies Creek	0 L/sec	2.90 L/sec	>2.9 L/sec 3
	Bowmans Creek	0 L/sec	0.59 L/sec	0.5m drawdown west of LW104B
	Hunter River	0 L/sec	0.13 L/sec	>0.1m drawdown south of LW104B
Mine Inflows	Inflow rate	32L/sec	15.7 L/sec	23.5 L/sec
	Total Underground Inflows	242ML	505ML	NA

Notes: 1 Predicted impacts by the end of mining at LW101-LW104, excludes mine inflows
2 No monitoring points were available in vicinity of the oxbow meander over the review period
3 As predicted for the start of mining ULD LW101
4 Impact sustained over a period of 3 consecutive months

Groundwater level responses to mining operations have been found to be consistent with the timing and predicted impact in the 2009 Bowmans Creek Impact Assessment (RPS Aquaterra, 2009). Drawdown was observed in the Bowmans Creek alluvium above LW6B and LW7B. This alluvium was predicted to be partially to fully dewatered following PG extraction and the observed response is within predicted levels. There was no mining related drawdown observed within the Glennies Creek Alluvium or Hunter River Alluvium. Water levels in these alluvial units showed fluctuations consistent with rainfall recharge and within historical water level elevations.

Results from the monitoring of groundwater quality in the alluvial aquifers over the review period have aligned with the baseline trend of low salinity and neutral pH levels. Detailed data analysis and interpretation is provided in Appendix 2. No groundwater quality impacts were identified over the review period.

During the review period the NEOC pit was utilised for backfilling and for water storage purposes. Stored water is made up of rainfall captured by the mine catchment, including rainfall infiltration to the in-pit waste rock, as well as groundwater inflows and some water pumped in from the CHPP. Groundwater inflows to the open cut are estimated to be only a small proportion of the water balance.

Groundwater inflow and dewatering rates for the underground mine are calculated using metered pumping data and presented as a net dewatering rate in Figure 21. The groundwater model predictions for inflows are included on Figure 21 for comparison. Net dewatering volumes are calculated using a water balance method, i.e. total inflows are equal to the sum of the water pumped from the underground mine, minus the sum of the water supplied for operational purposes. Over the review period the elevated inflows exceed the trigger value by up to 50% and have been sustained above the trigger value for approximately 2 months. If inflows are sustained above 23.5L/sec for a period of 3 consecutive months then the reporting requirement will be triggered as described in the 2012 WMP Mine Inflows TARP.

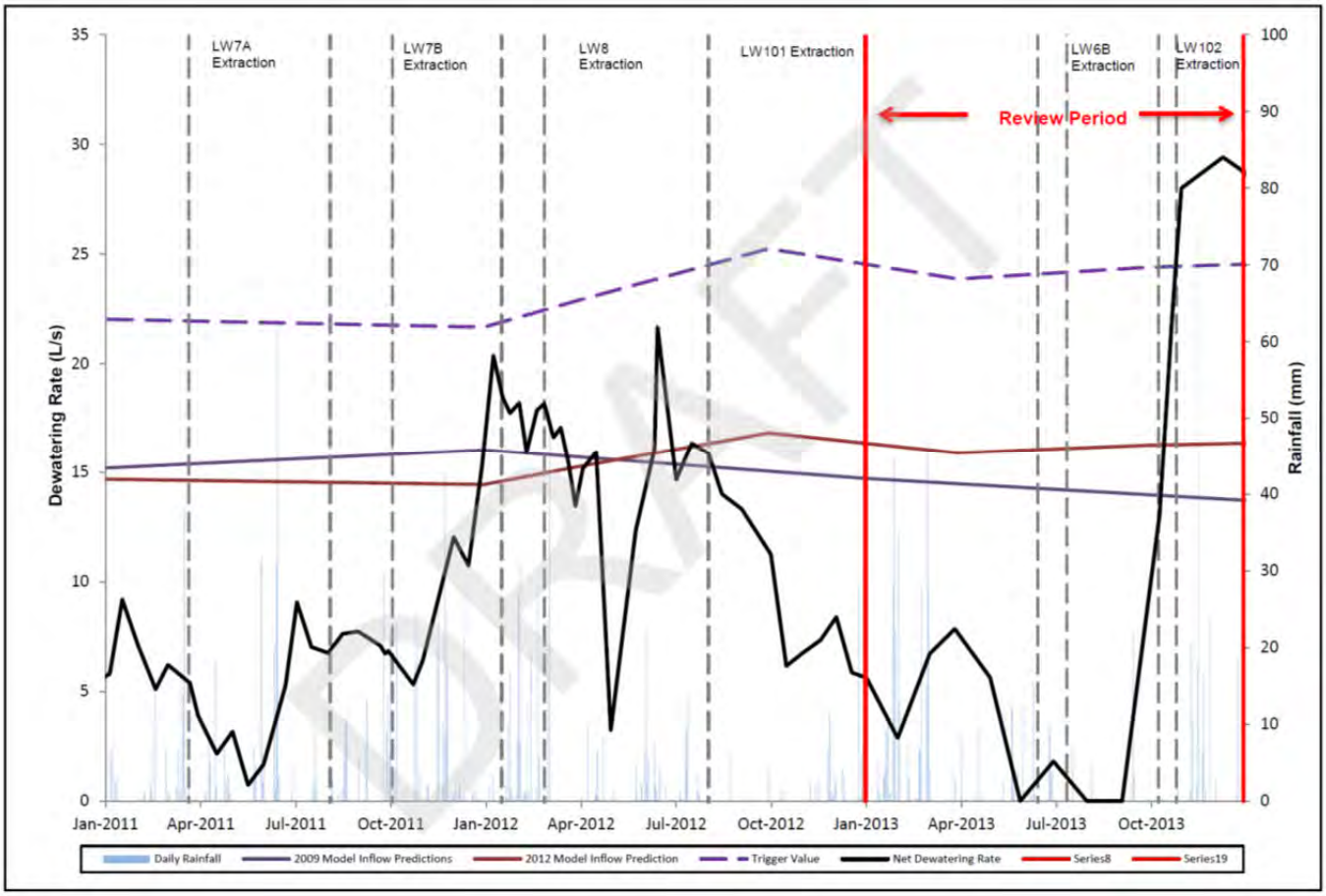


Figure 21: Mine dewatering and predicted inflows

It is considered unlikely that there would be any impact outside predictions on groundwater dependant ecosystems (GDEs) in the vicinity of longwall mining at ACOL. This is because of the following observations:

- No impacts on flows in Bowmans Creek, the Hunter River and Glennies Creek were observed over the review period.
- No significant impacts on the groundwater levels within Hunter or Glennies Creek alluvial aquifers from mining of the PG seam or ULD seam are noted within the review period.
- No groundwater related impacts were observed in the identified River Red Gum area over the review period. The identified River Red Gum area is located next to Bowmans Creek between the southern end of the western diversion and the Hunter River (Figure 1). The trigger value for an impact in this area is 0.5m outside of natural fluctuations, no drawdown attributable to mining was observed in this area.

3.5.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to groundwater during the reporting period and there were no related reportable incidents.

3.5.4 Further Improvements

The following activities are planned for 2014 in response to the groundwater monitoring data collected over the current review period:

- Continuation of the current monitoring programme as detailed in the 2012 WMP.
- Increased underground monitoring of flow rate, water transfer to and from storage and water quality where possible.
- Installation of additional vibrating wire piezometers in the Permian coal measures and overburden to assess vertical propagation of depressurisation above longwalls.
- Installation of additional standpipe piezometers in the BCA aquifer to further define the nature and extent of the water level decline.
- Recalibration of the ACP groundwater model utilising extensive data collected throughout the review period to further refine mine inflow predictions.

3.6 Contaminated Land and Hydrocarbon Contamination

3.6.1 Environmental Management

Hydrocarbons and other hazardous substances are kept in designated storage compounds designed and managed in accordance with relevant standards and procedures. Monitoring and inspection programs are maintained for these facilities to ensure hazardous materials and wastes are being adequately stored and disposed of and that any spills or leaks are promptly reported and managed.

3.6.2 Environmental Performance

Every person employed or contracted by Ashton Coal has a responsibility to take all reasonable steps to prevent harm to the environment occurring from a hazardous substance spill. Should the spill constitute a reportable event under the POEO Act, Ashton Coal will report the event to the relevant authorities. There were no reportable discharges to land during the reporting period.

During the reporting period, all spills were controlled and contained immediately using emergency spill kits or earthmoving equipment to form a temporary bund. Emergency response training was completed in November 2013 with all staff from the CHPP. The scenario of a hydrocarbon spill was simulated and initiation of the Pollution Incident Response Management Plan was tested and clean-up techniques practiced.

3.6.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to contaminated land or hydrocarbon contamination during the reporting period and there were no related reportable incidents.

3.6.4 Further Improvements

Ashton Coal will continue to provide environmental awareness training in 2014, with an emphasis on hydrocarbon spills as this is an ongoing environmental risk which can be managed through appropriate behaviour.

3.7 Biodiversity and Land Management

3.7.1 Environmental Management

Ashton Coal has a Flora and Fauna (Biodiversity) management plan (FFMP), approved in August 2012, that has been prepared to address the management and mitigation of potential impacts of the Ashton Coal Project to aquatic and terrestrial flora and fauna. The FFMP addresses Condition 3.46 of the development approval and

encompasses the requirements of the ACP approval following the Bowmans Creek Diversion modification and the Conservation Agreement.

A Conservation Agreement (dated 16 September 2010) was made between ACOL and the NSW Minister for the Environment under the National Parks and Wildlife Act 1974 (NP&W Act). The Conservation Agreement covers 65.66 hectares in the south east of the ACP (the southern woodland voluntary conservation area). The Conservation Agreement, together with the environmental management plans for the ACP site, constitutes the Plan of Management for the conservation area required by the development consent.

The Bowmans Creek diversions are managed through the commitments made in the Bowmans Creek Diversion Environmental Assessment (2009), and the Bowmans Creek Diversion Management Plan (Appendix F of the Site water management plan). These documents outline the staged construction and rehabilitation programmes that will lead to the full effectiveness of the eastern and western diversions over time.

Each year Ashton Coal undertakes flora and fauna monitoring to track progress against the management plan objectives. The monitoring program is aimed at tracking the condition of habitat areas over time and ensuring that the management plan's established performance indicators and project approval requirements are being met.

Ashton Coal undertakes a vertebrate pest control programme to mitigate the impacts of wild dogs and foxes on native fauna. Throughout 2013 Ashton Coal undertook a vertebrate pest control programme using 1080 baits to target wild dogs and foxes and cat traps were installed near the CHPP to target the cats sighted in this area. This is the third consecutive year the programme has been operating on land owned by Ashton Coal, and is aimed at building on the success of previous years in lowering the number of feral pest in the area.

3.7.2 Environmental Performance

3.7.2.1 Ecological Fauna monitoring

Fauna monitoring (including in the Southern Woodland Conservation Area) was undertaken during autumn and spring 2013 in line with the scheduled monitoring program defined in the FFMP. All surveys were completed in ideal climatic conditions, during which, no survey limitations were identified that could potentially influence findings. The surveys covered both impact sites and analogue (control) sites across the Ashton Coal holdings (Table 22).

In total, 12 fixed position sample plots (temporal replication plots of 100m x 30m area) are surveyed for at least 1.5 hours each day, over 8 days and nights of each sample period, for a total survey time of 288 hours per annum. Surveys include small and large mammal trapping, spotlighting, nocturnal and diurnal call playback, drift netting, Anabat detection, frog and reptile surveys and diurnal bird surveys.

Survey results were largely consistent with findings made over the previous three years. There were positive findings made of significant species, with some known species expanding their home ranges and new significant species being recorded, refer to Table 23.

Summary of significant species results include:

- None of the patches surveyed had negative changes in abundance or home ranges of significant species,
- the total number of significant species across all sites increased since 2012 surveys;
- the total number of individuals from local populations of Grey-crowned Babbler and Speckled warbler increased both within impact and control sites;
- Compared with the pre-mining condition, significant habitats within the impact sites have either remained consistent, or have improved.

Table 22: Ecological monitoring locations

Patch sampled	Sample sites within patch (Number)	Impact history	Type of sample site
1. Open cut regeneration area (OC)	1	Regeneration area, recovering communities. No current impacts.	Analogue Sites
2. Northern woodland (NW)	1	Remnant area removed from mining impacts. No grazing.	
3. South east open cut area 1 (SEOC1)	3	Remnant area removed from mining impacts. Occasional low level grazing.	
4. Southern woodland (SW)	3	Underground mining. No grazing	Impact sites
5. South east open cut area 2 (SEOC2)	2	Remnant area removed from mining impacts. High level grazing.	
6. Underground subsidence zone (UG)	2	Underground mining. Moderate levels of grazing	

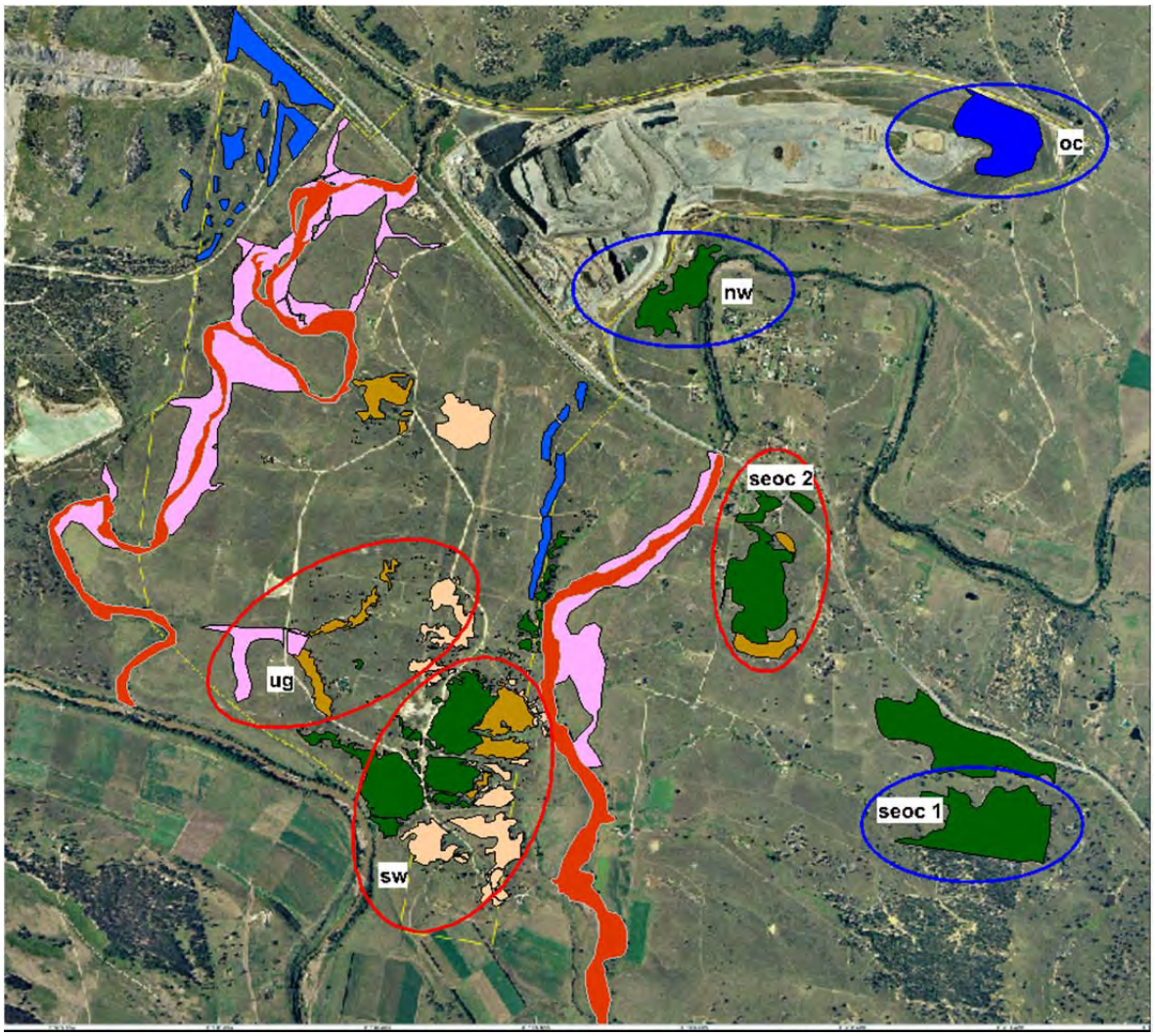


Figure 22 : Monitoring survey sites used for Autumn 2013 and Spring 2013 ecological surveys.
SW; Southern woodland, NW; northern woodland, OC; Open cut regeneration area, SOEC1; South east open cut area 1, SEOC2; South east open cut area 2.

Table 23: Significant species records during 2013surveys

Species													Impact site changes	Recorded* frequency	2013 New Sightings	Significance rating
	SW 2009-2012	SW 2013	UG 2009-2012	UG 2013	NW 2009-2012	NW 2013	SEOC 2009-2012	SEOC 2013	SEOC 2009-2012	SEOC 2013	OC 2009-2012	OC 2013				
Grey-crowned Babbler	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Positive-increase	17	3	Moderate
Turquoise Parrot	Y	N	N	N	N	N	N	N	Y	N	N	N	No change	3	0	High
Speckled warbler	Y	Y	N	Y	N	N	Y	Y	N	N	N	Y	Positive-increase	5	2	High
Hooded Robin	Y	N	N	N	N	N	N	N	Y	N	N	N	No change	3	0	High
Rose Robin	Y	Y	N	N	N	N	N	Y	N	N	N	N	Positive-increase	3	1	High
Red-capped Robin	Y	Y	N	Y	N	N	Y	Y	N	N	N	N	No change	3	0	Moderate
Scarlet Robin	Y	Y	N	N	N	N	N	N	N	N	N	N	No change	1	0	High
Black-breasted Buzzard	N	N	N	N	N	N	Y	Y	N	Y	N	N	Positive-increase	1	2	Moderate
Spotted Harrier	Y	Y	Y	Y	N	N	N	Y	N	Y	N	Y	Positive-increase	7	4	High
Squirrel glider	N	N	N	N	N	N	N	Y	N	N	N	N	Positive-increase	3 (5 individuals)	1	Very High
Little eagle	Y	Y	N	N	N	N	N	Y	N	N	N	N	Positive-increase	3	1	High
Yellow-bellied Sheathtail-bat	N	N	N	N	N	Y	N	N	N	N	N	N	Positive-increase	1	1	High
Large-eared Pied Bat	N	N	N	N	Y	Y	N	N	Y	Y	N	N	No change	9	0	High
Common Bent-wing Bat	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	No change	5	0	High
Large-eared Pied Bat	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Positive-increase	3	1	High

Notes: *Historical records are shown in black text and new 2013 additional records are shown in red text. New recorded species are highlighted green in the species column.*

** Recorded frequency represents how many locations this species has been recorded at during the duration of the sampling period (2009-2013). This gives an indication of its residency, trends in usage and the cryptic nature of each species. For example Spotted harrier is obvious and easily recorded yet is expanding its home range with 4 new sightings.*

Grey-crowned Babbler and Speckled Warbler populations continue to increase their occupation of the local area, in part due to improved management of agricultural lands to create habitat for woodland birds. Spotted Harrier is now considered resident, and can be regularly recorded on every part of Ashton's holdings. Whilst less significant more woodland birds are being recorded every year such as, Rose Robin and Black-breasted Buzzard this year. From these findings we can conclude that the significant species populations are either stable or expanding at both control and impact sites.

Diversity within the southern woodland conservation area has seen a trend towards increasing diversity over the life of this study (2009-2013).The monitoring results also indicate that diversity is increasing across all impact sites, with notable improvements within the SW, NW and OC patches. No patches have decreased in diversity compared to pre-mining condition.

River red gum individuals have been located downstream of impact areas and in other areas of the study area not impacted by mining operations. A relatively new sampling regime applied is the assessment of condition through the replicated measurement of projective foliage cover (PFC) indices taken from sample plants (No 17) within impact and control sites. PFC is measured from replicated DCP (Digital cover photography) vertical camera plots, following the methods of Perkin and Mcfarlane (2009) using the DCP vertical method. These images are classified into canopy, small within crown gaps and large between crown gaps. Crown cover is the fractional cover of canopy and within crown gaps. Foliage cover is the fractional cover of canopy. Crown

porosity is the ratio of crown gaps to crown gaps and canopy cover. Measurements are subjected to Analysis of Similarities tests of significance. The null hypothesis that there is no difference between foliage cover changes of Red gum trees within the impact site compared to the controls areas was tested. This analysis shows that there is no significant difference between impact sites and control sites (Global R, 0.43). 100m x 20m linear river bank transects starting from the location of each sample tree heading down stream are used in the same location as the foliage cover analysis above. To date there is no significant evidence that juvenile recruitment has improved above pre-mining conditions at any of the sample sites, be that impact or control sites.

Following a request from OEH after the 2010/2011 AEMR; an OEH monitoring form will be completed annually for the Ashton Coal Conservation Area and will be included in the AEMR. Ashton Coal commissioned Pacific Environmental Associates to undertake this work during January 2012. The OEH monitoring form is located in Appendix 4.

3.7.2.2 Aquatic Ecology Monitoring of Bowmans and Glennies Creek

Aquatic ecological monitoring was undertaken during the reporting period. Monitoring during the period builds on sampling studies undertaken between 2006 and 2012 and the initial surveys during the EIS phase in 2001. Monitoring was conducted in autumn 2013 and spring 2013 in Bowmans Creek and Glennies Creek, and the monitoring in 2013 also included the first formal monitoring of the Bowmans Creek Diversion Channels that were completed in late 2012. Monitoring locations are shown in Figure 24.

The Aquatic Ecology Monitoring study aims to generate a holistic picture of stream health and therefore a number of monitoring tasks are undertaken including:

- Metered water quality profiling
- Fish trapping
- Aquatic macro invertebrate assemblage analysis
- Aquatic habitat assessment

There are currently 13 monitoring sites available on Bowmans Creek of which a number are located in sections of the creek that are excised since the diversion channels are now fully operational, another four sites on the eastern and western diversion channels (two on Eastern Diversion Channel (EDC) and two on the Western Diversion Channel (WDC)).

Glennies Creek monitoring sites have been reduced to two (GCUp and GCMid) from an initial four sites owing to the consistently similar site conditions arising from the more or less consistent moderate to high Glennies Creek Dam release water flows through the study area. The two sites are deemed sufficient for providing pre mining base-line data.

Not all sites are sampled for the full stream health monitoring program during each survey period as sampling is tailored to site conditions, with some sites only sampled for fish passage and/or field water quality as conditions dictate. As an example, for the present reporting year 2013, and owing to consistent wet weather conditions from the time the new Bowmans Creek Diversions came on line in late 2012 through to the autumn 2013 sampling in June 2013, the initial sampling for the diversion channels concentrated on riffle samples rather than pool samples due to the high flow conditions (see Figure 23). As there were dry weather conditions in the subsequent months through to the spring 2013 sampling period in early November 2013, there was no more surface water riffle flow available in the diversions or the remaining creek, and the spring 2013 sampling for the diversion channels reverted to ‘edge’ sampling.

Figure 23: Connecting channel between EDC and Bowmans Creek in flood January 2013

Mean daily flow rates were very low (less than 1ML/day) for almost three months following the previous Bowmans Creek spring 2012 survey in early November, and then there were three distinct flood events in January to March, with the most significant event occurring between 28th February and 2nd March, where mean daily flow rates peaked at 6017 ML/day. This flood resulted in impacts to channel banks and drainage channels throughout the natural Bowmans Creek study area, including scouring, mobilisation and deposition of stream sediments, cobbles and organic matter, uprooting and deposition of large riparian trees and creation of new flow paths. The diversion channels were not adversely impacted by the high flow events and there were no indications of any significant scouring of the two engineered channels and no end channel scouring impacts, with only minor repairs works undertaken.

The non-engineered connecting channel between the EDC and Bowmans Creek at the downstream end consisted of a series of surface pools connected by multiple flow paths through the old oxbow channel. Whilst the channel showed the results of the recent high flow forces, it is on track to further shape itself to match the localised channel forms over time, as the riparian vegetation continues to grow and hold the banks and as the channel sediments and banks become reshaped by flood events.

Whilst the quality of the aquatic ecosystems within the diversion channels continued to improve over the period between the autumn and spring 2013 surveys, the complexity of aquatic habitats, creek substrates, and riparian habitats is yet to match that of the non-diversion channel sites (both in-line and excised sites). This is consistent with modelling and rehabilitation planning outlined in the Water Management Plan and the predictions made in the Bowmans Creek Diversion Environmental Assessment, which indicate that the rehabilitation program is staged and will take over seven years to complete and reach balance.

The low flow conditions have facilitated the settlement and growth of native macrophyte species, a number of which were recorded from the diversion channels for the first time in spring 2013. These species included sago pondweed, red water milfoil, cumbungi, curly pondweed and clasped pondweed.

Filamentous green algae density was high in pools throughout the EDC and WDC during both the autumn and spring 2013 surveys, compared to excised and remaining creek in-line pools, and is likely to remain so until the riparian vegetation bordering the diversion channel pools is able to provide shading over the diversion pools.

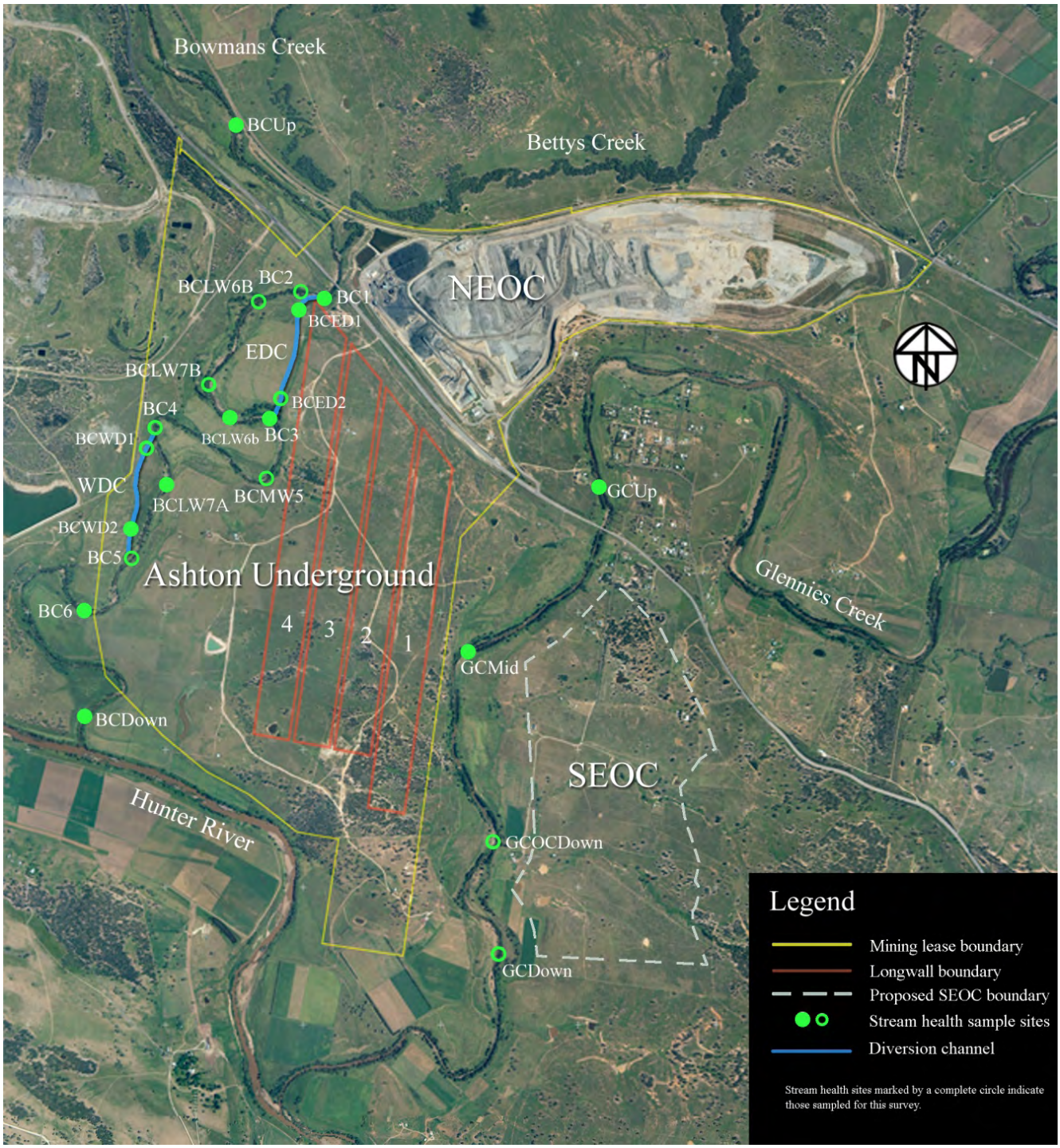


Figure 24: Aquatic monitoring locations

As the diversion channel riparian corridors continue to develop the overall aquatic and riparian habitat condition (RCE) scores should continue to improve. For example, the current status of the riparian corridor does not meet the criteria for "woody vegetation" due to the immature nature of the planted species. However over subsequent surveys it is expected that the saplings will grow to form continuous and dense riparian corridors spanning the full lengths of both the diversion channels. As a direct consequence a number of other RCE categories will also improve to reflect changes associated with an expanding riparian corridor, including stream detritus, aquatic vegetation, lower algae densities and more retention devices in stream.

Notwithstanding the relatively immature state of the overall creek riparian and aquatic habitats, the macro invertebrate sampling over autumn and spring 2013 indicate that the newly established diversion channel sites are supporting a macro invertebrate biodiversity and complexity consistent with that encountered within the range of monitoring sites located up and downstream in the retained Bowmans Creek sections (the in-line sections). The constituent macro invertebrate assemblage currently comprises animals considered to be hardier even though some of the study area's more sensitive aquatic taxa have also been recorded from both diversion sites BCED1 and BCWD2. It is expected that the succession of the aquatic macro invertebrate assemblage will match the establishment through to full development of the diversion channel riparian corridors, substrates and aquatic sub-habitats to eventually match the in-line Bowmans Creek monitoring sites in terms of diversity and quality as measured by SIGNAL scores.

Overall, the diversity and abundance of fish recorded from within the study area site pools for spring 2013 was high. It is most likely that the gradual reduction in pool water levels and subsequent cessation of connecting flow throughout the Bowmans Creek study area has to some extent concentrated the populations of both fish and macro invertebrates into these smaller refuge areas, and this could also explain the relatively high diversity results for both fauna types. The results also show that both the diversion channels and the excised sections of creek adjacent to the diversion channels continue to support sustained populations of fish throughout extended dry periods, even when the surface connecting flows cease. The results also demonstrate that the diversion channels have provided fish passage during periods of extended flow leading up to the spring 2013 sampling period.

3.7.2.3 Vertebrate Pest Control

Baiting programmes were conducted in autumn and spring of 2013. In autumn 26 bait stations were set and each station was checked on five separate occasions over a three week period. All baits not taken after the three weeks were removed on the fifth and final check. The autumn 1080 baiting program was successful, with 20 of the 130 presented baits positively identified as being taken by foxes and five baits taken by wild dogs. In spring, three additional bait stations were added to program, these being installed on the NEOC rehabilitation areas. A total of 29 bait stations were set and each station was checked on three separate occasions over a three week period. Similar trends to the autumn program were observed in spring, with 27 of the 87 presented baits positively identified as being taken by foxes and four baits taken by wild dogs.

With the use of cage traps, a trapping program was implemented in spring 2013 to target the feral cats that had been sighted by Ashton Coal employees on site near the CHPP. Four cage traps were installed and checked daily. No cats were caught in the program, although the traps were continuously set off by rats living in the bush.

Under the *National Parks and Wildlife* Act, 1974 Section 121, license 42000131302NC was issued by the NPWS to Ashton Coal to cull up to 200 Eastern Grey Kangaroos from 1 May 2013 till 31 August 2013. The license was obtained to curb possible impacts on areas of sensitive vegetation from grazing pressure by kangaroos. An open range shoot and kangaroo cull was conducted at the end of the baiting program to shoot any pest animals that were caught under spotlight, and to reduce the high numbers of kangaroos onsite. Over the two nights 129 kangaroos were shot and tagged, one fox and two hares were shot.

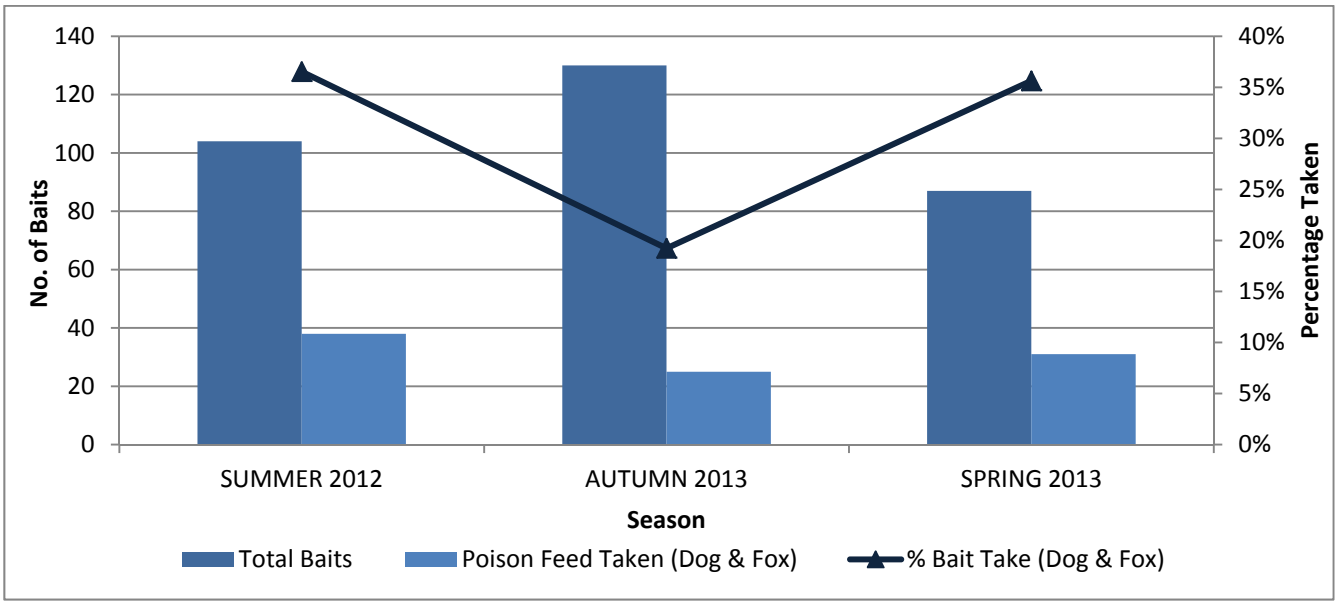


Figure 25: Seasonal 1080 baiting consumption

3.7.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to flora and fauna during the reporting period and there were no related reportable incidents.

3.7.4 Further Improvements

During 2014 a Biodiversity Offset Management Plan will be developed in accordance with DP&I's draft guidelines. This management plan will focus on management measures to be undertaken in the conservation areas and will be reported on in the next AEMR.

3.8 Weed Management

3.8.1 Environmental Management

Areas of weed impact are continually monitored through regular inspections conducted by Ashton Coal. Monitoring is assisted by feedback from mining personnel, contractors and lessees to identify areas of weed infestation.

An annual weed assessment was conducted in early 2013 and the results were used to guide priority of weed treatment for the 2013 reporting period. Weed control programs at Ashton Coal target weeds that are locally declared under the *Noxious Weeds Act 1993*, including African boxthorn, Mother-of-millions, various ground cactus species and St Johns Wort and other environmental weeds. Weed control on site has been consistent over the last few years, targeting the larger populations of weeds, the more invasive species and the riparian zones.

3.8.2 Environmental Performance

Ashton Coal completed approximately 373 hectares of weed treatment during the reporting period. Priority areas for treatment included the mine site boundary, rehabilitation areas and selected offset and conservation areas. Weed treatment is summarised in Table 24 and Figure 26. Activity primarily targeted St John's Wort, African Boxthorn, and Galenia. Observations during the weed treatment program and follow up inspections indicate that treatment has largely been effective.

Table 24: Weed treatment in areas in 2013

Weed Classification	Weed (common name)	Area treated ha
Class 1 Noxious Weed declared in the Upper Hunter County Council	Prickly Acacia	0.8
Class 2 Noxious Weed declared in the Upper Hunter County Council	Mother of Millions	1.9
Class 3 Noxious Weed declared in the Upper Hunter County Council	Coolatai Grass	3.3
	Green Cestrum	13.3
Class 4 Noxious Weed declared in the Upper Hunter County Council.	African Boxthorn	26.5
	Blackberry	6.0
	Prickly Pear	12.6
	St John's Wort	268.6
Serious environmental weed in the Upper Hunter County Council.	Galenia	38.8
	Oleander	0.8

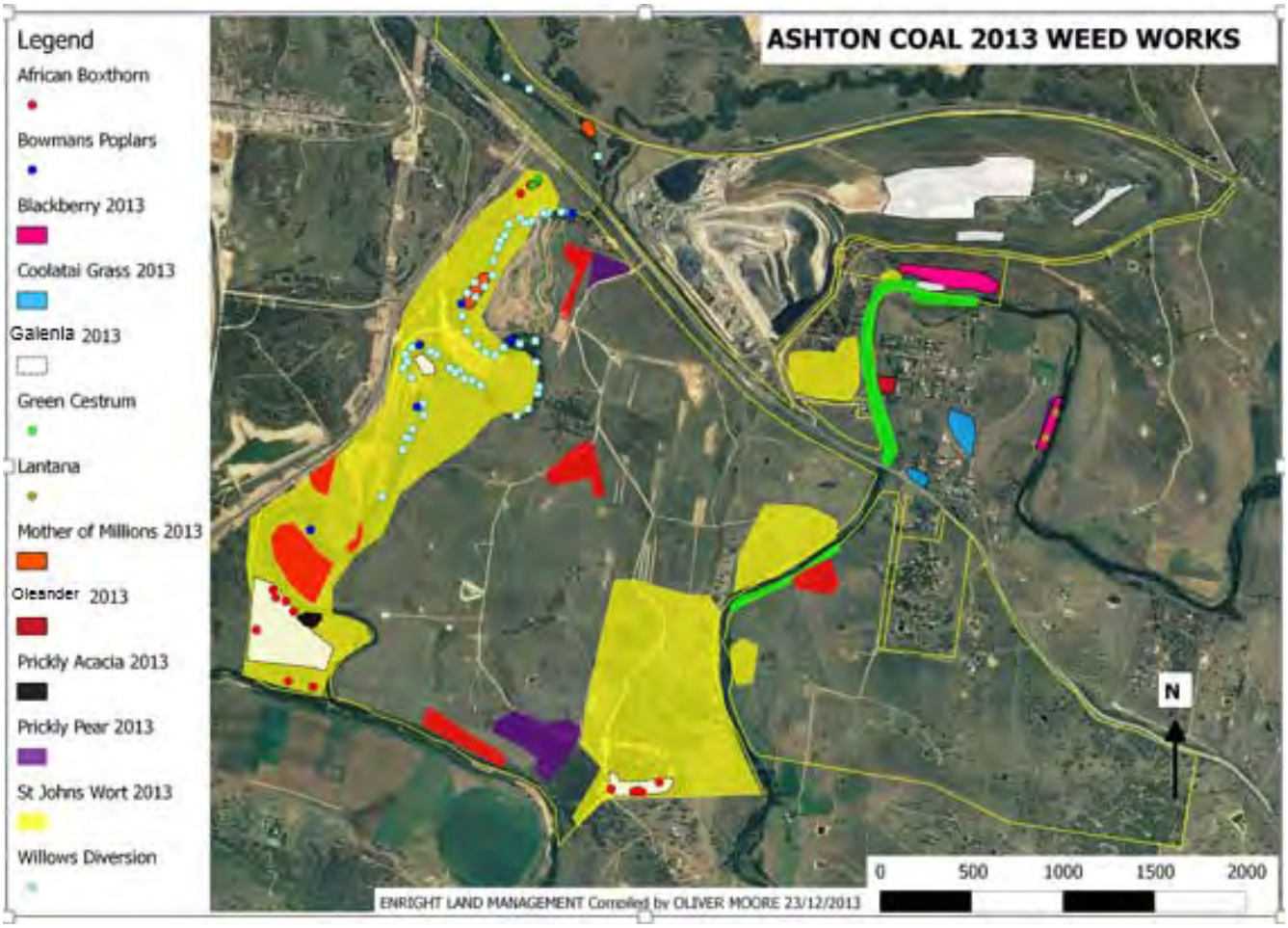


Figure 26: Weed management undertaken in 2013

3.8.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to weed management during the reporting period and there were no related reportable incidents.

3.8.4 Further Improvements

During the next reporting period, Ashton Coal will continue to engage a land management consultant to conduct an annual weed assessment. Weed management will be prioritised based on the outcomes of the assessment.

3.9 Blasting

While a Blast and Vibration Management Plan remains approved it was not required to be implemented during 2013. Ashton Coal has not blasted since September 2011.

3.10 Noise

3.10.1 Environmental Management

Noise management at Ashton Coal is managed in accordance with the Noise Management Plan. This plan was revised in 2013 and will be submitted to DP&I for approval during Q1 of the 2014 reporting period.

Ashton Coal has a range of management strategies in place to limit impacts of noise. The operation's noise management plan details the relevant noise impact assessment criteria, compliance procedures and controls relating to mining activities. A real time noise monitoring station is located in Camberwell Village as a management tool for determining noise sources for responding to high noise levels or complaints.

To adequately sample the noise environment, attended monitoring is undertaken by an independent consultant on a quarterly basis at five statutory monitoring locations as shown in Figure 9. Attended monitoring involves an acoustic consultant listening and measuring dominant noise sources at various locations for a period of time. Attended monitoring is conducted during day, evening and night time periods.

Received levels from various noise sources are noted during attended monitoring and particular attention is paid to the extent of Ashton Coal's contribution. During 2013, potential noise generating activities from Ashton Coal included underground mine related activities, maintenance of equipment, operation of the CHPP, train loading and land management activities.

At each monitoring location, the mine's $L_{Aeq\ (15min)}$, which is the average noise energy over a 15 minute period, and $L_{A1\ (1min)}$ (in the absence of any other noise), which is the highest noise level generated for 0.6 seconds during one minute, is measured. When Ashton Coal was measurable and where meteorological conditions resulted in criteria applying (in accordance with the project approval), a low frequency assessment was conducted in accordance with the NSW Industrial Noise Policy.

The impact assessment includes consideration of mining activity and atmospheric conditions during each measurement. Wind speed and estimated temperature inversion conditions may result in regulatory criteria not being applicable in accordance with the NSW Industrial Noise Policy. The assessment and investigation process for exceedances undertaken by Ashton Coal is described in the noise management plan.

3.10.2 Environmental Performance

Noise generated by Ashton Coal must not exceed the limits specified in Condition 6.34 of the development consent and condition L2.1 of the EPL.

An analysis of periodic attended noise monitoring results indicate Ashton Coal's operations were not audible at any monitoring location during any monitoring periods and therefore, did not exceed the relevant criterion at any location at any time. A summary of results from Ashton Coal's attended noise monitoring is provided in Table 25.

In August 2013 statutory quarterly noise monitoring attempted to monitor a worst case scenario. The monitoring occurred while there was north westerly winds and production rates were high (close to ACOL's highest production from the underground and CHPP in a 24hr period in the last two years); dozers were on stockpiles and there were two trains loaded at 1615 and 2030 during the noise monitoring. There were no exceedences during this monitoring.

Table 25: $L_{Aeq\ (15min)}$ attended noise monitoring results

$L_{Aeq\ (15min)}$	Richards	Scholz*	Clark	Horadam	Moss**
Noise impact assessment criteria (Intrusive criteria) ($L_{Aeq\ (15min)}$) Day and Evening	38	38	38	38	38
Noise impact assessment criteria (Intrusive criteria) ($L_{Aeq\ (15min)}$) Night	36	36	36	36	36
Predicted noise level for 2013 for each monitoring location (2002 EIS)	34	37	N/A	N/A	37
19/02/13 16:00 - 17:15 (Day)	IA	IA	IA	IA	IA
19/02/13 20:25 - 21:45 (Evening)	IA	IA	IA	IA	IA
19/02/13 22:15 - 23:37 (Night)	IA	IA	IA	IA	IA
21/05/13 16:00- 17:29 (Day)	IA	IA	IA	IA	IA
21/05/13 19:42 -21:23 (Evening)	IA	IA	IA	IA	IA
21/05/13 22:00 - 23:26 (Night)	IA	IA	IA	IA	IA
06/08/13 15:14 - 1710 (Day)	IA	IA	IA	IA	IA
06/08/13 18:50 – 21:10 (Evening)	NM	<30	32	IA	IA
06/08/13 22:01 – 24:05 (Night)	IA	32	33	NM	IA
15/11/13 16:27 - 17:44 (Day)	IA	IA	IA	IA	IA
15/11/13 19:59 – 21:20 (Evening)	IA	IA	IA	IA	IA
15/11/13 22:01 – 23:20 (Night)	IA	IA	IA	IA	IA

**Note that to avoid disruptions to the community, the noise measurements at the Scholz residence were relocated along the street to a location in front of the Stapleton residence.*
***The measurement at the Moss residence is taken at the entrance gate to the property.*
NM – Ashton Coal's operations were audible but not measurable.
IA – Ashton Coal's operations were inaudible.
N/A – Predicted noise levels were not applicable as monitored on land owned by Ashton Coal.
Note: Noise emission limits do not apply for winds greater than 3 metres per second (at a height of 10 metres), or temperature inversion conditions greater than or equal to 3 degrees Celsius per 100 metres (condition 6.40)
Condition 6.37 of the consent defines Day as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays, Evening is defined as the period from 6pm to 10pm and Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

In addition to the operational noise, the noise from ACP must not exceed 46 dB (A) L_{max} between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. During the night time measurement samples of 2013 the L_{max} noise from ACP was inaudible. The only exception was that Ashton Coal was audible and measurable at the Scholz and Clark residences

during the August 2013 night monitoring. At the Stapleton residence the loudest L1 $_{(1\ min)}$ noise event was as a result of emissions from dozer tracks and was at 39 dB (A) L1 $_{(1\ min).}$ At the Clark residence the loudest L1 $_{(1\ min)}$ noise event was also as a result of emissions from dozer tracks and was at 41 dB (A) L1 $_{(1\ min).}$ The measured L1 $_{(1\ min)}$ noise did not exceed the sleep disturbance criterion at any location at any time.

3.10.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to noise during the reporting period.

There were six complaints from one complainant that were received through the DP&I regarding noise in the reporting period. In all cases, it was determined that noise was not exceeding limits as a result of Ashton's activities.

3.10.4 Further Improvements

Condition 6.48 requires noise monitoring results shall be of sufficient detail to assess whether Ashton Coal noise contains low-frequency, tonal or impulsive components as defined in Section 4 of the EPA *Industrial Noise Policy* (INP). Low frequency assessment will be carried out in accordance with the INP when Ashton Coal is measurable and where meteorological conditions result in criteria applying (in accordance with the project approval).

The Noise Management Plan has been reviewed and will be submitted for approval in Q1 2014.

3.11 Visual Amenity and Lighting

3.11.1 Environmental Management

Visual amenity and lighting management at Ashton Coal is managed in accordance with the approved Lighting Management Plan. Fixed lighting is utilised to illuminate the areas around the underground surface facilities, CHPP and open cut workshop. During the reporting period an earth bund was constructed and tree screen planted as a visual screen for main fans that are being constructed at the northern end of LW101.

3.11.2 Environmental Performance

Landscaped areas, including earth bunds and tree screens installed along the New England Highway continue to successfully screen the Ashton Coal operation. Further tree screening works were completed in 2013 adjacent to Lemington Road in anticipation of future gas wells as longwall mining progresses to the West.

3.11.3 Further Improvements

Lighting from Ashton Coal will continue to be managed to minimise impacts on the local community whilst maintaining the minimum level necessary for operational and safety needs. The Lighting Management Plan will be reviewed and updated during 2014.

3.12 Aboriginal Cultural Heritage

3.12.1 Environmental Management

Aboriginal cultural heritage at Ashton Coal is managed in accordance with the approved Aboriginal and Cultural Heritage Management Plan, which was approved in August 2012. As part of the ACHMP, Ashton Coal operates under two Aboriginal Heritage Impact Permits; 1131017 over Longwalls 1 – 4, and 1130976 over Longwalls 5 – 8.

Ashton Coal operates within an area that is rich in Aboriginal cultural heritage. Through its cultural heritage program Ashton Coal assesses and manages significant heritage features that occur on its land. Ashton Coal has implemented a management plan that provides the framework to identify, assess, monitor, conserve and manage Aboriginal cultural heritage. The management plan assists Ashton Coal to mitigate the impacts of its operations on Aboriginal cultural heritage, comply with the requirements of the *National Parks and Wildlife Act 1974*, EP&A Act and the development consent and continue its active partnership with the Aboriginal community.

3.12.2 Environmental Performance

Pre-disturbance inspections for minor surface works within underground surface areas continued throughout the year as detailed Table 26 and full correspondence log with Registered Aboriginal Parties (RAP) is provided in Appendix 3.

Table 26 details works undertaken under the two AHIP areas during 2013. These works were all completed with involvement of archaeologists and Registered Aboriginal Parties to assess both archaeological and cultural values of the sites to be surveyed.

Table 26: Summary of Archaeological works undertaken in 2013

Date	Location	Activity	Results
24.01.2013	LW1-4	Surface walk over and grader scrape monitoring of high way HV power cable under bore to vent shaft site.	No artefacts recovered from monitoring. Also involved surface collection of AFA40, AFA112 & AFA63. AFA62 and AFA66 inspected for collection but artefacts could not be located.
24.04.2013	LW1-4	Surface walkover and grader scrapes for proposed exploration boreholes WMLC336, WMLC337, WMLC338, WMLC339, WMLC341	Surface walkover of compound areas followed by monitoring of grader scrapes of compound areas. WMLC 336 not completed by end of the day (see notes on 6.6.13 for completion of this site).
06.06.2013	LW1-4	Gas pipeline lay down areas inspection and surface collection	Surface inspection and collection of 5 areas for gas pipeline lay down. Results and recommendations provided in report 30.6.2013.
06.06.2013	LW1-4	GW2A inspection	An inspection for the artefacts recorded at EWA044 was also undertaken but none were relocated. No artefacts were located within the vicinity of GW2A. Report supplied 19.7.13
06.06.2013	LW1-4	Exploration borehole	Surface collection and grader scrape of exploration boreholes WMLC340 (revised location) and completion of WMLC336. Two artefacts recovered from Passes 1 and 2 at WMLC340.
15.07 - 30.07.2013	LW1-4	Salvage works ULD crack zone LW3 & 4.	Subsidence crack zones were walked by the field crew, followed by testing along the creek line, in the subsidence crack zone, at site EWA057. Testing then moved to the southern end of LW4. Due to artefact numbers, pits extended. Work to continue in this area, and at the southern end of LW3 & LW4 in the next round of field work.
30.07.2013	LW1-4	Inspection of proposed borehole 319112 E, 6404350N LW1.	40x40m area inspected around proposed borehole. No objects identified in inspected area. Results and recommendations regarding fencing off of nearby sites made in report 31.07.2013.
06.11.2013	WUG	Test pit for LW5 Exploration borehole , surface collection of access track way	Exploration borehole southern end of LW5. Test pit excavated. No artefacts recovered. Area grader scraped. One angular fragment recovered. Surface collection of adjacent access track way for vehicle

Date	Location	Activity	Results
			traffic. Artefacts collected GPS'd and bagged for analysis.
25.11.13-13.12.13	LW1-4	Archaeological salvage works Gas Pipeline & LW3.	Surface walk over and collections of areas of gas drainage pipeline located outside of ULD subsidence crack zone. RAPs consulted and a number of areas targeted for test pits followed by grader scrapes. • 15 Grader Scrapes across 14 Gas Pipeline Areas. • 3 Areas were not grader scraped. Two areas had been previously ripped. One area was densely vegetated and crossed a creek line. • 7 artefacts recovered during grader scrapes. Continued salvage works from July in the southern end of ULD crack zone LW3. Testing in crack zone around. Test pits at EWA047. Test pit 4 expanded to open area of 90m²

Ashton Coal have established an Aboriginal Community Consultative Forum (ACCF) with the following objectives:

- To provide regular formal communication with the Aboriginal community and to provide a forum to allow effective communication to take place between Aboriginal stakeholder groups and ACOL.
- To provide information to the community as well as receive feedback on cultural and community issues.

The ACCF is currently chaired by an independent facilitator and is made up of representatives from Ashton Coal, consulting archaeologists and members of ACOL's 32 Registered Aboriginal Parties (RAPs). Each ACOL RAP is invited to participate and is provided documentation from ACCF meetings irrespective of their participation levels. Details of consultation with Indigenous community is provided in Appendix 3.

3.12.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to Aboriginal cultural heritage during the reporting period and there were no related reportable incidents.

3.12.4 Further Improvements

At the request of the ACCF, a set of field work protocols developed by a working party formed from ACCF members has been developed. The fieldwork protocol is due to be approved at the first ACCF meeting held in 2014 and rolled out during field work in Q1 2014.

3.13 European Cultural Heritage

No European heritage sites have been identified within the ACP. St Clements Anglican Church (west of the Camberwell Village) and the Camberwell Community Hall (south of the New England Highway) are listed in the Singleton LEP 1996 as being items of environmental heritage of local significance and the Camberwell Glennies Creek Underbridge is listed under Section 170 of the Heritage Act 1977. These items will not be impacted by underground mining at the ACP and no specific management measures have been recommended for European heritage sites.

3.14 Spontaneous Combustion

3.14.1 Environmental Management and Performance

A Spontaneous Combustion Management Plan has been prepared and implemented on site. ACOL have taken on the responsibility of an area of Macquarie Generations Ravensworth Void 4 area for the disposal of Tailings. This area has had significant spontaneous combustion instances and is managed under the Tailings Emplacement Operations Plan. Part of this management includes regular monitoring by CHPP personnel. Monitoring during this period has shown a decrease in instances of spontaneous combustion. During the reporting period there were no new reports of spontaneous combustion.

3.14.2 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to spontaneous combustion during the reporting period and there were no related reportable incidents.

3.14.3 Further Improvements

A new spontaneous combustion management plan is currently being developed and is due for submission in Q1 2014.

3.15 Bushfire

3.15.1 Environmental Management and Performance

Bushfire at Ashton Coal is managed in accordance with the Bushfire Management Plan which documents fire prevention and control measures to reduce the risk of and protect the operations from bushfire.

During the reporting period there were no significant bushfires at Ashton Coal. There were two small grassfires that started along the verges of the New England Highway, that caused no significant damage to any assets, and were extinguished by ACOL employees and the Rural Fire Service.

Specific prevention and fire suppression control measures are implemented in order to protect remnant vegetation communities as well as Ashton Coal infrastructure. Preventative measures include fuel load assessment and reduction programs, the establishment and maintenance of fire breaks and the prevention of ignition sources. Fire suppression and control is achieved through on-site firefighting equipment, including a rescue truck and water carts, facilitated by a network of roads and vehicle access trails, which provide access to all areas of Ashton Coal owned land. Ashton Coal also maintained a trained emergency response team on each shift, and fire extinguishers are fitted in vehicles and buildings.

3.15.2 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to bushfire during the reporting period and there were no related reportable incidents.

3.15.3 Further Improvements

Ashton Coal will continue to ensure that bushfire prevention and control measures are implemented across the site. The Bushfire Management Plan was reviewed in 2013, and submitted to DP&I for approval after appropriate consultation in early 2014.

3.16 Greenhouse Gas and Energy

3.16.1 Environmental Management and Performance

During 2013 construction of a gas drainage and flare plant was completed, with commissioning commencing in December and being finalised in Q1 2014. The plant will allow for the currently vented methane to be flared and create potential to utilise the gas captured as a beneficial energy source.

As required under the Federal Government's Energy Efficiency Opportunities (EEO) Assessment Act 2006 Ashton Coal, through its parent company Yancoal Australia, is required to participate in the current cycle. Results will be input to the Yancoal EEO Public Report and published on EEO web site by the end of 2014.

Ashton Coal is developing a process to investigate potential projects to mitigate, substitute, reduce or eliminate energy consumption.

3.16.2 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to greenhouse gas or energy during the reporting period and there were no related reportable incidents.

3.16.3 Further Improvements

Ashton Coal will commence the process as required by EEO legislation during 2014.

3.17 Waste Management

3.17.1 Environmental Management

Ashton Coal's waste management system has been designed to meet both legislative requirements that seek to minimise the generation of waste and maximise reuse and recycling. This system consolidates the disposal, tracking and reporting of all waste generated on site.

To ensure the waste management system is working effectively and remains appropriate for the changing needs of the operation, regular inspections and monitoring is conducted. During the reporting period Ashton Coal's waste contractor conducted weekly site inspections of all areas where wastes were being generated and stored.

3.17.2 Environmental Performance

During the reporting period Ashton Coal's mining and related activities generated approximately 466 tonnes of waste that was sent off site for management, which was approximately a 20 per cent decrease on the previous year's results. Approximately 30 per cent of wastes generated were recycled or treated, with the waste end uses summarised in Figure 27. This is a slightly lower recyclable component compared with results from 2012 (46 per cent of wastes not disposed to landfill). The 2012 waste data was inflated by the decommissioning of open cut facilities. Further, the 2013 decrease in total waste generation and recyclable proportion is primarily a reflection of the change to an underground operation.

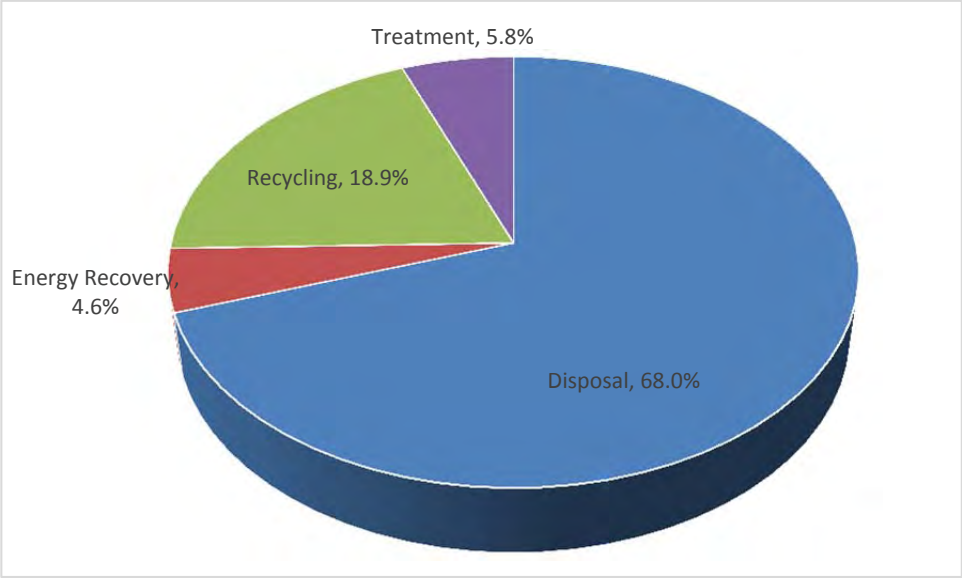


Figure 27: Waste end use from Ashton Coal during 2013

3.17.3 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to waste during the reporting period and there were no related reportable incidents.

3.17.4 Further Improvements

General awareness through toolbox talks and other site communications will continue during the next reporting period to ensure Ashton Coal achieves high levels of compliance in the areas of waste segregation and tracking. The revised Waste Management Plan will be submitted in Q1 2014 for approval by DP&I.

3.18 Mine Subsidence

During the reporting period the Underground mine continued first and secondary workings in the Pikes Gully (PG) and Upper Liddell (ULD) Seam. The first workings have been geotechnically assessed as long term stable and hence no subsidence was or will be experienced in these areas. The mined height was generally 2.6m to 2.8m for first workings development while the longwall targeted a 2.3 to 2.5m section to minimise extraction of excess roof and floor stone. The seam dips to the southwest at a grade of up to 1 in 10. The PG seam Longwall (LW) 6B overburden ranges in thickness from 106m to 140m. LW6B was the last block extracted in PG Seam. The ULD seam LW101 and LW102 overburden ranges in thickness from 165m near the start of the LW102 panel to 80m at the take-off end of LW101. Chain pillar dimensions for ULD seam are a minimum of 25m rib-to-rib at a maximum of 150m cut-through centres.

Longwall operations commenced in February 2007. To date mining of PG seam and ULD seam's LW101 were completed and longwall equipment has been relocated into ULD seam LW102 to continue extraction in this seam. The progress of longwall extraction is shown in Figure 28.

Fortnightly subsidence reports continued to be sent to key stakeholders during the reporting period in compliance with commitments set out in the approved extraction plans.

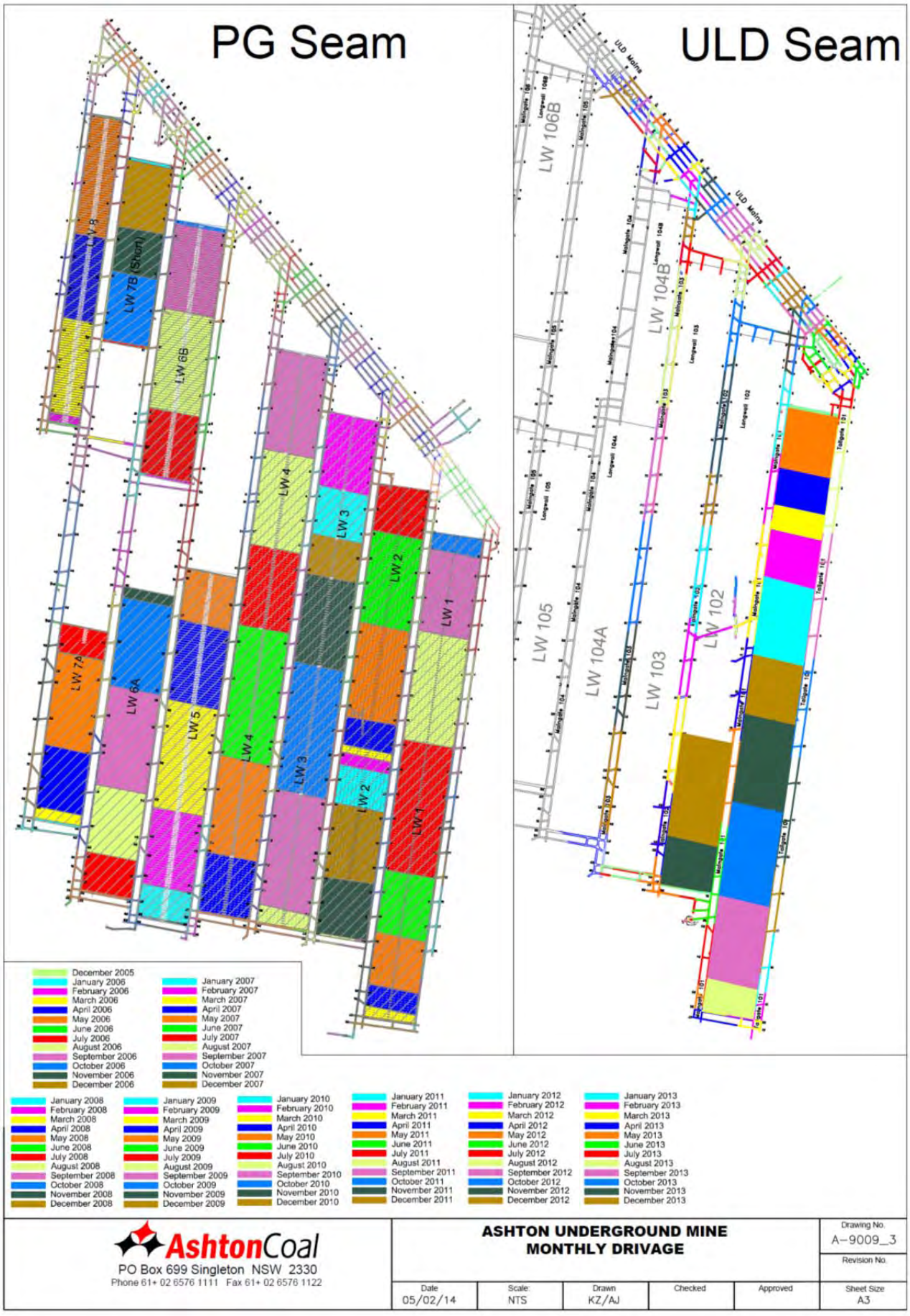


Figure 28: Progression of Longwall Extraction

3.18.1 Subsidence Monitoring

Ashton Coal has monitored the subsidence movement on the surface during the extraction of Longwalls 1 to 8 and Longwalls 101 and 102 using longitudinal subsidence lines. These are located over the start and finish of each panel, a main cross line extending over all seven southern panels and a dedicated cross line extending over Longwall 6B, 7B and 8. All panels have monitoring data from each start and end lines and various cross lines relevant to panel, surface or strata features.

The ULD seam LW101 and LW102 utilise panel centre lines (CL1 and CL2), the PG LW1 and LW2 panel centre lines and the cross block survey monitoring lines that were used for the PG longwalls. The subsidence monitoring lines relevant to ULD LW1 and LW2 to end of this reporting period are LW1-CL2, LW101-CL2, LW2-CL1, LW102-CL1 and XL6, XL7 and XL8. A plan showing the location of the subsidence monitoring centre lines and cross lines is included as Figure 29.

Table 27 outlines the maximum subsidence parameters recorded during regular survey of subsidence lines throughout the mine life as the longwall passed each location.

Visual monitoring of the excised Bowmans Creek channels were undertaken regularly during the mining of PG seam LW6B. Excised Bowmans Creek channels were undermined with no identified subsidence cracks on the creek bed and creek banks. Parts of the excised Bowmans Creek were holding some water and did not experience any significant water level drop during and post undermining.

Lemington Road was undermined during the mining of PG seam LW6B. Pre-inspection and baseline survey monitoring works were undertaken prior to undermining. Lemington Road Trigger Action Response Plan (TARP) was followed and daily visual inspection was undertaken during and post undermining. Only fine cracks were identified on the road. Signage of active subsidence area and ACOL contact number had been erected directly off New England Highway and 200m prior to subsidence impact area. Through the Mine Subsidence Board, a licensed traffic control contractor was engaged to manage subsidence impacts to Lemington Road, including traffic control and road maintenance.

Table 27: Subsidence Levels of Pikes Gully seam longwalls

	Maximum Predicted EIS	**Maximum Predicted SMP**	**Maximum Measured**		
North End of LW1			CL2	XL8	
Subsidence (mm)	1430	1800	1550	1550	
Tilt (mm/m)	122	244	100	125	
Horizontal Movement (mm)	-	>500	530	535	
Tensile Strain (mm/m)	16	73	36	20	
Compressive Strain (mm/m)	25	98	40	30	
Remainder of LW1			CL1	XL5	
Subsidence (mm)	1690	1700	1381	1429	
Tilt (mm/m)	60	141	61	100	
Horizontal Movement (mm)	-	300-500	502	428	
Tensile Strain (mm/m)	8	42	49	22	
Compressive Strain (mm/m)	12	56	23	19	
Longwall 2			CL1	CL2	XL5
Subsidence (mm)	1690	1600	1332	1566	1286
Tilt (mm/m)	91	102	40	94	63
Horizontal Movement (mm)	-	300-500	501	298	425
Tensile Strain (mm/m)	12	30	17	42	28

	Maximum Predicted EIS	Maximum Predicted SMP	Maximum Measured			
Compressive Strain (mm/m)	18	41	17	19	11	
Longwall 3			CL1	CL2	XL5	
Subsidence (mm)	1500	1600	1443	1451	1480	
Tilt (mm/m)	65	78	41	59	99	
Horizontal Movement (mm)	-	300-500	430	360	450	
Tensile Strain (mm/m)	9	23	10	40	22	
Compressive Strain (mm/m)	13	31	7	29	25	
Longwall 4			CL1	CL2	XL5	XL10
Subsidence (mm)	1430	1600	1421	1235	1491	1288
Tilt (mm/m)	46	78	36	40	55	34
Horizontal Movement (mm)	-	300-500	252	584	373	267[1]
Tensile Strain (mm/m)	6	23	10	31	10	10
Compressive Strain (mm/m)	9	31	9	67	9	6
Longwall 5			CL1	CL2	XL5	
Subsidence (mm)	1430	1600	1305	1374	1429	
Tilt (mm/m)	29	78	23	30	35	
Horizontal Movement (mm)	-	300-500	413	362[2]	402	
Tensile Strain (mm/m)	4	23	22	6	15	
Compressive Strain (mm/m)	5	31	9	8	6	
Longwall 6A			CL1	CL2	XL5	
Subsidence (mm)	1430	1600	1415	1332	1410	
Tilt (mm/m)	29	57	19	25	39	
Horizontal Movement (mm)	-	300-500	290	262	333	
Tensile Strain (mm/m)	4	17	7	10	9	
Compressive Strain (mm/m)	5	23	7	10	8	
Longwall 7A			CL1	CL2	XL5	
Subsidence (mm)	1430	1600	1452	>1010	1334	
Tilt (mm/m)	29	57	24	16	24	
Horizontal Movement (mm)	-	300-500	355	145	426	
Tensile Strain (mm/m)	4	17	8	>4	12	
Compressive Strain (mm/m)	5	23	10	>5	10	
Longwall 7B			CL3	CL4	XL13	
Subsidence (mm)	1430	1600	1400	1258	1500[3]	
Tilt (mm/m)	29	57	30	22	30[3]	
Horizontal Movement (mm)	-	300-500	321	180	415	
Tensile Strain (mm/m)	4	17	10	6	12	
Compressive Strain (mm/m)	5	23	8	10	6	
Longwall 8			CL1	CL2	XL13	XL14
Subsidence (mm)	1430	1200	548[4]	739[5]	569	869[6]
Tilt (mm/m)	29	50	8	11	12	21
Horizontal Movement (mm)	-	300-500	90	88	218	243
Tensile Strain (mm/m)	4	15	0.8	2.6	6.1	6.4

	Maximum Predicted EIS	Maximum Predicted SMP	Maximum Measured			
Compressive Strain (mm/m)	5	20	1.0	2.5	10.6	12.7
Longwall 6B			CL3	CL4	XL13	CL4 (106B)
Subsidence (mm)	1430 / 1600	1600	1390	1360	1210	1230
Tilt (mm/m)	29 / 70	70	25	34	27	31
Horizontal Movement (mm)	-	300-500	445	355	400	300
Tensile Strain (mm/m)	4 / 30	30	6	18	9	15
Compressive Strain (mm/m)	5 / 30	30	6	11	9	9

[1] *XL10 was installed after some horizontal movement associated with the previous longwall may have occurred so not all horizontal movements were measured.*
[2] *Maximum measured at end line.*
[3] *Estimated from the shape of the profile because subsidence line did not extend across the area of greatest subsidence.*
[4] *Maximum measured at end of line, construction activities prevented the monitoring points extending further into the panel.*
[5] *Maximum measured at the end of the line, monitoring line did not extend past the adjacent LW7B recovery point.*
[6] *Maximum measured at the end of the line, monitoring line installed to monitor subsidence effects outside the panel edge towards Ravensworth Underground Shaft 5 only.*

Table 28 outlines the maximum subsidence parameters predicted and recorded during regular survey of subsidence lines as the ULD LW101 passed each location. Subsidence monitoring over ULD seam LW101 since January 2013 consists of regular survey of cross line 6 (XL6) to 8 (XL8), PG Seam LW1 centreline 2 (LW1- CL2) and ULD Seam LW101 centreline 2 (LW101-CL2). The frequency and results of this have been maintained per monitoring document *"Ashton Mine Subsidence Monitoring Programme Longwall 101 to 104".* This information is being supplied to DRE's Principal Subsidence Engineer as per the "*Ashton Mine Subsidence Monitoring Programme Longwall 101"*.

Table 28 Subsidence of ULD Longwall Panel 101

	Predicted EIS	Predicted SMP	Maximum Measured		
Start of LW101			CL1 Incremental	CL1-PG	CL1-PG Incremental
Subsidence (mm)	3380	4400	2121	2757	1644
Tilt (mm/m)	122	235	47	60	30
Horizontal Movement (mm)	-	<500	435	483	365
Tensile Strain (mm/m)	10	94	17	49	10
Compressive Strain (mm/m)	49	94	22	26	24
Finish of LW101			CL2 Incremental	CL2-PG	CL2-PG Incremental
Subsidence (mm)	2600	4400	1813	2911	1466
Tilt (mm/m)	60	235	42	110	35
Horizontal Movement (mm)	-	<500	362	620	258
Tensile Strain (mm/m)	10	94	9	38	8
Compressive Strain (mm/m)	49	94	9	41	7
Southern Cross Lines			XL1	XL1 Incremental	XL4 Incremental
Subsidence (mm)	3380	4400	2494	1323	1822
Tilt (mm/m)	91	235	42	37	49
Horizontal Movement (mm)	-	<500	491	215	270
Tensile Strain (mm/m)	10	94	23	17	12
Compressive Strain (mm/m)	49	94	7	5	6

	Predicted EIS	Predicted SMP	Maximum Measured				
Northern Cross Lines			XL5	XL5 Incremental	XL7 Incremental	XL8	XL8 Incremental
Subsidence (mm)	3380	4400	3229	2239	1884	2784	1355
Tilt (mm/m)	91	235	101	57	50	136	29
Horizontal Movement (mm)	-	-	733	460	255	560	245
Tensile Strain (mm/m)	10	94	20	18	14	28	6
Compressive Strain (mm/m)	49	94	22	8	4	19	4

[1] *XL2, XL3, and XL6 do not extend far enough to register any significant change*

[2] *XL1 and XL4 may not measure maximum movements as movements are still increasing at end of line.*

Mining in LW102 commenced on the 10 November 2013. The latest subsidence monitoring survey of LW102 CL1 (ULD Seam LW102 centre line) indicates that a maximum of 1.98m of subsidence has been measured. Baseline survey of the 132kV powerlines was conducted on 26/09/2012. Latest subsidence monitoring survey of the 3 power poles set (CN90469, CN90470 and CN90471) which are sitting in the middle of LW102 block indicates that a maximum of 1.21m of subsidence has been measured. Power pole (CN90081) and power pole (CN90472) sitting on top of gate roads have subsided 51mm and 46mm respectively.

No exceedances of the predicted subsidence values, as approved for the underground mining area, were recorded within the current reporting period.

3.18.2 Subsidence Impacts

Surface subsidence cracks generally develop along each gate edge of the longwall panels. These generally run parallel to the gate road within the longwall block. Where required these cracks may be rehabilitated. The method and extent of remediation required is dependent on the extent of cracking and the environmental and other surface features in the vicinity of the crack zone.

No remediation works of cracking above PG seam LW6B were undertaken by ACOL during this reporting period. Most fine subsidence cracks were observed on sections of ACOL owned dirt access roads and some Longwall 6B mid-panel areas. Due to the limited width of cracking it poses minimal risk to injury of personnel, equipment or wildlife. In addition, the cracking which exists on the dirt access road is face cracking. It opens up during undermining and in most cases closes again as the longwall continues to retreat. LW6B undermined areas of alluvium and heavy grass growth. These two factors resulted in limited visible cracking (similar to that experienced in LW7B and LW8 mining).

During undermining of Lemington Road, there has been evidence of cracking up to 2mm in the lanes of Lemington road, with larger cracks on the western shoulder of the road. The maximum measured subsidence is 74mm, compared to the maximum of 300mm predicted. Signage of active subsidence area and ACOL contact number was erected directly off the New England Highway and 200m prior to the subsidence impact area. A licensed traffic control contractor was engaged to manage subsidence impacts to Lemington Road, including traffic control and road maintenance. The remediation works were conducted by the Mine Subsidence Board. The extent of PG seam subsidence remediation at the goaf edge is outlined in Figure 30.

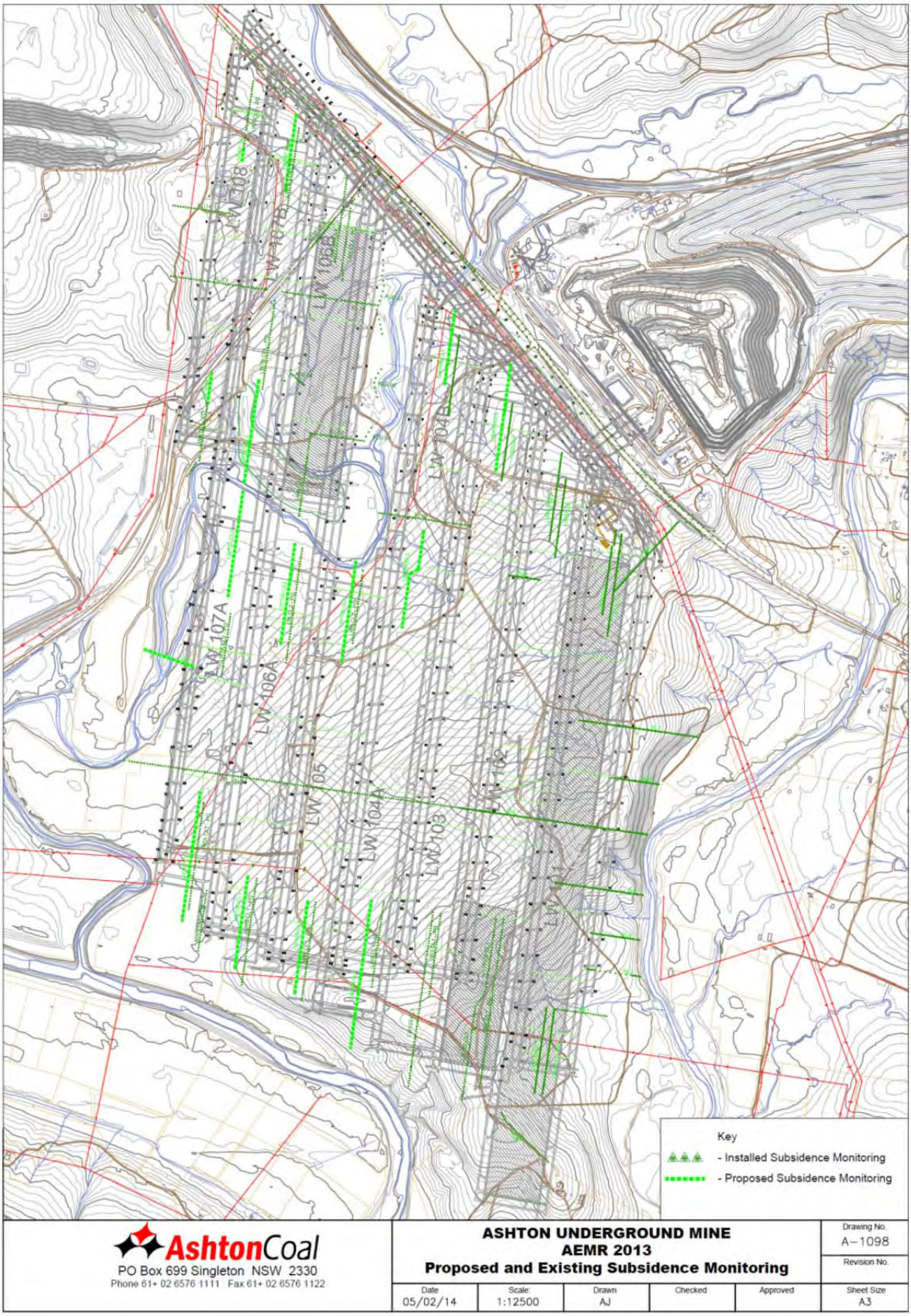


Figure 29: Subsidence Monitoring Lines

Cracks over the second half of ULD LW101 and start of ULD LW102 to the end of December 2013 are evident on the tailgate areas and on sections of primary Right of Way (ROW) access to Property 130 within ACOL property. This section of ROW traversing the active longwall panel is likely to suffer perceptible subsidence impacts (e.g. surface cracking). This section of primary access road was closed off from Monday 2/12/2013 while it was being undermined and an alternate access was adopted. Relevant road users were notified prior to the road closure. Road closed and detour signs were also been installed. The alternate access road was graded before the close of the ROW. The extent of ULD seam subsidence remediation at the goaf edge is outlined in Figure 31.

Powerline clearance signs within alternate access road have been updated to ensure safety for the movement of plant and equipment under and in the vicinity of these overhead lines.

Buried Telstra cables that run over ULD LW101 and LW102 were undermined without any negative impacts. This line remained in service during the impact period. Overhead 132kV and 33kV electricity transmission lines were also undermined without damage. Prior to undermining, the affected powerlines were placed in rollers to prevent the overstressing of the line as the pole moved with the subsidence.

No damage was observed to farm gates, grids or fences during the reporting period.

Ponding has become evident in some subsided areas, typically in those areas which were flat pre-mining. The ponding which exists does not present any increased safety or environmental issues however it will need to have drainage re-established to prevent continual filling and holding of water. This is planned as future remediation, in consideration of the currently approved multi seam mining which will see the same area undermined for a further three seams. Presently the ponding does not present a significant risk and serves as a water source for stock which graze over the lease.

In general, the maximum subsidence movements detected were less than those predicted. There is no indication of any significant lateral movement of the steep slope adjacent to Glennies Creek or of the New England Highway road cutting.

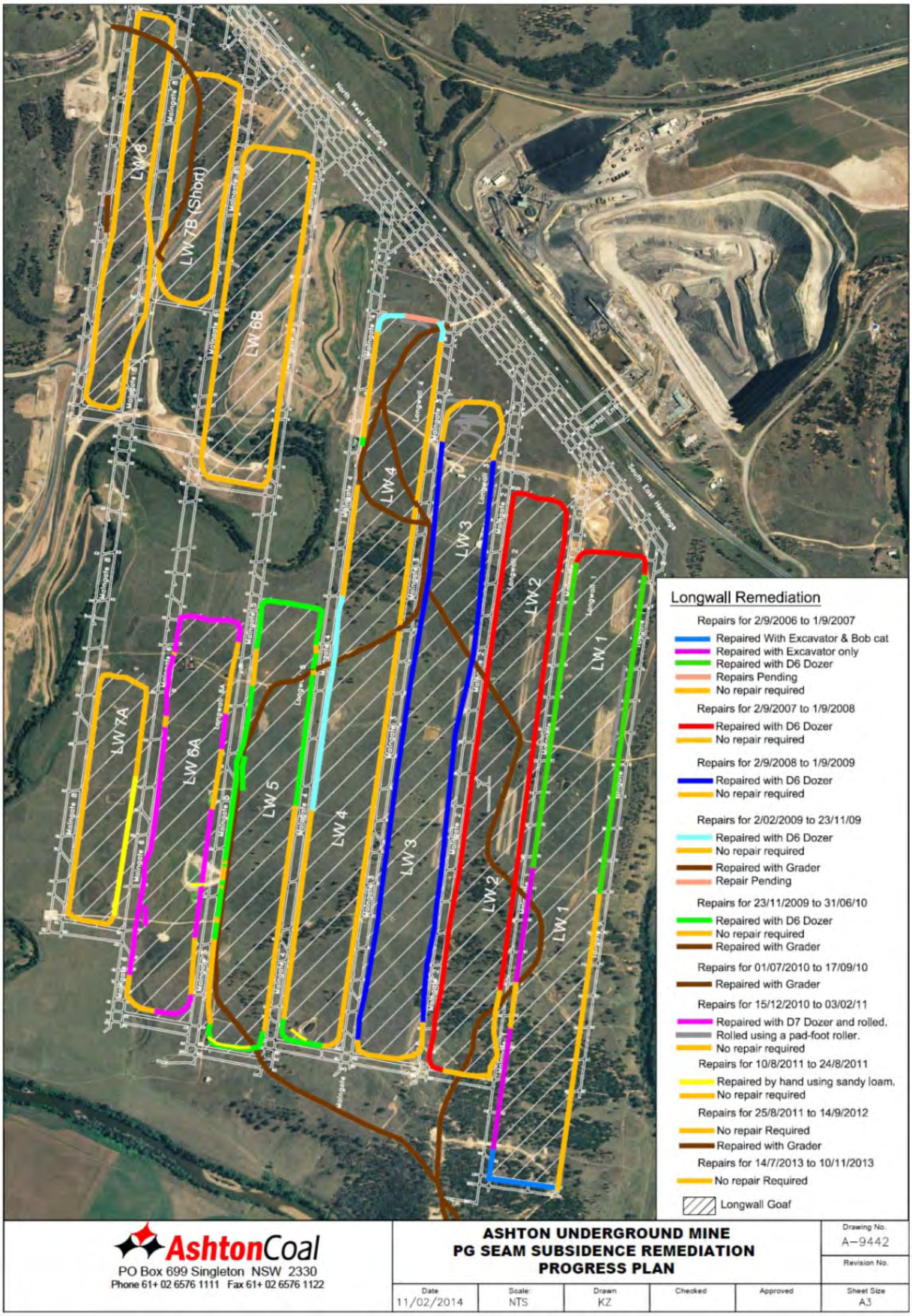


Figure 30: PG Seam Subsidence Remediation Progress

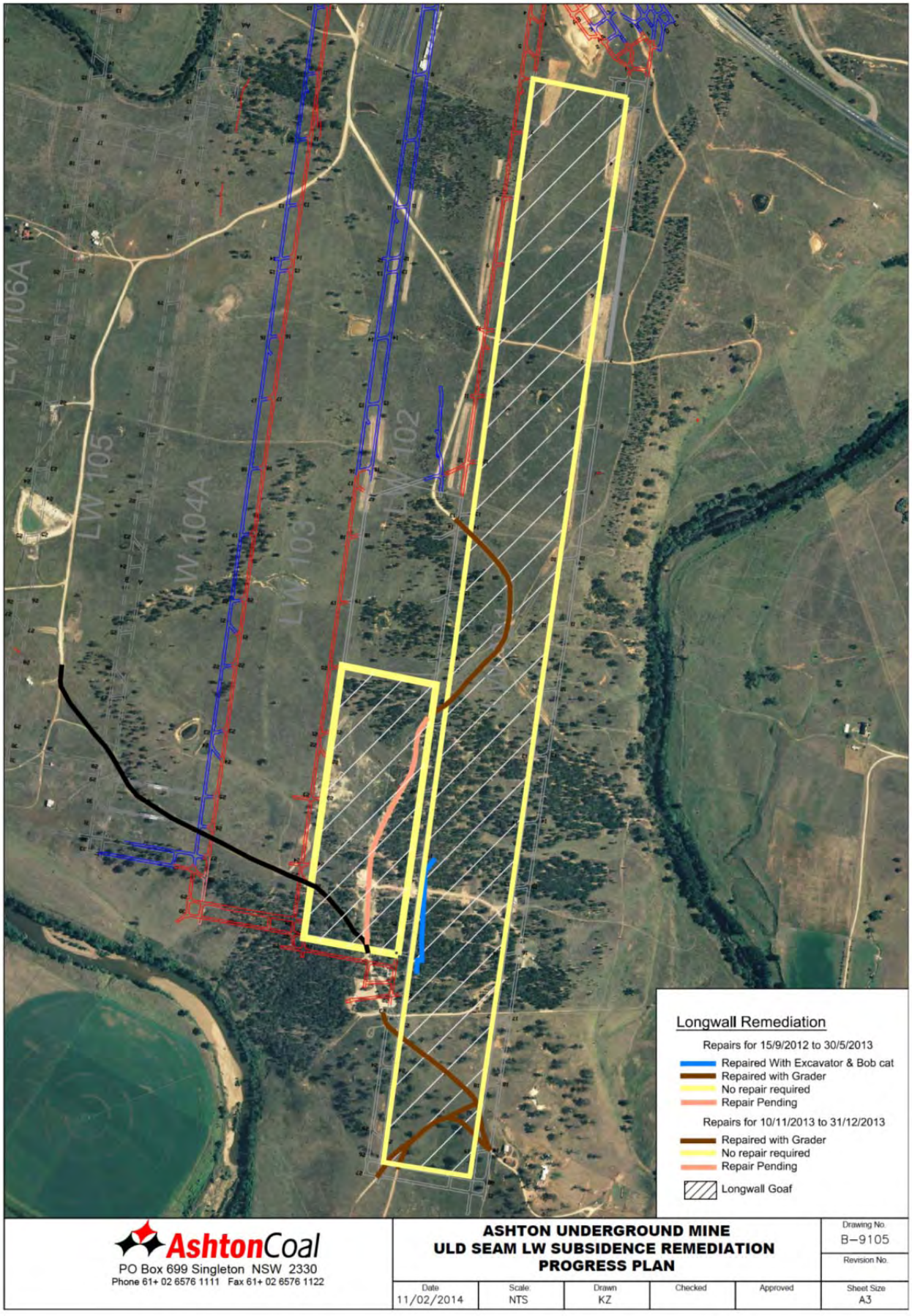


Figure 31: ULD Seam Subsidence Remediation Progress

3.19 Public Safety

3.19.1 Environmental Management and Performance

A boundary fence surrounds the open cut pit with warning signs indicating the area is subject to mining. Only one access road to the site is in general use and all visitors are directed to the ACOL office for further directions on the roads that they are permitted to access. All other vehicle access points are locked. A boom gate system that remains closed outside normal office hours has been installed to prevent ad hoc public access.

There were two public safety related complaints received during the reporting period. Both were related to interactions between mine related vehicles and the local school bus. This issue has been resolved with the gravel pad extended adjacent to the New England Highway to provide an adequate parking area at Dairy Lane for the bus.

Since the commencement of subsidence over the longwall area, signage has been erected on the Right of Way (ROW) on Ashton Property leading to property 130. An alternate access road has been established and road closure signs are placed when possible subsidence impact may be experienced on the ROW. As detailed in the approved SMP, Road Management Plan and Property 130 Management Plan, the tenants and owner of Property 130 are notified when any such impacts are expected to be experienced.

3.19.2 Reportable Incidents

Ashton Coal did not receive any government fines or penalties related to public safety during the reporting period and there were no related reportable incidents.

3.19.3 Further Improvements

The public safety related commitments of the approved SMP, Road Management Plan and Property 130 Management Plan will continue to be implemented during the next reporting period.

4 Community Relations

Ashton Coal is committed to minimising the impacts of its operations and is an active participant and contributor to community projects that benefit local people.

4.1 Environmental Complaints

Ashton Coal has a procedure for receiving, investigating, responding to and reporting complaints received from the community. The operation invites feedback about its activities through a free-call 24-hour Community Response Line (1800 657 639) which is advertised in the local phone directory and newspapers, and at www.ashtoncoal.com.au.

When a complaint is received it is investigated within 24 hours or the next business day, and any necessary action is taken to address the issue. When requested, the caller is advised of the investigation outcomes and the action taken.

Complaint details are recorded and reviewed by the operation to identify opportunities for further improvements. Ashton Coal also provides summary reports to CCCs and government agencies as requested, and reports in the AEMR annually.

During the reporting period, Ashton Coal received 8 complaints from community members and near neighbours. A comparison of complaints received during the reporting period against previous years is shown in Figure 32 and a complete register of complaints can be found in Appendix 5.

The significantly reduced number of complaints compared to pre 2011 continued in 2013 and is attributable to the shift in mining operations to an underground operation. Six noise complaints were received during 2013, through the DP&I. Monitoring information and site inspections indicated minimal contribution to noise disturbance from activities at Ashton Coal. Two 'other' complaints related to an interaction issue between mining related vehicles and the local school bus. This issue has been resolved with the extension of the gravel area adjacent to the New England Highway to provide an adequate parking area at Dairy Lane for the bus.

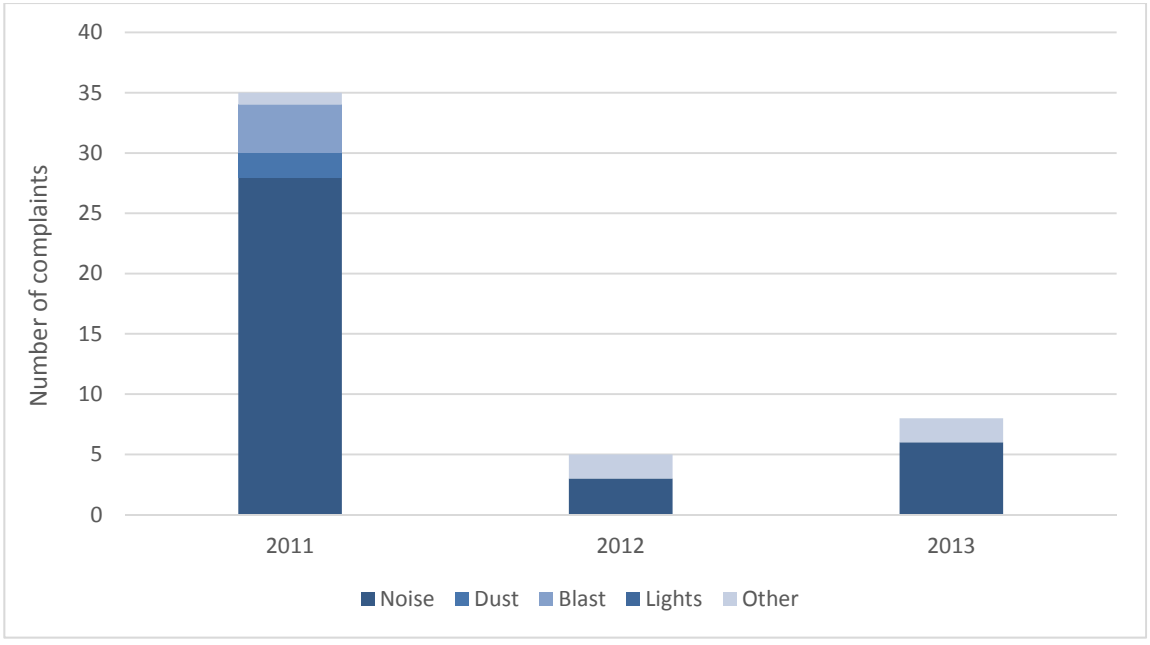


Figure 32: Comparison of complaints received during current and previous years

4.2 Community Liaison

Ashton Coal has a community engagement program that utilises multiple engagement strategies and communication tools.

4.2.1 Website and Media

Ashton Coal provides the community access to information about the operation through its website, www.ashtoncoal.com.au. Included on the site are project approval documents, CCC meeting minutes, community complaint records, environmental monitoring information, environmental audits, environmental management plans and annual environmental management reports.

Ashton Coal's free-call 24-hour Community Response Line (1800 657 639) continued to operate during the reporting period to allow the community to contact the operation directly to ask questions or raise concerns about mining activities.

4.2.2 Community Consultative Committee

As required by Ashton Coal's development consent (DA No. 309 -11- 2001-i, condition 10.1), the Community Consultative Committee (CCC) meet on a quarterly basis (March, June, September and December 2013). The committee is chaired by a representative from the Singleton Council and is made up of representatives from the local community and Ashton Coal. The aim of the CCC is to keep the community informed on the progress of the mine and provide a forum for open discussion. CCC members are provided with information on Ashton Coal's environmental monitoring performance, updates of current operations and upcoming projects.

4.2.3 Upper Hunter Mining Dialogue

Ashton Coal continued to be an active member of the Upper Hunter Mining Dialogue during the reporting period. Ashton had representatives on the steering committee and all working groups, as well as active participation in planning days and workshops held throughout the year.

5 Rehabilitation

5.1 Rehabilitation of Disturbed Lands

Ashton Coal manages its rehabilitation activities in accordance with good land management practices and regulatory requirements, and ensures rehabilitated areas are compatible with the surrounding landscape and selected future land uses. Rehabilitation of land is carried out in general accordance with Ashton Coal's MOP.

Rehabilitation is designed to achieve a stable final landform compatible with the surrounding environment and to meet the landform commitments presented in the MOP. This consists of bulk reshaping of overburden dumps, using large bulldozers, to slopes that average 10 degrees or less, and incorporating water management infrastructure to minimise the potential for erosion.

This infrastructure consists of contour diversion drains constructed at regular intervals down rehabilitated slopes to capture and divert surface water run-off into protective drop structures. These drains and drop structures report to sediment dams, which allow for the settling of suspended solids. Following bulk reshaping and drainage construction, the overburden surface is subject to a final trim and deep ripping in preparation for topsoil placement.

During the previous reporting period Ashton Coal completed all available areas of rehabilitation, and during this year continued maintenance activities on areas of previous rehabilitation, as listed in Table 29. This aligns with the rehabilitation proposed in the MOP.

The Bowmans Creek Diversion's (BCD) engineering works were completed in November 2012 with rehabilitation beginning soon after. The rehabilitation program is currently in the start of the second year which is approximately the midway point of Phase 1: Bank Stabilization. Progress is currently ahead of schedule due to the installation of an irrigation system on both the Eastern and Western diversions leading to high rates of rehabilitation success. The irrigation system has allowed for prolonged periods of planting to take place (Autumn & Spring 2013) without relying solely on rainfall to maintain soil moisture and plant survival rates.

In November 2013 the first annual monitoring event was conducted on the BCD rehabilitation. Results from the floristic survey showed a total of 53 species recorded from the plots, 37 exotic species and 16 native species.

Landscape Functional Analysis results showed that this was an immature, simplified landscape with relatively low scores for the Stability, Infiltration/Runoff and Nutrient Cycling Indices. This is the expected result as outlined in the Environmental Assessment for this very early stage of the revegetation process.

Canopy plantings have generally survived well with the Red Gum Woodland having survival rates of 78 per cent to 81 per cent (with one outlier at 29 per cent due to lack of irrigation) which is in line with the 80 per cent survival requirement. The River Oak Forest plots are faring much better with survival rates between 84 per cent and 100 per cent. It is expected that during the seven year rehabilitation program, there may be a need to supplement initial plantings in order to meet survival rates documented in the plan, however this need is not evident at this stage of the rehabilitation program.

Groundcovers are predominately exotic or pasture species, although *Cynodon dactylon* (Common Couch) is evident as a native grass. There were six other native forbs and grasses recorded in the surveys, but their coverage is low and occurrence infrequent. This is the expected result as outlined in the Environmental Assessment for this stage in the revegetation process. No noxious or listed weeds were identified during the annual survey.

Table 29: Ashton Coal rehabilitation summary

Domain	Area affected or rehabilitated (Hectares)		
	Previous reporting period (January - December 2012) (start of MOP)	Reporting period (January - December 2013)	Next reporting period (estimated) (January - December 2014)
MINE LEASE AREA			
Mine lease area 1529, 1533 & 1623	909.59	909.59	909.59
Active Mining Area			
Active	72.7	72.7	72.7
Infrastructure Area			
Active	82.5	82.5	82.5
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0
Ecosystem and Landuse Establishment	0	0	0
Ecosystem and Landuse Sustainability	0	0	0
Tailings Emplacement Facility			
Active	34	34	34
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0
Ecosystem and Landuse Establishment	0	0	0
Ecosystem and Landuse Sustainability	0	0	0
Water Management Area			
Active	13.9	13.9	13.9
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0
Ecosystem and Landuse Establishment	0	0	0
Ecosystem and Landuse Sustainability	0	0	0
Pasture - Underground			
Active	0	0	0
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0
Ecosystem and Landuse Establishment	41.8	41.8	41.8
Ecosystem and Landuse Sustainability	363.9	363.9	363.9
Southern Woodland Conservation Area [1]			
Active	0	0	0
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0

Domain	Area affected or rehabilitated (Hectares)		
Ecosystem and Landuse Establishment	16.5	16.5	16.5
Ecosystem and Landuse Sustainability	28.5	28.5	28.5
Pasture NEOC			
Active	0	0	0
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0
Ecosystem and Landuse Establishment	0	0	0
Ecosystem and Landuse Sustainability	67.7	67.7	67.7
Pasture NEOC			
Active	0	0	0
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0
Ecosystem and Landuse Establishment	0	0	0
Ecosystem and Landuse Sustainability	67.7	67.7	67.7
Bowmans Creek Diversion			
Active	0	0	0
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0
Ecosystem and Landuse Establishment	13.5	13.5	13.5
Ecosystem and Landuse Sustainability	0	0	0
Trees over Grass - NEOC			
Active	0	0	0
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0
Ecosystem and Landuse Establishment	0	0	0
Ecosystem and Landuse Sustainability	70.5	70.5	70.5
Trees over Grass – Underground [1]			
Active	0	0	0
Decommissioning	0	0	0
Landform Establishment	0	0	0
Growing Media Development	0	0	0
Ecosystem and Landuse Establishment	60.4	60.4	60.4
Ecosystem and Landuse Sustainability	20.3	20.3	20.3

[1] *Excludes areas outside of the Mine Leases*

5.2 Rehabilitation Maintenance

Maintenance activities will continue to play a major role in the success of rehabilitation at Ashton Coal. These activities include slashing, fencing, weed spraying, soil management, minor earthworks repairs and feral animal control.

Due to the poor rainfall during 2013, minimal opportunities were available to conduct maintenance activities on the rehabilitation. Plans to carry out another microbe spray on the 2012 trial areas were unable to be completed due to there being no suitable 'wet periods' (autumn and early winter).

Slashing of the 2012 rehabilitation pasture areas on top of the Eastern Emplacement Area (EEA) commenced in May 2013. Slashing promotes lateral growth in the pasture species and increases the organic matter in the soil. Based on the response of the pasture species to this initial slashing further slashing was completed. ACOL also received positive comments regarding the slashing from the Department of Planning and Department of Resources & Energy officers during their inspections onsite. ACOL continued the slashing to all rehabilitation pasture areas on the EEA. By the end of 2013 approximately 90 per cent of the 90ha had been slashed.

Table 30: Maintenance activities on rehabilitated land

Nature of treatment	Area affected or rehabilitated hectares			Comment, control strategies or treatment
	Reporting period 2013	Previous reporting period 2012	Next reporting period (estimate) 2014	
Additional erosion control works	0	0	0	
Re-topsoiling	0	0	0	
Soil treatment	0	0	68	Organic material (compost) at 10t/ha applied to assist rehabilitation program.
Pasture management	80	0	80	No grazing undertaken on rehabilitation. Pasture slashed
Reseeding and replanting	0	0	0	Legume species top dressed onto pasture areas
Weed Control	23.5	16.9	20	Targeting galenia on NEOC area
Feral animal control	900	900	900	Wild dog and fox baiting across Ashton Coal buffer areas and NEOC.

5.3 Rehabilitation Monitoring

Condition 3.47 the ACP development consent (DA No. 309 -11- 2001-I) requires all regeneration and revegetation work to be monitored by an appropriately qualified ecologist with the results of the monitoring reported annually. Ecological monitoring of the NEOC mine rehabilitation was conducted by Kleinfelder Australia during November 2013, extending the monitoring that began in 2007. Open cut mining operations in the NEOC ceased in late 2011, with initial rehabilitation completed in July 2012 and maintenance on-going. The Ashton Coal Mining Operations Plan 2013 – 2017 requires that monitoring occur within domains defined by land use, function and geophysical characteristics. The MOP defines two domains on the NEOC: Pasture – NEOC (referred to here as grassland) and Trees over Grass – NEOC.

Survey methods for Floristic and Landscape Function Analysis were consistent with previous surveys. Soil analysis was simplified to provide key soil chemical results only. Soil microbial analysis was undertaken for the second year with an increase in the number of plots sampled. Included this year was the first invertebrate survey.

Flora results indicate an insignificant reduction in the number of species recorded from the 2012 survey on the rehabilitation plots (57 in 2013 compared to 61 for 2012). Species reductions were predominately native species in the Trees over Grass plots, M200703 and M200803 (Figure 33 and

Figure 34). In M200703 the Acacia mid-storey continues to shade out groundcover species resulting in some species loss and erosion. M200802, M200804, M200901 and M201001) have increased diversity slightly following the weed control actions taken to counter the spread of *Galenia pubescens*. The only listed weed

observed in the Trees over Grass plot M200703 was African Boxthorn (*Lycium ferocissimum*) which requires immediate control to prevent further spread and increased costs. A noticeable paucity of pasture legume species was noted in the South Facing plots (M200702, M200801 and M201101).

Landscape Functional Analysis (LFA) measures how effectively an area operates as a biophysical system. The processes assessed are based mainly on surface hydrology and include rainfall, infiltration, runoff, erosion, plant growth and nutrient cycling. LFA is broken into four key indices that indicate the level at which a landscape is able to accumulate and utilise resources, namely nutrients and water. The LFA scores for the rehabilitation are assessed against established reference plots (i.e. not subject to mining) that form key performance indicators (KPIs) for the rehabilitation, noting that rehabilitation will take time to meet the KPIs set by mature vegetation plots.

The following observations were made in the pasture or grassland plots:

- Over 44% (down from 2012 scores) of the plots met KPIs for the Landscape Organisational Index (LOI) that describes how effectively the landscape will regulate resources. Weed control in North Facing plots and slashing some South Facing and Cap plots (M201201 and M201202) are likely to have lowered LOI scores.
- Stability Index (SI) measures the ability of the landscape to resist erosion and restabilise after disturbance. SI scores were generally below the KPI's with aspect, slope and management activities (e.g. slashing and weed control) influencing the result.
- Infiltration & Runoff Index (IRI) measures the ability of the soil to divide rainfall into plant available water and run-off water which is lost to the system and may remove nutrients. IRI scores were mixed. The two Cap plots and one North Facing plot met KPI's and recorded an improvement from the 2012 survey. The older South Facing plots and North facing plots were below KPI's and declined from 2012.
- Nutrient Cycling Index (NCI) scores were lower than 2012 survey reflecting the lower rainfall and reduced plant growth during this season. Occasional declining rates are to be expected throughout the monitoring period due to seasonal fluctuations.

Trees over Grass plots were mixed for the LFA indices, with key findings below:

- LOI scores met KPI's for all three plots (M200501, M200703 and M200803).
- The remaining three indices were consistent across the three plots. M200703 was the poorest performer the KPI's, generally recording scores below the KPI's, while the other Trees over Grass plots achieved the KPI's. All three plots recorded lower scores compared to 2012. The poor performance of M200703 can be attributed to the continued growth of the mid-storey Acacias.

LFA results for the rehabilitation plots need to be read in the context that reference plots (both grassland and woodland) also recorded mixed, but generally decreased scores for each of the indices. This can be attributed to the lower than average rainfall received in 2013 over the winter and autumn months preceding the survey. Lower rainfall will adversely affect all the measured indices due to reductions in plant growth and the consequent reduction in litter production and exposure of more bare soil.

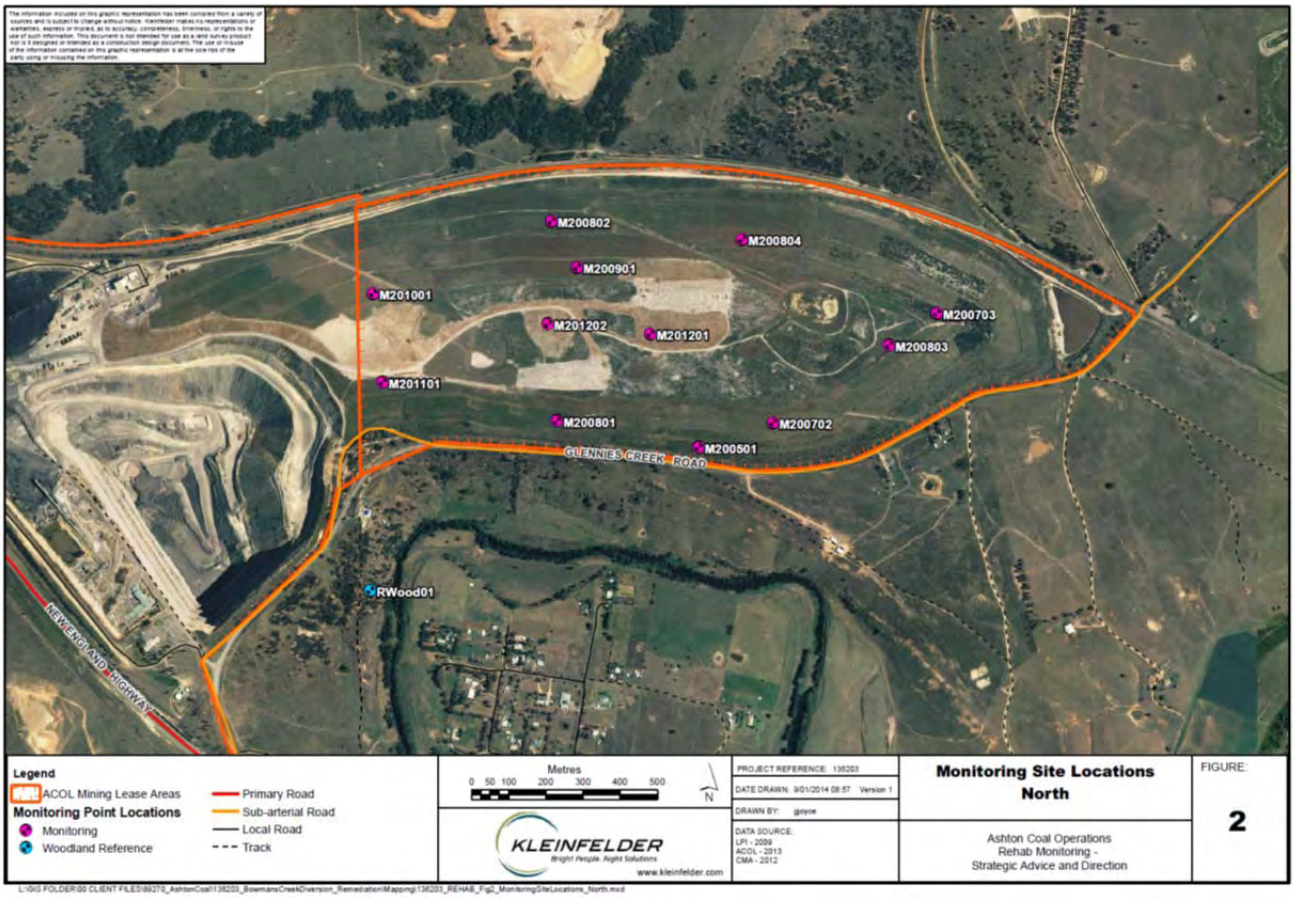


Figure 33: Rehabilitation monitoring site locations – north

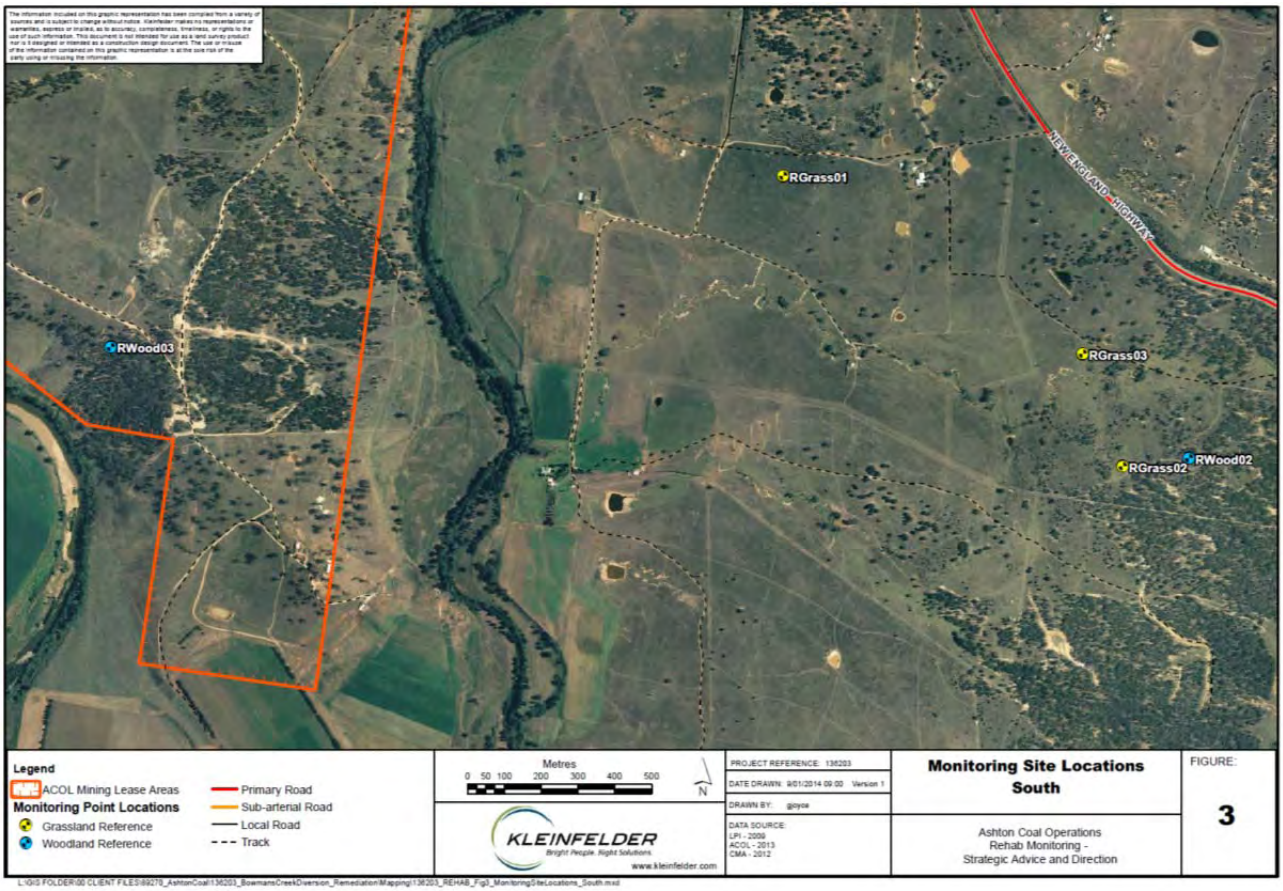


Figure 34: Rehabilitation monitoring site locations - south

In combination with the lower than average rainfall, aspect also influenced the LFA scores, with South Facing plots having higher vegetation coverage resulting in generally greater stability, less runoff and higher nutrient cycling scores than the North Facing and flat lying Cap monitoring plots.

Overall the rehabilitated areas demonstrated that soils were able to support vegetation, but several of the chemistry parameters reflected the immature soil profile with underlying overburden where results will improve with time. Key aspects of the chemistry parameters include:

- Electrical Conductivity was within acceptable limits. All plots show a large reduction in EC within 1 year of rehabilitation.
- Soils in the rehabilitated areas were alkaline ranging from 7.1 to 8.5 and largely steady and much higher than the desirable range of 5.5 – 6.5.
- Cation Exchange Capacity had levelled off in the older plots, while younger plots were still undergoing reductions. At this stage levels were within acceptable limits. Exchangeable cations were generally higher than the reference plots but had no significant toxicity issues.
- Organic Carbon (OC) levels were generally equivalent to or much higher than the reference plots. Older rehabilitated plots (M200501 and M200703) appear to have achieved a steady state of OC with no further reductions measured. The younger rehabilitation plots have undergone a rapid reduction in OC compared to the 2012 survey, attributable to the breakdown of readily available soil carbon by decomposer soil micro-organisms.
- Phosphorus levels are extremely variable with several plots recording high levels and four plots very low levels. These high levels may restrict the establishment of some native species. Four plots with low phosphorus were below the agriculturally desirable level of 35 to 45ppm, which may affect plant growth, particularly of non-native pasture species.
- Nitrate-nitrogen levels have decreased from relatively high 2012 levels. Measurement of this nutrient has appeared to vary dramatically from year to year and will require further investigation in subsequent surveys.

Soil microbiology has improved from the January 2013 monitoring period. This can be attributed to a combination of the increased growth in the younger plots, the difference in timing of the survey from January to November and the application of microbial treatments in some areas. Soil microbiology was still below some of the recommended levels; this is generally unavoidable given low floral biodiversity and immaturity of the ecological communities on the rehabilitation. The introduction of mycorrhizal fungi and rhizobia bacteria via inoculation to increase levels of these vital micro-organisms may improve sustainability of the grassland areas.

The 2013 invertebrate survey provided base line data for comparison to future surveys. Invertebrate diversity was low which was attributed to the lack of a complex vegetation structure and suitable habitat such as woody debris on the rehabilitated areas.

Recommendations for the management of the rehabilitated areas include;

- Seed pasture legumes into the south facing grassland areas, inoculated with commercially available microbial symbionts.
- Maintain weed control measures to remove/control the spread of African Boxthorn and Galenia.
- Conduct surveys in the wetter months of April or May to increase the chances of recording forb and grass species.

Condition 9.2(I) of the ACP development consent (DA No. 309 -11- 2001-I) requires the Annual Environmental Monitoring Report (AEMR) to include an assessment of any changes to agricultural land suitability resulting from the mining operations, including cumulative changes. An important factor of the agricultural suitability is the land's productivity; this report assesses a range of parameters that impact the fertility of the farm land.

ACOL owns a considerable quantity of pasture land that has been used for cattle and horse grazing. Coal extraction by the retreating longwall method occurs under farm land areas and subsidence is expected to occur. Therefore monitoring is required to be undertaken to determine what, if any, effects mining may have upon the land and the vegetation. Monitoring locations are shown in Figure 35 .

The 2013 survey results show that LFA indices remain stable indicating that underground mining has had little if any impact upon the farm land ecosystem. The floristic biodiversity has decreased with 52 species being recorded in the farm land plots. This diversity does follow a pattern that closely correlates to the rainfall received on site in the preceding early spring and winter months. Low rainfall throughout this period results in low species diversity being recorded at the time of the survey.

The results of the 2013 soil analysis show organic carbon levels have decreased for most plots. Soil pH has increased slightly across the plots which may have implications for availability of plant nutrients. Cation Exchange Capacity is recovering from the lows recorded in 2011. There are no obvious causes for these trends and while these trends can be plot specific they will be monitored over future surveys to determine if there is a trend toward reduced fertility.

MFarm04 has elevated levels of CEC and exchangeable calcium, magnesium and phosphorus that can best be explained by past farm management practices, such as dolomite treatments.

Salinity remains below the levels that can be expected to affect plant growth for all monitoring plots.

Soil microbial analysis showed that MFarm03 and MFarm04 improved across measured parameters when compared to the January survey, providing the necessary ecosystem functionality. MFarm06 has a depleted soil microbial community compared to MFarm03 and MFArm04, but due to the differences in vegetation type and structure the results should not be directly compared.

The invertebrate survey undertaken this year provides baseline data for comparison to future surveys. The results showed that invertebrate diversity was quite low with the major contributor being ants. There was a notable absence of pollinators. In MFarm03 and MFarm04 the low diversity was attributed to the prevailing dry conditions and the uniform vegetation structure, with no mid-storey or canopy vegetation, although this is typical of pasture or grazing country. MFarm06, which has a flora structure more indicative of a woodland site with a well-developed woodland canopy had a different assemblage of invertebrates, but again diversity was low due to an absence of mid- and understorey flora.

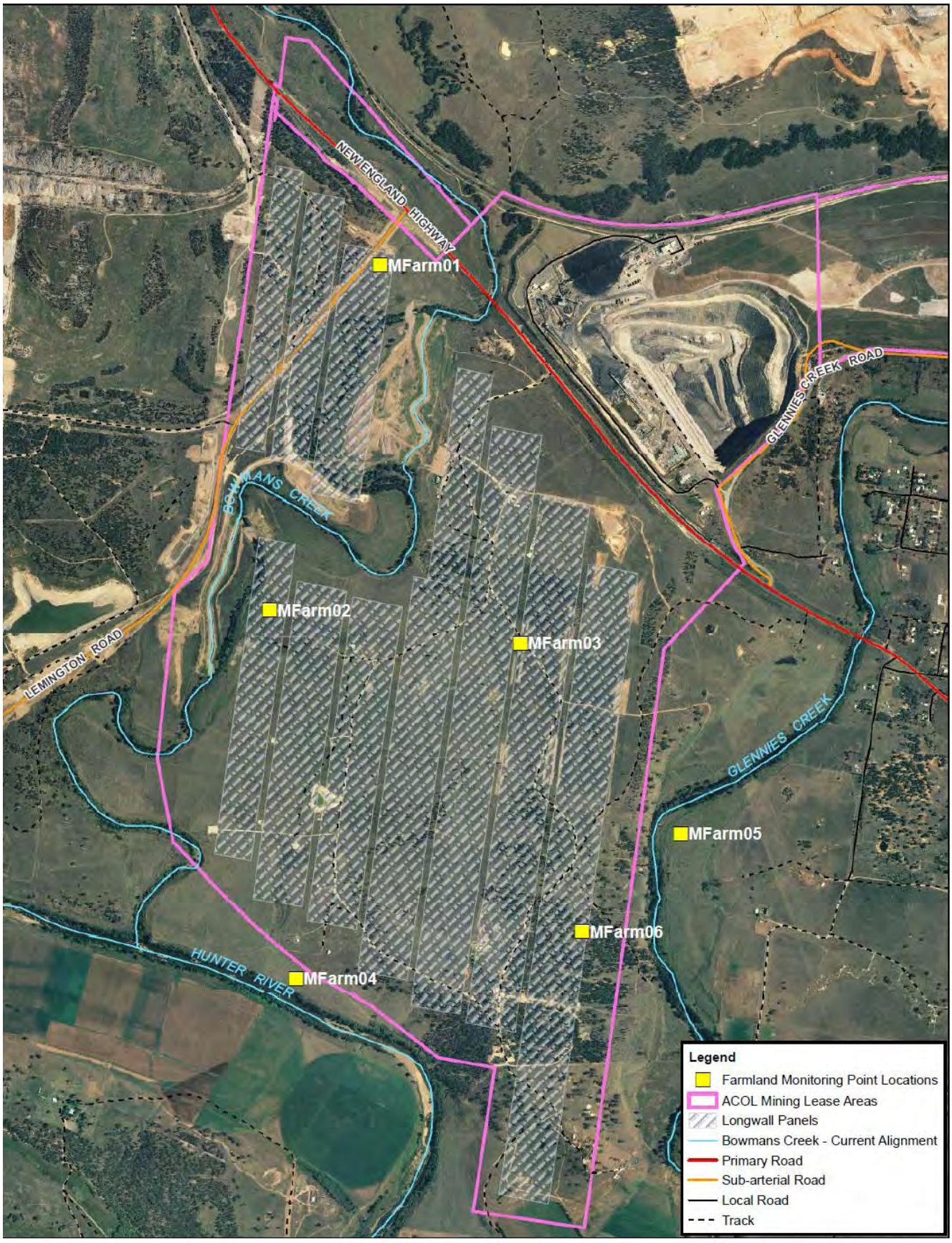


Figure 35: Farmland monitoring locations

5.4 Rehabilitation Trials and Research

SITA in conjunction with Ashton started a trial with varying microbial sprays on compost to investigate possible improvements to soil health, pasture coverage and diversity. The trial was conducted on the autumn 2012 pasture rehabilitation and involved a variety of Petrik products (BDX, Digester & Green Manure Plus). The location of the trial plots is shown in Figure 36. The trial consists of the following plots:

- Control: A horizon top soil + 100t/ha Rehab-ARRT compost (1.0 ha)
- Treatment area A2: A horizon top soil + 100t/ha Rehab-ARRT compost + 1L/ha of green manure (2.1 ha)
- Treatment Area A3: A horizon top soil + 100t/ha Rehab-ARRT compost + 2L/ha digester + 1L/ha green manure (2.3 ha)
- Treatment area B3: A horizon top soil + 100t/ha of Rehab-ARRT compost + 750g/ha BDX + 1L/ha green manure (2.0 ha).

Figure 36: Location of SITA trial plots.

During 2013, pasture assessments were completed in January, March, July, October and December and reviewed groundcover coverage, plant biodiversity development, structure of the topsoil and biodiversity of the soil.

Overall there was good groundcover over the different treatments varying naturally with the seasons, with no statistical difference between the different treatments for ground coverage. Figure 37 shows the improved plant biodiversity for all areas with treatment (A2, A3 and B3) compared to the control area.

The results indicate that using the Petrik products (BDX, Digester & Green Manure Plus) has shown a higher pasture diversity during the first six months compared to using Rehab-ARRT alone. The microbial testing has indicated an improvement on the soil nutrient cycling and accessibility and on the disease and drought resistance. Overall there is an improvement in microbial balance of the soil.

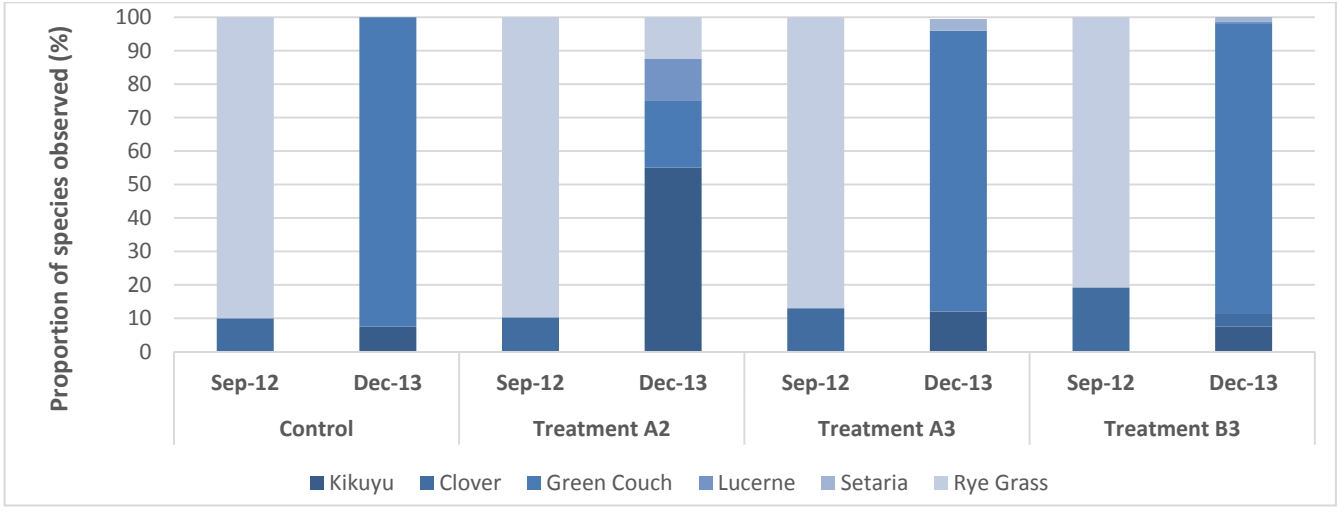


Figure 37: Comparison (September 2012 to December 2013) of pasture species diversity per treatment

6 Activities Proposed in the Next AEMR Period

Ashton Coal is committed to delivering a high standard of environmental and social performance into the future and has established targets for the next reporting period. These targets will be closely monitored and an update on the status of each will be reported in the next AEMR.

Ashton Coal has established the following targets for the next reporting period, calendar year 2014:

- Commence preparation of Subsidence Management Plan / Extraction Plan lodgement ULD105-108
- Implementation of CMO compliance system
- Review of key Management Plans for ACOL and SEOC
- Archaeological Clearance for Oxbow Area
- Revised water balance model implemented.

7 Acronyms

ACOL	Ashton Coal Operations Pty Limited
ACP	Ashton Coal Project
AEMR	Annual environmental management report
BCA	Bowmans Creek Alluvium
bcm	Bank cubic metres
CCC	Community consultative committee
CHPP	Coal handling preparation plant
dB	Decibels
DP&I	NSW Department of Planning and Infrastructure
DRE	NSW Department of Trade and Investment - Division of Resources and Energy
EA	Environmental assessment
EC	Electrical conductivity
EEO	Energy efficiency opportunities
EL	Exploration licence
EPA	NSW Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPL	Environment protection licence
GCA	Glennies Creek Alluvium
ha	Hectares
HRA	Hunter River Alluvium
HRSTS	Hunter River Salinity Trading Scheme
HVAS	High volume air sampler
ISO	International Standards Organisation
LB	Lower Barrett coal seams
LGA	Local government area
$L_{Aeq\ (15min)}$	Average noise energy over a 15 minute period
$L_{A1\ (1min)}$	The highest noise level generated for 0.6 seconds during one minute
LW	Longwall
m	Metre
mg/L	Milligrams per litre
ML	Megalitre
ML	Mining lease
m/s	Metres per second
mm	Millimetres
mm/s	Millimetres per second
MOP	Mining operations plan
m^2	Square metres
m^3	Cubic metres
NATA	National Association of Testing Authority
NGER	National Greenhouse and Energy Reporting
NGO	Non-government organisation
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
pH	Potential hydrogen
PIRMP	Pollution incident response management plan
PG	Pikes Gully
PM_{10}	Particulate matter less than 10 microns in size
PRP	Pollution reduction program
RAP	Registered Aboriginal Party
SSC	Singleton Shire Council
TEOM	Tapered element oscillating microbalance samplers
TSC Act	Threatened Species Conservation Act 1995

TSP	Total suspended particulate
TSS	Total suspended solids
ULD	Upper Liddell coal seams
ULLD	Upper Lower Liddell coal seams
UHAQMN	Upper Hunter Air Quality Monitoring Network
VPA	Voluntary planning agreement
W/m2	Watts per square metre (solar radiation unit of measurement)
µS/cm	Micro Siemens per centimetre
µg/m3	Micrograms per cubic metre
oC	Degrees Celsius

Appendix 1: Independent Environmental Audit Outcomes

Reference	Summary of finding (non-compliance)	Recommendation	ACOL Proposed Action	Due Date
DA 309-11-2001-i Condition 1.2	ACP EIS (2001) - Air quality modelling predicted that the project could operate with controls in place to ensure dust deposition and TSP limits could be achieved at Camberwell Village. Air quality monitoring has shown that exceedance of these criteria has occurred. It is noted that ACOL are unlikely to contribute to the majority of dust received at the village, however; the proportion of dust contributed by ACOL to these exceedances has not been determined.	ACOL should continue to implement best practice measures to mitigate dust generation from on-site operations.	Complete and submit the revision of the Air Quality Management Plan (AQMP) including the outcomes of the Best Management Practice PRP Report (Reference)	31/03/2014
DA 309-11-2001-i Condition 1.21	The audit found no evidence to show that a review of all strategies, management plans and programs required under the development consent had occurred within 3 months following an independent audit, completion of an AEMR or modification of the development consent.	Undertake a review of relevant management plans, programs in accordance with DA 309-11-2001-i Condition 1.21. Ensure this review process is recorded to show compliance with this condition in future audits.	Complete the revision of the relevant management plans and programs and resubmit if required. Ensure an action is recorded in the internal compliance management system to review strategies management plans and programs after completion of AEMR, independent audit and modification of development consents.	30/6/14 30/6/14
DA 309-11-2001-i Condition 2.4	ACOL sent a copy of the MOP to SSC on 1 October 2013 (refer to Document 54) and DP&I on 22 October 2013 (refer to Document 156). This was outside the required timeframe.	Ensure any future revisions or new MOPs are provided to SSC and DP&I within 14 days of approval by DRE.	The revision of the MOP with the TEOP to be provided to SSC, DP&I within 14 days of approval	30/6/14
DA 309-11-2001-i Condition 2.5C	ACOL have not appended the approved or revised Tailing Emplacement Operational Plan (TEOP) to the 2013-2017 MOP.	Ensure the current approved TEOP is appended to the current MOP.	The revised TEOP has been submitted to the DRE for approval on 27 September 2013. Once approved, this document will be appended to the approved MOP.	30/06/2014
DA 309-11-2001-i Condition 2.8 and Condition 6.41 EPL 11879	On 14 November 2010, a complaint was made to the DP&I compliance branch regarding a dozer commencing operation at 7.45am (15 minutes prior to its approved start time). This complaint resulted in an infringement notice being issued	Ensure approved operational hours are adhered to. If a breach of operational hours occurs it should be investigated and the outcomes of the investigation	Open cut operations will not recommence under this approval without modifications to the current consent. Historic finding requiring no	-

Reference	Summary of finding (non-compliance)	Recommendation	ACOL Proposed Action	Due Date
L2.6	to ACOL by DP&I. ACOL responded to this incident by implementing the following procedures. > Open Cut Examiner calls a start time over the radio and notes this time on the shift report. > No open cut machinery is to move from the go line until this is called.	reported to the relevant workforce.	action. Underground and CHPP operations are approved to operate 24 hours per day 7 days per week.	
DA 309-11-2001-i Condition 3.30	No evidence was found to show the Voluntary Conservation Agreement had been provided to SSC or DP&I following its approval by OEH.	Ensure a copy of the Conservation Agreement is provided to DP&I and OEH.	Provide a copy of the Conservation Agreement to DP&I and SSC.	31/03/2014
DA 309-11-2001-i Condition 3.31 and 9.2	> The 2012 AEMR does not provide the results of archaeological or heritage surveys. Section 3.12 (Aboriginal Heritage) of the 2012 AEMR states that *'pre-disturbance inspections for minor surface works within underground surface areas continued throughout the year* but does not provide the results of these surveys. > It is considered that the intent of this condition is to report the finding of surveys such as these.	Ensure the results of any cultural heritage surveys are described in future AEMRs.	Ensure that the results of cultural heritage surveys are reported in the 2013 and future AEMR's	31/03/2014
DA 309-11-2001-i Condition 3.36	>Appendix A of the Aboriginal Cultural Heritage Management Plan states, for this requirement *'All management measures are generally consistent with the commitments made in the various documents (refer to Table 5)'* The audit found that the ACHMP does not include a Table 5 and provides no specific reference to commitments made by documents listed in Condition 1.2 of the development consent. > The ACHMP includes a figure that shows AHIMS registered sites and the boundaries of AHIPs applicable to the site. The VCA area is not shown on this figure. Appendix A of the plan states *'The conservation areas have been excluded from the AHIP boundaries and these areas will be managed to prevent impacts.'* The VCA is referred to throughout the ACHMP,	Ensure the ACHMP summarises the commitments made in relevant documents listed in Condition 1.2 of the development consent, and shows how consistency has been achieved with these. Revise Figure 1 included in the ACHMP to show the location of the VCA.	Ensure the ACHMP summarises the commitments made in relevant documents listed in Condition 1.2 of the development consent, and shows how consistency has been achieved with these. Revise Figure 1 included in the ACHMP to show the location of the VCA. Ensure that the compliance audit and these changes are discussed at the ACC Forum, and then resubmit the ACHMP to DP&I and OEH for approval.	30/06/2014

Reference	Summary of finding (non-compliance)	Recommendation	ACOL Proposed Action	Due Date
	and specific procedures for managing this area are provided in Appendix E. The auditors therefore believe the area should be shown on a figure provided in the ACHMP.			
DA 309-11-2001-i Condition 3.46	> The Flora and Fauna Management Plan (FFMP) was reviewed against the sub-requirements of this condition (a-t) and was found to cover all requirements, with the following exceptions: - (n) Integration of rehabilitation works from nearby mines is not discussed - (r) Table 1 of the plan discusses Aboriginal heritage management but does not provide any specific details of how activities under the plan will avoid impact to Aboriginal heritage values. - (s) A protocol for identifying and managing significant impacts to threatened species not identified in the EIS is not included. > It was found that the FFMP provided reference to the Rehabilitation Management Plan for certain requirements of the development consent. The audit found that the Rehabilitation Management Plan has been replaced by the MOP (refer to Condition 3.51).	Amend the FFMP to include: - discussion of how rehabilitation works could be integrated with nearby mines. - how protection of Aboriginal heritage values against actions described in the FFMP will be achieved. - include a protocol for identifying and managing significant impacts to threatened species not previously identified. - update references to the Rehabilitation Management Plan that are provided in the FFMP to reflect that it has been replaced by the MOP.	Amend the FFMP to include: - discussion of how rehabilitation works could be integrated with nearby mines. - how protection of Aboriginal heritage values against actions described in the FFMP will be achieved. - include a protocol for identifying and managing significant impacts to threatened species not previously identified. - update references to the Rehabilitation Management Plan that are provided in the FFMP to reflect that it has been replaced by the MOP.	30/06/2014
DA 309-11-2001-i Condition 3.55	A review of the content of the MOP against this condition found that the landscaping and revegetation strategies discussed in the MOP are consistent with this condition, although non-compliances were noted against the following sub-clauses: - (c) Appropriate erosion and sediment control practices for earthworks associated with landscaping are not discussed. - (d) The MOP provides a broad discussion of the visual appearance of buildings, but does not provide a specific description of individual buildings, structures etc. Construction of new structures is an activity covered by the MOP (e.g. upcast vent fan facility); however specifications	Revise the MOP to ensure it is compliant with the requirements for a Landscape and Revegetation Management Plan under DA 309-11-2001-i. Liaise with DP&I to determine a suitable timeframe for this.	Revise the MOP to include the requirements of condition 3.55 of DA309-11-2001-i	30/06/2014

Reference	Summary of finding (non-compliance)	Recommendation	ACOL Proposed Action	Due Date
	for the visual appearance of the facility are not provided. - (e) Details, for building/structure maintenance to ensure that their original visual appearance is maintained are not provided. - (f) Details of how vegetation screening and fauna protection corridors will be incorporated into visual and landscaping works are not provided.			
DA 309-11-2001-i Condition 3.56	> Section 1 of the 2013-2017 MOP states that it satisfies the requirements for a Final Void Management Plan under this condition. > The MOP also outlines that the intended use of the final void is for tailing disposal. A Final Void Management Plan will therefore be redundant, should the final void be completely backfilled as shown on Figure 5A of the MOP. > As this condition was current during the audit period and the approved MOP states that it satisfies the requirements under this condition for a Final Void Management Plan, a review of the contents of the MOP against this condition was undertaken. This found it to be non-compliant with the following sub-clauses of this condition: - (b) the MOP does not outline future use options for the final void other than for tailings disposal. - (c) the MOP does not include a re-examination and validation of groundwater modelling. - (d) the MOP does not include details of a strategy for long-term management of the final void. - (e) the MOP does not include any strategies to minimise impacts where it is identified that potential degradation of surrounding water resources may occur.	Liaise with DP&I to determine an appropriate outcome regarding the requirement for ACOL to have a Final Void Management Plan, given that under current plans, the NEOC void will be completely backfilled.	Liaise with DP&I to determine an appropriate outcome regarding the requirement for ACOL to have a Final Void Management Plan, given that under current plans, the NEOC void will be completely backfilled.	31/12/2014

Reference	Summary of finding (non-compliance)	Recommendation	ACOL Proposed Action	Due Date
	- (f) the MOP does not contain programs for catchment management including practices to ensure there is little residual risk of nutrient enrichment of final void water.			
DA 309-11-2001-i Condition 3.57	No evidence was found to show that an annual report such as the AEMR or similar annual report had been submitted to the Singleton Fire Control Officer and therefore full compliance with this condition could not be demonstrated.	Ensure a copy of the AEMR is provided to the Singleton Fire Control Officer.	Provide a copy of the 2013 AEMR and future AEMR's to the Singleton Fire Control Officer Include an action in the internal compliance management system under AEMR to send a copy to the Singleton Fire Control officer so this is not missed in the future.	31/3/14 31/12/2014
DA 309-11-2001-i Condition 3.58	> A review of the contents of the MOP against this condition found that it is non-compliant with the following sub-clauses of this condition: (c) and (d) Section 3.22 of the MOP provides a brief discussion of subsidence crack and ponding rehabilitation in agricultural areas. Sections 4.3 provides broad agricultural land rehabilitation objectives and some pasture soil criteria is provided in Tables 28 and 31. Section 8.2.3.1 discusses pasture productivity assessment via laboratory testing. However, it was determined that the MOP does not provide *'a strategy for sustainable land management and the enhancement of agricultural values and production across the entire site'* as required by this clause. - (e) there is no discussion of how land degradation will be prevented. - (g) the potential for recycling of standing timber removed from the site is not provided in the MOP. - (h) Section 3.16.8 provides commitment to control weeds and discusses a plan, however no detail is provided and there is no discussion of vermin eradication.	Revise the MOP to ensure it is compliant with the requirements for a Land Management Plan under DA 309-11-2001-i. Liaise with DP&I to determine a suitable timeframe for this.	Revise the MOP to include the requirements of condition 3.58 of DA309-11-2001-i	30/06/2014

Reference	Summary of finding (non-compliance)	Recommendation	ACOL Proposed Action	Due Date
	- (i) feral pests are discussed in Section 3.16.8 of the MOP, however, no detail is provided.			
DA 309-11-2001-i Condition 3.62	The Emergency Response System was found to have been amended in 2013 (version 12), but no evidence was found to show this amendment had been approved by DRE.	Ensure the revised Emergency Response Plan applicable to the tailings disposal pipeline is provided to DRE for approval.	Ensure the revised Emergency Response Plan applicable to the tailings disposal pipeline is provided to DRE and meets their satisfaction.	30/03/2014
DA 309-11-2001-i Condition 4.7	> The WMP was submitted in June 2012, the required date was June 2011. This was due to ongoing issues relating to the delayed approval of mod 5 and the SEOC project, which would have created further changes in the Management Plan. > An Erosion and Sediment Control Plan ESCP has been incorporated into the WMP. This plan was reviewed against Managing Urban Stormwater: Soils and Construction (Landcom 2004). This review found the ESCP: - Does not identify critical natural areas requiring special planning or management. - Does not define the nature and extent of earthworks to be undertaken or the location of stockpiles and access roads. - Does not describe general site characteristics (slopes, topography etc.). - Does not describe major soil types present. - Does not describe existing vegetation species. - Does not describe catchment areas above and within the site. - Does not identify any areas within the site with serious erosion or sedimentation potential, such as steeply grading areas and areas with dispersive or magnetic sub or topsoils. - Does not provide design standards for erosion control or criteria to be used to select, locate and schedule control measures. > The diversion drain, channel design and sizing criteria provided is not compliant with Table 6.1 of Managing Urban Stormwater: Soil and	Amend the ESCP to ensure compliance with Managing Urban Stormwater: Soils and Construction Manual (Landcom) 2004.	Revise the Water Management Plan (WMP) and ensure compliance with Managing Urban Stormwater: Soils and Construction Manual (Landcom) 2004.	30/06/2014

Reference	Summary of finding (non-compliance)	Recommendation	ACOL Proposed Action	Due Date
	Construction, Volume 2e Mines and Quarries.			
DA 309-11-2001-i Condition 6.1 and 2001 EIS	> PM10 - exceedances of the 24-hour cumulative average criteria occurred on 23 occasions at off-site locations and on 52 occasions at on-site monitoring locations. ACOL state in the 2011-12 AEMR that these exceedances *'were not attributed to ACOL as the NEOC was no longer operating and all of the available overburden dump had been reshaped and rehabilitated by the end of May 2012'* It is noted that the criteria for 24hr Pm10 was reduced from 150ug/m3 following approval of MOD7 in 2011. > Deposited dust - exceedances of annual average criteria occurred during 2010 at sites D6, D7 and D13; and during 2012 gauges D2, D4 and D5. It was noted that as open cut mining at ACOL ceased in September 2011, the exceedances at D2, D4 and D5 during 2012 are likely to have been influenced by a source outside Ashton Mine.	ACOL should continue to implement best practice measures to mitigate dust generation from on-site operations.	As per action for Condition 1.2	
DA 309-11-2001-i Condition 6.10B	> ACOL has prepared a Greenhouse Gas Abatement Plan and received approval from DP&I for this plan, on the basis that it be revised to reflect the outcomes of Modification 9. > No evidence was found to show that the plan had been revised as requested by DP&I.	Ensure the Greenhouse Gas Abatement Plan is modified as required by DP&I.	DP&I approved the Greenhouse Gas Abatement Investigation Report on 12 June 2012. Subsequently Mod 10 was assessed and approved. Mod 10 covers the appropriate proposed greenhouse gas abatement measures contained within the report. These measures are currently being commissioned (gas drainage and flare plant). Therefore it is ACOL's view that no further action is necessary.	-
DA 309-11-2001-i Condition 6.22 and EPL 11879 L3.2	The 5% overall limit for 115-120 dBL blasts during the 2009-10 reporting period was exceeded at St Clements Church and Camberwell Village.	Ensure the effective blast planning and controls are implemented if open cut operations recommence in the future.	Open cut operations will not recommence under this approval without modifications to the current consent. Historic finding requiring no action.	-

Reference	Summary of finding (non-compliance)	Recommendation	ACOL Proposed Action	Due Date
DA 309-11-2001-i Condition 6.48	> The NMP does not specify measures to assess noise results for low-frequency, tonality or impulsive components. > Noise monitoring results presented in the AEMRs and Quarterly Monitoring Reports do not provide any analysis on frequency, tonality or impulsive components of noise monitored.	Ensure noise monitoring reporting includes an analysis of low-frequencies, tonality and impulsive sounds.	For all future noise monitoring and reporting ensure that it includes an analysis of low-frequencies, tonality and impulsive sounds.	30/03/2014
DA 309-11-2001-i Condition 8.2	> The AQMP and WMP do not specify quality control or assurance measures for monitoring programs. > The AQMP does not specify how laboratory analysis of dust samples should occur.	Amend management plans to include quality control/assurance measures and specify how laboratory analysis should be undertaken.	At the next revision ensure that the AQMP and the WMP specify quality control/assurance measures and specify which standards should be used to undertake laboratory analysis.	30/06/2014
DA 309-11-2001-i Condition 8.12	The audit did not find evidence to show that the site is recording Sigma-Theta through meteorological monitoring.	Ensure sigma theta is recorded at monitoring stations and provide evidence that this is occurring in a relevant report such as the AEMR.	Determine what is required to record sigma theta at the monitoring station and implement this monitoring and report it in the AEMR and other relevant reports	30/12/2014
DA 309-11-2001-i Condition 9.2	The AEMRs do not discuss changes to agricultural land or land suitability as a result of mining operations.	Ensure future AEMRs discuss any impacts to agricultural land, including potential changes to land suitability.	Incorporate the results of the farmland monitoring into future AEMR reports	31/03/2014
EPL 11879 M2 2	Annual returns applicable to the audit period were observed to contain all required information (refer to Documents 16-18), with the following exception: - Total Suspended Solids were not analysed during October 2012 due to a laboratory error and therefore no results were received for any site for this month. It is understood that corrective actions were undertaken following this incident to ensure analysis of all collected samples occur correctly.	Ensure required analysis are undertaken for all collective water quality samples.	Monthly check of water quality results is undertaken following this issue prior to monthly upload of monitoring data onto website. This process will be documented in the WMP review and tracked in an internal Compliance Management System.	30/09/2014
EPL 11879 U1.2	The Particulate Matter Best Management Practice Pollution Reduction Program does not include a timeframe for undertaking the review of current practices and developing a procedure for undertaking site watering practices and therefore full compliance with this condition	Provide a commitment to implementing the recommendations provided in the Particulate Matter Best Practice Pollution Reduction Program Report.	As per action for Condition 1.2	

Reference	Summary of finding (non-compliance)	Recommendation	ACOL Proposed Action	Due Date
	cannot be demonstrated.			
EPL 11879 U1.4	The Particulate Matter Best Management Practice Pollution Reduction Program was finalised on 4 July 2012, 5 days after the deadline.	Ensure future compliance reports are submitted to the required agency by the required deadline.	Ensure that deadlines for future compliance reports are captured within an action tracking database to ensure that they are submitted by the due date	30/06/2014
EL 4918 and EL 5860 (Conditions 5-7)	> ACOL are required to provide an annual report on Community Consultation to DRE within 28 days of the anniversary of the licence being granted. > No evidence of any community consultation activities being undertaken regarding exploration activities, or any evidence of an annual report being submitted in accordance with this condition were found during the audit. An annual report for 2011-12 was sighted for EL 4918, but this did not describe any consultation activities.	Submit an annual report to DRE within 28 days of the anniversary of each EL detailing any community consultation activities undertaken in regard to exploration activities.	Liaise with DRE to have this covered off in the AEMR each year.	30/03/2014
EL 4918 and EL 5860 (Conditions 12)	> ACOL are required to prepare a Groundwater Monitoring and Modelling Plan in consultation with NOW. > The auditors found that the site's WMP covers the requirements for this plan and that ACOL undertakes regular consultation with NOW. > The site's WMP does not cover the SEOC area and it is understood that EL's 5860 and 4915 at least partly cover this area. It is understood that a Draft Groundwater and Verification Monitoring Program has been prepared for the South East Open Cut and that it covers exploration activities, although this program was not viewed during the audit.	It is recommended that ACOL review its commitments under this requirement and consult with DRE and NOW regarding compliance with this requirement.	The WMP for the ACP covers most of the requirements of this condition. The draft SEOC Groundwater Monitoring and Verification Program will be lodged with DP&I and NOW which will satisfy the rest of the area covered by EL 4918 and EL 5860	30/06/2014

Appendix 2: Groundwater Report (prepared by RPS)

ASHTON COAL OPERATIONS 2013
GROUNDWATER MANAGEMENT REPORT

ASHTON COAL OPERATIONS 2013
GROUNDWATER MANAGEMENT REPORT

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Document Status

	Issue Date	Purpose of Document
Revision A	20/12/2013	First draft for client review
Revision B	29/01/2014	Second draft incorporating client review
Revision C	7/02/2014	Third draft incorporating client review
Revision D	21/02/2014	Fourth draft incorporating client review
Revision E	26/02/2014	Final

	Name	Position	Signature	Date
Author	Sam Cook	Senior Hydrogeologist	S-C-K	26/02/2013
Reviewer	Greg Sheppard	Principal Hydrogeologist	pp BB Woods	26/02/2013

Disclaimer

EXECUTIVE SUMMARY

This Groundwater Management review is prepared by RPS as a supporting document for the 2013 Annual Environmental Management Report for Ashton Coal Operations Pty Limited. The report has been prepared in accordance with Development Consent DA No. 309-11-2001-i, condition 9.2 (d).

This report details the groundwater monitoring and management for the Ashton Coal Project over the review period, 1 January 2013 to 31 December 2013. The results of the groundwater monitoring are presented and summarised together with analysis of trends over a three year period.

Over the 2013 review period, the following activities were of relevance to the groundwater management at the Ashton Coal Project:

- Four additional vibrating wire piezometers (WMLP361 to WMLP363 and WMLC339) were installed across the underground mining area to measure the propagation of depressurisation following the completion of longwall extraction in the Pikes Gully seam.
- The frequency of groundwater monitoring was increased to fortnightly and weekly at key piezometers during the mining of LW6B and LW101.
- The mining of LW6B, the final longwall panel to access coal from the Pikes Gully seam, was completed. The following points are noted in relation to the mining of LW6B:
  - Groundwater drawdown was measured in parts of the Bowmans Creek Alluvium overlying and adjacent to LW6B.
  - An increased rate of mine inflows was observed, this increase has been attributed to increased leakage resulting from mining related subsidence.
  - Assessment of the groundwater drawdown and mine inflows found the observed impacts to be within the approved predictions.
- The mining of LW101, the first longwall panel accessing coal from the Upper Liddell seam was completed. The following points are noted in relation to the mining of LW101:
  - No groundwater drawdown was observed within the Glennies Creek Alluvium.
  - No impacts to Glennies Creek baseflow were measured.
- During the latter part of the review period, mining commenced in LW102.
- A preliminary investigation was commenced (October 2013) into the observed increase to the rate of mine inflow associated with LW6B.

Predicted impacts to the groundwater system are detailed within groundwater impact assessment reports completed in support of applications for project approval. Of relevance to this report are the Bowmans Creek Diversion Groundwater Impact Assessment Report (Aquaterra 2009) and the Upper Liddell Seam Extraction Plan Groundwater Impact Assessment (RPS Aquaterra 2012).

Over the review period a comprehensive groundwater monitoring programme has been carried out in accordance with the 2012 Ashton Coal Water Management Plan (Ashton Coal 2012) and the requirements detailed under the conditions of Development Consent DA No. 309-11-2001-i and Environmental Protection Licence 11879.

Impacts exceeding predictions are identified using trigger values detailed in the Water Management Plan. Over the 2013 review period, no trigger values have been exceeded.

Table E1 provides a comparison of the observed impacts over the 2013 review period and the predictions as detailed in the projects groundwater impact assessments (Aquaterra 2009 and RPS Aquaterra 2012).

Table E1: Comparison of Observed and Predicted Impacts

Impact Description	Observed	Predicted [1]	Trigger Value	Impact Assessment Reference
Glennies Creek Alluvium – Groundwater Drawdown				
South of LW101	0m	0.11m	>0.11m	2012 EP GIA: Section 5.4 – Table 5.1 2012 WMP: Section 7.3.1 – Table 7.4
East of central portion of LW101	0m	0.18m	>0.18m	
Hunter River Alluvium – Groundwater Drawdown				
South of LW104	0m	0.01m	>0.01	2012 EP GIA: Section 5.4 – Table 5.1 2012 WMP: Section 7.3.1 – Table 7.4
South of LW105-107	0m	0.01m	NA	
Bowmans Creek Alluvium – Groundwater Drawdown				
In the vicinity of the oxbow meander west of LW104B	NA [2]	0.5 to 2m	>0.5 to 2m	2012 EP GIA: Section 5.6.6 2012 WMP: Section 7.3.4 2009 GIA: Section 7.2.1 – Figure 7.1
Above LW6A and LW7A	0 to 3m	Partly dewatered	NA	
Groundwater dependent ecosystems south east of LW7A.	0m	<0.5m	0.5m	
Reduction in Baseflow				
Glennies Creek	0L/sec	2.90L/sec	>2.9L/sec [3]	2012 WMP: Section 6.2.1 – Table 6.1 2012 WMP: Section 10.3.2 2012 WMP: Section 6.3.1 – Table 6.2
Bowmans Creek	0L/sec	0.59L/sec	0.5m drawdown west of LW104B	
Hunter River	0L/sec	0.13L/sec	>0.1m drawdown south of LW104B	
Mine Inflows				
Inflow Rate [3]	32L/sec	15.7L/sec	23.5L/sec [4]	2012 WMP: Section 7.3.5 – Table 7.5 2012 WMP: Section 10.4.4
Total Underground Inflows [3]	242ML	505ML	NA	

Notes

2012 WMP – *Ashton Coal Water Management Plan*.

2012 EP GIA: *Upper Liddell Seam Extraction Plan – Groundwater Impact Assessment*.

2009 GIA*: Bowmans Creek Diversion: Groundwater Impact Assessment Report.*

[1] Predicted impacts by the end of mining at LW101-LW104, excludes mine inflows.

[2] No monitoring points were available in vicinity of the oxbow meander over the review period.

[3] As predicted for the start of mining at ULD LW101

[4] Impact sustained over a period of three consecutive months.

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TABLES

FIGURES (compiled at end of report)

1. BACKGROUND

The Ashton Coal Project (ACP) is located 14 kilometres (km) west of Singleton within the Upper Hunter Valley region of New South Wales. The ACP is a jointly owned subsidiary of Yancoal Australia (Yancoal) who has the majority share (90%) in a joint venture with Itochu Corporation of Japan.

The ACP comprises of an underground mine, a coal handling and preparation plant, a rail siding and the North East open cut mine (NEOC) which ceased operations in September 2011. The Development Consent DA No. 309-11-2001-i for the ACP was granted by the Minister for Planning in October 2002. The ACP is approved to produce up to 5.45Mtpa of ROM coal until February 2024.

The underground mine is approved to extract coal from the Pikes Gully (PG), Upper Liddell (ULD), Upper Lower Liddell (ULLD) and Lower Barrett (LB) coal seams. The approval includes two lined diversions of Bowmans Creek constructed to re-route the creek to areas that will not be undermined and reduce baseflow losses (Figure 1).

Underground mine development began in July 2006 with coal extraction from the first longwall panel in the PG seam commencing on 12 March 2007. Mining of all eight longwall panels (LW1 to LW8) accessing coal from the PG seam concluded in October 2013.

Coal in the underlying ULD seam is to be accessed via eight longwall panels (LW101 to LW108) underlying the PG panels. Mining of the ULD seam commenced at LW101 in August 2012. Extraction of coal from LW101 is complete and LW102 has commenced.

1.1 Scope of this Report

This report forms a Groundwater Management Report for the review period 1 January 2013 to 31 December 2013 (the review period). The report has been prepared for inclusion into the Annual Environmental Management Report (AEMR).

Condition 9.2(d) of DA 309-11-2001-i requires that the AEMR include (inter alia):

> A Groundwater Management Report prepared by an independent expert to the satisfaction of the NSW Office of Water (NoW), addressing:
>
> i) work done under and the level of compliance with the groundwater management measures defined in the Groundwater Management Plan.
>
> ii) identification of trends in groundwater monitoring data and comparison with predictions as described within documents referred to in condition 1.2 and any previous SMPs, over the life of mining operations.

This report addresses Condition 9.2(d) by presenting a detailed review of the groundwater management work undertaken over the review period and the level of compliance with the conditions of Development Consent DA No. 309-11-2001-i and the approved Ashton Coal Water Management Plan (2012 WMP).

A detailed analysis of the monitoring data is presented. Trends displayed by the monitoring data have been compared to predictions as per the Bowmans Creek Diversion: Groundwater Impact Assessment Report (2009 GIA) and the updated prediction from the Upper Liddell Seam Extraction Plan Groundwater Impact Assessment (2012 EP GIA).

1.2 Review Period

Over the review period the following relevant activities took place:

- Underground longwall mining:
  - 3 August 2012 to 16 June 2013 – LW101 extraction in the ULD seam
  - 14 July 2013 to 27 October 2013 – LW6B extraction in the PG seam
  - 10 November 2013 to 31 December 2013 – LW102 extraction in the ULD seam (partially complete).
- Four vibrating wire piezometers (VWP) were installed (WMLP361, WMLP362, WMLP363 and WMLC339).

- Mid-panel groundwater review for LW101.
- End of Panel groundwater review for LW101.
- Monthly assessment and reporting for LW6B.
- A preliminary mine inflow investigation commenced 18 October 2013 and will be completed during the first quarter of 2014 in accordance with the 2012 WMP.

2. GROUNDWATER MONITORING PROGRAMME

2.1 Monitoring Network

An extensive groundwater monitoring network surrounding the ACP has provided a comprehensive baseline dataset as presented on Figures 1 to 4. The network has been designed to allow a high level of understanding of the hydrogeological system in the area such that responses to mining can be readily identified and quantified.

The monitoring network targets all hydrogeological units identified in the area. These units include Quaternary alluvium, Permian sandstone, and Permian coal measures. Targeted monitoring of individual units is achieved using sealed standpipe piezometers and fully grouted multi-level vibrating wire piezometers (VWPs).

The monitoring network is spatially distributed across the underground mining area. Monitoring coverage is focussed in areas within and adjacent to the mining associated subsidence footprint, notably:

- Saturated quaternary sediments (alluvium) including:
  - Bowmans Creek Alluvium (BCA)
  - Glennies Creek Alluvium (GCA)
  - Hunter River Alluvium (HRA).
- Shallow Permian sandstone and minor coal seams referred to in this report as coal measures overburden (CMOB).
- Permian coal measures of varying thickness targeted by mining.
- The identified Groundwater Dependent Ecosystem (GDE), a river red gum population shown in Figure 1.

2.1.1 Alterations to the Monitoring Network

During the review period the monitoring network was expanded with the addition of the following piezometers:

- A multi-level VWP (WMLC361) installed south of LW7B in September 2013 to increase the monitoring coverage in the area. Piezometers were installed in the Lemington, Arties and ULD seams.
- Three multi-level VWPs (WMLP362, WMLP363 and WMLC339) installed in December 2013 in chain pillars between completed PG longwalls to increase the understanding of the vertical propagation of depressurisation related to subsidence cracking.

All installed piezometers were completed in accordance with specifications outlined in the *Minimum Construction Requirements for Water Bores in Australia* (NUDLC 2012).

2.2 Rainfall

Monthly rainfall data measured at the Ashton weather station is compared against the monthly total and the long-term median (LTM) for the Singleton area. The Bureau of Meteorology Singleton STP Station (number 061397) is used for long-term rainfall data.

2.3 Groundwater Monitoring

Groundwater level, piezometric pressure and field water quality parameters are monitored across the network in accordance with the 2012 WMP (Ashton Coal 2012).

2.3.1 Groundwater Levels

Monitoring of groundwater levels at selected key piezometers is intensified to fortnightly during the extraction of longwall panels. Piezometers for intensified monitoring are selected based on the identified potential impacts from mining as per the 2012 EP (RPS Aquaterra 2012).

During the review period, monitoring frequency was increased at selected piezometers for the extraction of LW101, LW6B and LW102 as detailed in Table 2.1.

Some of these piezometers were equipped with automatic data loggers recording measurements on six-hourly intervals. The data loggers were relocated as mining progressed to provide early identification of mining related impacts and the ability to relate any impacts to the exact position of the longwall face.

2.3.2 Groundwater Quality

Field water quality screening parameters of electrical conductivity (EC), pH and temperature were monitored monthly in key monitoring bores over the review period. EC results are presented in Tables 3.2, 3.2 and 3.4 and pH results in Tables 3.5, 3.6 and 3.7.

2.3.3 Underground Monitoring

Monitoring of net inflows is conducted routinely by adopting a water balance approach. This routine monitoring forms part of the ongoing groundwater monitoring programme as outlined in section 9.3.1 of the 2012 WMP.

Monitoring of underground mine inflows undertaken during the review period included:

- Water transfer rates (metering on the dewatering pipelines).
- Water supply to the underground mine (cumulative flow metering on the pipelines).
- Metering of total water volumes abstracted from the mine.
- Water quality monitoring (EC).
- Water quality and flow monitoring at various underground collection points where possible.

Review Period

Over the review period, water was removed from the underground mine via two pathways: borehole pump no.2 (BH2) located south of LW5 and pipelines along the gate-roads that eventually pump to the Arties Dam (near the mine portal).

Over the review period, the outflows were monitored regularly at flow meters installed on:

- The underground dewatering pipeline in the ULD drifts (flow meter 28).
- BH2 at the outflow point and at the borehole (flow meters 32 and 33).
- BH3 at the borehole (flow meter 38).
- The underground water supply pipeline (flow meter 26).

Table 2.1: Selected (Key) Piezometers for Groundwater Level Monitoring

Piezometer ID	Piezometer Type	Monitored Strata and Hydrograph Reference
LW6B – Pikes Gully Seam (see Figure 2)		
WMLP308[1]	Standpipe	Bowmans Creek Alluvium – Figure 6
WMLP311[1]	Standpipe	
WMLP323[1]	Standpipe	
WMLP328[1]	Standpipe	
Ashton Well	Well	
T5	Standpipe	Bowmans Creek Alluvium – Figure 7
T6	Standpipe	
T7	Standpipe	
RA30	Standpipe	
WML115C	Standpipe	

Piezometer ID	Piezometer Type	Monitored Strata and Hydrograph Reference
T2A[1]	Standpipe	Bowmans Creek Alluvium - Figure 8
RA18	Standpipe	
WML115B	Standpipe	Coal Measures Overburden - Figure 14
WMLP324	Standpipe	
WMLP325	Standpipe	
RSGM1	Standpipe	
T2P	Standpipe	Coal Measures Overburden - Figure 15
LW101 – Upper Liddell Seam (see Figure 3)		
WML120B	Standpipe	Glennies Creek Alluvium – Figure 10
WML247	Standpipe	
WML239	Standpipe	Glennies Creek Alluvium – Figure 11
WML240	Standpipe	
WML129[1]	Standpipe	Glennies Creek Alluvium – Figure 12
WMLP336[1]	Standpipe	Hunter River Alluvium – Figure 13
WMLP337[1]	Standpipe	
WMLP338[1]	Standpipe	
WML119	Standpipe	Pikes Gully seam – Figure 20
WML181	Standpipe	
WML182	Standpipe	
WML183	Standpipe	
WML184	Standpipe	
WML185	Standpipe	
WML120A	Standpipe	
WMLP302	Standpipe	Arties seam – Figure 22
WML261	Standpipe	Upper Liddell seam – Figure 22
WML262	Standpipe	
WML107A[1]	Vibrating wire	Multiple coal seams – Figures 18, 19, 21, 22, 23 and 24
WMLC144	Vibrating wire	
WML189	Vibrating wire	
WMLC248[1]	Vibrating wire	
WMLC334[1]	Vibrating wire	
WMLC335[1]	Vibrating wire	
LW102 – Upper Liddell Seam (see Figure 4)		
WML278	Standpipe	Hunter River Alluvium – Figure 13
WMLP280	Standpipe	
WMLP337	Standpipe	
RA27	Standpipe	
WML120B	Standpipe	Glennies Creek Alluvium – Figures 10 and 12
WML129	Standpipe	
WML108B	Standpipe	Lemington 8 and 9 – Figure 18
WML119	Standpipe	Pikes Gully seam – Figure 20

Piezometer ID	Piezometer Type	Monitored Strata and Hydrograph Reference
WML120A	Standpipe	
WML181	Standpipe	
WML183	Standpipe	
WML261	Standpipe	Upper Liddell seam – Figure 22
WML262	Standpipe	
WML107A	Vibrating wire	Multiple coal seams – Figures 18, 19, 21, 22, 23 and 24
WML108A	Vibrating wire	
WML189	Vibrating wire	
WML191	Vibrating wire	
WMLC248	Vibrating wire	
WMLC334	Vibrating wire	

Notes
[1] Piezometers equipped with data loggers during relevant longwall mining periods

3. MONITORING RESULTS

3.1 Rainfall

During the review period, the total annual rainfall was 690.4mm being above the long-term median (LTM) annual rainfall of 660.1mm (Table 3.1).

- In early 2013 (January to March), Ashton experienced wetter than normal conditions with rainfall above the LTM.
- Significantly reduced rainfall was experienced in July, August and October 2013 leading to dry conditions. A total rainfall of only 46mm was measured over the four month period July to October, well below the LTM for the period of 131mm.
- November and December 2013 were generally dry with the exception of an intense rainfall event on 18 November, 73mm was experienced in 24hrs leading to a minor flooding event and peak creek flows.

Table 3.1: 2013 Monthly Rainfall

Month	2013 Ashton Rainfall (mm)	Long-Term Median* (mm)
January	131.6	50.4
February	100	137.8
March	100.4	48.6
April	21.2	32.2
May	33.6	24.8
June	57.8	46.1
July	10.8	24.2
August	5.0	23.0
September	27.4	29.6
October	4.8	54.5
November	175.2	83.6
December	22.6	66.6
Annual	690.4	660.1

*Data obtained from the Bureau of Meteorology Singleton STP Station number 061397

The LTM is used for comparison. This measurement provides a robust and representative measure of typical seasonal rainfall for the catchment. An extreme rainfall event will have less effect on the median than it will have on the arithmetic mean.

Daily rainfall is plotted on all hydrographs (Figures 5 to 28) and salinity plots (Figures 29 to 31) to help interpret the trends observed in groundwater level and EC in the BCA, GCA and HRA.

3.2 Groundwater Levels

Groundwater levels over the last three review periods (2011 to 2013) are presented in hydrographs to allow an observation of longer term trends (Figures 5 to 28).

3.2.1 North East Open Cut – Figure 5

Aside from GM1 the piezometers which form the NEOC monitoring network were dry and were not monitored during the review period.

- Piezometer GM1 which monitors the Upper Liddell seam, showed a steady decline through the review period.
- A more pronounced decline in water levels is observed during October 2013. This decline coincides with LW6B mining and may represent transmission of a pressure response. The observed decline is consistent with predictions and is not significant compared with the depressed water levels experienced during the active dewatering of the NEOC.

3.2.2 Bowmans Creek Alluvium – Figures 6 to 9

The elevations of the water levels within the BCA are shown to range from 49mAHD to 63mAHD.

Over the review period a response to the mining of LW6B was observed. This drawdown response aligns with modelled predictions (Aquaterra 2009) and has been carefully monitored following identification in September 2013.

Over the 2013 calendar year the following trends were observed:

Northern Underground Area – Figures 6 and 7

- Water level trends are shown to increase in early 2013 following medium rainfall events experienced in late January and early February.
- A gradual decline in water levels is observed following the early season rainfalls through to July 2013.
- From early August through to November an accelerated declining trend is observed. The trend is inconsistent with seasonal fluctuations and coincided with adjacent and underlying longwall extraction at LW6B.
- In mid November 2013 a rapid recovery of the water levels was observed in all piezometers following the large rainfall event (73mm) experienced on 18 November. Following the rainfall event the water levels are observed to revert to the previously observed rate of decline.

Central Underground Area – Figure 8

- Water levels show a general increase in early 2013 following rainfall events experienced in late January and early February.
- A gradual decline in water levels is observed following the early season rainfalls through to July 2013. Water levels are observed to recover following rainfall recharge in late November.
- There is no evidence of a depressurisation response to mining within the central BCA. This suggests that drawdown within the BCA is less than that predicted in response to PG extraction.
- A significant water level decline is noted at WMLP316 (outside of the current review period) from March through to October 2012. This is associated with the construction of the Western Diversion of Bowmans Creek, and it is noted that a full recovery was observed post construction.
- An increase in water levels was observed in all piezometers in response to the large rainfall event on 18 November.

Southern Underground Area – Figure 9

- Water levels show a general increase in early 2013 following rainfall events experienced in late January and early February.
- A water level decline is observed following the rainfall events experienced in late January and early February 2013. WML113C shows the most pronounced decline with the water level dropping 3m between monitoring intervals. This decline is anomalous and does not correlate with any mining activities or trends of other piezometers in the area.
- No data was collected at T10 between 5 June 2012 and 23 October 2013. During this period this piezometer was inaccessible due to standing water on the surface.

3.2.3 Glennies Creek Alluvium – Figures 10–12

No mining related impacts were observed within the GCA over the review period. Water levels in the GCA are shown to be generally within the range 51mAHD to 53mAHD.

The following observations are noted over the review period:

Northern Underground Area – Figure 10

- A rise in water levels observed in piezometer WML120B shows a response to rainfall recharge experienced in late January and February 2013. The gradual decline to baseline levels following the increase corresponds with the dry conditions experienced from March to October 2013.
- The water level in piezometer WML120B is observed to respond rapidly to the large rainfall recharge experienced in November 2013 with a sharp increase in water levels.
- Piezometer WML247 exhibits a gradual increase in response to rainfall recharge in late January and February 2013 and a gradual response to the November recharge. The relatively muted response at WML247 reflects the piezometers distance from the creek.

Central Underground Area – Figure 11

- Water levels in the central GCA remain within historical levels over the review period.
- A general increase in water levels is observed in central GCA piezometers following rainfall events in late January and early February.
- Following this increase a general decline in water levels (to within historical levels) is observed in response to reduced rainfall recharge.
- Water levels in all central GCA piezometers are shown to rise in response to the rainfall events experienced in November 2013.

Southern Underground Area – Figure 12

- Water levels in the southern GCA are observed to remain within historical levels over the review period.
- Water levels in all southern GCA piezometers are shown to rise in response to rainfall recharge experienced in late November.
- Piezometers WML241, WML243 were measured less frequently over the review period to limit disturbances to local residents.

3.2.4 Hunter River Alluvium – Figure 13

No mining related impacts were observed within the HRA over the review period. Water levels are shown to be within a range of 48 to 52mAHD.

The following observations are noted over the review period:

- Water levels in the HRA are shown to rise in response to rainfall recharge (late January and early February of 2013). Following the increase a general decline in water levels is observed to historical levels.
- Piezometers WMLP336, WMLP337 and WMLP338 were last monitored in June 2013 following LW101 extraction. These piezometers were installed to monitor impacts from LW101 extraction and have not been monitored subsequent to LW101 completion. Monthly monitoring at these piezometers will be re-established in 2014 during the LW102 and LW103 extraction periods.

3.2.5 Permian Coal Measures Overburden – Figures 14–16

Over the review period the following observations are noted:

Northern Underground Area – Figure 14

- Piezometric heads at WMLP324 and WMLP325 are observed to depressurise over the review period. The observed depressurisation is in response to subsidence cracking associated with the extraction of LW6B in the underlying PG seam. A similar response was observed in the previous review period with WMLP115B responding to LW7B extraction.
- Piezometric heads exhibit rapid recovery following the intense rainfall event experienced in late November. Following the recovery, piezometric heads are shown to continue the declining trend observed previously.

Central Underground Area – Figure 15

- Piezometric heads display gradual responses to rainfall variation over the review period remaining within historical trends.

Southern Underground Area – Figure 16

- Piezometric heads have a general declining trend and are observed to respond to rainfall recharge over the review period and generally remain within historical levels.
- T4-P has shown a slightly stronger declining trend over the review period. However, water level elevations remain within historical levels.

3.2.6 Permian Coal Seams – Figures 17–26

Bayswater and Lemington Coal Seams – Figures 17–19

- Piezometers monitoring the Bayswater seam show a continuation of historical trends (Figure 17). No responses to mining are observed.
- Some piezometers monitoring the Lemington seam exhibit responses following the extraction of the underlying PG seam (Figures 18 and 19). Over the review period:
  - WML113A-95m is shown to continue a depressurising trend first observed during LW7A extraction.
  - Piezometers WML107-98m and WMLC334-91m exhibit a continuation of a depressurising trend first observed during LW101 extraction.

Pikes Gully – Figures 20–21

- The piezometers monitoring the Pikes Gully to the East of LW1 generally show no response to mining.
- WML182 and to a lesser extent, WML183, (shown on Figure 20) exhibit high water level fluctuations in response to rainfall events, possibly indicating a hydraulic connection with the GCA. A general increasing trend observed over the review period is consistent with historical responses to rainfall recharge.
- Piezometers within the underground area (Figure 21) did not display any groundwater related responses to mining over the review period.

Arties Seam – Figure 22

- Piezometers monitoring the Arties seam generally show a continued gradual decline over the review period following LW101 extraction, with the exception of WML189 and WMLP302, which remain stable.
- A pressure decline is observed at WMLC334 – 126m which continues a declining trend which commenced in response to LW101 extraction. This response is within expectations following the extraction and resulting depressurisation of the underlying ULD seam.

Upper Liddell Seam – Figures 23–24

A continuation of a depressurising trend first observed in response to the extraction of the ULD development headings (10 January 2012) is observed in VWPs WML213 and WML262 (Figure 23) and WMLC334 – 157m, WMLC335 and WMLC191 (Figure 24).

The VWPs demonstrate depressurisation within the ULD outside the immediate vicinity of the extracted LW101. For example WML213 located approximately 3km away demonstrates pressure responses likely associated with vertical leakage to the extracted PG seam.

Depressurisation of the ULD seam is predicted in the 2009 GIA with no observations outside of predicted impacts.

Over the review period the following responses were observed:

- Outside the immediate LW101 area, piezometers WML213-247m and WML262 show the continuation of a gradual depressurising trend first observed prior to the review period.
  - The depressurisation trend at WML213-247m was first observed during PG extraction with the declining trend over the review period consistent with historical trends. This may be attributed to either a local drill hole allowing local depressurisation, or possibly a grout failure in the VWP installation providing a connection to the overlying and depressurised PG seam.
  - WML262 commenced depressurisation in 2012 following the extraction of the ULD development headings. The observed response is attributed to the transmission of a pressure response resulting from the extraction of the ULD development headings.
  - The ULD is predicted to be become completely depressurised in the underground area following ULD extraction. These declining trends are within predictions.
- South of LW101 piezometers WMLC334-157m and WMLC335-121.5m show the continuation of a gradual depressurising trend.
- WMLC191-132m is shown to have completely depressurised following the extraction of LW101 in-line with predictions from the 2009 GIA.

Middle and Lower Liddell Seams – Figure 25

- Piezometers monitoring the Liddell seams underlying the ULD are shown to generally remain pressurised following ULD extraction.
- WML191-155m and WML213-275m show a gradual depressurisation response initially observed during extraction of the LW101 development headings.
- WMLC334-175m shows a complete depressurisation in response to the extraction of LW101.

Barrett and Hebden Seams – Figure 26

- No responses to mining activities are observed in the Barrett or Hebden seams over the review period.

3.2.7 Paired Monitoring Sites – Figures 27–28

Paired standpipes provide the ability to compare water levels in the unconfined alluvium with piezometric pressures in the underlying, confined strata. Figures 27 and 28 provide this comparison for the BCA and the immediately underlying CMOB.

Prior to mining the piezometric pressure within the CMOB was often above the water level in the overlying alluvium leading to an upward hydraulic gradient. As mining has progressed depressurisation caused by mining related subsidence has reversed the hydraulic gradient. This was predicted to occur in the 2009 GIA.

Over the review period the piezometric pressure of the CMOB is observed to be below the overlying alluvial water level at all five paired sites (Figures 27 and 28). The depressurisation trend in CMOB piezometers WMLP324 and WMLP325 is observed to increase in August 2013. This increase correlates with LW6B mining and predictions from the 2009 GIA.

At all paired sites the alluvium and CMOB water levels are shown to have diverged prior to the current review period. A gradual increasing head difference continues at T4-A and T4-P while a more rapid depressurisation response is observed at WMPL323/WMPL324 and WMPL311/WMPL325 in response to mining and subsidence above LW6B.

The 2009 GIA specifically references monitoring points to the north-east and the south-east of LW6B (paired sites WMLP323/324 and WMLP311/325) to be used to determine if connective cracking from the goaf to the BCA has occurred.

At these sites, an accelerated drop in water levels within the coal measures overburden (CMOB) is observed and relatively gradual declines within the BCA (Figure 28). This is consistent with a response from disconnective cracking and increased permeability with the gradual decline demonstrating that direct connective cracking from the goaf has not occurred.

3.3 Groundwater Quality

Results from the monitoring of groundwater quality in the alluvial aquifers over the review period have aligned with the baseline trend of low salinity and neutral pH levels.

The following sections discuss the results from the water quality monitoring completed over the review period. The available data has been compared with baseline groundwater quality statistics as presented in Section 8.3.2 and Appendix E of the 2012 WMP.

3.3.1 Alluvial Groundwater Electrical Conductivity Levels

Monitoring of EC levels in the saturated alluvium can assist in the identification of mining related impacts. Section 7.3.3 from the 2012 WMP provides trigger values to identify an impact from mining. The trigger value for salinity is a 50% variation in EC levels from the baseline ranges.

Over the review period the groundwater within the alluvial aquifers was observed to be fresh to brackish with an EC range of 267µS/cm to 5020µS/cm. No groundwater quality impacts were identified over the review period.

Bowmans Creek Alluvium – Figure 29

The EC data monitored in the BCA over the review period is presented in Table 3.2. The following observations are noted in regard to the BCA salinity levels over the review period:

- Salinity levels ranged from 624µS/cm to 5,020µS/cm EC with an average of 1,320µS/cm.
- With the exception of RA08, EC levels within the BCA have been stable and below 3000µS/cm over the review period.
- A continuation of a gradual long-term decline in EC levels is observed at piezometer RA08 where data is available. This trend is attributed to the cessation of upward leakage of saline groundwater from the underlying Permian coal measures.
- A small spike in EC levels occurred in some piezometers during September 2013 coinciding with a rainfall event on 16 September 2013 and following a prolonged dry period. This spike is attributed to the sudden flushing of salts from the unsaturated zone towards the water table which accumulate during periods of low rainfall. RA30, however shows the opposite trend with a corresponding decrease in EC.

The EC range observed in BCA piezometers over the review period is generally consistent with the baseline range (722-9920µS/cm) as detailed in the 2012 WMP (section 8.3.2, Table 8.2).

Glennies Creek Alluvium – Figure 30

The EC data monitored in the GCA over the review period is presented in Table 3.3. The following observations are noted in regard to the salinity levels within the GCA:

- The groundwater salinity levels in the GCA ranged from 267µS/cm to 1,047µS/cm with an average of 626µS/cm.
- All piezometers show EC levels remain within baseline ranges over the LW101 extraction period.

- Piezometer WML240 demonstrates a rapid decline in EC correlating with high rainfall in early 2013.
- Piezometer WML129 shows a rising EC level correlating with the lower rainfall experienced from March to November 2013. Following the high rainfall event experienced in mid November a natural decline to historical levels is observed.
- The EC levels at WML120B display a reduced response to recharge events although there is still a seasonal variation. This is historically consistent with these piezometers displaying a high level of variability with rainfall recharge.

The EC range observed in the GCA over the review period is generally consistent with the baseline range for the GCA (300–16,300µS/cm) as detailed in the 2012 WMP (section 8.3.2, Table 8.2).

Hunter River Alluvium – Figure 31

The EC data monitored in the HRA over the review period is presented in Table 3.4. The following observations are noted in regard to the salinity levels within the HRA:

- Groundwater EC levels ranging from 100µS/cm to 3,050µS/cm with an average of 1742µS/cm.
- The EC levels in all piezometers are observed to fluctuate in response to rainfall recharge.
- Piezometer WMLP337 shows slightly elevated EC levels attributed to a lower permeability in the alluvium in the area.
- EC levels at piezometers WMLP337 and WML278 are shown to rise over periods of low rainfall recharge and naturally decline following rainfall events.
- WMLP336 shows the stabilisation of a declining EC trend observed in the previous review period.
- RA27 shows the continuation of a gradual long-term decline in EC levels. This trend has been observed over the last two years and may be attributed to the cessation of upward leakage of saline groundwater from the underlying Permian coal measures.

The EC range observed in the HRA over the review period is generally within or below the baseline range (1375–2540µS/cm) as detailed in the 2012 WMP (section 8.3.2, Table 8.2), with the exception of WMLP337.

3.3.2 Alluvial Groundwater pH Levels

Groundwater pH levels provide a key determinant of water quality. The groundwater in the saturated alluviums of the ACP area is historically neutral to slightly basic with a pH range from 6.44 to 10.04.

Over the review period, the pH was observed to be generally consistent with the baseline range with data ranging from 6.03 to 8.09 with an average of 7.10.

Bowmans Creek Alluvium

The pH data monitored in the BCA collected over the review period is presented in Table 3.5. The following observations are noted in regard to the groundwater pH within the BCA over the review period:

- A neutral pH was observed with a range of 6.64 to 8.27 and an average of 7.31 pH units.
- All pH values measured were within the ANZECC guideline limits for freshwater ecosystems (6.5 to 8) over the review period.

The pH range observed in the GCA over the review period is within the baseline range for the BCA (6.44 to 10.04) as detailed in the 2012 WMP (section 8.3.2, Table 8.2).

Glennies Creek Alluvium

The pH data monitored in the GCA over the review period is presented in Table 3.6. The following observations are noted in regard to the groundwater pH within the GCA over the review period:

- A neutral to slightly basic pH was observed with a range of 6.03 to 8.5 and an average of 6.81.
- The majority of pH values measured in the GCA were within the ANZECC guideline limits for freshwater ecosystems (6.5 to 8) over the review period.

The pH range observed in the GCA over the review period is slightly above the baseline range for the GCA (6.53 to 7.79) as detailed in the 2012 WMP (section 8.3.2, Table 8.2).

There were no observed variations in pH levels exceeding 50% of the baseline range; therefore the water quality trigger for pH (outlined in Section 7.3.3 of the 2012 WMP) was not exceeded during the review period.

Hunter River Alluvium

The pH data monitored in the HRA over the review period is presented in Table 3.7. The following observations are noted in regard to the groundwater pH within the HRA over the review period:

- A neutral pH was observed with a range of 6.3 to 7.79 and an average of 7.00.
- The pH values measured in the HRA were within the ANZECC guideline limits for freshwater ecosystems (6.5 to 8) over the review period.

The pH range observed in the HRA over the review period is slightly above the baseline range for the HRA (6.76 to 7.14) as detailed in the 2012 WMP (section 8.3.2 - Table 8.2).

There were no observed variations in pH levels exceeding 50% of the baseline range, therefore the water quality trigger for pH (outlined in Section 7.3.3 of the 2012 WMP) was not exceeded during the review period.

Table 3.2: Bowmans Creek Alluvium Groundwater Quality – Electrical Conductivity (µS/cm)

Piezometer ID	12-Apr-13	9-Jul-13	22-Jul-13	5-Aug-13	22-Aug-13	3-Sep-13	18-Sep-13	2-Oct-13	16-Oct-13	30-Oct-13	13-Nov-13	28-Nov-13	11-Dec-13	24-Dec-13
RA08	5020	-	-	-		-	-	-	-	-	-	-	-	-
RA10	1890	-	-	-		-	-	-	-	-	-	-	-	-
RA14	2160	-	-	-		-	-	-	-	-	-	-	-	-
RA18	937	-	-	-		-	-	-	-	-	-	-	-	-
RA30	1160	1360	1349	1347	1228	1304	918	1281	-	-	-	1211	1299	1316
T2-A	717	-	-	-		-	-	-	-	-	-	-	-	-
T3-A	2550	-	-	-		-	-	-	-	-	-	-	-	-
T4-A	1860	-	-	-		-	-	-	-	-	-	-	-	-
T5	1070	-	-	1074		1063	1088	1051	-	-	-	-	-	1049
T6	1040	1042	1044	1056	984	1066	1107	-	-	-	-	-	-	-
T7	2360	1884	1899	1948	1383	2331	2491	2378	-	-	-	1268	-	-
WML113C	1040	-	-	-	-	-	-	-	-	-	-	-	-	-
WML115C	-	1044	1571	1665	1587	1815	1945	1804	1812	1935	1703	1372	1434	1034
WMLP311	1150	1146	1111	1197	1119	1231	1271	1240	1231	1223	1103	920	1072	1072
WMLP316	624	-	-	-	-	-	-	-	-	-	-	-	-	-
WMLP320	969	-	-	-	-	-	-	-	-	-	-	-	-	-
WMLP323	875	-	-	1006	951	1050	1148	1197	1215	1235	874	835	839	858
WMLP328	879	1052	1062	1022	1038	1136	1177	1173	1137	1079	971	945	989	928

Note:
- indicates no data from this date

Table 3.3: Glennies Creek Alluvium Groundwater Quality – Electrical Conductivity (µS/cm)

Piezometer ID	10-Jan-13	22-Jan-13	7-Feb-13	19-Feb-13	18-Mar-13	4-Apr-13	12-Apr-13	19-Apr-13	2-May-13	15-May-13	29-May-13	13-Jun-13	26-Jun-13	13-Nov-13	28-Nov-13	11-Dec-13	24-Dec-13
WML120B	788	776	790	755	660	676	744	801	702	745	678	741	732	629	638	700	-
WML129	309	267	292	293	320	318	354	386	353	392	369	400	428	300	262	333	267
WML239	852	845	787	844	637	721	839	870	804	855	774	844	840	-	-	-	-
WML240	1034	1047	810	796	508	513	603	622	579	649	660	711	727	-	-	-	-

Note:

- indicates no observation from this date.

Table 3.4: Hunter River Alluvium Groundwater Quality – Electrical Conductivity (µS/cm)

Piezometer ID	10-Jan-13	22-Jan-13	7-Feb-13	19-Feb-13	18-Mar-13	4-Apr-13	12-Apr-13	19-Apr-13	2-May-13	15-May-13	29-May-13	13-Jun-13	26-Jun-13	13-Nov-13	28-Nov-13	11-Dec-13	24-Dec-13
RA27	-	-	-	-	-	-	1340	-	-	-	-	-	-	-	-	1207	-
WML278	-	-	-	-	-	-	1100	-	-	-	-	-	-	1558	1674	1899	1890
WML279	-	-	-	-	-	-	934	-	-	-	-	-	-	-	-	-	-
WML280	-	-	-	-	-	-	1580	-	-	-	-	-	-	1518	-	1763	1735
WMLP336	1747	1664	1153	712	837	739	-	919	869	933	886	886	782	-	-	-	-
WMLP337	3010	2850	3040	2880	2830	2317	-	2590	2327	2720	2326	2760	2840	-	3050	2880	3000
WMLP338	100	996	1565	1529	1335	1471	-	1734	1602	1715	1721	1719	1632	-	-	-	-

Note:

- indicates no data from this date.

Table 3.5: Bowmans Creek Alluvium Groundwater Quality – pH

Piezometer ID	12-Apr-13	9-Jul-13	22-Jul-13	5-Aug-13	22-Aug-13	3-Sep-13	18-Sep-13	2-Oct-13	16-Oct-13	30-Oct-13	13-Nov-13	28-Nov-13	11-Dec-13	24-Dec-13
RA08	7.69	-	-	-	-	-	-	-	-	-	-	-	-	-
RA10	7.39	-	-	-	-	-	-	-	-	-	-	-	-	-
RA14	7.02	-	-	-	-	-	-	-	-	-	-	-	-	-
RA18	7.61	-	-	-	-	-	-	-	-	-	-	-		
RA30	7.19	7.1	7.1	7.35	7.12	7.32	7.37	6.84	-	-	-	6.98	6.7	7.33
T2-A	7.79	-	-	-	-	-	-	-	-	-	-	-	-	-
T3-A	7.29	-	-	-	-	-	-	-	-	-	-	-	-	-
T4-A	7.55	-	-	-	-	-	-	-	-	-	-	-	-	-
T5	7.49	-	-	7.13	-	7.28	7.43	6.9	-	-	-	-		7.2
T6	7.44	7.21	7.39	7.17	7.12	7.27	7.57	-	-	-	-	-	-	-
T7	7.76	7.52	7.63	7.68	7.58	7.65	7.36	7.34	-	-	-	7.57	-	-
WML113C	7.39	-	-	-	-	-	-	-	-	-	-	-	-	-
WML115C	-	7.44	7.69	7.33	7.21	7.26	7.94	7.16	7.06	7.5	7.82	7.42	6.95	7.57
WMLP311	7.39	7.02	7.01	7.48	7.01	7.21	7.63	6.89	6.97	7.45	8.01	7.23	6.81	-
WMLP316	7.31	-	-	-	-	-	-	-	-	-	-	-	-	-
WMLP320	7.37	-	-	-	-	-	-	-	-	-	-	-	-	-
WMLP323	7.64	-	-	7.37	-	7.34	7.63	7.07	6.88	-	-	-	6.91	7.18
WMLP328	7.64	7.19	6.73	6.78	6.74	6.64	7.72	6.95	7.16	7.52	8.27	7.42	7.09	7.53

Note:
- indicates no data from this date

Table 3.6: Glennies Creek Alluvium Groundwater Quality – pH

Piezometer ID	10-Jan-13	22-Jan-13	7-Feb-13	19-Feb-13	18-Mar-13	4-Apr-13	12-Apr-13	19-Apr-13	2-May-13	15-May-13	29-May-13	13-Jun-13	26-Jun-13	13-Nov-13	28-Nov-13	11-Dec-13	24-Dec-13
WML120B	7.23	6.5	6.36	6.66	6.43	6.41	7.21	6.43	6.09	6.85	6.12	7.43	6.69	6.65	6.99	7.12	
WML129	7.08	6.7	6.83	6.96	6.81	6.96	7.53	6.71	6.53	8.09	7.14	8.5	7.83	7.8	7.56	7.21	7.68
WML239	6.78	6.71	6.59	6.68	6.55	6.51	7.39	6.33	6.29	7.38	7.35	7.74	6.66			-	-
WML240	6.46	6.44	6.44	6.48	6.31	6.32	7.14	6.06	6.03	6.98	6.39	7.55	6.74			-	-

Note:
- indicates no data from this date

Table 3.7: Hunter River Alluvium Groundwater Quality – pH

Piezometer ID	10-Jan-13	22-Jan-13	7-Feb-13	19-Feb-13	18-Mar-13	4-Apr-13	12-Apr-13	19-Apr-13	2-May-13	15-May-13	29-May-13	13-Jun-13	26-Jun-13	13-Nov-13	28-Nov-13	11-Dec-13	24-Dec-13
RA27	-	-	-	-	-	-	7.68	-	-	-	-	-	-	-	-	7.03	-
WML278	-	-	-	-	-	-	7.68	-	-	-	-	-	-	7.74	7.22	6.8	7.17
WML279	-		-	-	-	-	7.42	-	-	-	-	-	-	-	-	-	-
WML280	-	-	-	-	-	-	7.44	-	-	-	-	-	-	7.78	-	6.73	7.44
WMLP336	6.58	6.57	6.84	6.74	6.78	6.47	-	6.52	6.3	6.99	6.39	7.43	7.02	-	-	-	-
WMLP337	6.78	6.87	6.89	6.99	7.06	7.09	-	7.06	6.91	7.27	6.81	7.79	7.24		7.02	7.14	7.11
WMLP338	6.78	6.68	6.66	6.75	6.78	6.83	-	6.85	6.63	7.15	6.58	7.652	7.14	-	-	-	-

Note:

- indicates no data from this date

3.4 Mine Inflows

3.4.1 North East Open Cut

Mining operations at the NEOC were completed in early 2011 prior to the review period. During the review period, the pit was utilised for backfilling and for water storage purposes.

Stored water is made up of rainfall captured by the mine catchment, including rainfall infiltration to the in-pit waste rock, as well as groundwater inflows and some water pumped in from the CHPP. Groundwater inflows to the open cut are estimated to be only a small proportion of the water balance.

3.4.2 Underground Mine

Groundwater inflow and dewatering rates for the underground mine are calculated using metered pumping data and presented as a net dewatering rate in Figure 33. The groundwater model predictions for inflows are included on Figure 33 for comparison.

Net dewatering volumes are calculated using a water balance method, i.e. total inflows are equal to the sum of the water pumped from the underground mine, minus the sum of the water supplied for operational purposes.

The inflow calculation does not take into consideration underground operational factors such as the temporary storage of water within the mine and changes in this storage. This can lead to a misrepresentation of inflow rates. Specifically, actual inflows can be exaggerated during periods of active water extraction where water is also being pumped from storage and understated during periods where inflows are diverted to storage areas.

The following observations are noted over the review period:

- During the review period, ACOL remained in compliance with the Water Management Plan, and the GIA.
- During the months of June, July and August minimal water was extracted from the mine. This was because water was stored underground over this period and wasn't able to be removed until the level of the stored water reached the elevation of BH2. Due to the water balance approach adopted for estimating inflows during this period stated inflows may not indicative of actual inflow rates.
- The calculated net dewatering rates ranged from approximately nil to 31L/s (2.7ML/d) over the review period.
- On 10 October 2013 an increase in pumping rate was observed at BH2. Although the inflow rate increased above model predictions, the increase had not been sustained for a three-month period, and total inflow volumes for the year are within approved predictions (Table 3.8 and Figure 32).
- It is likely that the increased mine inflow rates will be sustained and therefore exceed the trigger value from the TARP (2012 WMP) in early in 2014. This will be investigated and reported a preliminary inflow investigation report consistent with the requirements of the WMP.
- The total dewatering volume for the review period is approximately 242ML at an average of 7.5L/s (0.65ML/d). This is below the original EIS predicted inflow of 567ML/yr (18L/s) and the revised predictions of 505ML/yr (16L/s) from the 2009 GIA. Table 3.8 presents a comparison of the actual versus predicted annual dewatering volumes to date.

Table 3.8: Mine Dewatering Volumes

Year	2008	2009	2010	2011	2012	2013
Predicted * (ML)	240	347	432	459	490	505
Actual (ML)	188	160	169	216	400	242

Note: * - Adjusted for equivalent year of actual mining.

3.5 Groundwater Dependent Ecosystems

It is considered unlikely that there would be any impact outside predictions on groundwater dependent ecosystems (GDEs) in the vicinity of longwall mining at ACOL. This is because of the following observations:

- No impacts on flows in Bowmans Creek, the Hunter River and Glennies Creek were observed over the review period.
- No significant impacts on the groundwater levels within Hunter or Glennies Creek alluvial aquifers from mining of the PG seam or ULD seam are noted within the review period.
- No groundwater related impacts were observed in the identified river red gum area over the review period. The identified river red gum area is located next to Bowmans Creek between the southern end of the western diversion and the Hunter River (Figure 1). The trigger value for an impact in this area is 0.5m outside of natural fluctuations, no drawdown attributable to mining was observed in this area.

4. DISCUSSION

4.1 Groundwater Levels

Water levels during the review period remained within the predictions made in the 2009 GIA (Aquaterra 2009).

Drawdown was observed in the BCA above LW6B and LW7B. This alluvium was predicted to be partially to fully dewatered following PG extraction and the observed response is within predicted levels.

There was no mining related drawdown observed within the GCA or HRA. Water levels in these alluvial units showed fluctuations consistent with rainfall recharge and within historical water level elevations.

4.1.1 LW6B Groundwater Level Drawdown

Groundwater drawdown was initially observed within the CMOB and BCA in August 2013 and reached a low in November (Figure 6, 7 and 14). Following an intense rainfall event in November groundwater levels were observed to recover fully in the BCA with partial recovery in the CMOB. Following the recovery, water levels over December have been shown to resume the declining trend observed prior to the November rainfall event.

The observed drawdown trend is consistent with predictions in the 2009 GIA (Aquaterra 2009). The BCA is predicted to progressively dewater during PG and ULD extraction.

4.2 Increase in Mine Inflows

The inflow rate to the underground mine seems to have increased during the mining of LW6B. On 10 October 2013 an increased pumping rate was measured at dewatering borehole BH2.

The approved 2012 WMP details the ACPs TARP which provides trigger values to identify impacts outside of approved predictions (2009 GIA and 2012 ULD EP).

The trigger value for mine inflows is documented in the WMP (Section 7.3.5). The assigned trigger value is:

> 50% in excess of the predicted inflow rate for the equivalent stage of mining sustained for a period of three consecutive months.

For the current stage of mining the predicted inflow rate is 15.7 litres per second (L/sec) therefore the corresponding trigger value is 23.5L/sec sustained over a period of three consecutive months.

Actual dewatering rates are anticipated to differ from predictions in the short term (days to months) and therefore an observed value in excess of the trigger value in the short term does not constitute an exceedence. To account for this expected variation, only a dewatering rate observed above the trigger value that is sustained for a period of three consecutive months will trigger a response (WMP).

The dewatering rate was first assessed as above the trigger value (23.5L/sec) on 24 October 2013. Since that time the net dewatering rate has been sustained at approximately 26L/s to 30L/sec. Despite the increase in groundwater inflows, the total volume of dewatering for the review period (2013 calendar year) is still consistent with annual volumes predicted in the groundwater model for the equivalent period of mining (the completion of longwall 101 in the Upper Liddell Seam). The dewatering volumes have been below the refined predictions from the 2009 GIA for each year of mining.

Over the review period the elevated inflows exceed the trigger value by up to 50% and have been sustained above the trigger value for approximately two months. If inflows are sustained above 23.5L/sec for a period of three consecutive months then the reporting requirement will be triggered under the 2012 WMP Mine Inflows TARP.

4.3 Baseflow

4.3.1 Bowmans Creek

During the review period, LW6B extraction progressed beneath saturated alluvium. Predictions in the 2009 GIA indicate that leakage from the BCA is likely to occur during this stage of mining.

Aligning with predictions the saturated thickness of the BCA has been observed to decline with a corresponding increase in mine inflows indicating potential for seepage loss from the BCA because of mining.

In accordance with predictions, the extraction of LW6B and LW7B has resulted in subsidence to parts of the alluvial aquifer.

Monitoring results collected during LW6B and LW7B extraction show pressure responses in the CMOB and partial dewatering of the overlying alluvium. Despite the subsidence causing an increased hydraulic gradient and associated seepage, the alluvial bores have continued to report water levels that are above the underlying Permian coal measures during the review period as demonstrated in Figures 27 and 28. The partial saturation of the alluvial aquifer overlying extracted longwall panels in the PG seam demonstrates that the mining related impacts on the alluvium aquifers were less than predicted over the review period.

Within the zone of depressurisation caused by the extraction of LW7B and LW6B, Bowmans Creek has been diverted and lined with a geosynthetic clay layer. A block bank diverts flow from the natural creek north of LW5 into the lined diversion and effectively limits the potential baseflow losses from the creek.

No evidence of direct connective cracking to the alluvium or the diverted sections of the creek channel has been identified. There is therefore no immediate reason (or trigger) to raise the block bank to further reduce any flows to these diverted creek channels.

Accordingly, there have been no observed impacts on Bowmans Creek baseflow in excess of those predicted in the 2009 GIA (0.45L/s or 0.38ML/d).

4.3.2 Glennies Creek

There were no impacts to the baseflow losses from Glennies Creek outside predictions from the 2009 GIA and no increases in mine inflows during the review period. Calculated GCA seepage inflow rates during the review period are well below the 2009 GIA prediction of 2.6L/s (0.21ML/d) for this stage of the mining operation.

Most of the previously observed impacts had stabilised prior to the end of LW1, and no incremental increase in measured seepage rate or influence from PG or ULD extraction has been observed.

No additional impacts on Glennies Creek baseflow were observed over the review period. Previously observed impacts have diminished and they are within predictions in the 2009 GIA.

4.3.3 Hunter River Seepages

The 2009 GIA predicted very small seepage losses of around 0.07L/s (<0.01ML/d) from the HRA during the mining of the PG seam. However, no reduction in Alluvium storage has been observed during the review period, and consequently no seepage loss from the HRA is likely to have occurred.

The impact on HRA has therefore been less than the 2009 GIA and below the trigger levels detailed in the 2012 WMP.

5. GROUNDWATER MODEL

In accordance with Consent Condition 9.2, the performance of the groundwater system in response to mining operations was compared with impacts detailed in the 2012 WMP. The 2012 WMP derives impacts from the updated groundwater impact assessment completed for the 2012 EP GIA (RPS Aquaterra 2012).

The current iteration of the groundwater model was developed as part of a modification to Development Consent DA No. 309-11-2001-i and subsequently updated during preparation of the 2012 EP GIA (RPS Aquaterra 2012).

Updates to the model included redefinition of model layers, in particular assignment of separate model layers for the main coal seams and the interburden (previously each seam and its overburden were treated as a single layer), and the subdivision of the PG seam overburden into several layers (previously the Pikes Gully seam and its overburden constituted a single layer).

Groundwater level responses to mining operations have been found to be consistent with the timing and predicted impact in the 2009 Bowmans Creek Impact Assessment (RPS Aquaterra 2009).

An observed increase in the mine inflow rate discussed in Section 3.4 is shown to exceed the predictions from the groundwater model for the relevant mining period (Figure 33). The 2012 WMP details predicted inflow rates as annual averages; it is therefore not unexpected that short-term inflow rates might exceed predictions at certain stages of longwall development (Ashton Coal, 2012).

As the current rate of inflow (approximately 26–30L/sec) exceeds predictions ACOL have committed to update and re-calibrate the current groundwater model using monitoring data collected to date, including the increased inflow rate. This model update is scheduled to commence in January 2014 and will be reported in the 2014 AEMR.

6. CONCLUSIONS

6.1 Summary

During the review period coal extraction occurred within the Pikes Gully and Upper Liddell seams at LW101, LW6B and LW102. In addition the Bowmans Creek diversions were operational reducing potential baseflow and surface flow losses. Groundwater monitoring over the review period was concentrated on the potential impacts from these operations.

The following conclusions are noted from interpretation of the monitoring data over the review period:

- No mining associated impacts were identified to the HRA or GCA.
- No significant groundwater quality impacts have been observed.
- No water level decline was observed to the central BCA.
- No significant impacts to GDEs or other groundwater users in the area have been identified.
- A declining trend in the northern BCA water levels is noted over the review period. This decline is a predicted impact from mining activities and was approved under Development Consent DA No. 309-11-2001-i (modification 6).
- While inflow rates were observed to increase in October 2012 the total inflow volume to the underground for the review period (247ML) is well below the inflow volumes predicted in the 2012 ULD Extraction Plan (505ML). The increased inflow rates will trigger a response (as per section 7.3.5 of the 2012 WMP) if the current inflows are sustained for a three month period.
- The mine inflow peaks observed over the review period are attributed to a combination of water level drawdown in the BCA and depressurisation of the Lemington seams and CMOB. Total inflows over the review period are below predicted rates.
- ACOL has initiated an update and re-calibration of the existing groundwater model to reflect the increased inflows observed following LW6B extraction.

The observed impacts are compared against the impacts as they are detailed in the 2012 WMP in Table E1.1.

The groundwater monitoring during the review period has been completed in full compliance with Development Consent DA No. 309-11-2001-i.

With a few noted exceptions, noted below, Ashton Coal has operated in compliance with the 2012 WMP over the review period. The following exceptions are:

- A period pumping at above predicted inflow rates occurred during November and December 2013. The groundwater-related impacts from underground mining during the review period were below the levels predicted in the 2012 EP GIA (RPS Aquaterra 2012) and the 2009 GIA (Aquaterra 2009).
- Key water quality indicators of EC and pH were not monitored quarterly at all piezometers in the last quarter of the review period. However, monitoring these parameters did occur at increased frequencies (fortnightly / weekly) at key piezometers during mining activities. No impacts or significant variations from baseline ranges were observed.

The following recommendations are made for the 2013 review period based on analysis of the groundwater monitoring data collected over the current review period.

- Continuation of the current monitoring programme as detailed in the 2012 WMP.
- Increased underground monitoring of flow rate, water transfer to and from storage and water quality where possible.
- Recalibration of the ACP groundwater model utilising extensive data collected throughout the review period to further refine mine inflow predictions.

7. REFERENCES

ANZECC/ARMCANZ, 2000. *National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality*.

Ashton Coal, 2012. *Site Water Management Plan MP 3.4.1.8*, *Revision E*. Ashton Coal Operations Pty Limited, July 2012.

Aquaterra, 2009. *Bowmans Creek Diversion: Groundwater Impact Assessment Report*, Revision G. Aquaterra Consulting Pty, October 2009.

Marine Pollution Research Pty Ltd, 2009. *Riparian & Aquatic Ecology Assessment*. Appendix 9 Report Submitted in Support of the 2009 Ashton Coal Bowmans Creek Diversion Environmental Assessment.

National Uniform Drillers Licensing Committee (NUDLC), 2012. *Minimum Construction Requirements for Water Bores in Australia.*

RPS Aquaterra, 2012, A*COL Upper Liddell Seam Extraction Plan – Groundwater Impact Assessment.* Revision D, August 2012.

HLA, 2001. *Ashton Coal Project: Groundwater Hydrology and Impact Assessment*. Appendix H Report Submitted in Support of the 2002 Ashton Coal Project EIS.

FIGURES

- Groundwater Monitoring Site
- ULD Underground Mine Plan
- Pikes Gully Seam Extraction
- ULD Seam Extraction
- Alluvium boundary
- Bowmans Creek Diversion
- Red River Gum

N

0 150 300 450 600

Metres

APPROX SCALE 1:17,000 @ A3

GDA 1994 MGA Zone 56

RPS

FIGURE 1

Ashton Coal - AEMR 2013
Groundwater Monitoring Network

S56C_007d_DD01_Ashton_Coal_Groundwater_Monitoring_Network.mxd Produced: JC Reviewed: SC Date: 13/02/2014

- Standpipe Piezometer
- Vibrating Wire Piezometer
- Well
- ULD Underground Mine Plan
- Pikes Gully Seam Extraction
- Alluvium boundary
- Saturated alluvium boundary
- Bowmans Creek Diversion

N

0 100 200 300 400

Metres

APPROX SCALE 1:10,000 @ A3

GDA 1994 MGA Zone 56

RPS

FIGURE 2

Ashton Coal - AEMR 2013
LW6B Fortnightly Groundwater Monitoring

S56C_007b_DD02_LW6B_Fortnightly_Groundwater_Monitoring.mxd Produced: JC Reviewed: SC Date: 29/01/2014

- Standpipe Piezometer
- Vibrating Wire Piezometer
- ULD Underground Mine Plan
- Pikes Gully Seam Extraction
- ULD Seam Extraction
- Alluvium boundary
- Bowmans Creek Diversion

N

0 100 200 300 400
Metres

APPROX SCALE 1:11,123 @ A3

GDA 1994 MGA Zone 56

RPS

FIGURE 3

Ashton Coal - AEMR 2013
LW101 Fortnightly Groundwater Monitoring

S56C_007d_DD02_LW101_Fortnightly_Groundwater_Monitoring.mxd Produced: JC Reviewed: SC Date: 20/02/2014

LEGEND

- Standpipe Plezometer
- Vibrating Wire Piezometer
- ULD Underground Mine Plan
- Pikes Gully Seam Extraction
- ULD Seam Extraction
- Alluvium boundary
- Saturated alluvium boundary
- Bowmans Creek Diversion

N

0 100 200 300 400

Metres

APPROX SCALE 1:7,268 @ A3

GDA 1994 MGA Zone 56

RPS

FIGURE 4

Ashton Coal - AEMR 2013
LW102 Fortnightly Groundwater Monitoring

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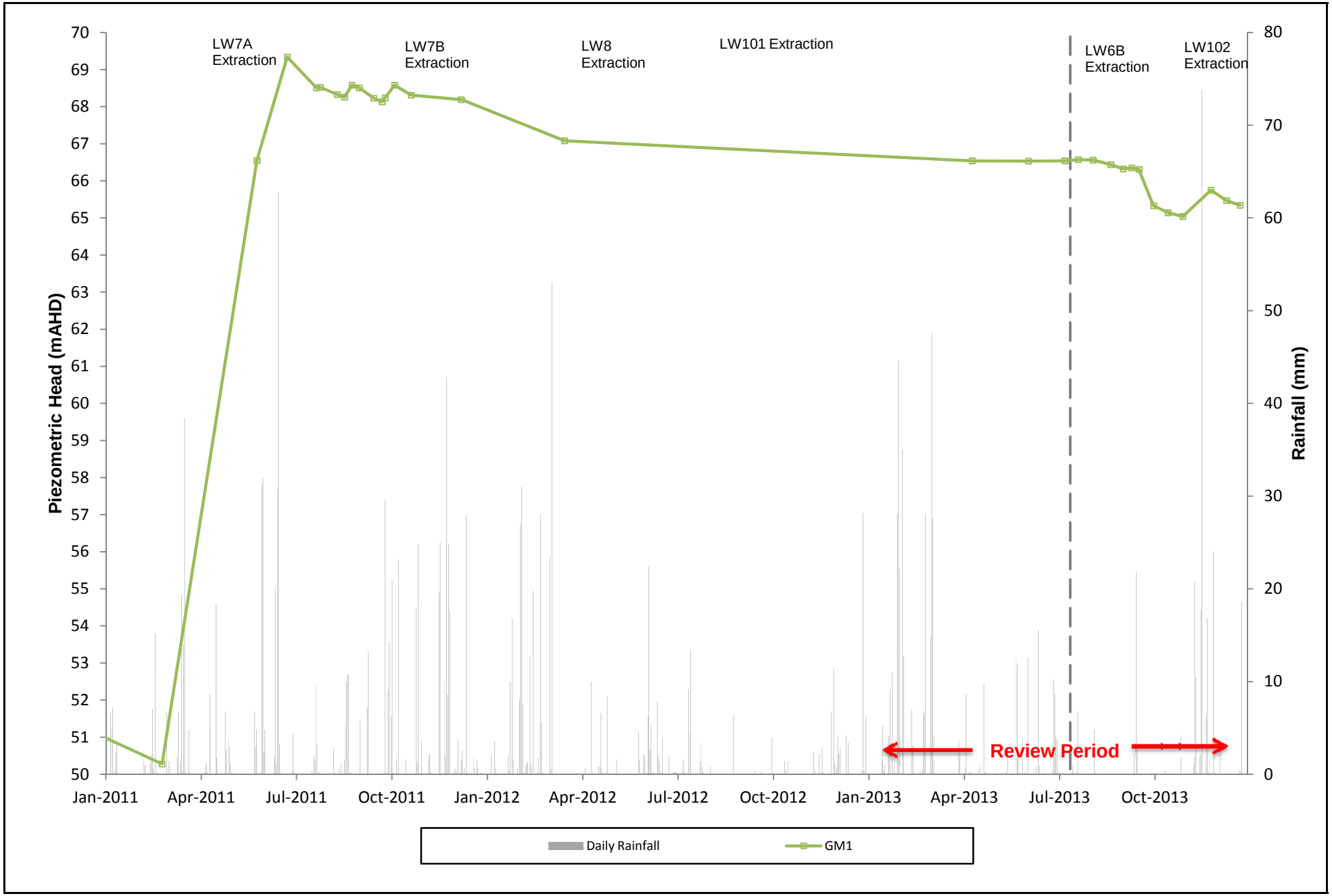

RPS

HYDROGRAPHS - NORTH EAST OPEN CUT FIGURE 5

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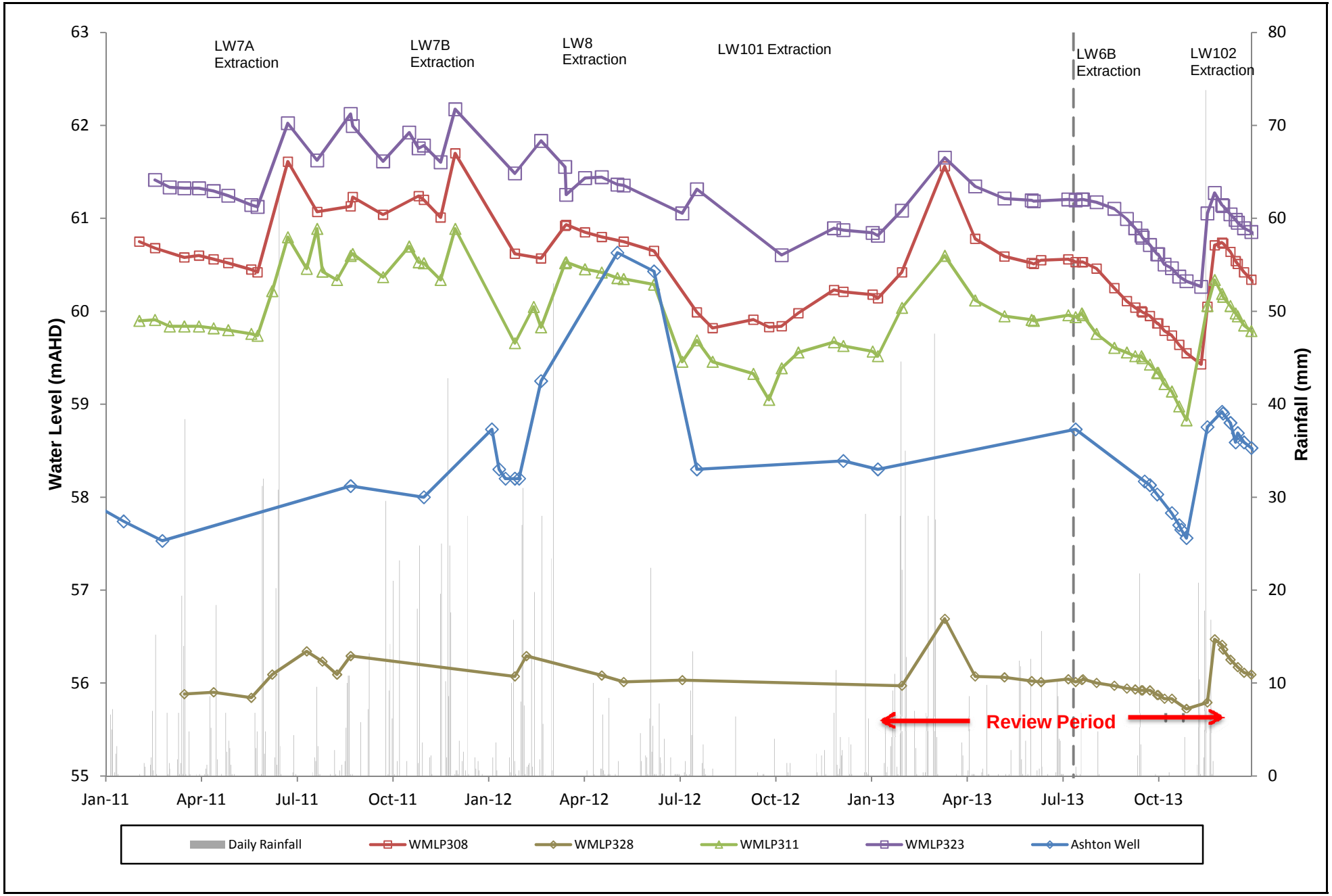

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HYDROGRAPH - BOWMANS CREEK ALLUVIUM (NORTH EAST) FIGURE 6

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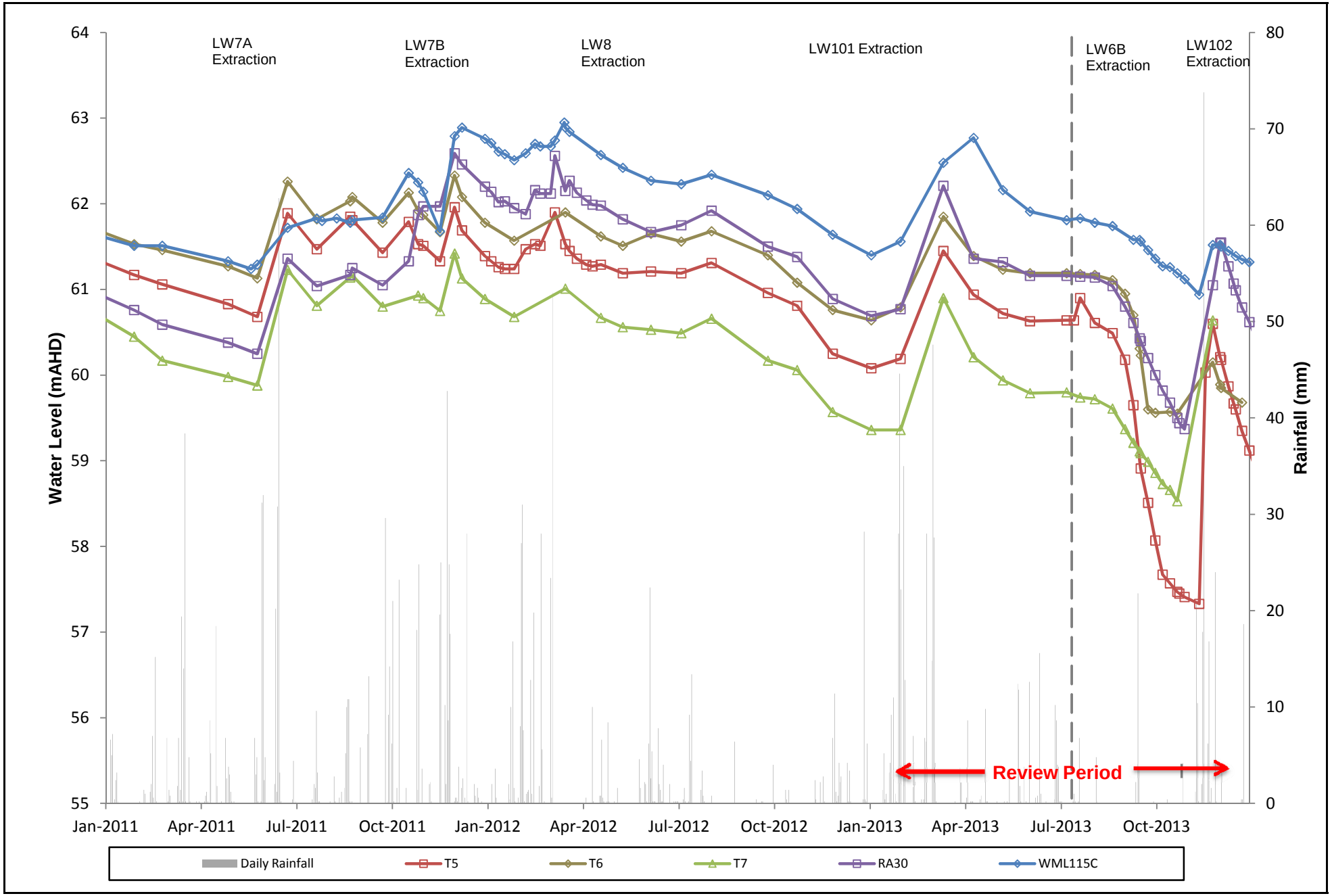

HYDROGRAPH - BOWMANS CREEK ALLUVIUM (NORTH-WEST) FIGURE 7

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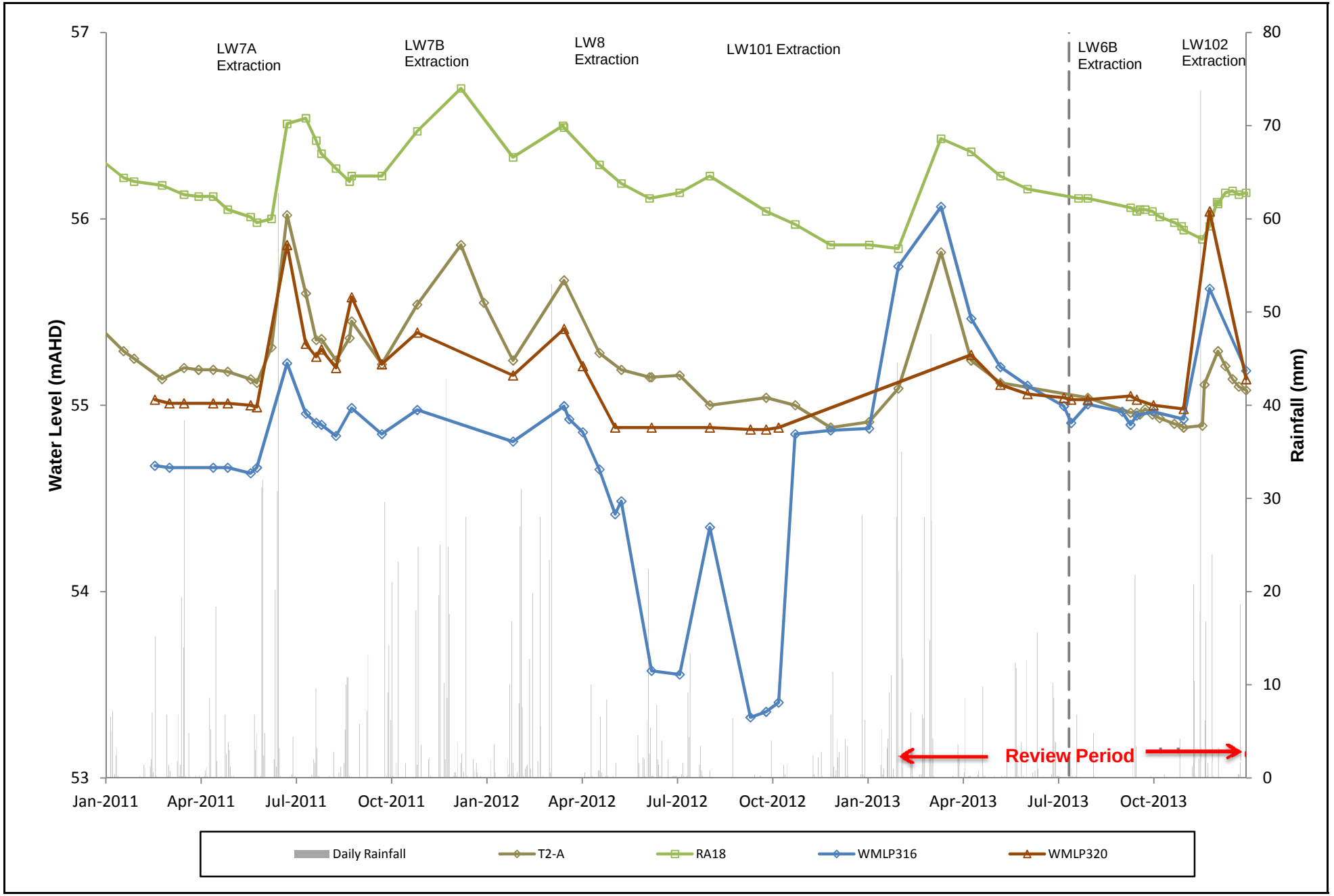

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HYDROGRAPH - BOWMANS CREEK ALLUVIUM (CENTRAL) FIGURE 8

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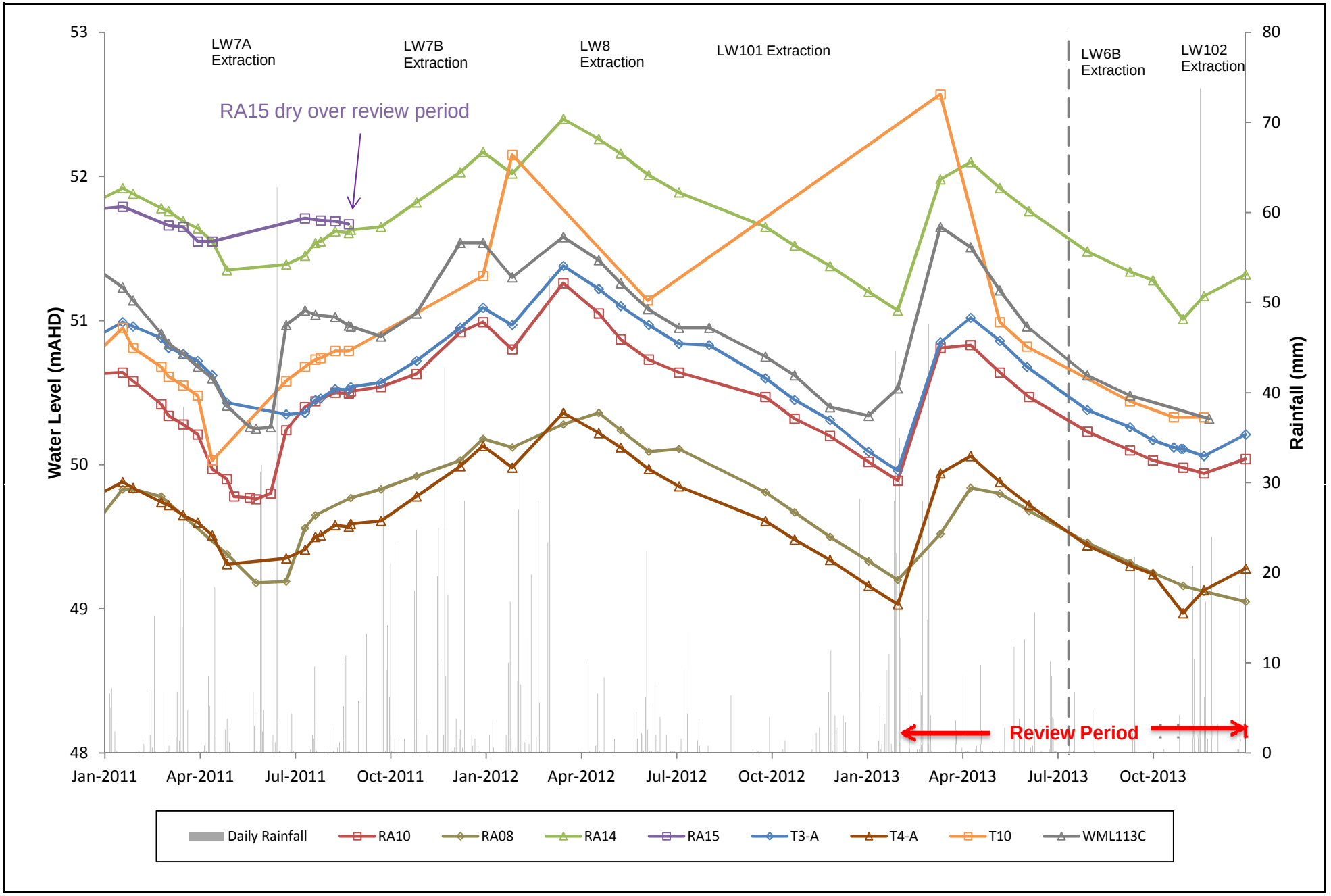
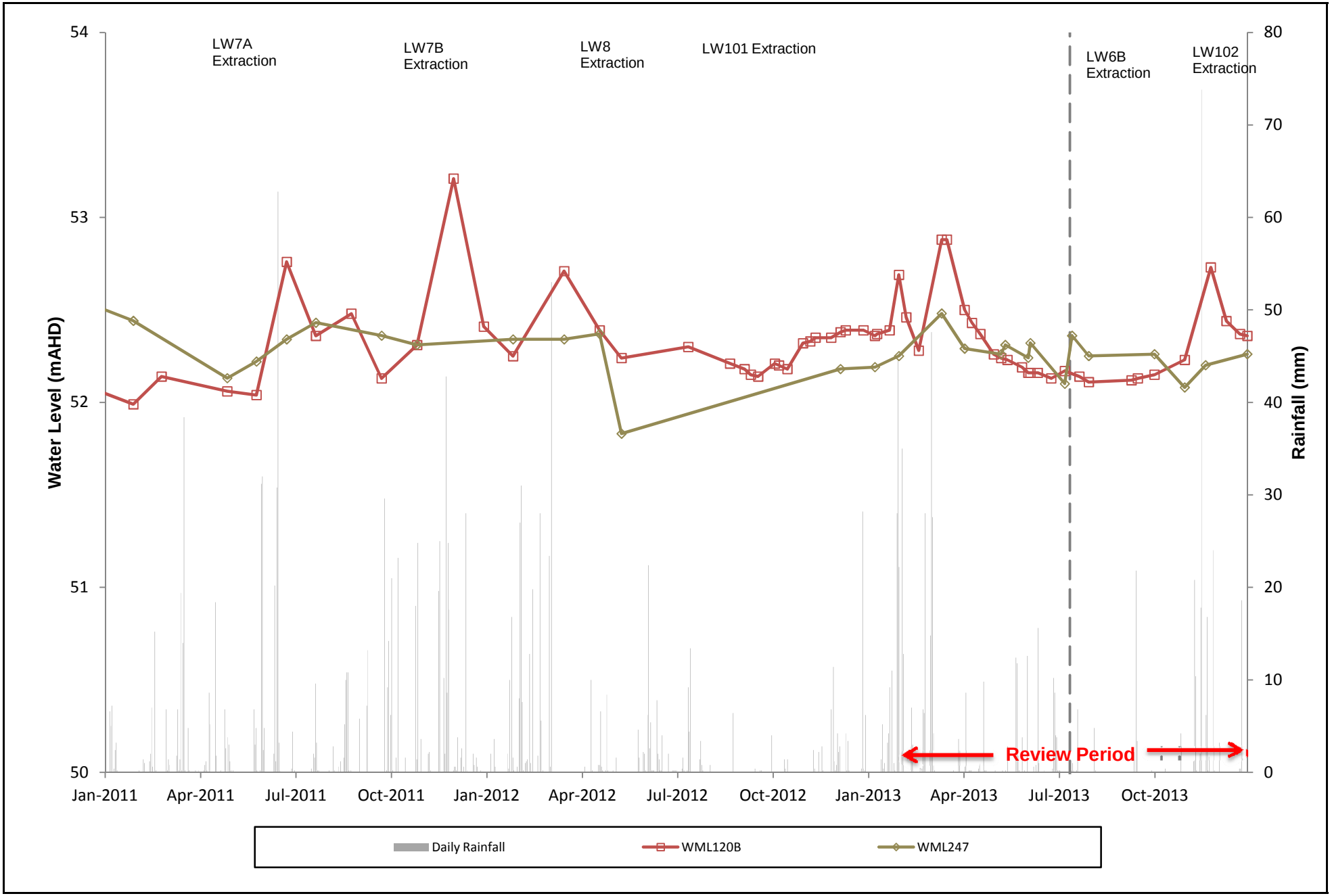


RPS

HYDROGRAPH - BOWMANS CREEK ALLUVIUM (SOUTH) FIGURE 9

F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 9

Note: T10 unaccessible for monitoring from 5 June 2012 to 23 October 2013



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HYDROGRAPH - GLENNIES CREEK ALLUVIUM (NORTH) FIGURE 10

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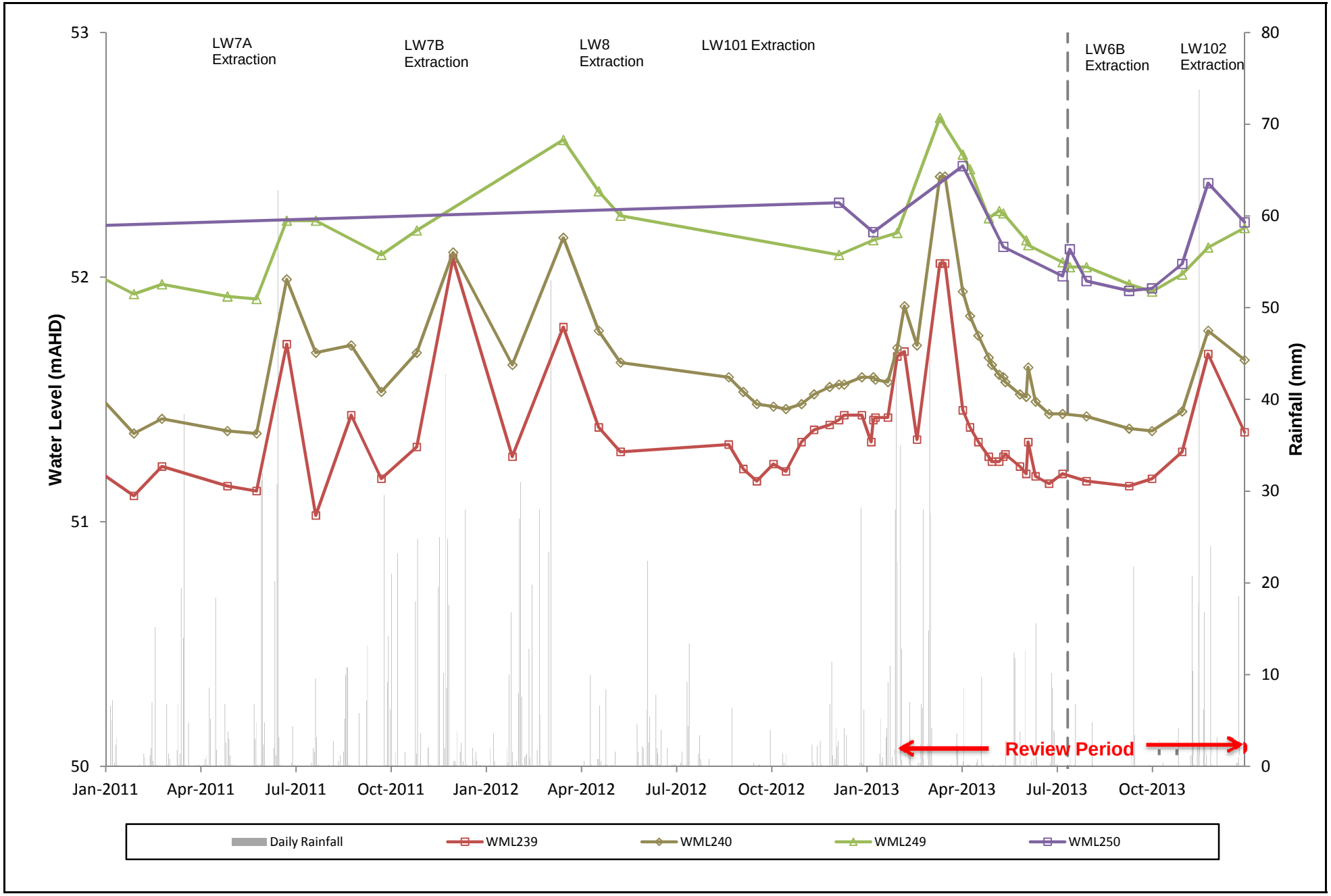

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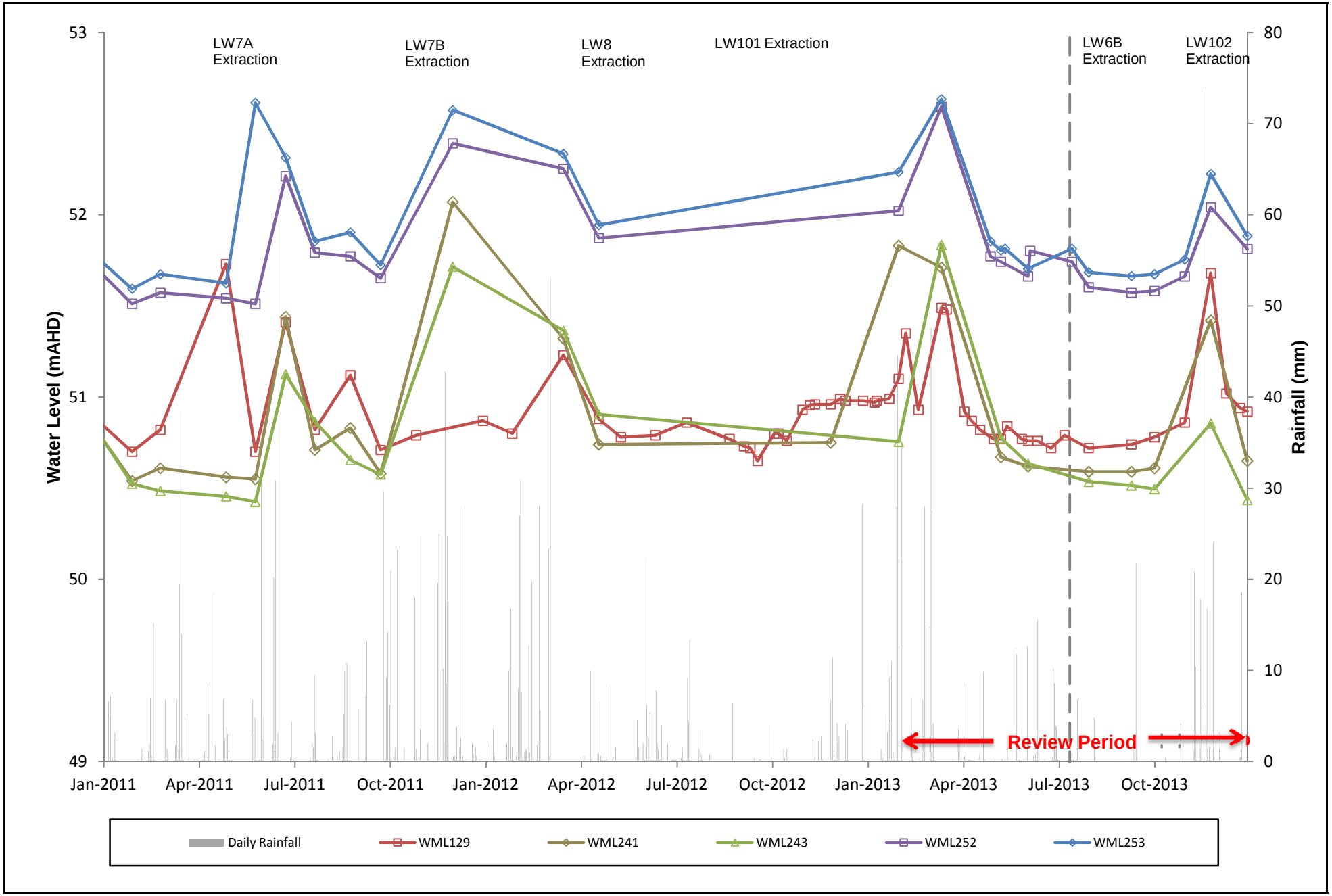
HYDROGRAPH - GLENNIES CREEK ALLUVIUM (CENTRAL) FIGURE 11

F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 11



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HYDROGRAPH - GLENNIES CREEK ALLUVIUM (SOUTH) FIGURE 12

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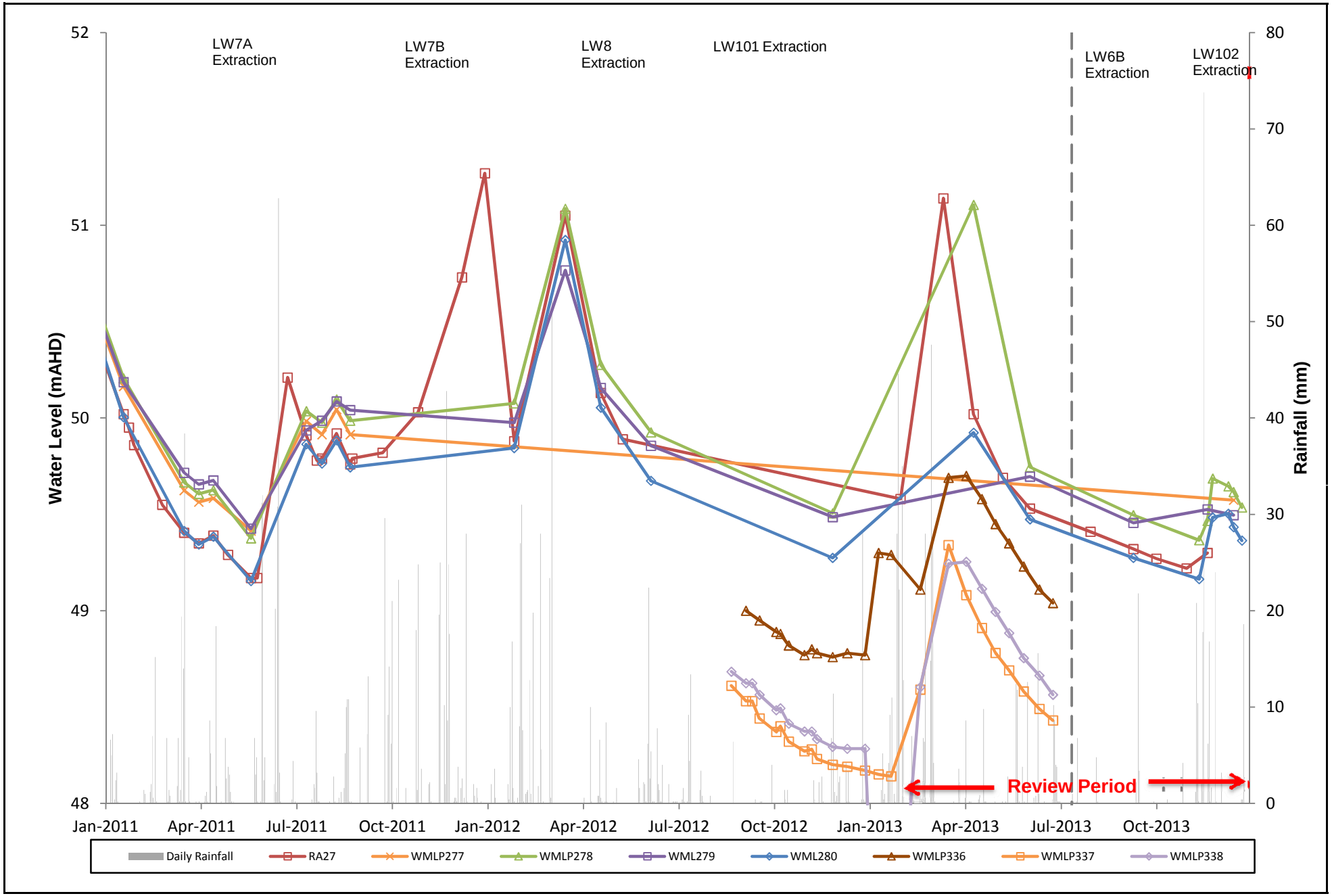

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HYDROGRAPH - HUNTER RIVER ALLUVIUM FIGURE 13

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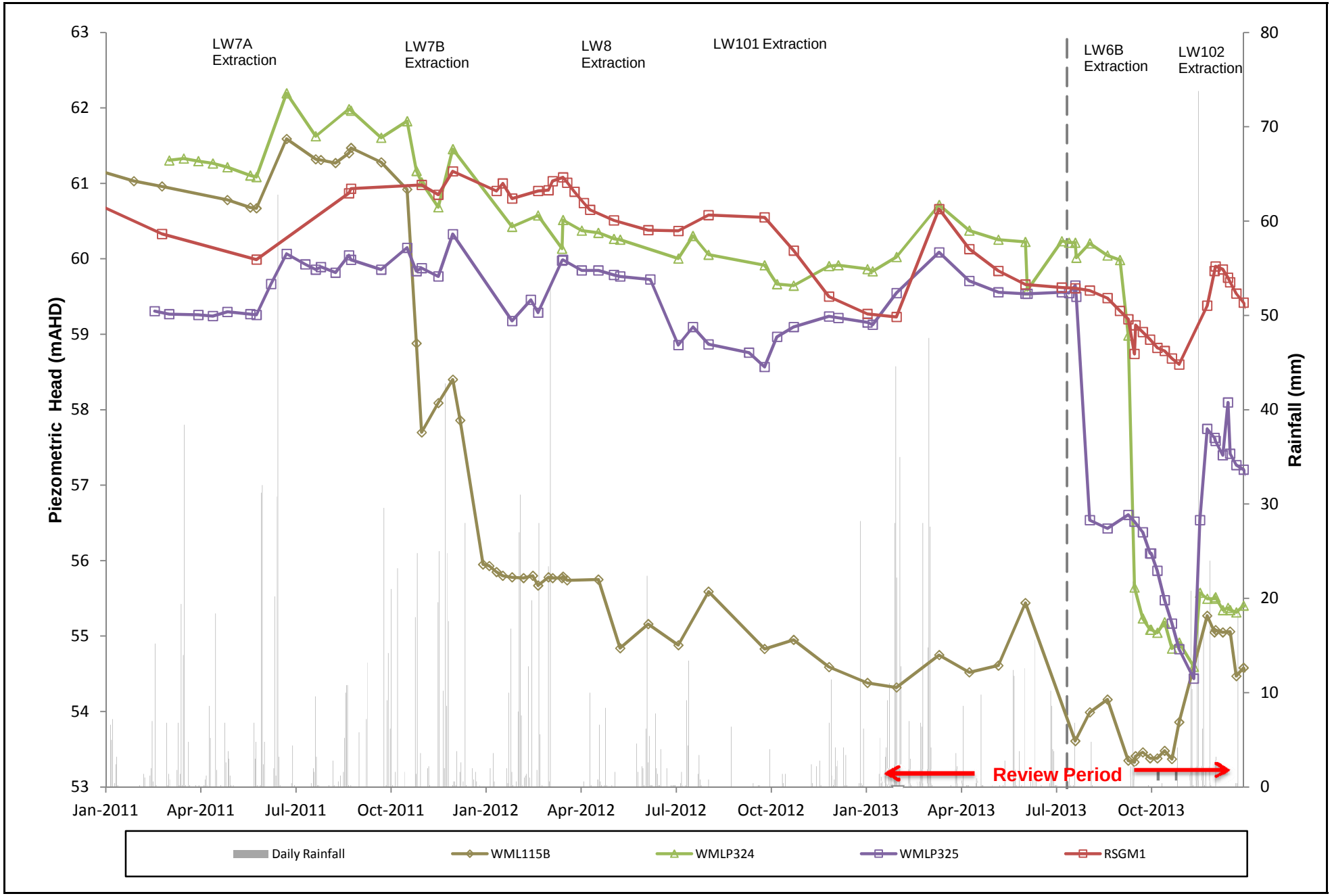
Note: WMLP336, WMLP337 and WMLP338 not monitored following LW101 extraction



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COAL MEASURES OVERBURDEN (NORTH) FIGURE 14

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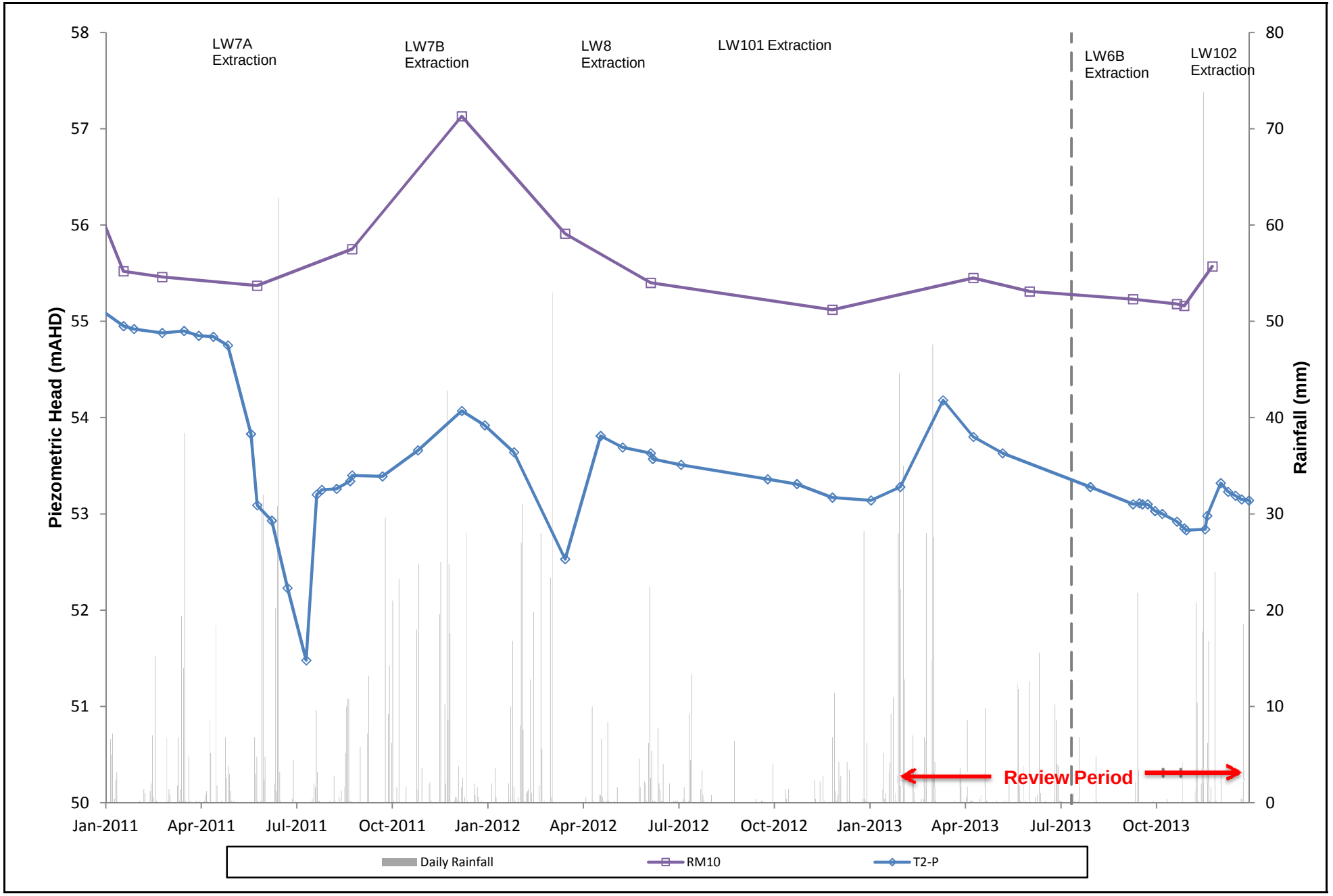

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COAL MEASURES OVERBURDEN (CENTRAL) FIGURE 15

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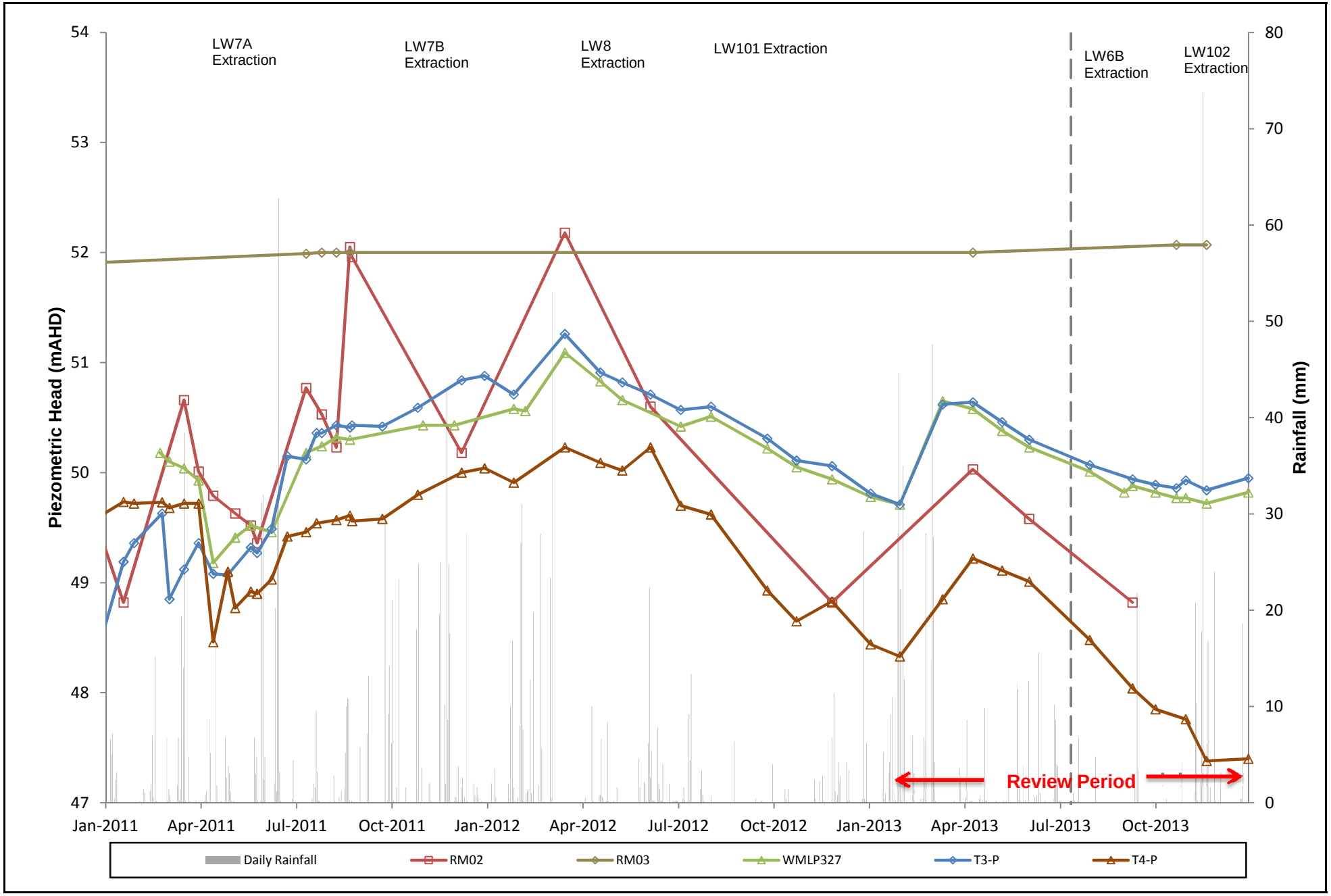

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COAL MEASURES OVERBURDEN (SOUTH) FIGURE 16

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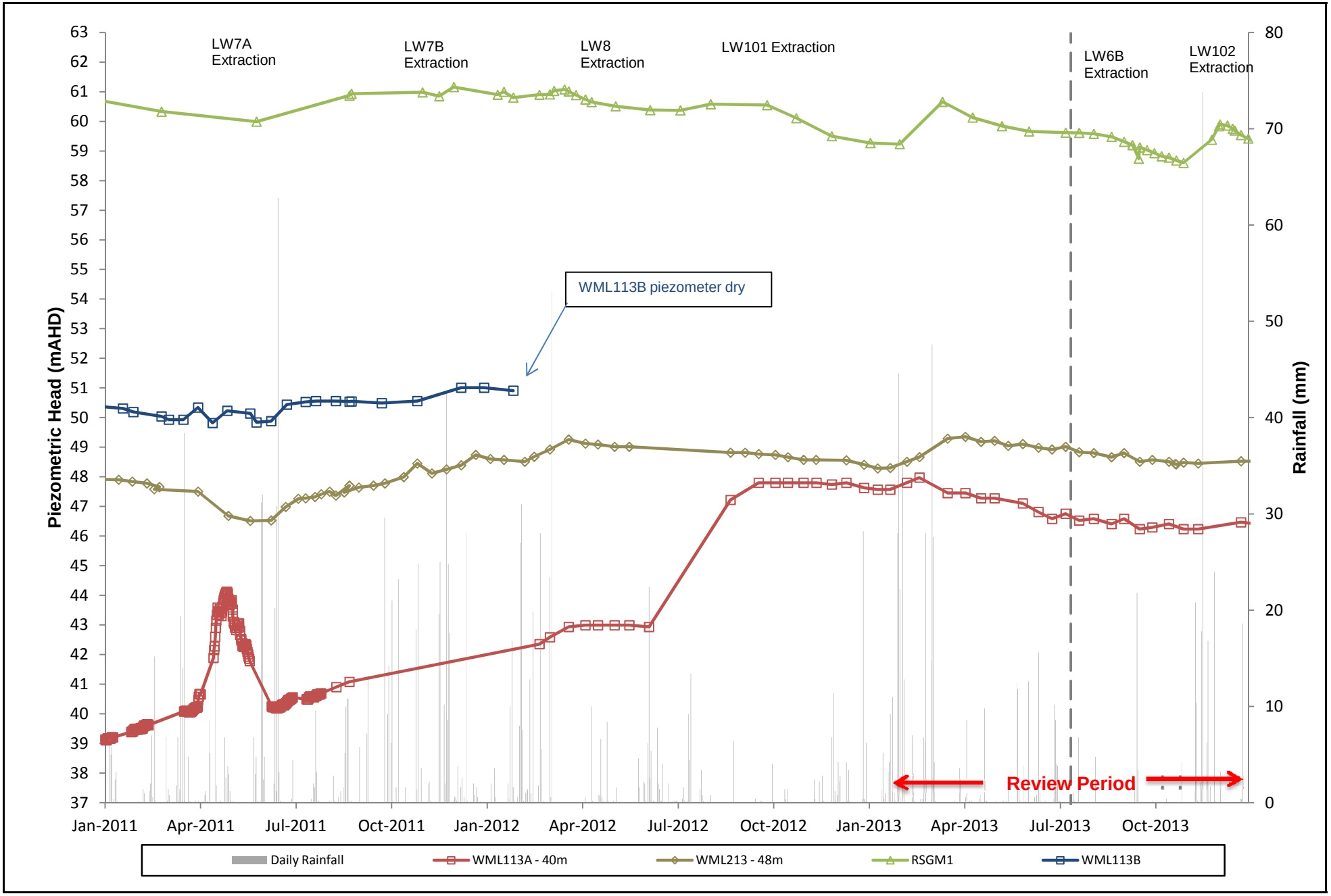

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HYDROGRAPH - BAYSWATER SEAM FIGURE 17

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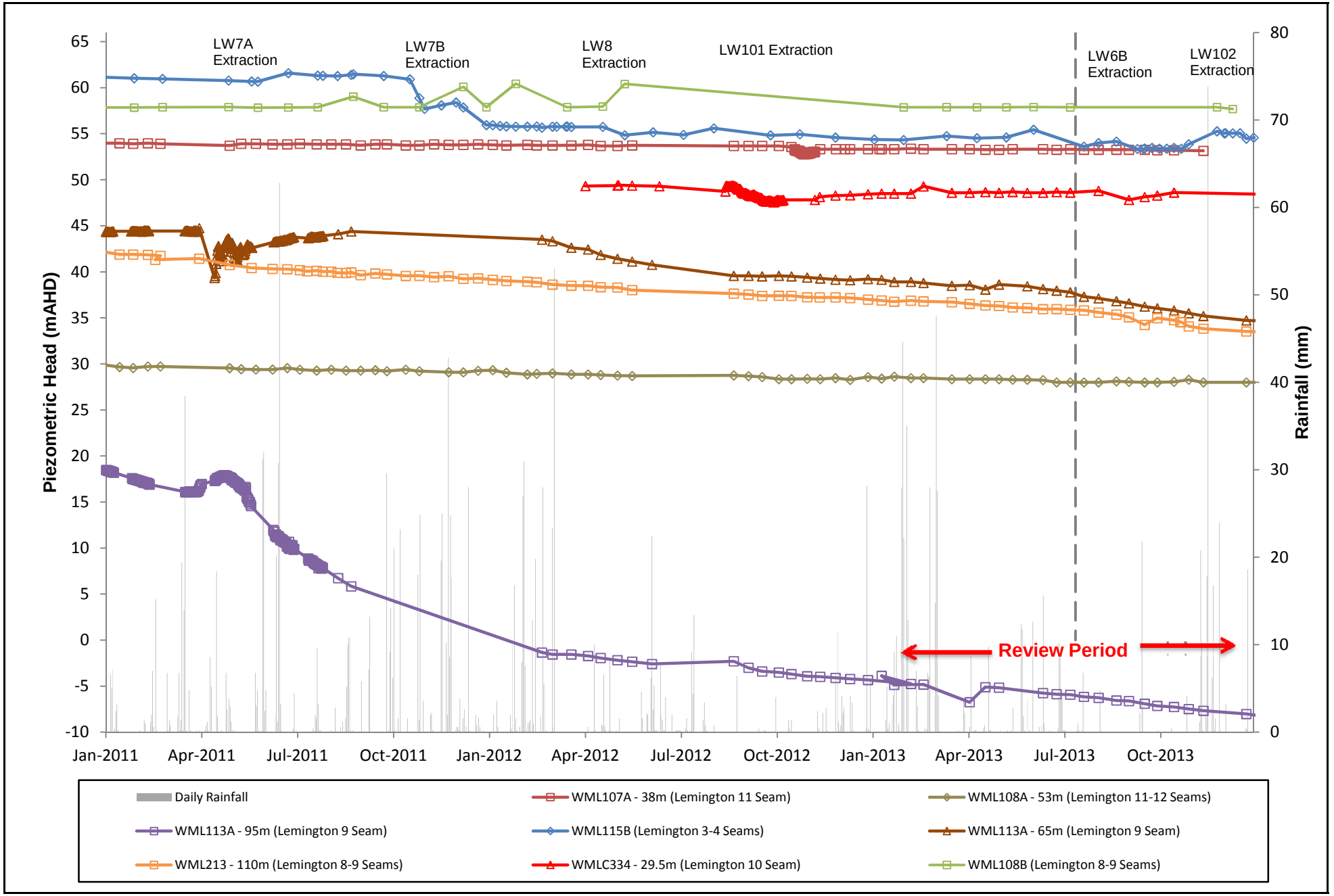

HYDROGRAPH - LEMINGTON SEAMS 2, 3, 4, 10, 11 & 12 FIGURE 18

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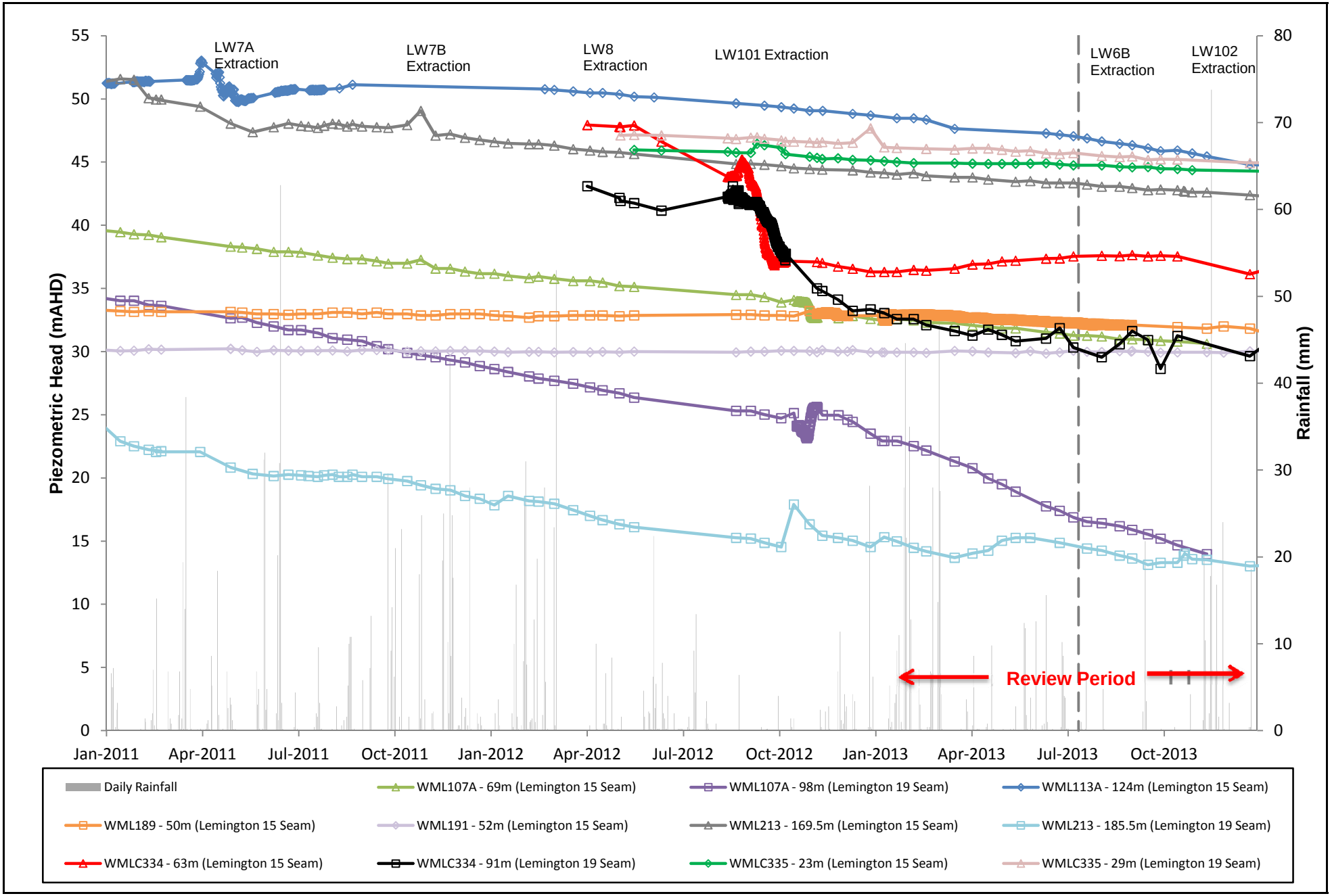

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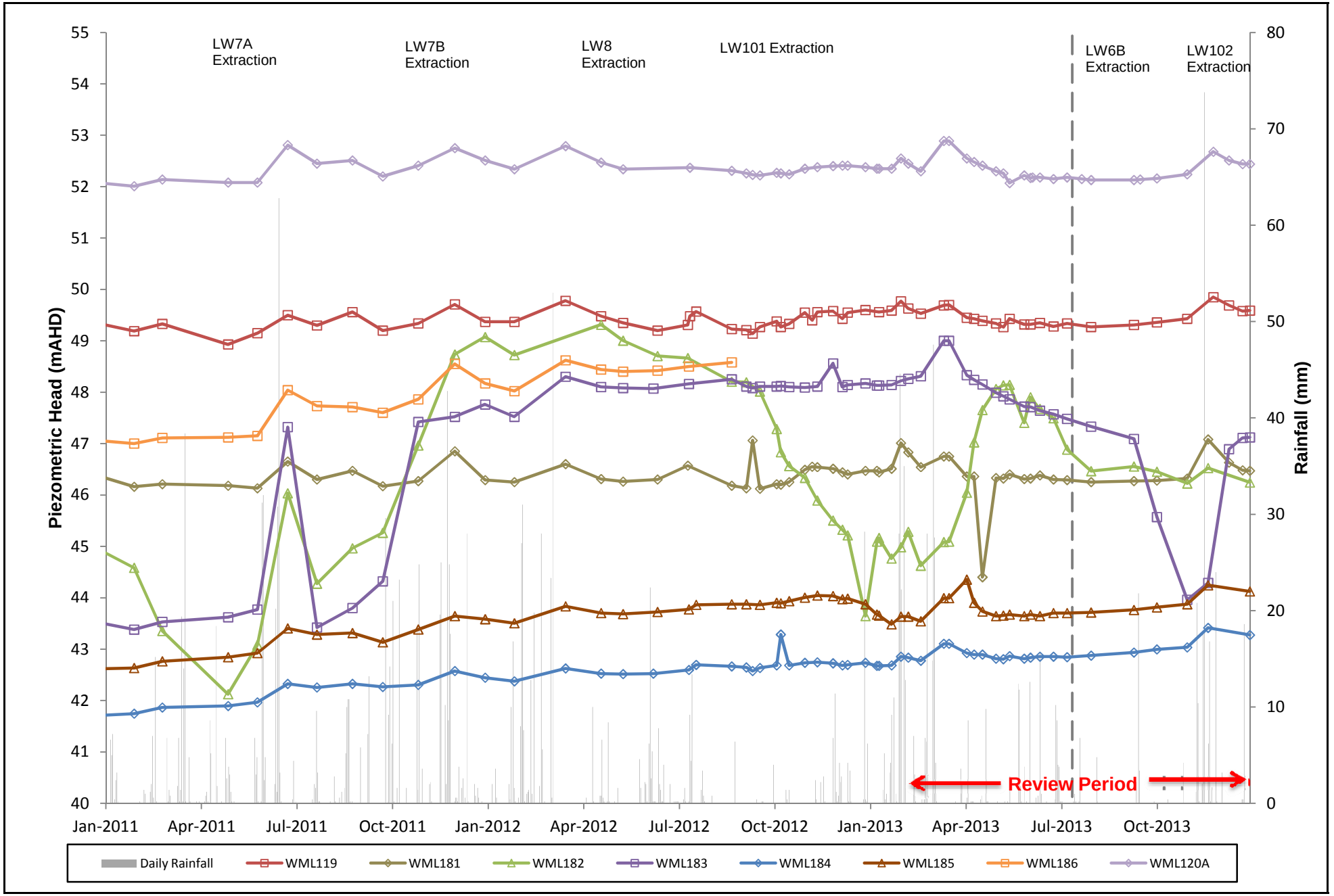
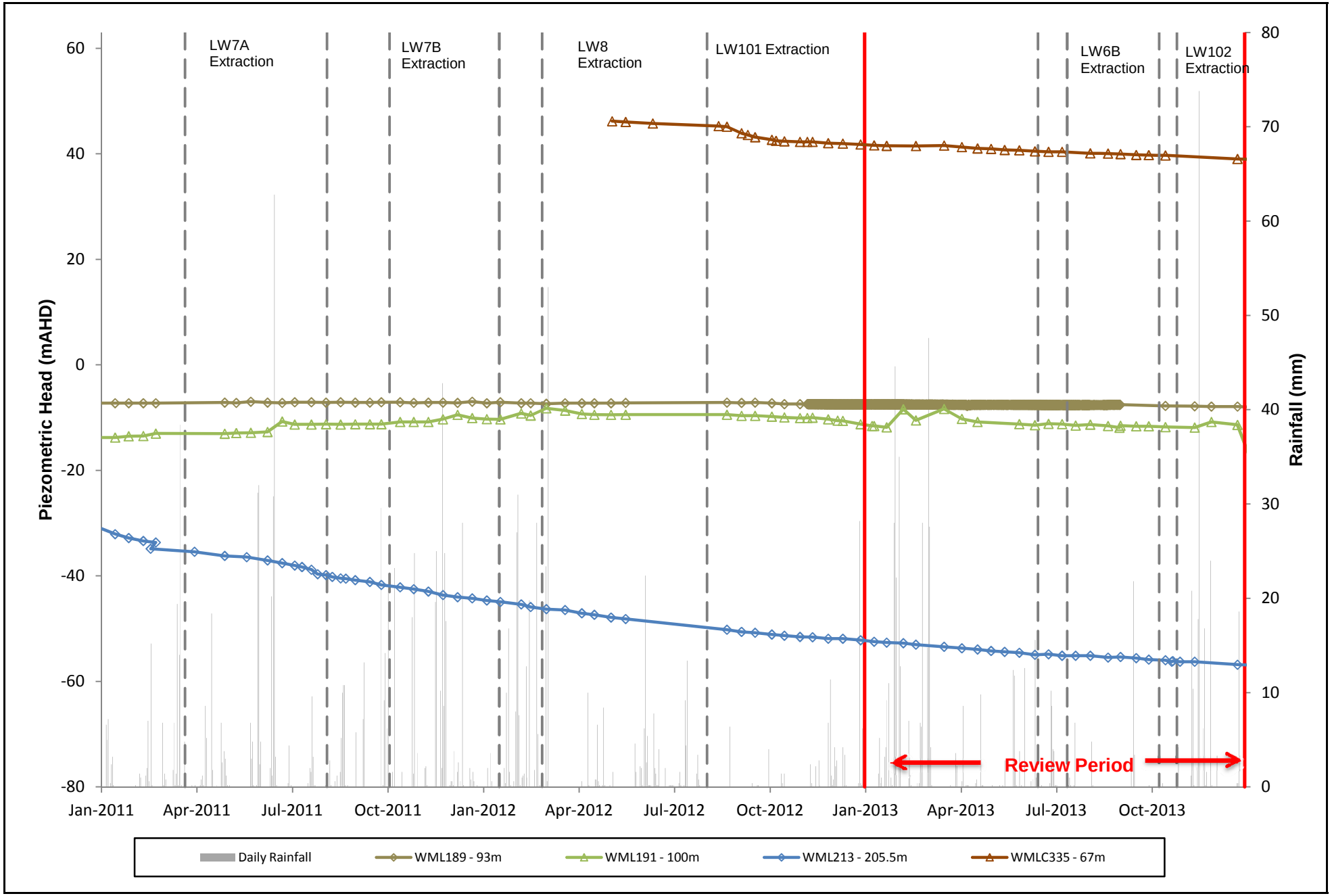
HYDROGRAPH LEMINGTON SEAMS 15 & 19 FIGURE 19

F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 19



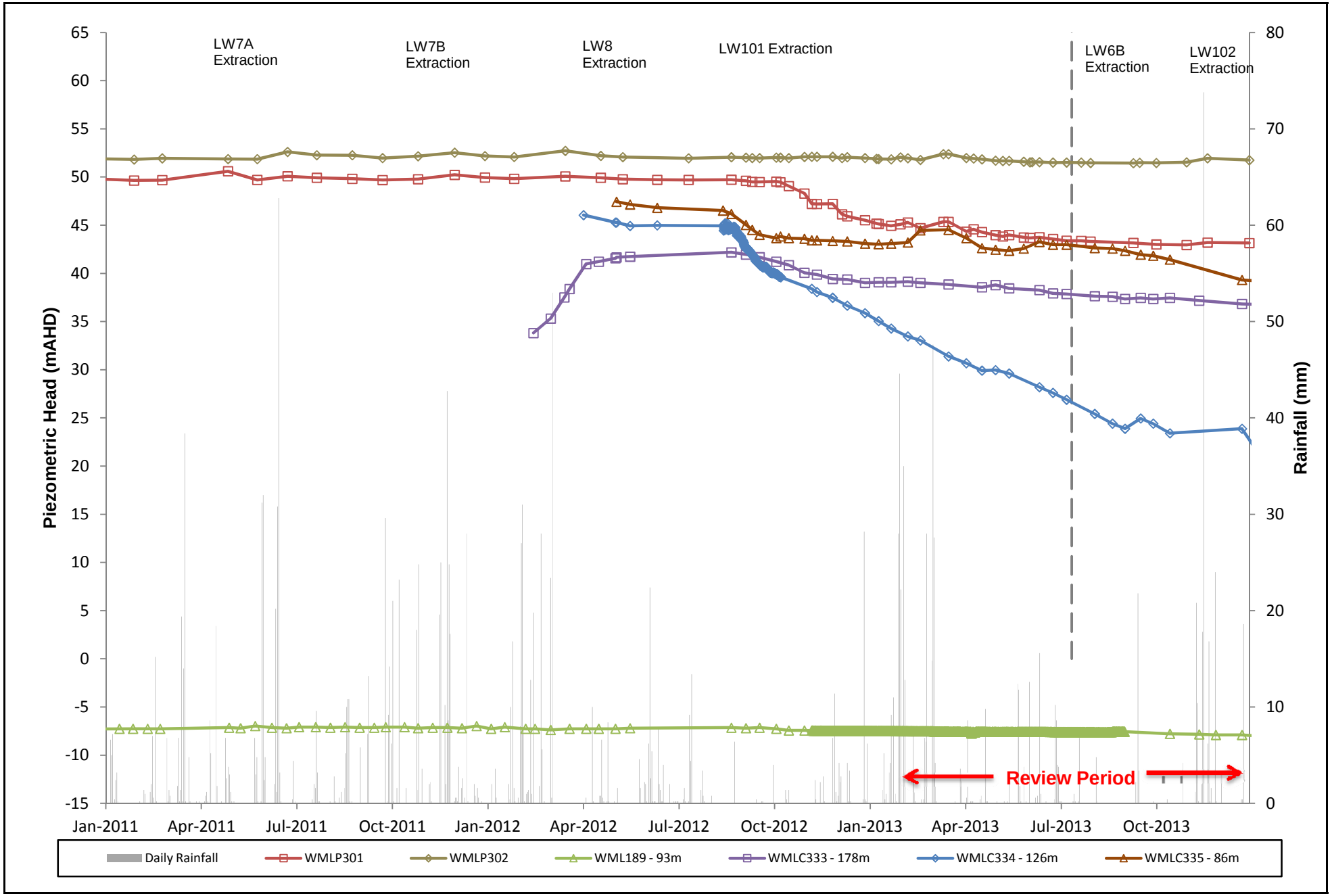
HYDROGRAPH PIKES GULLY SEAM (EAST OF LW1) FIGURE 20

F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 20



HYDROGRAPH PIKES GULLY SEAM (UNDERGROUND AREA) FIGURE 21

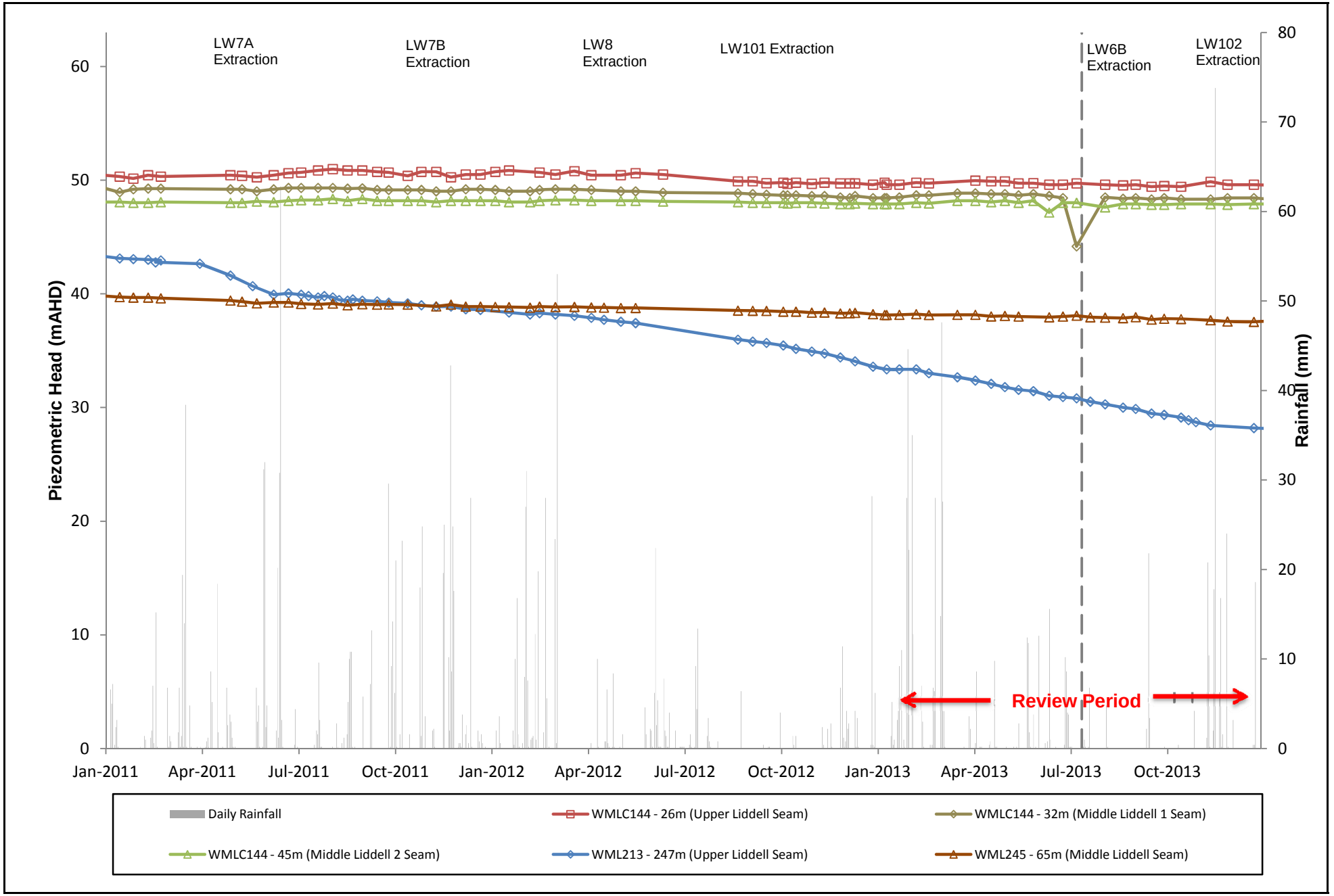
F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 21



RPS

HYDROGRAPH - ARTIES SEAM FIGURE 22

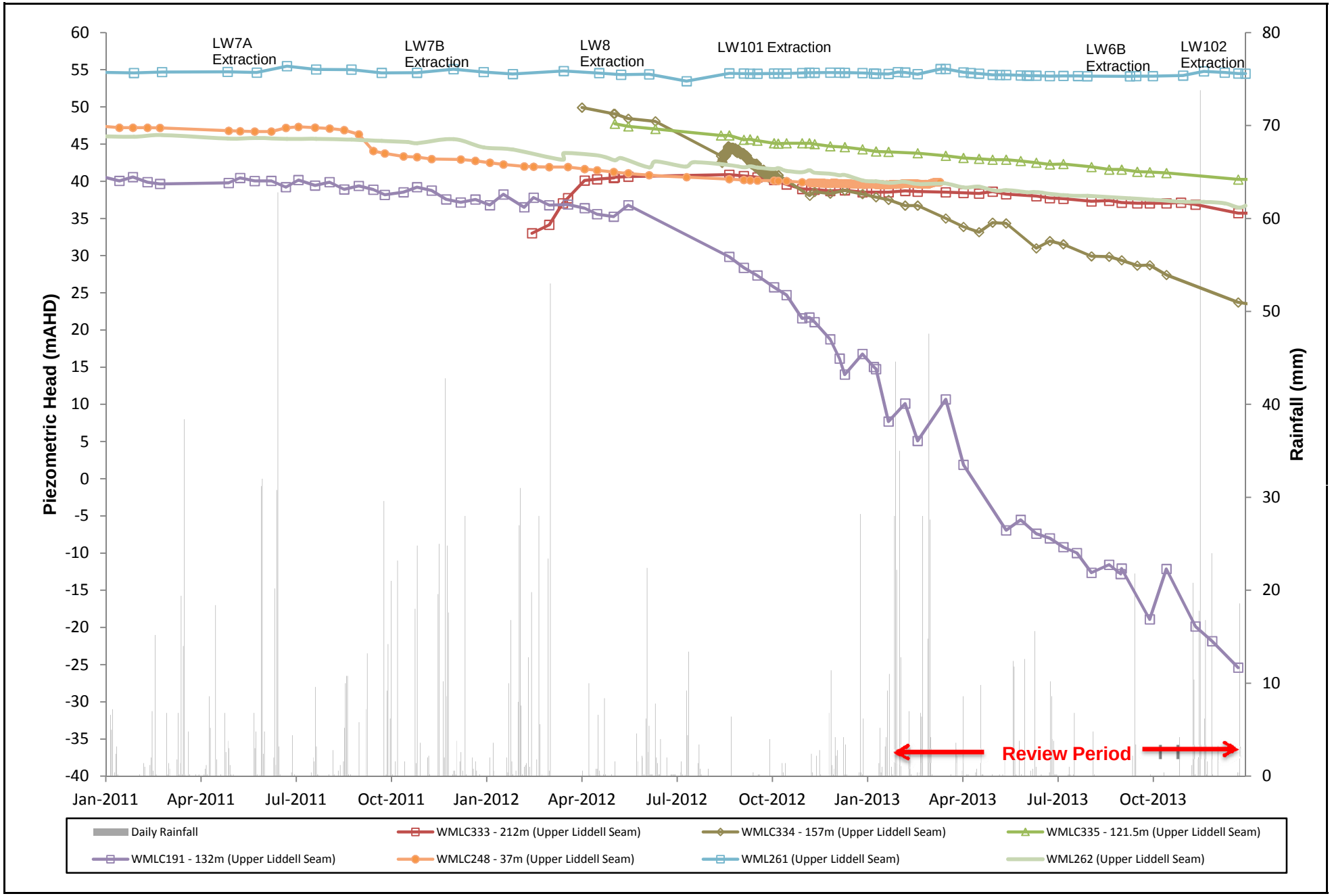
F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 22



RPS

HYDROGRAPH - UPPER LIDDELL SEAM (1) FIGURE 23

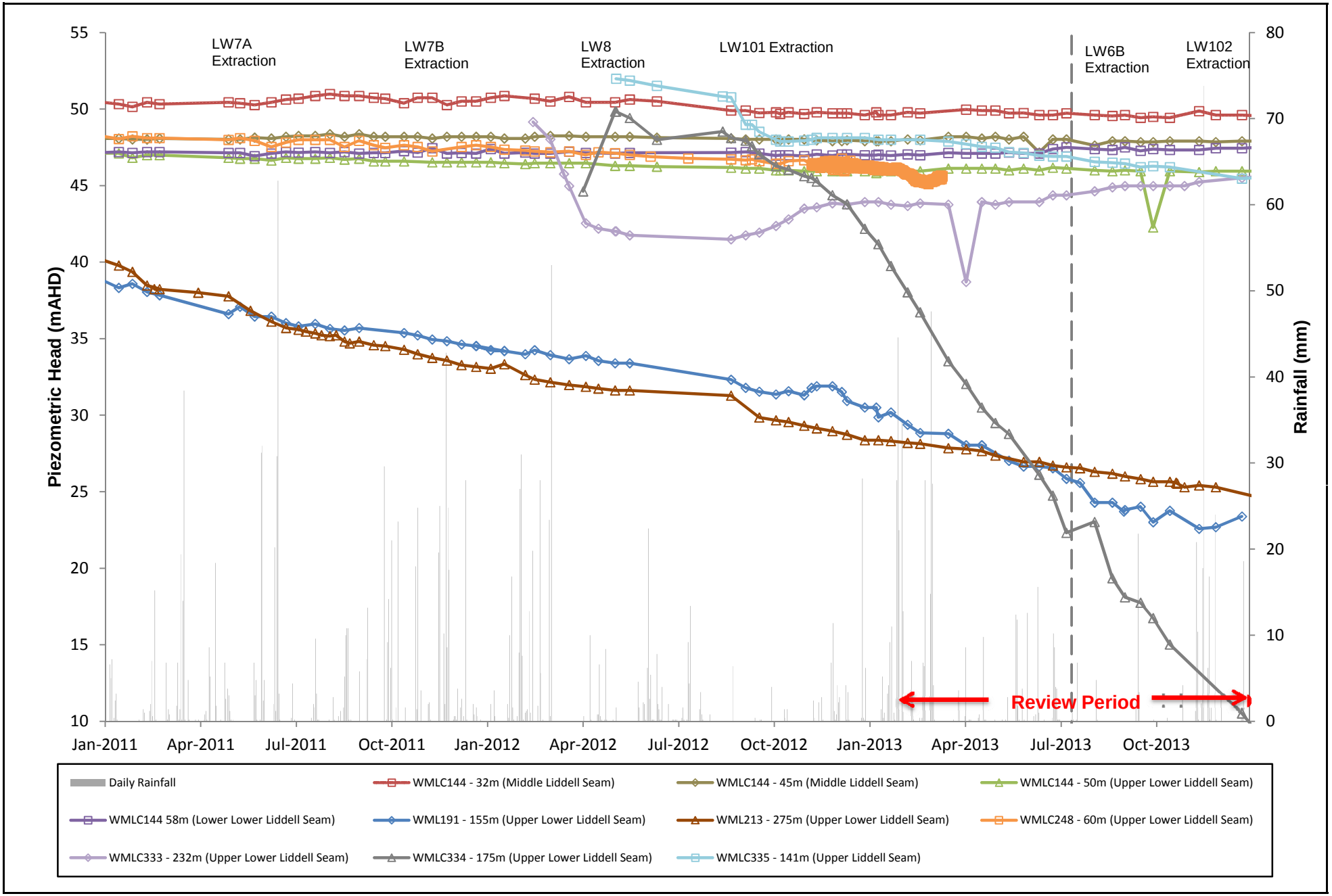
F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 23



HYDROGRAPH - UPPER LIDDELL SEAM (NEAR LW101) FIGURE 24

F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 24

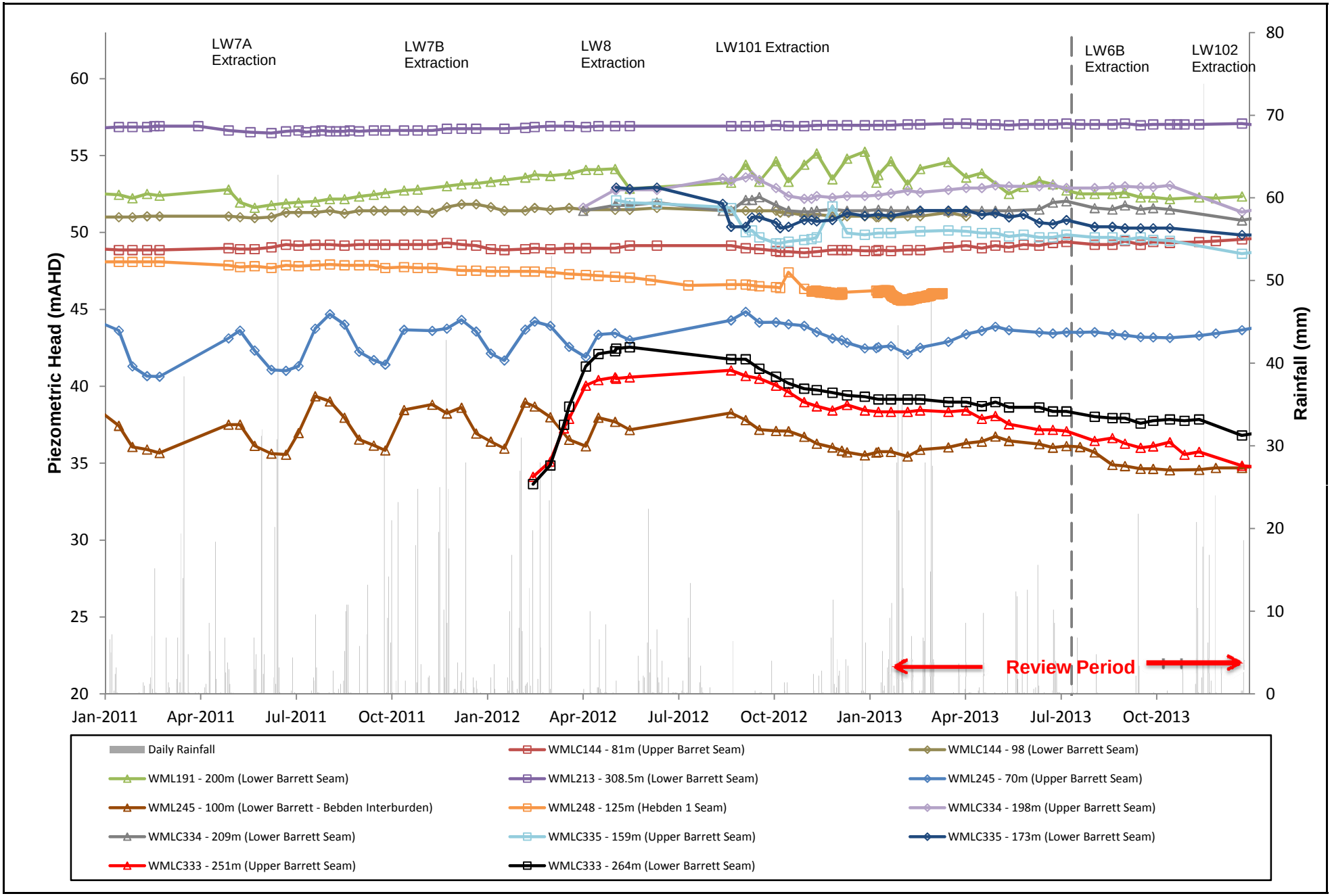
Note: Downloading of WMLC248 VWP logger stopped following the progression of LW101 past the saturated alluvium



HYDROGRAPH - MIDDLE AND LOWER LIDDELL SEAM FIGURE 25

F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 25

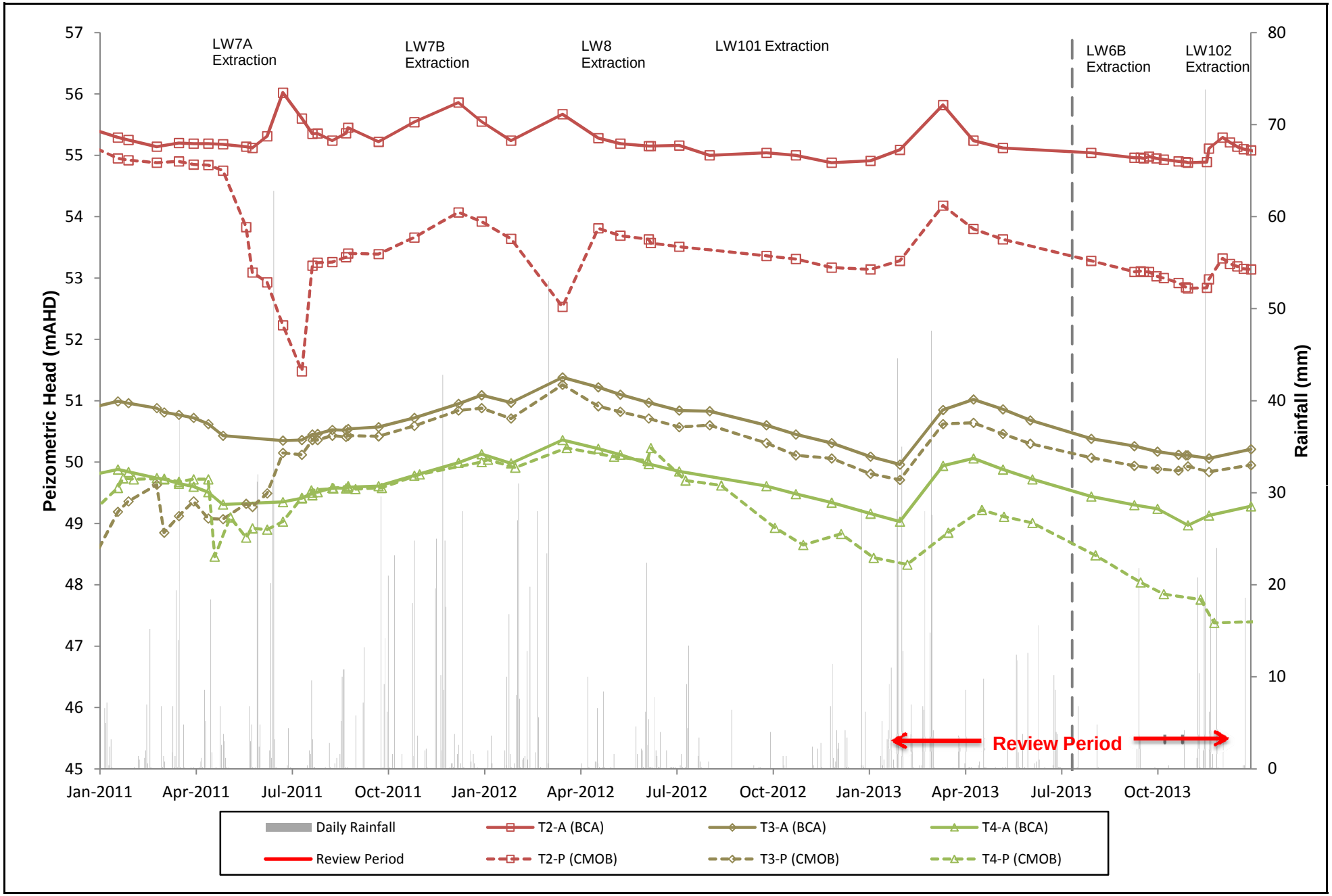
Note: Downloading of WMLC248 VWP logger stopped following the progression of LW101 past the saturated alluvium



HYDROGRAPH - BARRET AND HEBDEN SEAMS FIGURE 26

F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 26

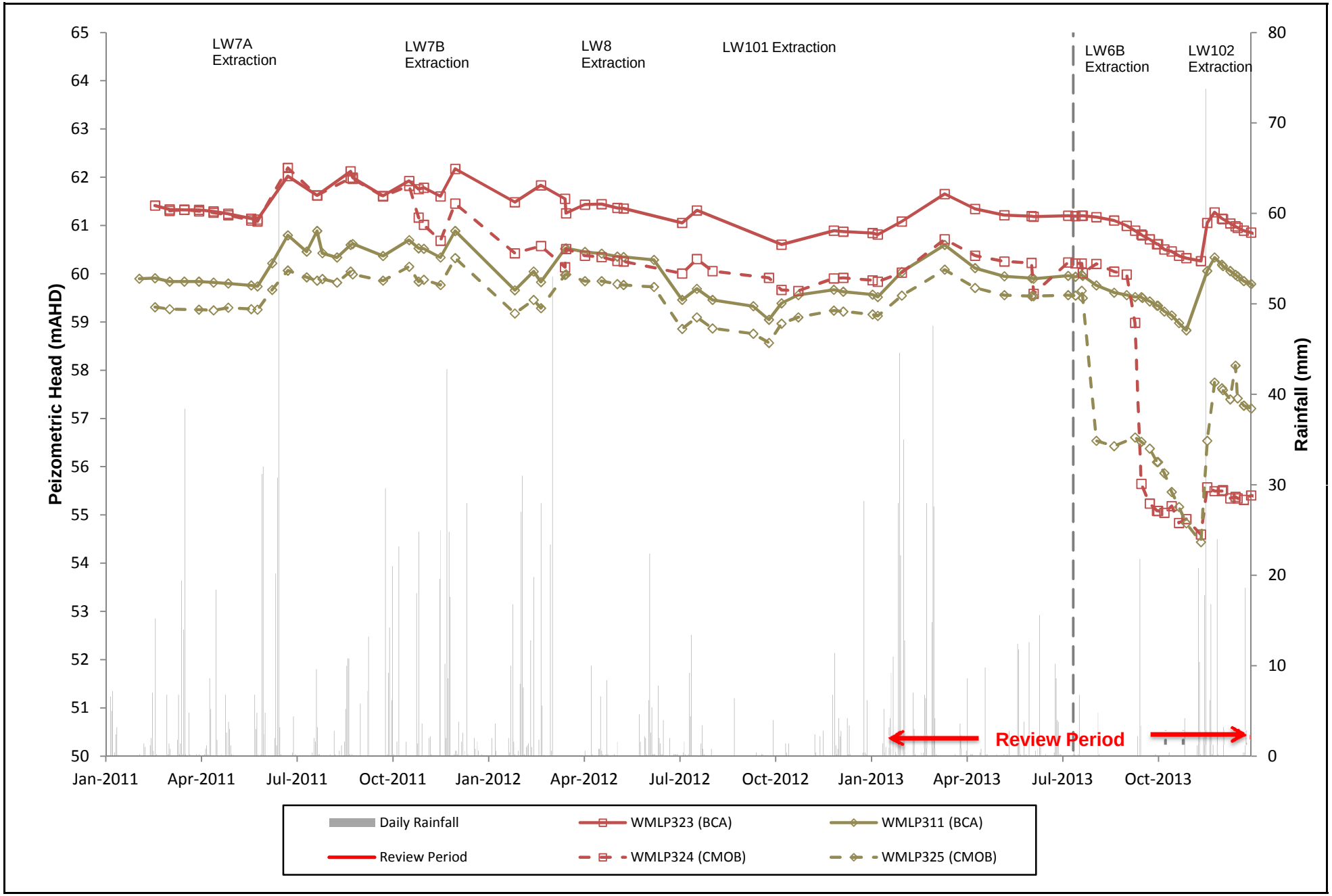
Note: Downloading of WMLC248 VWP logger stopped following the progression of LW101 past the saturated alluvium



HYDROGRAPHS - PAIRED STANDPIPES (1) FIGURE 27

F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 27

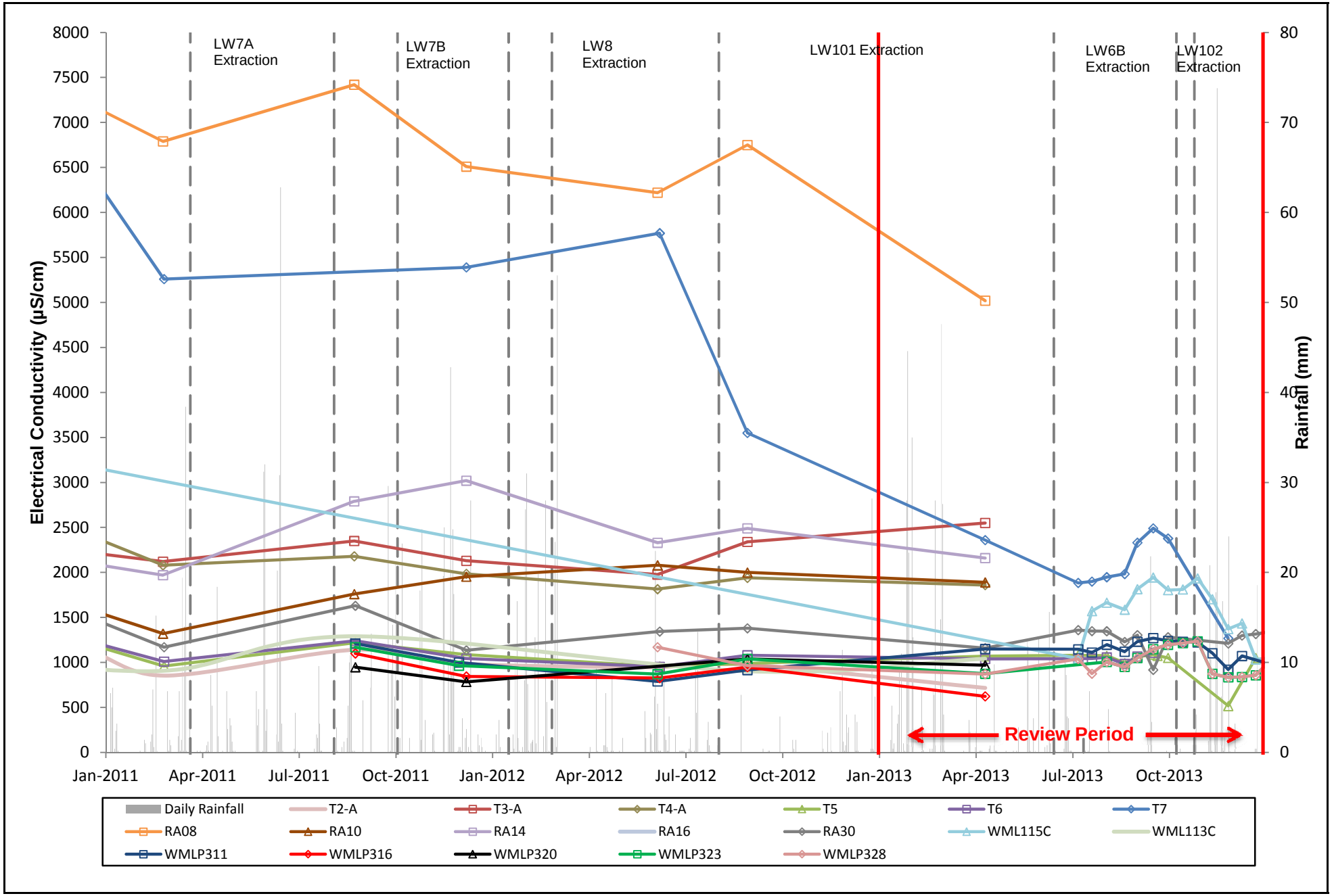
Note: BCA - Bowmans Creek Alluvium, CMOB - shallow coal measures overburden



HYDROGRAPHS - PAIRED STANDPIPES (2) FIGURE 28

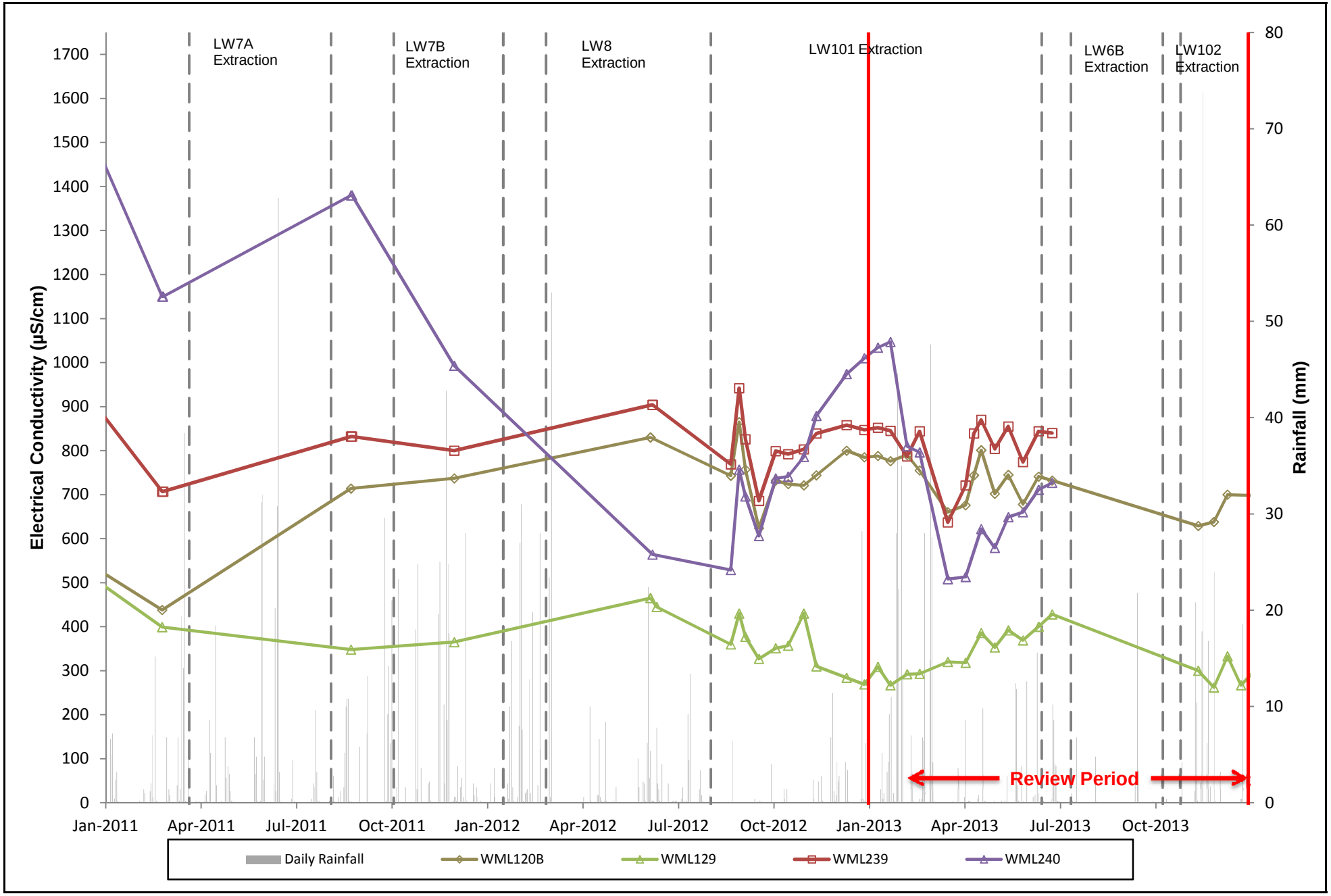
F:\Jobs\S56C\300\Hydrographs\[006d.xls]Figure 28

Note: BCA - Bowmans Creek Alluvium, CMOB - shallow coal measures overburden



GROUNDWATER SALINITY - BOWMANS CREEK ALLUVIUM FIGURE 29

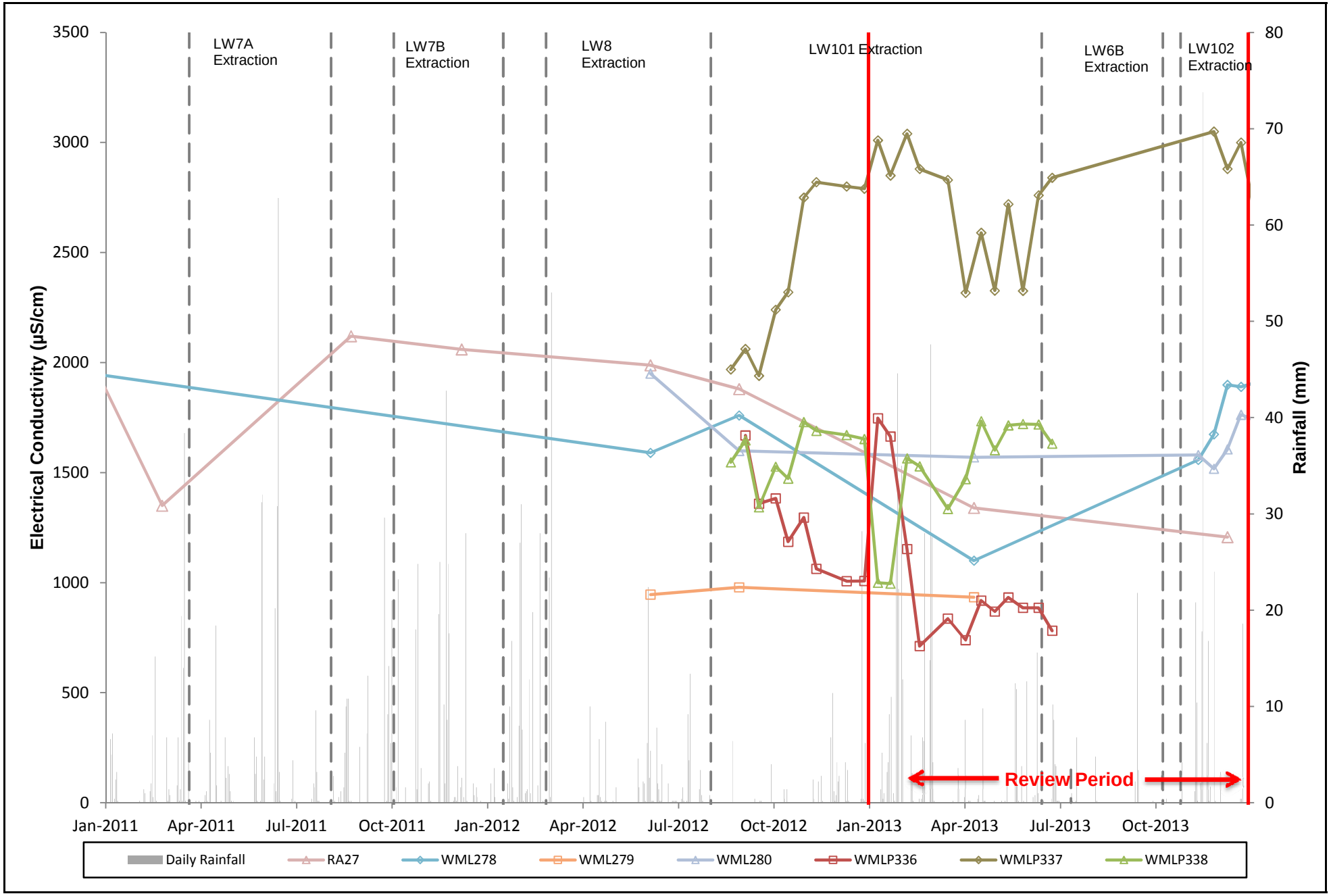
F:\Jobs\S56C\300\Water Quality\[008d.xls]Figure 29



RPS

GROUNDWATER SALINITY - GLENNIES CREEK ALLUVIUM FIGURE 30

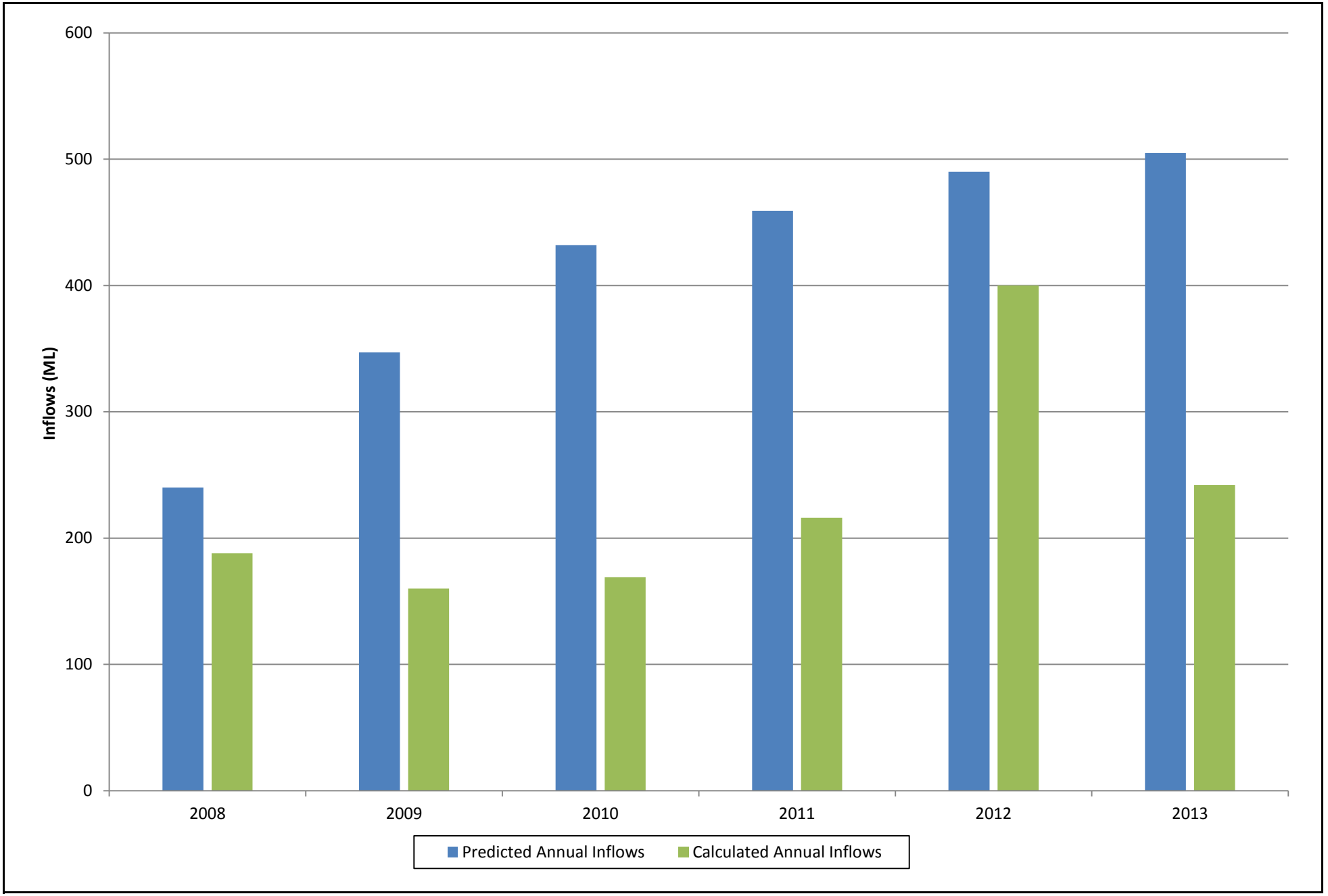
F:\Jobs\S56C\300\Water Quality\[008d.xls]Figure 30



RPS

GROUNDWATER SALINITY - HUNTER RIVER ALLUVIUM FIGURE 31

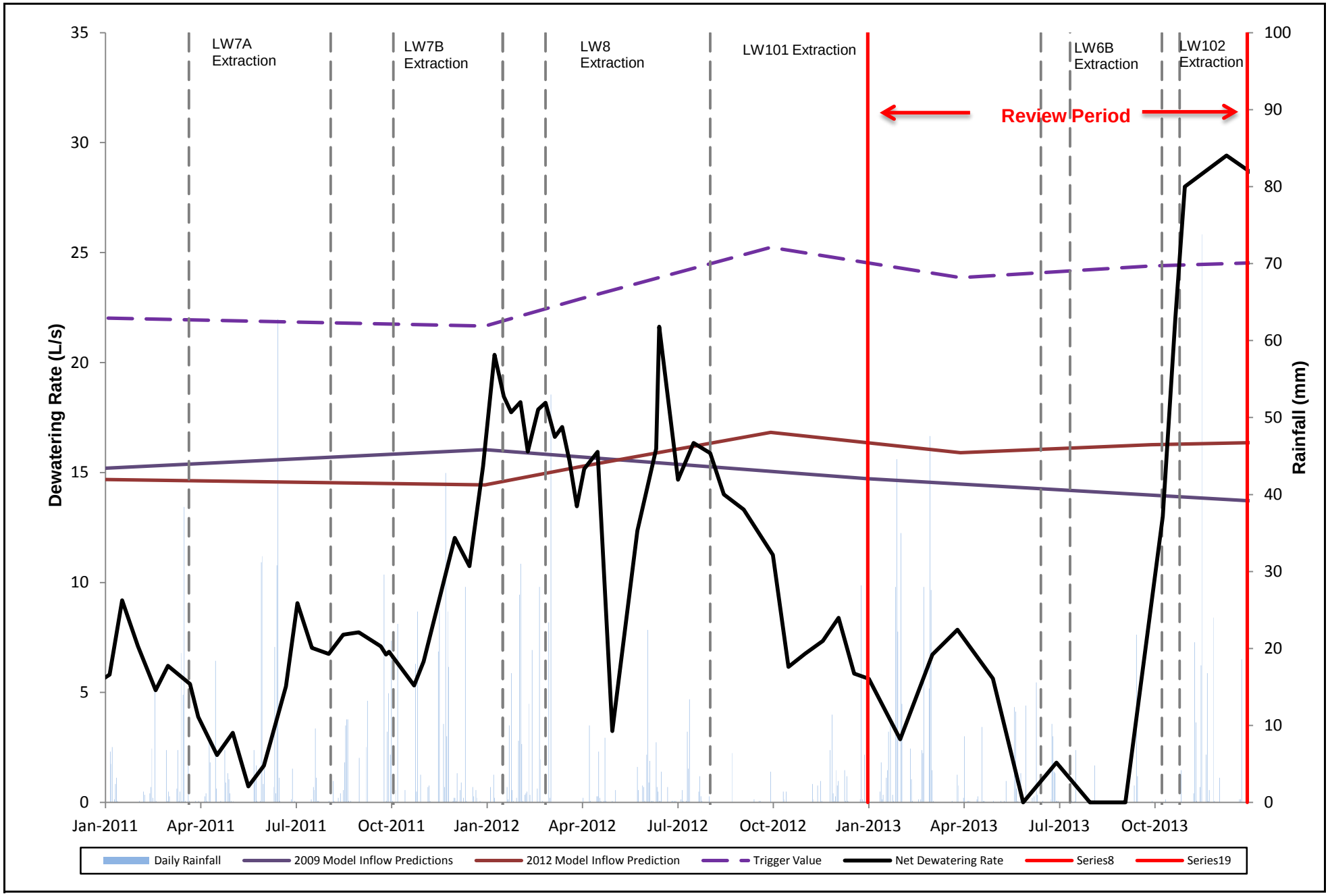
F:\Jobs\S56C\300\Water Quality\[008d.xls]Figure 31



RPS

MINE INFLOW VOLUMES - CALCULATED VS PREDICTED FIGURE 32

F:\Jobs\S56C\600\2013\Tables\[007a_EC_Table_SHC.xls]Figure 32



RPS

MINE DEWATERING AND PREDICTED INFLOWS FIGURE 33

F:\Jobs\S56B\300\Mine Inflows\[081a.xls]Figure 33

Appendix 3: Aboriginal consultation

Date	Issue	Description	Aboriginal Stakeholder Groups Correspondence Log	
19/02/13	ACCF	Invitations to the Aboriginal Community Consultative Forum and previous meeting minutes were sent out.	The correspondence was sent to: • Yinarr Cultural Services • Tocomwall • Lower Hunter Wonnarua Council • Girwirr Consultants • Gidawaa Walang • Wonnarua Culture Heritage • Culturally Aware • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Heritage • Wanaruah Local Aboriginal Land Council • Yarrawalk Enterprises • Carrawonga Consultants • Mingga Consultants	• Wonnarua Nations Aboriginal Corporation • Kayaway Eco-Cultural and Heritage • Hunter Valley Cultural Surveying • Ungooroo Aboriginal Corporation • Wattaka Cultural Consultants Services • Cacatua Cultural Consultants • Upper Hunter Wonnarua Council Inc • Valley Culture • Wanaruah Custodians • Ungooroo Cultural & Community Services Incorporated • Wonn1 Contracting • Hunter Valley Natural and Cultural Resource Management • Hunter Valley Aboriginal Corporation • Warren Taggart
04/03/13	ACCF	The Quarter 1 ACCF meeting was held with the following RAP represented at the meeting:	• Wanaruah Local Aboriginal Land Council • Hunter Valley Aboriginal Corporation	
24/05/13	ACCF	Invitations to the Quarter 2 Aboriginal Community Consultative Forum and previous meeting minutes were sent out.	The correspondence was sent to: • Yinarr Cultural Services • Tocomwall • Lower Hunter Wonnarua Council • Girwirr Consultants • Gidawaa Walang • Wonnarua Culture Heritage • Culturally Aware • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Heritage • Wanaruah Local Aboriginal Land Council • Yarrawalk Enterprises • Carrawonga Consultants • Mingga Consultants	• Wonnarua Nations Aboriginal Corporation • Kayaway Eco-Cultural and Heritage • Hunter Valley Cultural Surveying • Ungooroo Aboriginal Corporation • Wattaka Cultural Consultants Services • Cacatua Cultural Consultants • Upper Hunter Wonnarua Council Inc • Valley Culture • Wanaruah Custodians • Ungooroo Cultural & Community Services Incorporated • Wonn1 Contracting • Hunter Valley Natural and Cultural Resource Management • Hunter Valley Aboriginal Corporation • Warren Taggart

Date	Issue	Description	Aboriginal Stakeholder Groups Correspondence Log	
11/06/13	ACCF	The Quarter 2 ACCF meeting was held	The following registered aboriginal parties represented at the meeting: • Yinarr Cultural Services • Lower Hunter Wonnarua Council • Girwirr Consultants • Wonnarua Culture Heritage • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants	• Hunter Valley Cultural Consultants • Wanaruah Local Aboriginal Land Council • Carrawonga Consultants Ungooroo Aboriginal Corporation • Wattaka Cultural Consultants Services • Wonn1 Contracting
01/07/13	SEOC ACHMP Consultation Workshop	Invitations to the SEOC ACHMP Consultation Workshop were sent out (including a copy of the draft SEOC ACHMP)	The correspondence was sent to: • Yinarr Cultural Services • Tocomwall • Lower Hunter Wonnarua Council • Girwirr Consultants • Gidawaa Walang • Wonnarua Culture Heritage • Culturally Aware • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Bullem Heritage • Wanaruah Local Aboriginal Land Council • Yarrawalk Enterprises • Carrawonga Consultants • Mingga Consultants	• Wonnarua Nations Aboriginal Corporation • Kayaway Eco-Cultural and Heritage • Hunter Valley Cultural Surveying • Ungooroo Aboriginal Corporation • Wattaka Cultural Consultants Services • Cacatua Cultural Consultants • Upper Hunter Wonnarua Council Inc • Valley Culture • Wanaruah Custodians • Ungooroo Cultural & Community Services Incorporated • Wonn1 Contracting • Hunter Valley Natural and Cultural Resource Management • Hunter Valley Aboriginal Corporation • Warren Taggart
09/07/13	SEOC ACHMP Consultation Workshop	The SEOC ACHMP Consultation Workshop was held.	The following registered aboriginal parties represented at the meeting: • Culturally Aware • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Bullem Heritage • Carrawonga Consultants	• Wonnarua Nations Aboriginal Corporation • Ungooroo Aboriginal Corporation • Cacatua Cultural Consultants • Upper Hunter Wonnarua Council Inc
09/07/13	SEOC ACHMP Consultation Workshop	Additional feedback was received after the SEOC ACHMP workshop	The following registered aboriginal parties provided feedback: • Hunter Valley Cultural Surveying • Culturally Aware • Gidawaa Walang	
10/07/13	Fieldwork / Inductions / Insurances	A notice of when upcoming field work in July & August was being conducted was sent to	The correspondence was sent to: • Yinarr Cultural Services • Tocomwall • Lower Hunter Wonnarua Council • Girwirr Consultants • Gidawaa Walang	• Wonnarua Nations Aboriginal Corporation • Kayaway Eco-Cultural and Heritage • Hunter Valley Cultural Surveying • Ungooroo Aboriginal Corporation

Date	Issue	Description	Aboriginal Stakeholder Groups Correspondence Log	
			• Wonnarua Culture Heritage • Culturally Aware • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Bullem Heritage • Wanaruah Local Aboriginal Land Council • Yarrawalk Enterprises • Carrawonga Consultants • Mingga Consultants	• Wattaka Cultural Consultants Services • Cacatua Cultural Consultants • Upper Hunter Wonnarua Council Inc • Valley Culture • Wanaruah Custodians • Ungooroo Cultural & Community Services Incorporated • Wonn1 Contracting • Hunter Valley Natural and Cultural Resource Management • Hunter Valley Aboriginal Corporation
30/07/13	Fieldwork	A notice of the cancellation of the previously proposed August fieldwork	The correspondence was sent to: • Yinarr Cultural Services • Tocomwall • Lower Hunter Wonnarua Council • Girwirr Consultants • Gidawaa Walang • Wonnarua Culture Heritage • Culturally Aware • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Bullem Heritage • Wanaruah Local Aboriginal Land Council • Yarrawalk Enterprises • Carrawonga Consultants • Mingga Consultants	• Wonnarua Nations Aboriginal Corporation • Kayaway Eco-Cultural and Heritage • Hunter Valley Cultural Surveying • Ungooroo Aboriginal Corporation • Wattaka Cultural Consultants Services • Cacatua Cultural Consultants • Upper Hunter Wonnarua Council Inc • Valley Culture • Wanaruah Custodians • Ungooroo Cultural & Community Services Incorporated • Wonn1 Contracting • Hunter Valley Natural and Cultural Resource Management • Hunter Valley Aboriginal Corporation
01/10/13	ACCF	Invitations to the Quarter 3 Aboriginal Community Consultative Forum and previous meeting minutes were sent out.	The correspondence was sent to: • Yinarr Cultural Services • Tocomwall • Lower Hunter Wonnarua Council • Girwirr Consultants • Gidawaa Walang • Wonnarua Culture Heritage • Culturally Aware • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Bullem Heritage • Wanaruah Local Aboriginal Land Council • Yarrawalk Enterprises • Carrawonga Consultants	• Wonnarua Nations Aboriginal Corporation • Kayaway Eco-Cultural and Heritage • Hunter Valley Cultural Surveying • Ungooroo Aboriginal Corporation • Wattaka Cultural Consultants Services • Cacatua Cultural Consultants • Upper Hunter Wonnarua Council Inc • Valley Culture • Wanaruah Custodians • Ungooroo Cultural & Community Services Incorporated • Wonn1 Contracting • Hunter Valley Natural and Cultural Resource Management • Hunter Valley Aboriginal Corporation

Date	Issue	Description	Aboriginal Stakeholder Groups Correspondence Log	
			• Mingga Consultants	
11/10/13	ACCF	The Quarter 3 ACCF meeting was held with the following registered aboriginal parties represented at the meeting	The following registered aboriginal parties represented at the meeting • Gidawaa Walang • Culturally Aware • Wanaruah Local Aboriginal Land Council	• Wonnarua Nations Aboriginal Corporation • Ungooroo Aboriginal Corporation • Upper Hunter Wonnarua Council Inc • Hunter Valley Aboriginal Corporation
08/11/13	Fieldwork / Inductions / Insurances	A notice of when upcoming field work in November & December	The correspondence was sent to: • Yinarr Cultural Services • Tocomwall • Lower Hunter Wonnarua Council • Girwirr Consultants • Gidawaa Walang • Wonnarua Culture Heritage • Culturally Aware • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Bullem Heritage • Wanaruah Local Aboriginal Land Council • Yarrawalk Enterprises • Carrawonga Consultants • Mingga Consultants	• Wonnarua Nations Aboriginal Corporation • Kayaway Eco-Cultural and Heritage • Hunter Valley Cultural Surveying • Ungooroo Aboriginal Corporation • Wattaka Cultural Consultants Services • Cacatua Cultural Consultants • Upper Hunter Wonnarua Council Inc • Valley Culture • Wanaruah Custodians • Ungooroo Cultural & Community Services Incorporated • Wonn1 Contracting • Hunter Valley Natural and Cultural Resource Management • Hunter Valley Aboriginal Corporation
10/12/13	ACCF	Invitations to the Quarter 4 Aboriginal Community Consultative Forum and previous meeting minutes were sent out.	The correspondence was sent to: • Yinarr Cultural Services • Tocomwall • Lower Hunter Wonnarua Council • Girwirr Consultants • Gidawaa Walang • Wonnarua Culture Heritage • Culturally Aware • Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Bullem Heritage • Wanaruah Local Aboriginal Land Council • Yarrawalk Enterprises • Carrawonga Consultants • Mingga Consultants	• Wonnarua Nations Aboriginal Corporation • Kayaway Eco-Cultural and Heritage • Hunter Valley Cultural Surveying • Ungooroo Aboriginal Corporation • Wattaka Cultural Consultants Services • Cacatua Cultural Consultants • Upper Hunter Wonnarua Council Inc • Valley Culture • Wanaruah Custodians • Ungooroo Cultural & Community Services Incorporated • Wonn1 Contracting • Hunter Valley Natural and Cultural Resource Management • Hunter Valley Aboriginal Corporation
18/12/13	ACCF	The Quarter 4 ACCF meeting was held with	The following registered aboriginal parties represented at the meeting: • Girwirr Consultants	• Consultants Services • Wonn1 Contracting

Date	Issue	Description	Aboriginal Stakeholder Groups Correspondence Log	
			• Aboriginal Native Title Consultants • Muswellbrook Cultural Consultants • Upper Hunter Heritage Consultants • Hunter Valley Cultural Consultants • Bullem Bullem Heritage • Carrawonga Consultants • Wonnarua Nations Aboriginal Corporation • Wattaka Cultural	• Hunter Valley Aboriginal Corporation • Warren Taggart • Mingga Consultants

Appendix 4: OEH monitoring form

MONITORING REPORT FORM

This form is being completed for the following reason:

- ☑ Annual Report by landholder (self reporting)
- ☐ Routine visit by OEH with landholder
- ☐ Compliance visit by OEH with landholder
- ☐ Change of ownership visit by OEH with landholder
- ☑ Conservation Agreement
- ☐ Wildlife Refuge
- ☐ Property Agreement

Please make three copies of the completed form and any additional information. One to be retained by the landowner, one for the local Area office of NPWS and the third to go to Conservation Partnerships Delivery Unit, OEH, PO Box A290, Sydney South NSW 1232.

A LANDOWNER AND PROPERTY DETAILS

Property Owner	ASHTON COAL MINES LTD
Property Name	—
Property Address	PART OF LOT 3 DP1114626. POBox 699 SINGLETON NSW 2330
CA number	AGREEMENT SIGNED BY THE MINISTER FOR NP&W ACT 1974 FRANK SARTOR 16/9/2010
Area (ha)	65.66 ha
~~CMA Region~~ LLS Region	HUNTER
Agreement signed	16/9/2010
Date of last monitoring visit	JANUARY 2012
Date of visit	OCTOBER 2013
Officer undertaking visit	NIL

B LANDHOLDER OVERVIEW SINCE LAST VISIT

1 LANDHOLDER EXPERIENCES RELATING TO THE IMPLEMENTATION OF THE CONSERVATION AGREEMENT /WILDLIFE REFUGE

Points to note	*Comments*
CONSTRUCTION OF NEW SURFACE INFRASTRUCTURE, GAS WELL 2A TO MAINTAIN SAFETY OF UNDERGROUND EMPLOYEES HAS OCCURRED DURING THIS PERIOD AND SUBSIDENCE REPAIRS TO AREAS EFFECTED BY SUBSIDENCE IMPACTS	

☐ Please place an X in this box if new issue(s)/problem(s) require management help

2 WORKS UNDERTAKEN SINCE LAST VISIT

Description of work undertaken	*Source of funding and amount*	*Date completed*
CONSTRUCTION AREA FOR UNDERGROUND SURFACE INFRASTRUCTURE – GAS WELL 2A SUBSIDENCE REPAIRS TO ACCESS ROAD AND WITHIN SUBSIDENCE CRACKING ZONE WEED CONTROL – PLEASE NOTE ST JOHNS WORT WAS ONLY FOUND IN SCATTERED PATCHES HOWEVER FOR CLARITY OF THE MAP THE OUTER BOUNDARY OF CONTROL WAS MAPPED PEST CONTROL – 1080 BAITING AUTUMN AND SPRING.	ASHTON OPERATING BUDGET	DURING ~~2013~~ LATE 2012 AND THROUGH OUT 2013.

3 FIRE HISTORY MONITORING

Date of fire	Area burnt (% of c.a./approx ha)	Reason (hazard red./wild)	Intensity (low/medium/high)
NO FIRE			

4 VISITATION

Average No. of Visitors per year	Purpose of Visitation	Visitation effects	Strategies to overcome effects
40	WEED CONTROL, FOX & WILD DOG BAITING, ECOLOGICAL MONITORING, WORKS AT MW. ENGINEERING SURFACE INFRASTRUCTURE, SUBSIDENCE REPAIRS	CONSTRUCTION WORKS	RESTRICTED TO INFRASTRUCTURE AREAS AND SUBSIDENCE ZONES.

5 COMMUNITY CONSULTATION AND INPUT INTO DECISION MAKING

Type of Involvement	Numbers involved	Outcomes
NIL		

C CONSERVATION VALUES

	Conservation Values noted in Agreement and its significance	Current condition ** (I = improving M= maintain D= declining) *Anecdotal evidence only available at present*	Current and emerging threats	Level (severe, high, moderate or low) and extent (throughout, widespread, scattered or localised) of threats	New findings; any other relevant information.
Landscape/ Catchment - World/national heritage listings - Landscape & scenic values	N. A.				
Biological - Vegetation Communities - Flora - Fauna & habitat - Water bodies	SIGNIFICANT WOODLAND BIRDS SIGNIFICANT EEC VEGETATION	I M	PREDATORS SUCH AS FOXES, WILD DOGS & CATS PREYING ON FAUNA NOTHREATS FOR VEGETATION	LOW LEVEL THREAT THAT HAS BEEN MANAGED BY BAITING PROGRAM	INCREASE IN PREY SPECIES WAS REDUCED WITH BAITING PROGRAM. NO EFFECT RECORDED IN MONITORING PROGRAM
Geological	N. A.				
Cultural Heritage - Aboriginal - Historic	SIGNIFICANT ABORIGINAL HERITAGE SITES	M	NONE		
Research/ education	N. A.				
Other	N. A.				

** Current Condition: determine change by comparison with previous Condition Assessments (Pages 5 to 8). Carry out new assessment if not done previously. Biometric can also be used.

D MANAGEMENT ISSUES

	Describe the Issue (short description of current extent of impacts, new sightings and any other relevant information	Description of planning and implementation of control measures being and to be undertaken, and duration
Weeds (where applicable, infestation can be given as a % of total vegetation)	LOW LEVEL WEEDS ARE PRESENT, DENSITY IS NOT AT A LEVEL WHERE IMPACTS ON FAUNA ARE BEING RECORDED	WEED REMOVAL IS AN IMPORTANT PART OF THE VEGETATION MANAGEMENT PLAN. WEED MANAGEMENT IS AN ONGOING PROGRAM ONSITE
Pest Animals - Feral - Domestic - Native	PEST SPECIES ARE CONTROLLED BY A COMBINATION OF BAITING AND HABITAT MANAGEMENT	1080 BAITING PROGRAM AND REMOVAL OF STOCK GRAZING.
Fire Management	IT IS LIKELY THAT IF A FIRE DOES NOT OCCUR NATURALLY WITHIN 3 YEARS (2017) INTERVENTION WILL BE REQUIRED	THIS WILL BE MONITORED AND IMPLEMENTED IF REQUIRED
Threatened species; endangered ecological communities etc	NEW FINDINGS, INCREASE IN OVERALL NUMBERS. NEW TERRITORIES RECORDED FOR 4 SPECIES	ADDITIONAL SAMPLE SITES HAVE BEEN INCLUDED TO IMPROVE UNDERSTANING OF NEW HABITATS.
Cultural Heritage Management	CONSTRUCTION AREAS WERE ARCHEOLOGICALLY CLEARED BY ARCHAEOLOGIST AND REGISTERED ABORIGINAL PARTIES	WORKS WERE CARRIED OUT IN COMPLIANCE WITH AMIP 11/3017 AND ASHTON COAL'S ACHMP
Visitor Impact Management	RESTRICTED TO INFRASTRUCTURE AREAS USING EXISITING ROADS AND SUBSIDENCE ZONES	
Community Consultation and input into decision making.	NIL	
Research/ Education programs	N. A	
Other permitted uses -vehicle access - use of timber -seed collection - etc	SUBSIDENCE REPAIRS	REPAIRS WERE ONLY CARRIED OUT FOR THE SAFETY OF PERSONNEL AND TO REDUCE IMPACTS TO VEGETATION. I.E. REPAIRS TO EXISITING ROADS AND ONLY USING A SMALL 5TONNE RUBBER TRACKED EXCAVATOR IN VEGETATION AREAS.

E WORKPLAN TO ADDRESS MANAGEMENT ISSUES (in priority order)

Action to be completed or ongoing action (discuss on site and where necessary confirm details later)	*Cost and possible funding sources*	*Completion Date*	*Responsibility (landholder, OEH, other)*
SUBSIDENCE REPAIRS	$15,000	DURING 2014	ASHTON
WEED CONTROL	$15,000	DURING 2014	ASHTON
FOX & WILD DOG 1080 BAITING (AUTUMN & SPRING)	$ 700	DURING 2014	ASHTON

F ATTACHMENTS

☑ Map showing location of activities referred to above eg weed infestations; fire; location of past and future management actions.

List further attachments if relevant:

☑ Photos from previously/new identified photopoints

☐ Rapid Assessment Sheets for previous/new sites.

☑ Other Monitoring results.

I/we confirm a field inspection has been undertaken and this form is a summary of the conservation values and management issues discussed.

Signature: Ric Wyley
Landowner

—
Visiting OEH/NPWS Officer, if applicable

Date report completed: 20/2/2014

Level of threat definition

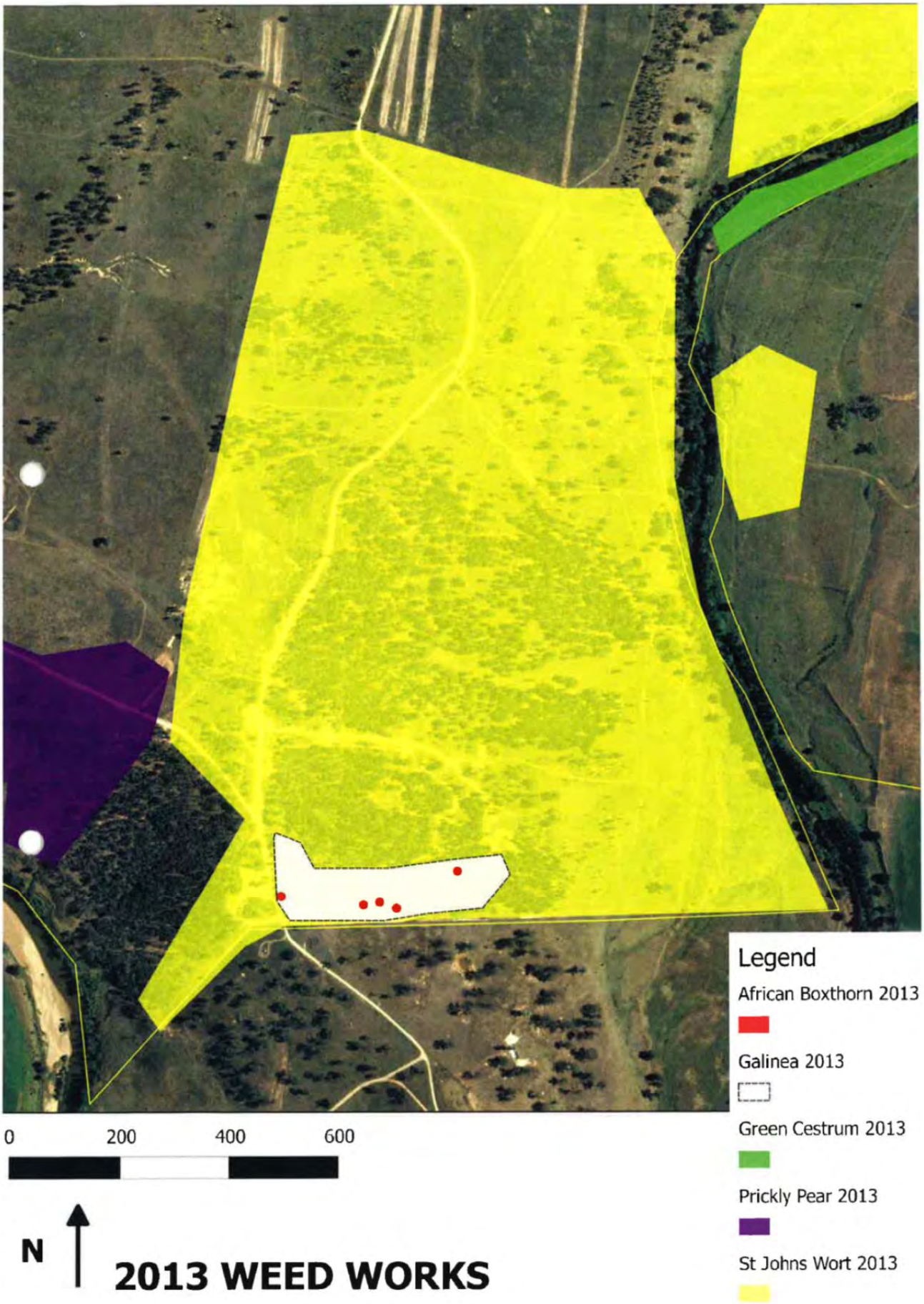
Table 4 Description of the level of impact categories (adapted from State of the Parks 2007 Guidelines)

Impact of the threat	Description of category
Severe	The threat will lead to loss of property value(s) in the foreseeable future if it continues to operate at current levels
High	The threat will lead to a significant reduction of property e values(s) if it continues to operate at current levels.
Moderate	The threat is having a detectable impact on reserve values(s) but damage is not considered significant.
Mild	The threat is having minor or barely detectable impact on property value(s).

Extent of threat definition For cultural heritage places, sites and objects, classify the extent the impact is having on the place/site/object itself.

Table 5: Description of the extent categories (adapted from State of the Parks 2007 Guidelines)

Extent of the threat	Description of category
Throughout	The impact is occurring in 50% or more of property area/cultural place/site/object.
Widespread	The impact is occurring in more than 15% but less than 50% of reserve area/cultural place/site/object.
Scattered	The impact is occurring in between 5 and 15% of reserve area/cultural place/site/object.
Localised	The impact is occurring is less than 5% of reserve area/cultural place/site/object.


Legend
African Boxthorn 2013
Galinea 2013
Green Cestrum 2013
Prickly Pear 2013
St Johns Wort 2013
0
200
400
600
N
2013 WEED WORKS

Ashton Southern Woodland Conservation area Photo-Point photographs

Arboreal/ terrestrial Trapline-Bird survey and Pitfall survey areas

Site A (318600, 6403350, WGS84)- Photographs follow in order, south, east, north, west

Site B (318325, 6403425, WGS84)- Photographs follow in order, south, east, north, west

Site C (318500, 6403600, WGS84)- Photographs follow in order, south, east, north, west

Appendix 5: Community Complaints Register

Complaint No	Date	Time	Identifier	Issue	Wind Speed (m/s)	Wind Direction	Inversion	Comments/Operational Changes
1	22/04/2013	9:00 PM	51	noise	1.6-2.5m/s	NW	>9°C/100m	There were no activities at ACOL that would have contributed to the noise levels reported. During the specified time period between 2100 to 2300 ACOL had no open cut mine activities; our coal washery was operating as normal shift change over was at 2200, no abnormal activities were being undertaken; and the underground was operating as normal, time period of complaint was during mid-shift and all personnel were underground.
2	7/06/2013	10:00 AM	50	other	NA	NA	NA	A private spoke to ACOL's site supervisor complaining about an incident where the driver of a bluish / white 4WD ute had abused the school bus driver for blocking the entrance to Dairy Lane when the 4WD was tryint to enter off the New England Highway. The site supervisor, from the description of the vehicle, spoke to all the ACOL contractors and from the investigation was able to determine the vehicle in description was in fact a contractor for one of the neighbouring mine sites.
3	25/07/2013	12:05 AM	51	noise	<0.5m/s	ENE	>10°C/100m	There was a large inversion in place greater than 10°C/100m during the time of the complaint. There was a dozer operating occasionally throughout night shift on the ROM stockpile, it was operating in 1st gear and upon reviewing the audio files no substantial dozer noise was heard.
4	1/08/2013	10:00 AM	50	other	NA	NA	NA	Due to this being the second complaint of this nature, the Site Supervisor consulted with the bus driver on possible solutions that leave the site access open at all times. An extended dirt pad area adjacent to the roadway will be installed to provide an adequate parking area for the bus.
5	16/08/2013	7:00 AM	51	noise	<0.5m/s	ESE	Stability Class 'G'	Enviro Coordinator was in the village this morning at 6am and then at the CHPP and around the underground from just after 6am until 8:30am. From all locations there were no unusual sounds and everything was operating as normal. There was minimal wind this morning with a top of 0.5m/s from an easterly direction, there was also an inversion in place with a stability

Complaint No	Date	Time	Identifier	Issue	Wind Speed (m/s)	Wind Direction	Inversion	Comments/Operational Changes
								class of 'G' during the early morning.
6	19/08/2013	4:50 AM	51	noise	1.9m/s	NW	Stability Class 'F & G'	There was no unusual sounds from the CHPP and everything was operating as normal. There was a slight breeze of 1.9m/s from a north-westerly direction at the time of the complaint, there was also an inversion in place with a stability class of 'F & G' during the early morning.
7	25/08/2013	10:00 PM	51	noise	0.7 to 2.7m/s	NNW	11 to 15^{o}C/100m	Ashton's CHPP was shut down and not operating between the hours of 2200 and 0700. There was an incident underground at midnight which resulted in the longwall stopping and no production starting until Sunday night. Two CHPP operators started shift at 0400 and started operating two dozers at 0410 to clear room on the ROM stockpile. There were no trains being loaded. Our CHPP operators did indicate that prior to starting their shift at 0400 there was noticeable mining noise coming from a northerly direction.
8	4/09/2013	8:00 AM	51	noise	0.3m/s	W	>3^{o}C/100 m	Environmental Coordinator was in the village during the time of the complaint on a separate issue and did not notice any dozer noise.

Appendix 6: Consultation for the development of this AEMR

Note no response to correspondence from NOW, EPA and SSC.

Email correspondence with DRE

From: john.trotter@industry.nsw.gov.au [mailto:john.trotter@industry.nsw.gov.au]
Sent: Thursday, 30 January 2014 8:17 AM
To: Scotney Moore
Subject: Re: 2013 AEMR

Hello Scotney,
If you could please refer to the DRE guideline when preparing the AEMR. This guideline is available on the departmental website (http://www.resources.nsw.gov.au/environment/pgf).
Specifically, "AEMR-Guidelines-for-MOPs-prepared-to-EDG03-requirements.pdf".

Regards.
John

John Trotter
Inspector Environment, Northern Region
Environmental Sustainability Unit – Mineral Resources Branch
Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy
516 High Street Maitland NSW 2320 | GPO Box 344 | Hunter Region Mail Centre NSW 2310
T: 0249 316553 | E: john.trotter@industry.nsw.gov.au | W: www.dtiris.nsw.gov.au

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From: "Scotney Moore" <smoore@ashtoncoal.com.au>
To: <john.trotter@industry.nsw.gov.au>
Cc: "Julie McNaughton" <jmcnaughton@ashtoncoal.com.au>
Date: 29/01/2014 05:14 PM
Subject: 2013 AMER

Dear John

This year we have commissioned Glade Consulting to prepare and write Ashton Coal's 2013 AEMR. As per condition 9.3 of our consent we are required to consult with Department of Trade & Investment – Resources & Energy during the preparation of the report. If you could please provide any relevant information in relation for us to consider in the preparation of the report it would be appreciated.
Furthermore Ashton Coal has approached Aquaterra to complete the Groundwater Management Report to satisfy condition 9.2(d) of the development consent. We have contacted NSW Office of Water for approval of Aquaterra as the independent groundwater expert.
If you would like to discuss the 2013 AEMR preparation further please contact either myself or Julie McNaughton on 02 6576 1111.

Regards,
Scotney Moore
Environment & Community Relations Coordinator
Ashton Coal Operations Pty Ltd
Phone: +61 (0)2 6570 9125

Email correspondence with DP&I

From: Scott Brooks [mailto:Scott.Brooks@planning.nsw.gov.au]
Sent: Thursday, 30 January 2014 5:54 PM
To: Scotney Moore
Subject: Re: 2013 AEMR

Scotney,

Suggested issues that you may want to consider in requirements of the condition below are:

- Some detailed update on the Bayswater Ck Diversion, its performance against commitments and an explanation of the most recent advice regarding an increased water make of the UG mine.
- A summary of the Independent Audit findings.
- The progress of the monitoring location review following the ending of open cut mine operations.

We noted last years AEMR report was very late. I ask if this years report could be provided in a more timely manner.

Scott

Scott Brooks
Team Leader Compliance (Mining)

Development Assessment Systems and Approvals
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Suite 14, Level 1, 1 Civic Av
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F: 02 65753415

>>> "Scotney Moore" <smoore@ashtoncoal.com.au> 1/29/2014 5:12 pm >>>

Dear Scott

This year we have commissioned Glade Consulting to prepare and write Ashton Coal's 2013 AEMR. As per condition 9.3 of our consent we are required to consult with NSW Department of Planning and Infrastructure during the preparation of the report. If you could please provide any relevant information in relation for us to consider in the preparation of the report it would be appreciated.

Furthermore Ashton Coal has approached Aquaterra to complete the Groundwater Management Report to satisfy condition 9.2(d) of the development consent. We have contacted NSW Office of Water for approval of Aquaterra as the independent groundwater expert.

If you would like to discuss the 2013 AEMR preparation further please contact either myself or Julie McNaughton on 02 6576 1111.

Regards,Scotney

Scotney Moore
Environment & Community Relations Coordinator
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Mobile: +61 (0)427 904 268