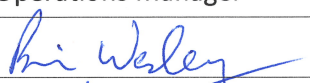
ASHTON COAL PROJECT

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT 2014

Wonnarua Mine Rehabilitation Services planting along the Bowmans Creek Diversion, 2015.

Ashton Coal AEMR 2014

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 2014
AEMR Completion Date	31 December 2014
Name of Leaseholder	White Mining Limited, White Mining (NSW) Pty Limited and ICRA Ashton Pty Ltd.*
Reporting Officer Name	Brian Wesley
Reporting Officer Title	Operations Manager
Reporting Officer Signature	
Date	24/3/2015

* As of 31 December 2014, the Leaseholder names are correct. During 2014 Ashton Coal has undergone some ownership changes, and applications have been submitted to DRE for title changes.

DISTRIBUTION

NSW Trade and Investment, - Resources & Energy (DRE)

Department of Planning &Environment (DP&E)

NSW Office of Water (NoW)

Office of Environment and Heritage (OEH)

Environment Protection Authority (EPA)

Singleton Council (SC)

Singleton Fire Control Officer

Ashton Coal Community Consultative Committee Members

Executive Summary

This Annual Environmental Management Report (AEMR) details the Ashton Coal Project (ACP) environmental and community performance for the period from 1 January 2014 to 31 December 2014. 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The AEMR has been written in accordance with the superseded NSW Department of Trade and Investment *EDG03 Guidelines to the Mining, Rehabilitation and Environmental Management Process* and the NSW Department of Planning and Environment (DP&E)(formerly Department of Planning and Infrastructure) Draft *Guideline for Preparation of Annual Environmental Management Review (AEMR) December 2012.* The AEMR also covers the commitments made in the Ashton Coal Mining Operations Plan, 2013 (MOP).

During the reporting period, coal was mined from the Upper Liddell coal seam, with mining occurring in Longwalls 102 and 103 (LW102, LW103). Approximately 2.8 million tonnes of run-of-mine coal was mined from the underground operations, which is 15 per cent below the 3.3 million tonnes that was planned for 2014 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 2014 was effective with general compliance with consent conditions and Environmental Assessments (EA) predictions.

Air Quality

The AQMP was reviewed and approved during the reporting period, rationalising the Air Quality Monitoring programme to reflect the nature, scale and risk of current operations at the ACP.

All depositional dust gauges were below the annual average of 4g/m²/month for the reporting period.

During the reporting period Ashton Coal Operations Limited's (ACOL) statutory HVAS monitor remained below the long-term annual impact assessment criteria.

During 2014 the short term 24-hour impact assessment criteria of 50 µg/m^3 was exceeded twice at the statutory TEOM monitoring site (site 8). Following investigations it was found that on both occasions ACOL's contribution was likely to be less than 50 µg/m^3. During the reporting period ACOL's statutory TEOM monitoring site remained below the long-term annual impact assessment criteria.

There were no air quality related complaints or incidents during 2014.

Noise

During the reporting period the noise management plan was reviewed and approved by DP&E, with the major changes including moving from quarterly to monthly monitoring and night time monitoring only. During the 2014 attended noise monitoring program all monitoring results were under consent criteria, and either consistent with or lower than predictions outlined in the EA.

There was one complaint related to noise in the reporting period. Upon investigation it was concluded that the noise was unrelated to ACOL's operations.

Water

During the reporting period there were no material variations from the MOP related to water management activities. ACOL used approximately 1,250 ML of water for coal handling and processing, dust suppression and irrigating rehabilitation. Similar to results in recent years, the CHPP was the main consumer of water. During the

reporting period, the net water make from the underground remained consistent with the last quarter of 2013 with approximately 72ML/month mine water make. This is higher than historical values, but consistent with model predictions and the water management plan.

ACOL pumped water from Glennies Creek and Hunter River as per licence entitlements during 2014.

For the calendar year 2014 ACOL pumped 202ML from Glennies Creek surface water. Water NSW (formerly State Water) accounts for 0.17 ML/day (62ML/Year) as incidental take (through underground seepage) however monitoring at ACOL indicates that this take is likely to be much lower (approximately 22ML/year). Therefore total water take from Glennies Creek for the reporting period is 264ML against a licence allocation of 445ML per financial year.

A total of 28ML was pumped from the Hunter River predominantly for the purpose of irrigating Bowmans Creek Diversion rehabilitation. ACOL holds in excess of 465ML of water licence allocation for the Hunter River.

In June and August 2012, ACOL submitted applications for two Bore Licenses to the NSW Office of Water. These licences were issued to Ashton in January 2013 and water extraction commenced after the date of issue. Following the issuing of the licences, it was identified that the construction of boreholes had occurred after the submission of applications, but prior to licences being issued. Consequently, ACOL received two penalty infringement notices during the reporting period for 'construction of a water supply work without approval' from the 2012 works. The penalty infringement notices have been paid.

Blasting

There was no blasting activity during 2014.

Heritage

During 2014 salvage of the oxbow site was undertaken. There were approximately 4000 artefacts recovered from the oxbow area. Initial analysis indicates that the site is may have been a communal camping area where women, children and men would congregate. This is supported by findings in Test Area 3, there is little evidence of tool manufacture, a large variety of stone material, and the discovery of a broken training / child's axe.

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

With the North East Open Cut rehabilitation completed in 2012, rehabilitation focus during 2014 was on the Bowmans Creek Diversion (BCD). The rehabilitation program is currently in the start of the third year which is in Phase 1: Bank Stabilisation of the seven year rehabilitation programme.

During the reporting period over 30,000 plants including trees, shrubs, grasses and aquatic plants were grown and planted in the BCD area. Extensive monitoring was carried out including pebble counts, structure surveys, aquatic flora and fauna, rehabilitation success, and weed management.

In localised areas of the diverted channels some scour or sedimentation processes have started to occur, reflecting the natural creation and development of pool and riffle sequences within the channels. The majority of the cross sections for the Eastern Diversion indicate no significant change from previous surveys. The Western Diversion channel identified no evidence of significant scour, accumulation of sediment or variation in grade levels, however there are some areas of deeper scour in the first half of the channel and subsequent deposited material in the last quarter of the channel. An qualified geomorphologist will undertake more detailed investigations in 2015.

Land improvement activities have been undertaken during the reporting period, in particular weed management works and slashing of rehabilitation to promote fresh growth.

Rehabilitation monitoring has been linked to the completion criteria outlined in the 2013 Mining Operations Plan. The NEOC rehabilitation is progressing well, achieving and partially achieving most of the completion criteria when compared to the analogue monitoring sites. Control of *Galenia sp.* has been highlighted as a recurring issue in achieving other components of the completion criteria.

Bowmans Creek Diversion rehabilitation is progressing well against the completion criteria, with favourable growth and survival rates in most areas of plantings. Most completion criteria have not been met, which is to be expected, as the rehabilitation programme is not complete. Some areas, in particular on the Western Diversion may need re-planting and additional support. These will continue to be monitored over the coming years.

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

Proposed actions in 2015

ACOL 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.

ACOL has established the following targets for the next reporting period, calendar year 2015:

- Complete EPL variations, as discussed with EPA, and amend associated air quality and groundwater monitoring programs;
- Obtain Mining Purposes Lease from the NSW Department of Energy and Resources for the Tailings Dam and associated infrastructure;
- Prepare, consult and lodge the Extraction Plan for the Upper Liddell Seams 105 - 107B for approval from the NSW DP&E;
- Implement revised Water Management Plan, once approved by the NSW Department of Planning and Environment;
- Assess and commence remedial works as required in areas rehabilitated following the installation of pipework associated with boreholes and gas wells;
- Continue rehabilitation of the Bowmans Creek and the Bowmans Creek Diversion;
- Recalibrate site water balance model;
- ACOL to commission an appropriately qualified geomorphologist to investigate the Western Diversion bed scour and recommend any remedial actions.

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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, 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.

During 2014, ownership of the Ashton Coal Project changed from an unincorporated Joint-Venture between Yancoal Australia Ltd (90%) and Itochu Corporation of Japan (10%) to being wholly owned by the Yancoal Australia Group.

This Annual Environmental Management Report (AEMR) details the ACP's environmental and community performance for the period from 1 January 2014 to 31 December 2014. The report addresses mining and related operations for the Ashton Coal Project, which includes the Ashton Coal 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.

Ashton Coal Operations Limited (ACOL) also have the South East Open Cut Project (SEOC), to the South East of current surface operations. This project was approved by the Planning Assessment Commission on the 4 October 2012 and was subsequently appealed. In August 2014, the Land and Environment Court determined that approval can be granted, with further consideration of appropriate conditions required before the court can grant conditional approval. Final conditions are pending and are expected to be handed down during 2015. 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 Ashton Coal Mine Project Approval (DA No. 309-11-2001-i; including modifications, condition 9.2), referred to hereafter as the project approval and the commitments outlined in the Mining Operations Plan. The AEMR also considers the superseded Resources and Energy, a division of NSW Trade & Investment (DRE) EDG03 Guidelines to the Mining Rehabilitation and Environmental Management Process (2012). 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, Department of Planning and Environment (DP&E), Environment Protection Authority (EPA) and Singleton Council (SC). No additional information was requested to be included in this report.

The AEMR is distributed to a range of stakeholders that include government authorities, the Community Consultative Committee (CCC), other mines and ACOL employees. 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 (superseded)	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 (superseded)	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 (superseded)	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 2
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 PM_{10} 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 SC 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 provides a summary of relevant information. 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.	Section 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.	This report for the period 1 January 2014 – 31 December 2014 Specifically; a) Table 2 b) Table 2 c) n/a d) Appendix 1 e) Section 3 f) Section 3 g) Section 3 h) Section 3 i) Section 5.3 j) n/a k) Table 12 l) Section 5 m) Section 6

Reference	Condition	AEMR section
	e) a review of the effectiveness of the environmental management of the mine in terms of OEH, EPA, NoW, DRE, and SC requirements; 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 4
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, SC and the CCC, and made available for public information at SC 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, SC, 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 2014 – 31 December 2014 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

Environmental performance condition	AEMR Section reference	
	Compliance with Project Approval conditions and MOP *	Compliance with EA/EIS prediction *
Surface water	3.4.3	3.4.2
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	3.11
Aboriginal and European heritage	3.12	3.12
Bushfire	3.15	3.15
Waste	3.17.3	3.17.2
Mine Subsidence	3.18.1	3.18.1
Rehabilitation	5.1	5.1

*Legend

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

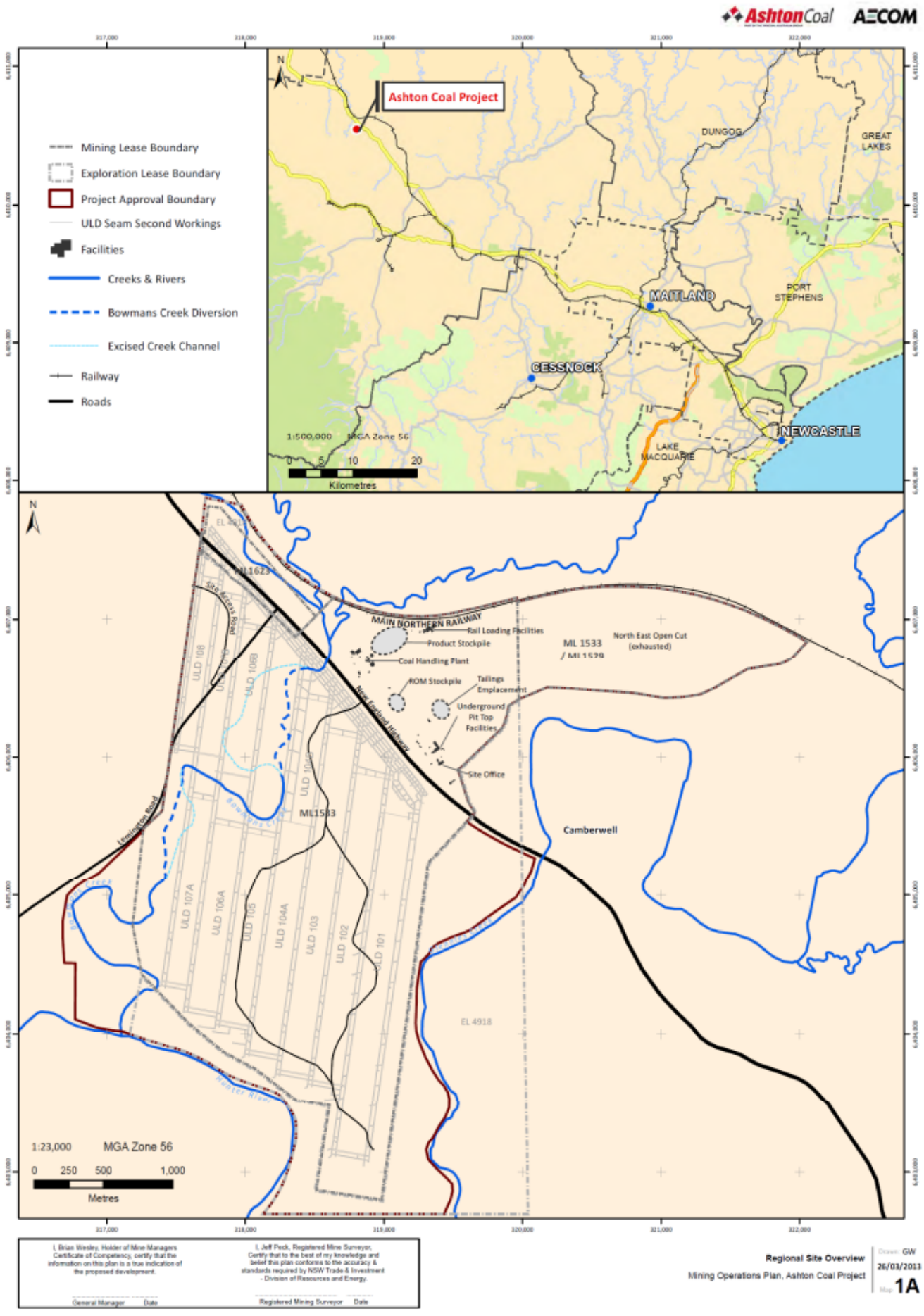

Figure 1: Location of the Ashton Coal Operations Project Area

1.3 Consents, Leases, Licences and Management Plans

ACOL 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 2014 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 relevant environmental management plans for the ACP site, constitutes the Plan of Management for the conservation area.

In line with changes to radiation legislation, during 2014 ACOL received a Radiation Management Licence, replacing individual radiation licences previously held.

Table 3: ACOL's primary statutory approvals as at 31 December 2014

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	10/09/2003	11/11/2021
ML 1623	Mining Lease	30/10/2008	30/10/2029
ML 1696	Mining Lease*	16/05/2014	16/05/2035
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

* ML 1696 relates to the South East Open Cut Project, not the Ashton Coal Project. The South East Open Cut Project is out of scope for this report.

Table 4: ACOL's other statutory approvals as at 31 December 2014

Approval	Description	Expiry date
Radiation Management Licence		
RML28485	Radiation Management Licence	06/04/15
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

Approval	Description	Expiry date
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
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

Figure 2 ACOL's Coal Handling and Preparation Plant

Table 5: Water Related Licences

Approval	Description	Expiry date	Extraction licence limit
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*
Groundwater Licences			
WAL29566 Alluvial (aquifer) 358ML	Water Access Licence	Perpetuity	358 ML
20BL136766 Stock Domestic	Bore	Perpetuity	N/A*

Approval	Description	Expiry date	Extraction licence limit
20BL168848 Test Bore	Bore	Perpetuity	N/A
20BL168849 Test Bore	Bore	Perpetuity	N/A
20BL170596 Monitoring	Bore	Perpetuity	N/A
20BL172482 Mining (dewatering) 230ML (in conjunction with 20BL171364 and 20BL169937)	Bore	20/02/2017	230ML
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	230ML[1]
20BL173418 Mining (dewatering) 230ML	Bore	13/01/2018	230ML[1]
20BL173175 Mining - monitoring	Bore - Monitoring	Perpetuity	511 ML[1]
20BL173717A Mining (dewatering)	Bore – Dewatering	29/05/2019	511 ML[1]
20BL173715 Mining (dewatering)	Bore – Dewatering	29/05/2019	511 ML[1]
20BL173716 Mining (dewatering)	Bore – Dewatering	29/05/2019	511 ML[1]
20BL169508 Bore - mine dewatering 100ML	Bore – Dewatering	14/03/2015	100ML

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

[1] *Linked to other bore licences*

1.3.1 Mining Operations Plan

ACOL has an approved mining operations plan (MOP) in place that covers a five year period from 28 March 2013 to 31 December 2017.

The MOP satisfies the requirements of the Mining Operations guidelines (DRE), as well as the following management plans required by the Development consent: Land Management Plan, Landscape and revegetation management plan, rehabilitation management plan and final void management plan.

This MOP was approved by the DRE on 28 March 2013 and subsequently reviewed and approved on the 27 August 2014 following the independent compliance audit. The independent audit found that the MOP did not address the requirements of the landscape and revegetation management plan and the land management plan completely. Throughout the MOP changes have been made to more adequately comply with the requirements of the management plans where they are relevant. Some management plan requirements relating to construction or open cut operations have not been included in the MOP.

1.3.2 Environmental Management Plans

ACOL 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 2014

Environmental management plan	Condition	Approval date
Environmental Management Strategy	3.3	19/08/2006
Noise	6.43	03/04/2013
Air Quality	6.10	03/04/2014
Lighting	6.56	03/04/2014
Waste	5.3	03/04/2014
Spontaneous Combustion	2.6	28/03/2014
Archaeology and Cultural Heritage	3.36	31/07/2012
Bushfire	3.57	09/12/2013
Flora and Fauna	3.46	31/07/2012
Water	4.7	10/08/2012

1.4 Mine Contacts

ACOL environment team contacts can be found in Table 7.

Table 7: ACOL management contact details

Name	Role	Phone contact details
Brian Wesley	Operations Manager	(02) 6570 9104
Digby Short	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, ACOL achieved a high level of compliance against approval conditions and legislation applicable to the operation. ACOL maintains regular communication with government agencies to ensure that improved levels of effective assessment and reporting continue.

The DRE and DP&E conducted a review of the 2013 AEMR, including attending a site meeting at ACOL on 6 June 2014. The 2013 AEMR contained various commitments made by ACOL that would be undertaken in 2014 that assist in continually improving the environmental performance of the mine and these are summarised in Table 8.

As part of the 2013 AEMR, ACOL established targets for calendar year 2014. These targets and their current status are summarised in Table 9.

During 2013 an independent audit of Ashton's operations was undertaken against approval conditions. The actions resulting from this audit were presented in an Appendix of the 2013 AEMR. Thirty findings were identified

in the audit, with 19 findings complete and closed, ten findings commenced and one finding not applicable to current operations. All outstanding audit actions are administrative in nature and are updates to management plans and the mining operation plan. ACOL will continue to work with the relevant government departments to finalise the review to documentation and progressively close out audit findings.

Figure 3 underground operations.

Table 8: Actions from previous AEMR Review

AEMR period/ Dept. reference - Action No.	Issue / Observation	Action	Due	Status
DP&E 1	Ashton does not have a bioremediation area, which may result in large amounts of hydrocarbon contaminated material to be removed from site and disposed of appropriately. The management of smaller amounts was not known.	Provision of a Hydrocarbon Management Plan to DP&E.	29/08/14	Outstanding. ACOL are undertaking an internal hydrocarbon management review in 2015. For more information see section 3.6
DP&E 2	Rehabilitation following the installation of pipework for gas drainage was of a poor standard.	A better system to revegetate these areas is needed for these areas and new areas as they are completed.	31/03/15	The permit to disturb process will now capture the need for rehabilitation in the planning stage of any project. Routine inspections of areas covered by some permits have identified rehabilitation maintenance which have been scheduled for the first half of 2015.
Source: DRE letter dated 16 June 2014				
1	Titleholders of Mining Leases should be correctly stated with the AEMR.	Provide correct titleholder information within next AEMR.	31/03/15	Included in this AEMR (Page 1)
2	AEMR not signed and dated.	Next AEMR to be signed and dated.	31/03/15	Included in this AEMR (Page 1)
3	AEMR plans should provide equivalent information to Mining Operations Plan (MOP) 3A (reporting period) and 3B (next AEMR period).	Include plans is next AEMR which allow comparison with MOP plans 3A and 3B.	31/03/15	Included in this AEMR. See Figure 34 and Figure 35.
4	Information required per Section 5 of the "Guidelines and Format for Preparation of an Annual Environmental Management Report" incomplete.	Include information to fully satisfy Section 5 ("Rehabilitation (this AEMR period")).	31/03/15	'Guidelines and Format for Preparation of an Annual Environmental Management Report' has been superseded. Further details have been added to Section 5 to meet requirements.
5	Poor initial ground cover for recently buried gas drainage pipework. (refer Photo 1)	Provide a vegetative ground cover which will exclude weeds.	As soon as practicable given seasonal constraints	As above (action no. DP&E2)
6	Opportunity for weeds to establish upon fill material retained to address expected subsidence in Bowmans Creek diversion area.	Control weeds to limit weed spread potential.	As soon as practicable given seasonal constraints	Weed Management was undertaken along Bowmans Creek in the reporting period. See section3.8 and Figure 26.

Table 9 Status of 2013 AEMR Actions

2013 AEMR Action	Status
Commence preparation of Subsidence Management Plan / Extraction Plan for ULD105-108	Subsidence Management Plan / Extraction Plan for ULD105-108 has commenced and will be completed and lodged in accordance with current mine plans.
Implementation of CMO compliance system	Implementation of CMO continued during 2014 with corporate upgrades undertaken and site data added.
Review of key Management Plans for ACOL and SEOC	A number of key management plans including noise, lighting, air quality, and water were lodged for approval within 2014.
Archaeological Clearance for Oxbow Area	Completed. Further information in section 3.12
Revised water balance model implemented	Completed.

1.6 ACOL Environmental Management System

ACOL 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.

ACOL'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. Actions are tracked in compliance management software.

2 Operations

2.1 Exploration

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

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

- Two piezometer open holes
- Two partly cored exploration holes
- Four exploration holes for various purposes
- One goaf inspection hole.

Rehabilitation and sealing of completed boreholes was completed, with rehabilitated sites monitored in accordance with ACOL'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.

There are no surface drilling exploration activities currently planned for 2015.

2.2 Land Preparation

During the reporting period there was minimal land disturbance undertaken. Land disturbance activities were limited to works discussed above and related to gas drainage works and dewatering borehole construction. There were no material variations from the MOP related to land preparation activities.

2.3 Construction

During 2014, the following construction activities were commenced:

- Three gas drainage holes were drilled,
- The gas drainage pipeline was extended by approximately 1400 metres (m). The pipeline is buried and has been spread with topsoil and seeded. The pipeline rehabilitation will be monitored and reseeded if necessary during 2015.
- Construction of two mine dewatering boreholes.
- Commencement of the fines plant construction at the CHPP, including civil works, switch room and foundations. The fines plant should be completed and commissioned during 2015.
- Construction of approximately 500m of drift roads to access the Upper Lower Liddell seam.

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

During 2015, the following activities are planned:

Gas Drainage

Post goaf gas drainage is undertaken at ACOL to maintain the long wall return methane concentration below statutory levels. In 2015, there will be three gas wells drilled to minimise the risk of undesirable gas levels during the extraction of LW104 panel. Details of each gas well are as follows:

- GW4A: To the ULD seam (180m)
- GW4C: to the PG seam (95m)
- GW4F: to the PG seam (60m)

Dewatering

In the second half of the 2015 a dewatering borehole will be drilled to the ULD seam.

2.4 Mining

The North East Open Cut (NEOC) Mine ceased mining operations with the last of the Hebden seam mined on the 24 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 1.8m to 2.8m 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 Upper Liddell coal seams (LW102 and 103). Approximately 2.8 million tonnes of run-of-mine coal was mined from the underground operations, which is 15 per cent below than the 3.3 million tonnes that was planned for 2014 in the MOP. This is also in accordance with the 5.45 million tonnes of maximum ROM extraction allowed from the project approval. Table 10 provides a summary of ACOL's mine performance figures for 2014.

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 10: Mine performance figures for 2014

Category	Unit	This reporting period (January 2014 to December 2014)	MOP prediction for Year 2 (2014)	Estimated for next reporting period (MOP) (January 2015 to December 2015)
Topsoil stripped	bcm	0	0	0
Topsoil used/spread	bcm	0	0	0
Overburden	bcm	0	0	0
Run-of-mine coal mined	tonnes	2,771,218	3,273,676	2,959,712
Coarse reject	tonnes	1,252,548	905,506	837,143
Product (saleable) coal	tonnes	1,336,092	1,764,500	1,564,474

2.4.1 Equipment Fleet

Due to the construction of the drift roads to the ULLD seam, slightly more underground equipment was utilised during 2014 than previous years.

Table 11 provides a list of the underground mine equipment used during the reporting period.

Table 11: Mining equipment

No	Description	No.	Description
Underground mining equipment			
4	12CM 12 Continuous Miners	8	PJB Mk4.5
4	10SC32 Shuttle Cars	8	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)
1	Mittsui Road Header	1	10t telescopic fork lift

2.4.2 Employment

At the end of the reporting period ACOL employed 70 staff and 133 wages employees and the equivalent of 58 contractors linked to everyday production. Another 34 contractors were hired for a drift project: these positions were filled by employees from Austar who were temporally redeployed while the mine completes its investigations into a site incident.

There was a decrease of 8 per cent of staff employees since 2013, mostly due to the formation of a Shared Services Group such that the administration staff have transferred to this Group and are no longer paid by ACOL, and also due to a reduction in numbers as part of a restructure of some departments. Although the number of wages employees is less than 2013 these positions are being filled by Austar employees who have been temporarily redeployed. It is expected that the workforce will remain constant during 2015 although the current market has resulted in consistent review to determine the best outcome for the business to remain sustainable.

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 ACOL, which is approximately 25 per cent lower than the **1.76 million tonnes** that was planned for 2014 in the MOP. This was due to a reforecast in 2014 that reduced budgeted saleable product, and also operational issues in LW102 and 103 leading to delays in the mine plan. 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.

Consistent with the Tailings Emplacement Operations Plan (TEOP) the Ravensworth Void 4 tailings emplacement area will be utilised until it reaches capacity, followed by utilisation of the NEOC void. There were no material variations from the MOP or TEOP related to tailings management.

2.7 Water Management

The Ashton Coal Project is situated between Bettys 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. ACOL's water management system includes monitoring surface and ground water sites according to an approved monitoring program.

In addition to water quality monitoring, ACOL 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 5.

During the reporting period ACOL continued to implement a site quantitative water model and run a water balance in accordance with the Mineral Council of Australia's Water Accounting Framework for the Minerals Industry (2012) (MCA WAF):
http://www.minerals.org.au/file_upload/files/resources/water_accounting/WAF_UserGuide_v1.2.pdf.

The strength of the MCA WAF is that it allows sites to account for, report on and compare site water management practices in a rigorous, consistent and unambiguous manner that can easily be understood by non-experts. It has been designed to align with frameworks for the Global Reporting Initiative (GRI) and Australian Water Accounting Standard. The MCA WAF focusses on the flows between the environment and the boundary of the operation i.e. the inputs, outputs and diversions.

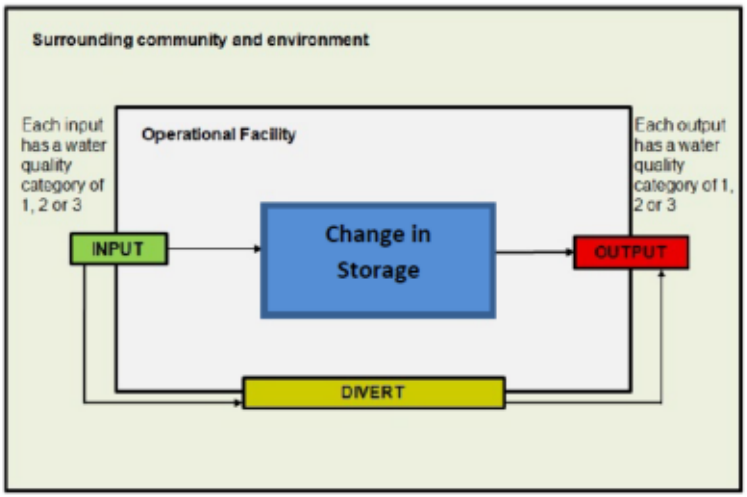

Figure 4 Water Accounting Framework Input Output Model

An overview of key inputs and outputs for ACOL's water balance for the reporting period is provided in Table 12.

During the reporting period there were no material variations from the MOP related to water management activities. During the reporting period, the net water make from the underground remained consistent with the last quarter of 2013, with approximately 72ML/month mine water make. This is higher than historical values, but consistent with model predictions and the water management plan and within licence allocations.

For the calendar year 2014 ACOL pumped 202ML from Glennies Creek surface water. Water NSW (formerly State Water) accounts for 0.17 ML/day (62ML/Year) as incidental take (through underground seepage) however monitoring at ACOL indicates that this take is likely to be much lower (approximately 22ML/year). Therefore total water take from Glennies Creek for the reporting period is 264ML against a licence allocation of 445ML per financial year.

A total of 28ML was pumped from the Hunter River predominantly for the purpose of irrigating Bowmans Creek Diversion rehabilitation. ACOL holds in excess of 465ML of water licence allocation for the Hunter River.

During the reporting period ACOL used approximately 1,250 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. Table 12 provides a surface water balance for the reporting period.

The ACP is a zero discharge site and therefore did not discharge to the Hunter River during the reporting period and has no licensed discharge point under the Hunter River Salinity Trading Scheme (HRSTS).

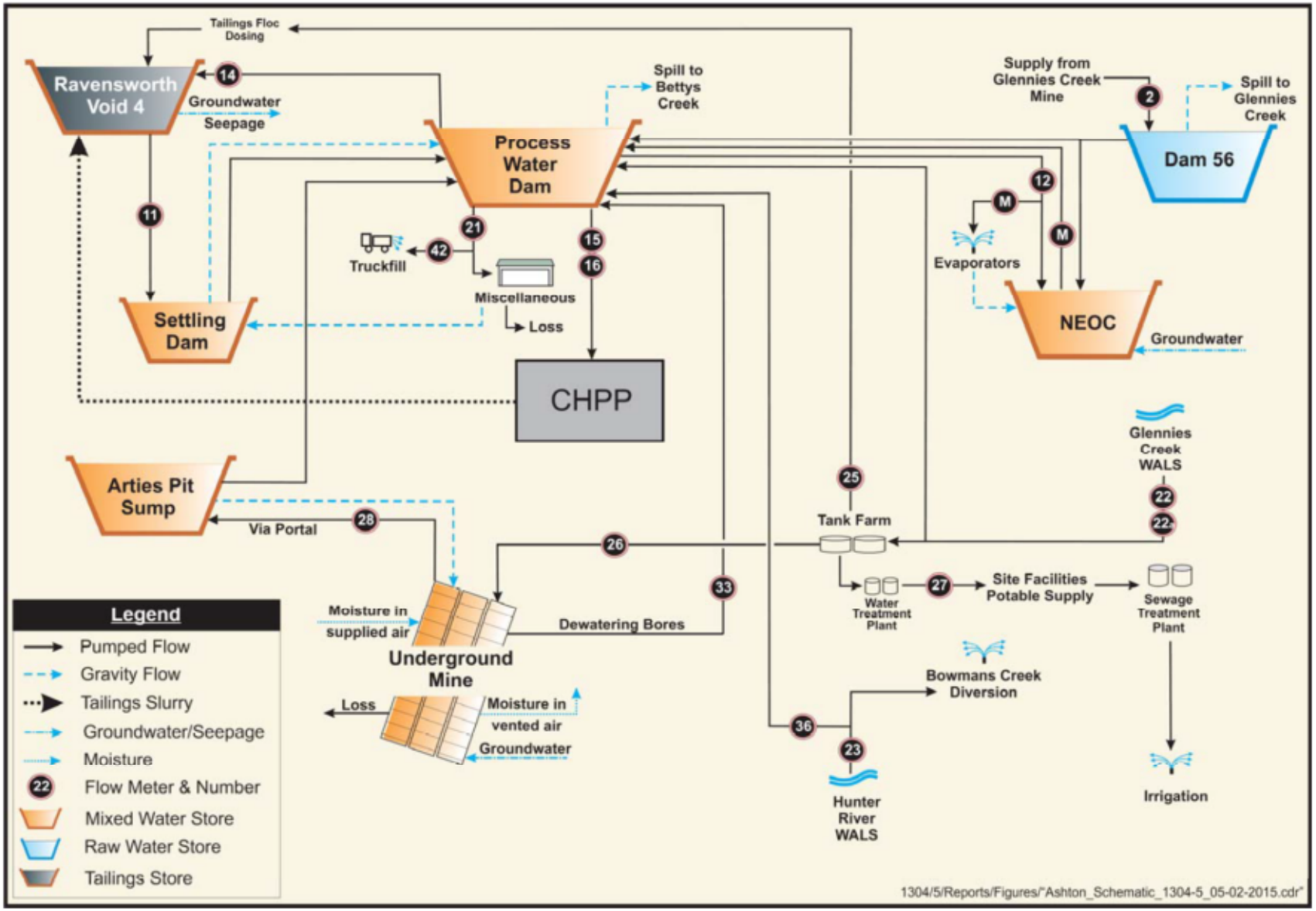

Figure 5: Schematic of water structures

Table 12: ACOL's site water balance for the reporting period

Input-Output	Element	Sub-Element	Volume of Water in Quality Category			Sub-Element Total (ML)	Accuracy (high, medium, low)			How were the flows obtained and what is the confidence in them?
			1 (ML)	2 (ML)	3 (ML)		Measured	Estimated	Simulated	
Inputs	Surface Water	Precipitation and Runoff	211	385	63	659	0	110	549	Simulated, medium; Estimated, medium
		Rivers and Creeks	233	0	0	233	233	0	0	Measured, high
		External Surface Water Storages	0	0	0	0	0	0	0	-
	Groundwater	Aquifer Interception	0	863	0	863	0	0	863	Simulated, high; Simulated, medium
		Bore Fields	0	0	0	0	0	0	0	-
		Entrainment	0	0	132	132	132	0	0	Measured, high
	Sea Water	Estuary	0	0	0	0	0	0	0	-
		Sea-Ocean	0	0	0	0	0	0	0	-
	Third Party Water	Contract/Municipal	0	0	12	12	12	0	0	Measured, high
		Waste Water	0	0	0	0	0	0	0	-
	TOTAL INPUTS		444	1,248	207	1,899				
Outputs	Surface Water	Discharge	0	0	0	0	0	0	0	-
		Environmental Flows	0	0	0	0	0	0	0	-
	Groundwater	Seepage	0	0	344	344	0	344	0	Estimated, low
		Reinjection	0	0	0	0	0	0	0	-
	Sea Water	Discharge to Estuary	0	0	0	0	0	0	0	-
		Discharge to Sea/Ocean	0	0	0	0	0	0	0	-
	Supply to Third Party		0	0	0	0	0	0	0	-
	Other	Evaporation	386	0	0	386	0	142	244	Estimated, low; Estimated, medium; Estimated, high; Simulated, medium
		Entrainment	0	0	869	869	227	642	0	Measured, high; Estimated, low
		Other	129	0	0	129	0	129	0	Estimated, medium
	TOTAL OUTPUTS		515	0	1,219	1,728				
Diversions not applicable										

2.8 Hazardous Material Management

ACOL 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 ACOL 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

ACOL 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 the impact of our operations on the environment and community.

Identification of environment risks associated with the ACP through environmental assessments, risk assessments and learnings from historical incidents (both internally and across the industry) is undertaken on a regular basis. 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 consolidation environmental assessment;
    - performance outcomes;
    - long-term trends in monitoring data; and
    - 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&E 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 Site 1 (Figure 11) 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 Site 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 13, along with a comparison to monitoring results from 2012 and 2013. Meteorological data capture rates for the reporting period were 100 per cent for all parameters except rainfall, which recorded a capture rate of 99.2 per cent. Power failure to the rain gauge was responsible for the lost 0.8 per cent of data. The local Bureau of Meteorology site (Singleton STP {station 061397}) recorded zero rainfall during the period that the rainfall gauge was out of order.

During the review period the total rainfall was 700mm, higher than the annual average rainfall of 647.3mm (at Singleton STP, BOM site 69317). January, May - June and October - November experienced lower than median rainfall, with the remainder of months experiencing higher than median rainfall.

Table 13: Summary of meteorological results from the Repeater monitoring station

Parameter	Units	2014	2013	2012
Total rainfall	mm	700 in 96 rain days	690.4 in 97 rain days^	493 in 105 rain days^
Maximum monthly rainfall	mm	157 (recorded in December)	175.2 (recorded in November 2013)	142.6 (recorded in February 2012)
Minimum monthly rainfall	mm	7 (recorded in January)	4.8 (recorded in October 2013)	3.2 (recorded in October 2012)
Maximum monthly temperature	°C	43.9 (recorded in November 2014)	44.3 (recorded in January 2013)	41 (recorded in December 2012)
Minimum monthly temperature	°C	1.6 (recorded in May 2014)	1.7 (recorded in August 2013)	1.3 (recorded in June 2012)

^ A rain day includes days with >0.01mm

Wind direction at the ACP during the reporting period was predominantly from the east during summer and from the west during winter. Annual and seasonal wind roses, including a calculation of the percentage of calm winds are shown in Figure 6, Figure 7, Figure 8, Figure 9 and Figure 10.

3.1.3 Reportable Incidents

ACOL 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

ACOL will continue to operate and maintain a meteorological station.

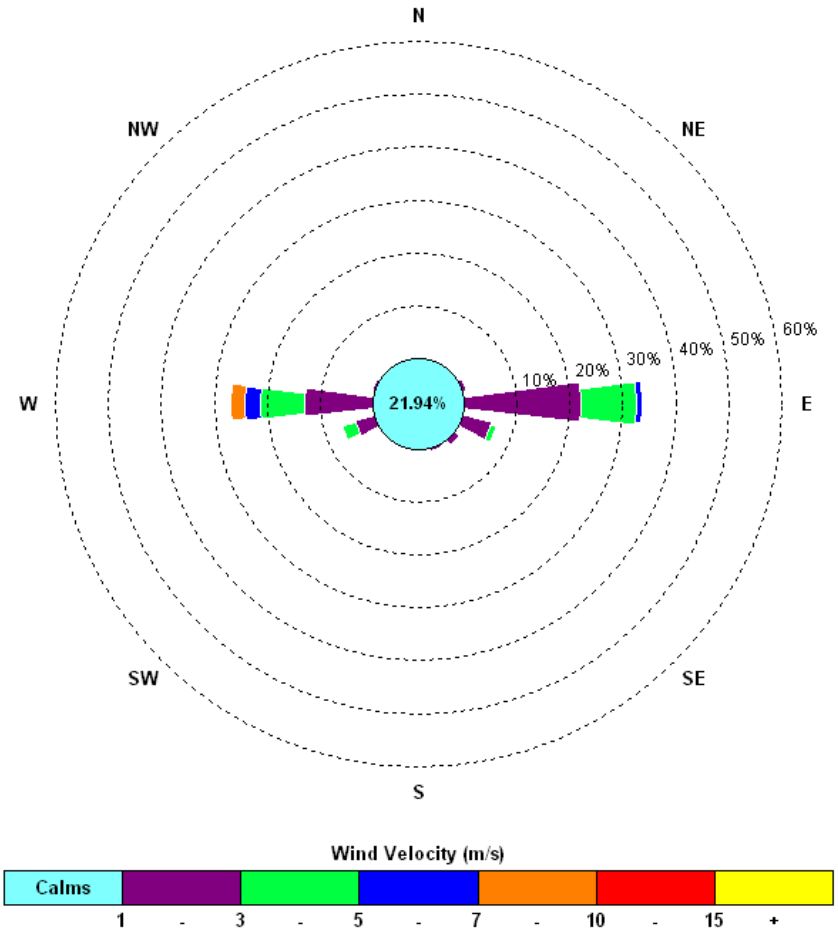

Figure 6 2014 Annual Wind Rose Ashton Coal Meteorological Station

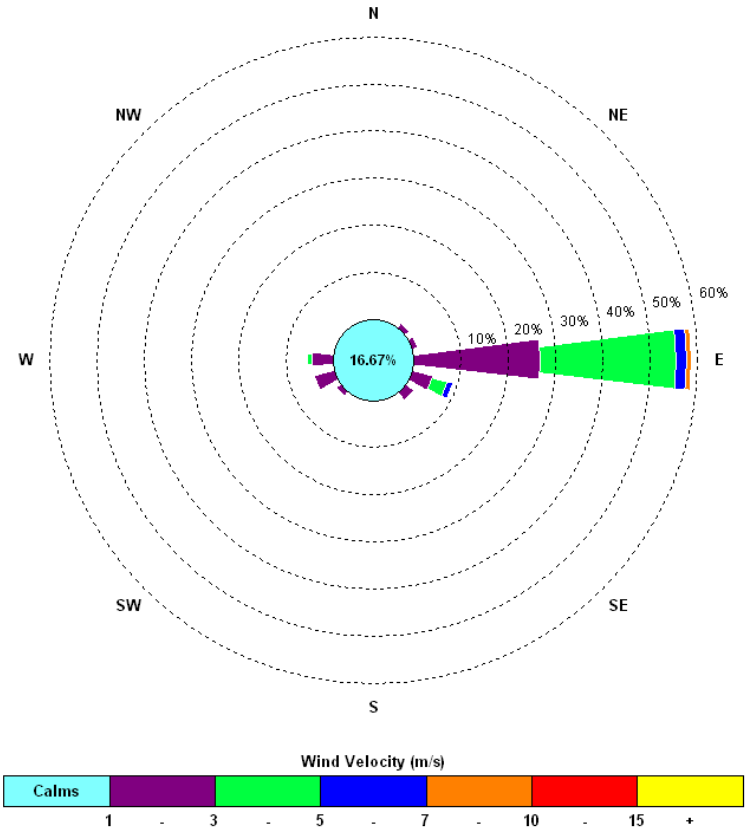

Figure 7: Ashton Coal summer wind rose for 2014

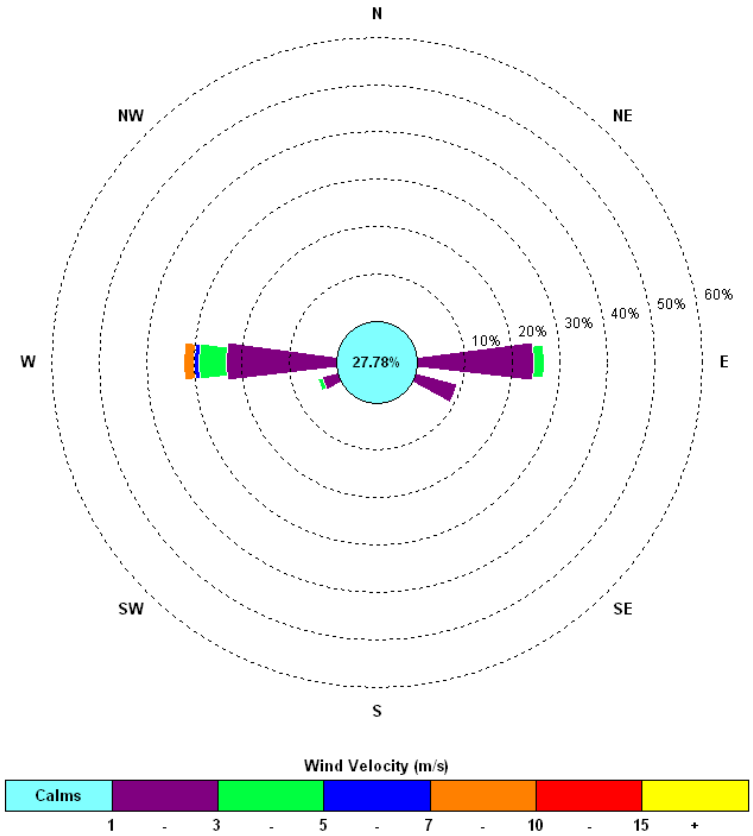

Figure 8: Ashton Coal autumn wind rose for 2014

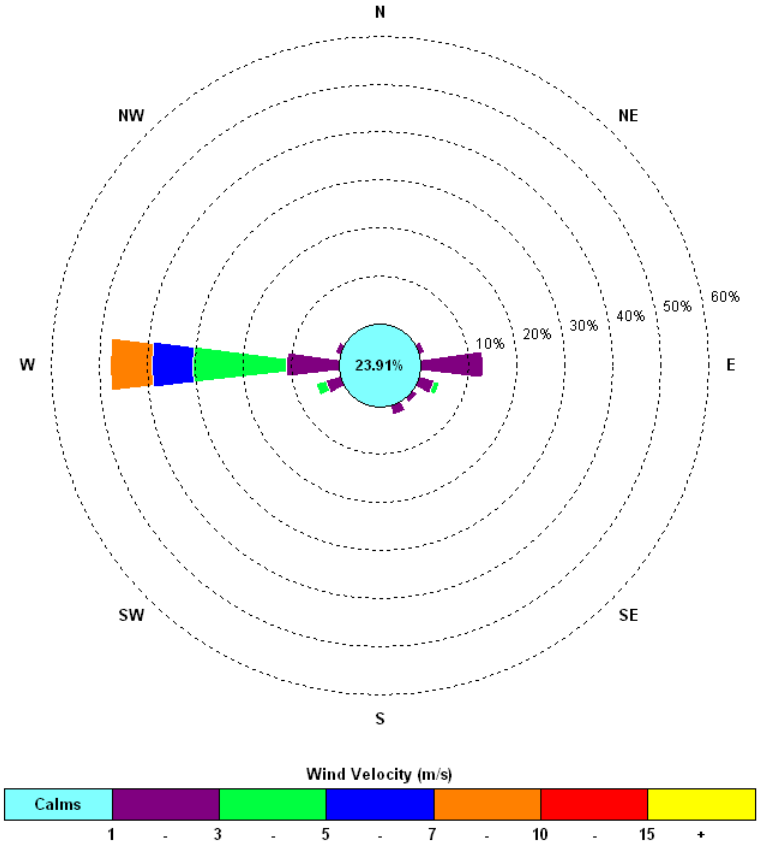

Figure 9: Ashton Coal winter wind rose for 2014

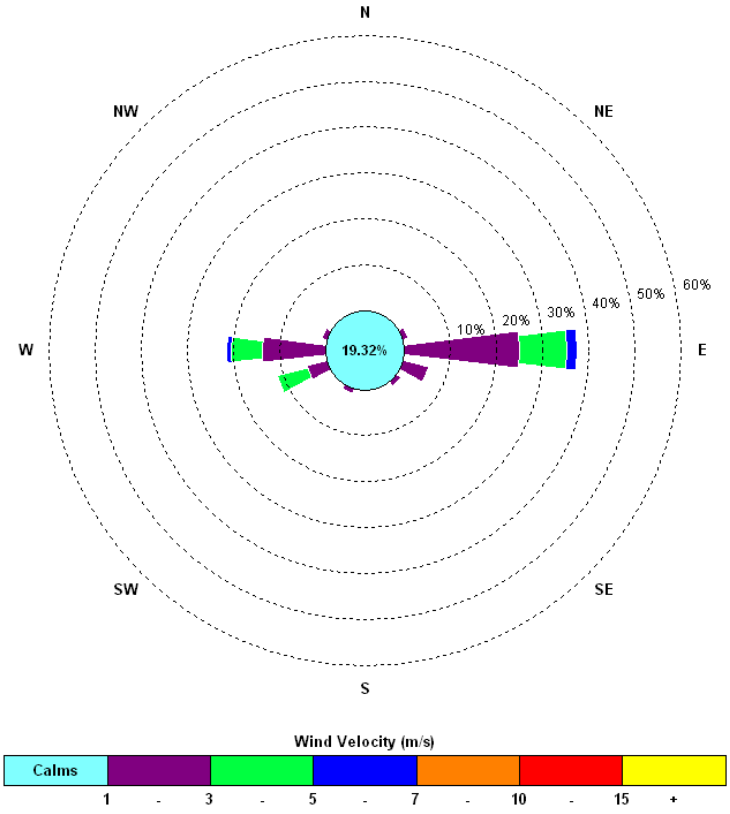

Figure 10: Ashton Coal spring wind rose for 2014

3.2 Air Quality

3.2.1 Environmental Management

During the 2014 reporting period a review of the Air Quality and Greenhouse Gas Management Plan was finalised and was approved by the DP&E. As part of this review the Air Quality Monitoring programme was rationalised to reflect the nature, scale and risk of current operations at ACOL. Up until April 2014 the monitoring programme was very comprehensive, reflective of historical open cut operations in close proximity to other large open cut mines and communities. Additional monitoring carried out in the first quarter of 2014 under the superseded management plan is available upon request.

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 ACOL 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 over the review 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 four depositional dust gauges surrounding Ashton Coal.

Total suspended particulate (TSP) matter are monitored using a high volume air sampler (HVAS). This monitor operates for 24-hours every six days in accordance with Australian Standard. HVAS measure cumulative dust levels from all sources.

In addition to the HVAS monitor, one statutory real-time dust monitor, referred to as tapered element oscillating microbalance sampler (TEOM) is 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. There are also two TEOMs used for operational management purposes in the monitoring programme. One of these monitors is not reflective of impacts on sensitive receptors, and the other monitor is part of the Upper Hunter Air Quality Monitoring Network (UHAQMN). Delayed data from this monitor is available online to the public. As it is not available in real time or in a recordable format, it cannot be utilised as a statutory monitor. Using this site as part of the operational control monitoring network reflects ACOLs commitment to addressing cumulative impacts in collaboration with industry and regulators in the region.

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

The locations of air quality monitoring sites at Ashton Coal are shown in Figure 11.

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. The controls include:

- Large earth berms and tree plantations between the operations and the village have been constructed and trees established;
- 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.

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 ACOL's operations over an annual averaging period at any one dust gauge is 2 g/m^2/month.

Table 14 shows the annual average insoluble solids for each gauge over the 2014 reporting period. There were no depositional dust gauges which exceeded the annual average of 4g/m^2/month for the reporting period.

Table 14: Comparison of annual average deposited dust results

Site reference	Location	2014 annual average g/m^2/month	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	3.66	5.16	4.73	3.5
D6	St Clements Church	3.59	4.13	3.2	1.5
D7	TEOM site 1 – Camberwell Village	3.03	3.30	3.16	N/A
D14	TEOM site 8 – Camberwell Village	2.56	2.91	2.87	N/A

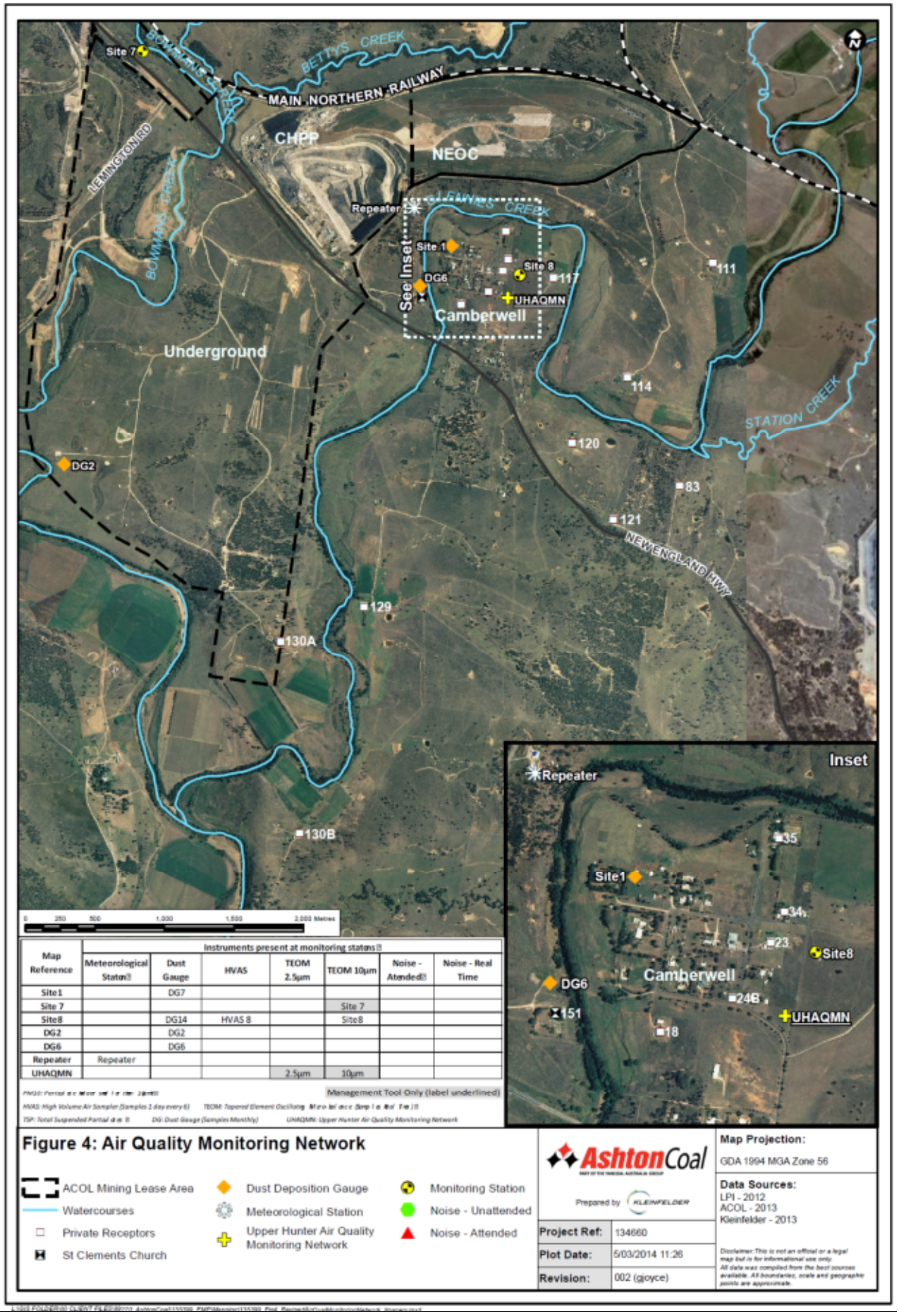

Figure 11: ACOL's meteorological and air quality monitoring locations

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 dust deposition sites, as detailed in Table 15. 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 15: Summary of contaminated depositional dust results

Month	Site reference with contaminated result	Month	Site reference with contaminated result
Jan-14	-	Jul-14	D2
Feb-14		Aug-14	D2
Mar-14	D2	Sep-14	D2
Apr-14	D6	Oct-14	D2
May-14	D2	Nov-14	D6
Jun-14	D6, D14	Dec-14	D2

3.2.2.2 High Volume Air Samplers

A summary of the results from the statutory HVAS TSP monitoring site for the reporting period is provided in Table 16. HVAS data capture rates for the reporting period were 100 per cent. 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 ACOL's statutory HVAS monitor remained below the long-term annual impact assessment criteria. The long term trends for HVAS results are presented in Figure 12 and indicate that the trends recorded from the HVAS site during 2014 remain below the long- term trends indicating influences beyond ACOL current activities.

Table 16: 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 (east)	8	16	169	73	90

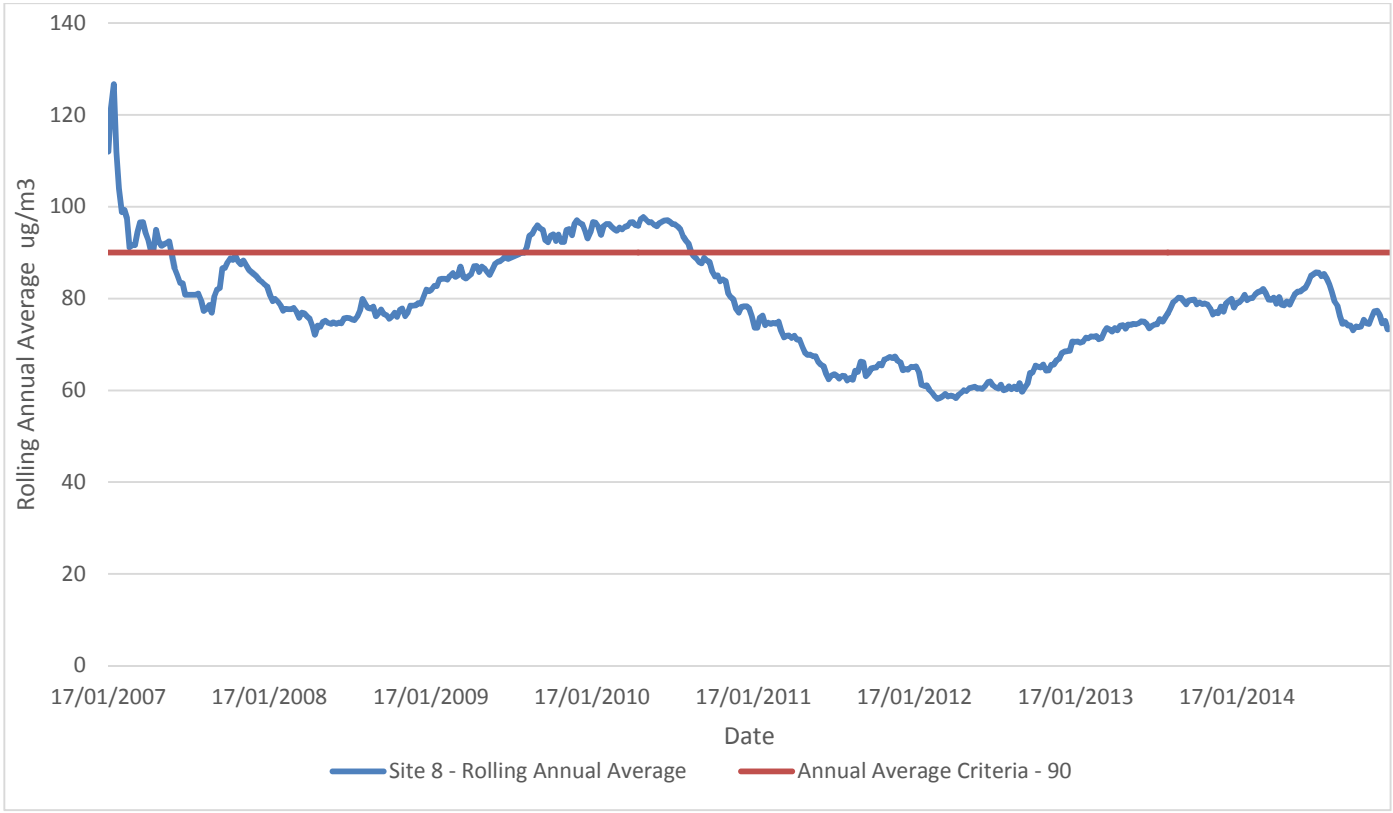

Figure 12: Long Term annual average TSP (HVAS) trends for site 8.

3.2.2.3 Tapered Element Oscillating Microbalance Samplers (TEOM)

There is one statutory PM_{10} TEOM monitoring station in operation for Ashton, as well as one operational TEOM and the local UHAQMN TEOM based in Camberwell village. Monitoring Location 7 is situated to the north of mining operations, immediately south of the Main Northern Railway and is 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 17: Locations of TEOM sites.

Monitoring Station No	Particulates measured	Monitor Purpose	Location
7	PM_{10}	Background (upwind) Site	Onsite at north-western end of rail siding
8	PM_{10}	Community Site - statutory	Camberwell village (east)
UHAQMN	PM_{10} and $PM_{2.5}$	Reference site	Camberwell Village

TEOM data capture rates in 2014 were very high, with one day of lost data at one monitor during the reporting period.

Table 18: Data capture rates and outage explanations for statutory TEOM sites, 2014.

Site	Outage	Reason	Data Capture %
Site 7	1 day in December	Tripped circuit breaker	99%
Site 8	-	-	100%
UHAQMN PM_{10}*	2 days in May	Not given	99%

Site	Outage	Reason	Data Capture %
UHAQMN $PM_{2.5}$*	2 days in April, 2 days in May, 2 days in July, 1 day in August, September, October and December.	Not given	97%

*the UHAQMN is run by NSW EPA. Data is sourced from http://www.environment.nsw.gov.au/AQMS/search.htm

A summary of the results from the statutory real-time PM_{10} TEOM monitoring site (Site 8) for the reporting period is provided in Table 19. During the reporting period the short term 24-hour impact assessment criteria of 50 µg/m^3 was exceeded twice at the community site, 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 both occasions, results of the investigation showed that ACOL's contribution was less than 50 µg/m^3. During the reporting period ACOL's statutory TEOM monitoring site remained below the long-term annual impact assessment criteria.

Table 19: 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	Long term Criteria annual average µg/m^3
7 (background upwind site)	7	96	50	24	30
8 (community site)	6	56		20	
Camberwell UHAQMN (PM_{10})	7	80		25	
Camberwell UHAQMN ($PM_{2.5}$)	0.5	31.6	8*	7.8	25*

* Advisory reporting standards only

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

ACOL 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.

3.3 Erosion and Sediment

3.3.1 Environmental Management

ACOL 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.

3.3.2 Environmental Performance

In accordance with the erosion and sediment control plan, the impact assessment criteria applicable to ACOL 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 3.4.2.

3.3.3 Reportable Incidents

ACOL 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.

During 2014 the ACP Water Management Plan, including the erosion and sediment control plan was revised and submitted to DP&E for review and approval.

3.4 Surface Water

3.4.1 Environmental Management

Surface water at ACOL 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 ACOL'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 13 and described in Table 20. 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).

ACOL'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. ACOL'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 20. Most of the time monitoring locations SM1 and SM2 in Bettys 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 21.

Table 20: 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	83*
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 for most of 2014, Site SM5 was dry or too low to sample during November and December 2014.*

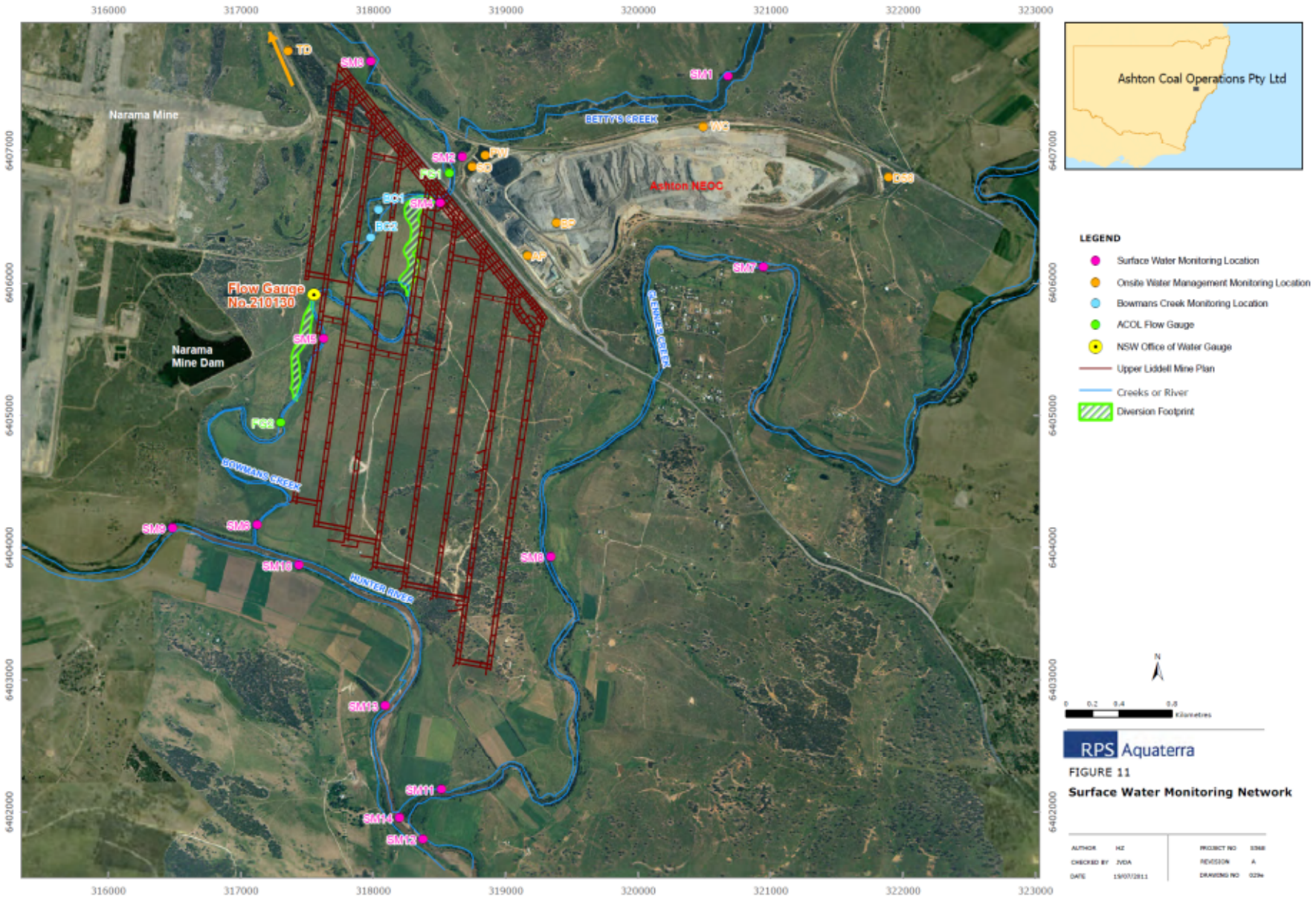

Figure 13: ACOL's surface water monitoring locations

Table 21: Summary of surface water quality monitoring results

Creek System	2014	pH	EC µS/cm	TDS mg/L	TSS mg/L	Total Hardness mg/L	Oil and Grease mg/L
Bettys Creek	Minimum	7.0	666	461	3	104	<5
	Maximum	7.9	6100	4090	133	1093	<5
	Average	7.5	2330	1536	67	418	<5
Bowmans Creek	Minimum	7.1	630	410	1	131	<5
	Maximum	8.2	3150	1930	246	648	<5
	Average	7.8	1325	797	34	275	<5
Glennies Creek	Minimum	7.2	207	121	1	57	<5
	Maximum	7.9	1033	626	92	249	<5
	Average	7.7	390	240	11	100	<5
Hunter River	Minimum	7.7	317	178	9	99	<5
	Maximum	9.1	1180	704	83	351	<5
	Average	8.2	813	472	30	251	<5

3.4.2.1 pH

Surface water pH measured in Bowmans Creek (SM3, SM4, SM5 and SM6) were slightly alkaline (ranging from 7.1 to 8.2) and remained within the acceptable pH range.

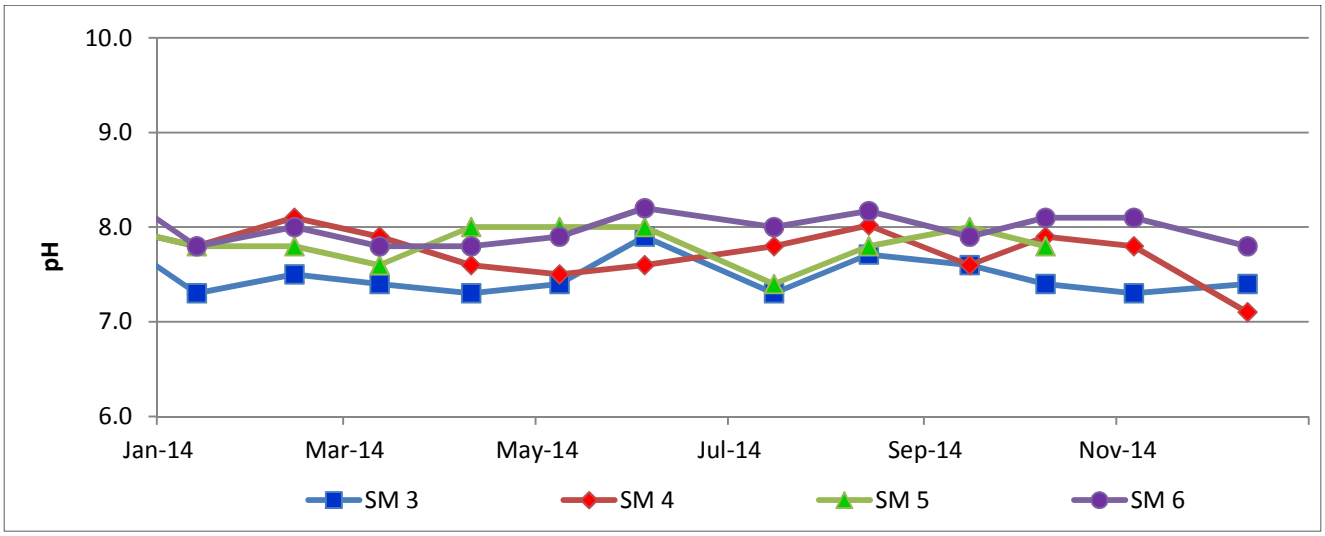

Figure 14: Bowmans Creek pH levels during 2014

Glennies Creek (SM7, SM8 and SM11) pH levels were neutral (ranging from 7.2 to 7.9) with little variation between sites for most of the year. The pH levels at this site were also very similar to 2013 levels. The pH levels remained within the acceptable pH range.

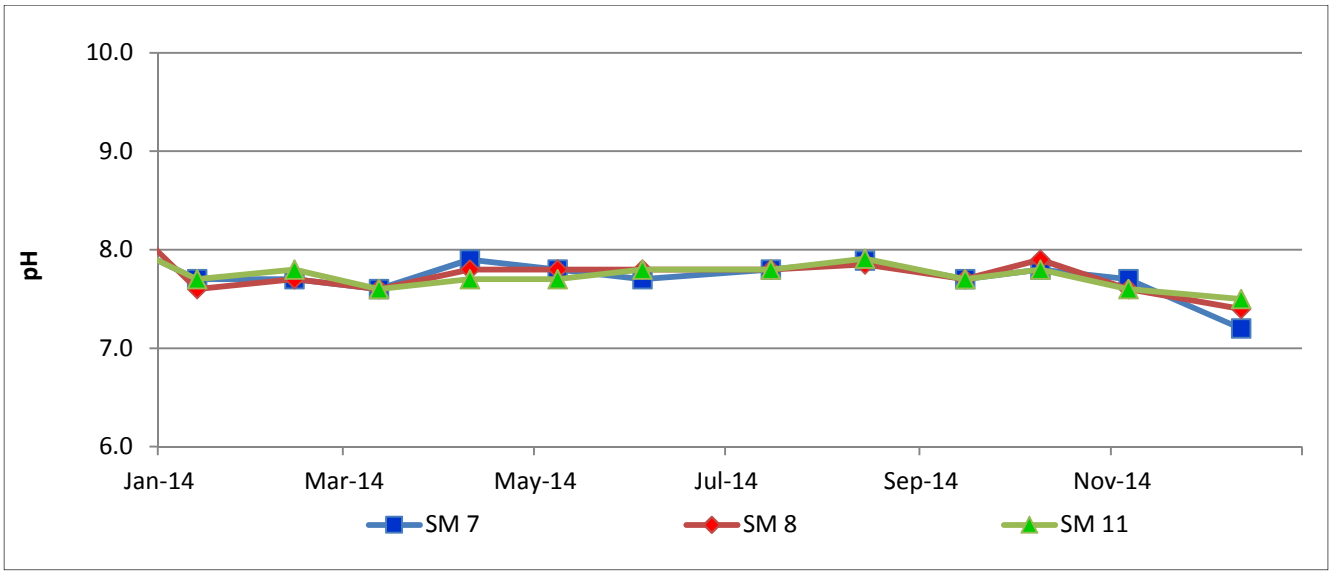

Figure 15: Glennies Creek pH levels during 2014

pH levels in the Hunter River (SM9, SM10, SM12, SM13 and SM14) were neutral to slightly alkaline (ranging from 7.7 to 9.1) with minimal variation between sites, and remained within the acceptable recommended pH range.

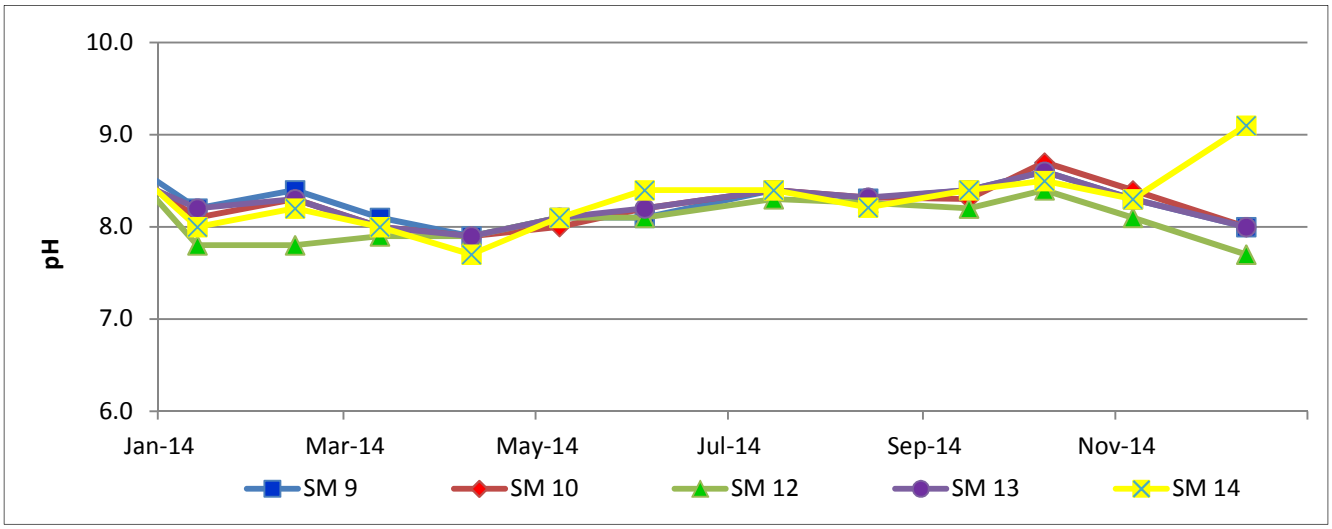

Figure 16: Hunter River pH levels during 2014

3.4.2.2 Electrical Conductivity (EC)

Surface water Electrical Conductivity (EC) results were generally consistent with results from 2013.

The EC trends in Bowmans Creek indicate there was pooling and little to no flow at the beginning of the year and again towards the end of the year. Typical of previous years, 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 630 - 3150µS/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.

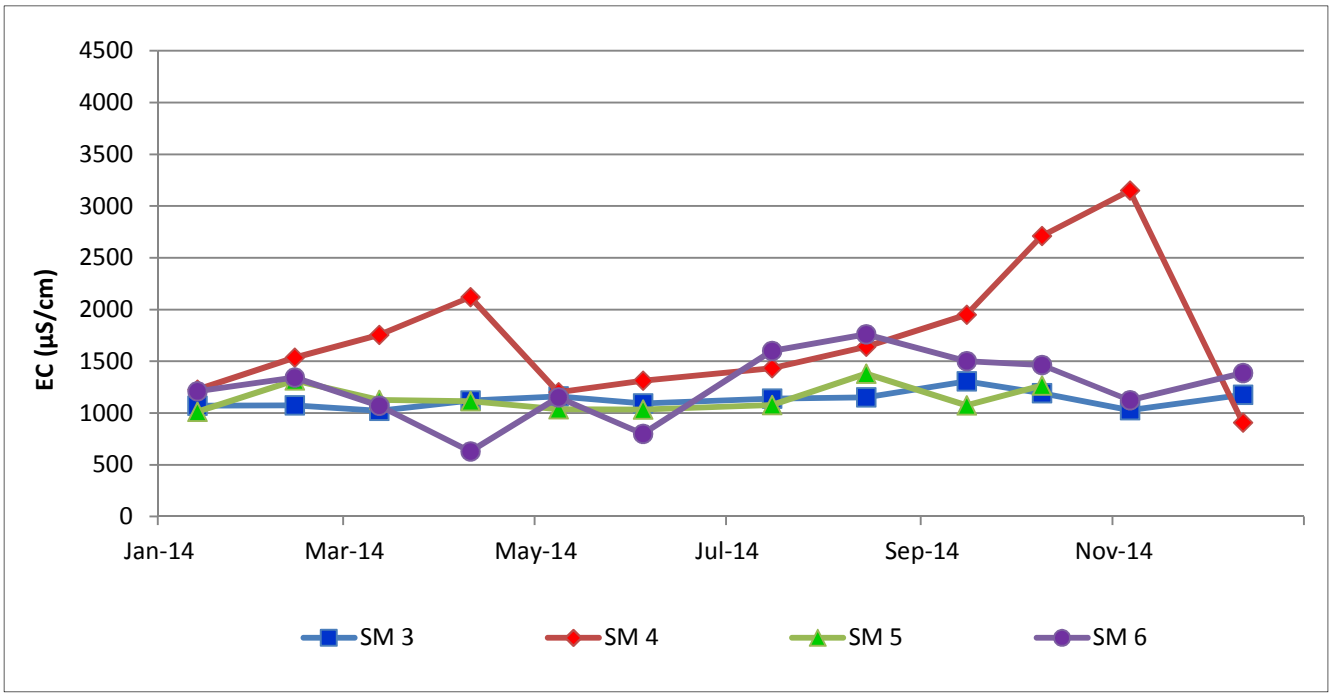

Figure 17: Bowmans Creek EC during 2014

Glennies Creek (SM7, SM8 and SM11) EC levels remained consistently low throughout the year and were similar in 2013. EC ranged between 207 and 1033µS/cm. The peak in April coincided with a high flow event in the creek and is consistent at upstream and downstream monitoring sites.

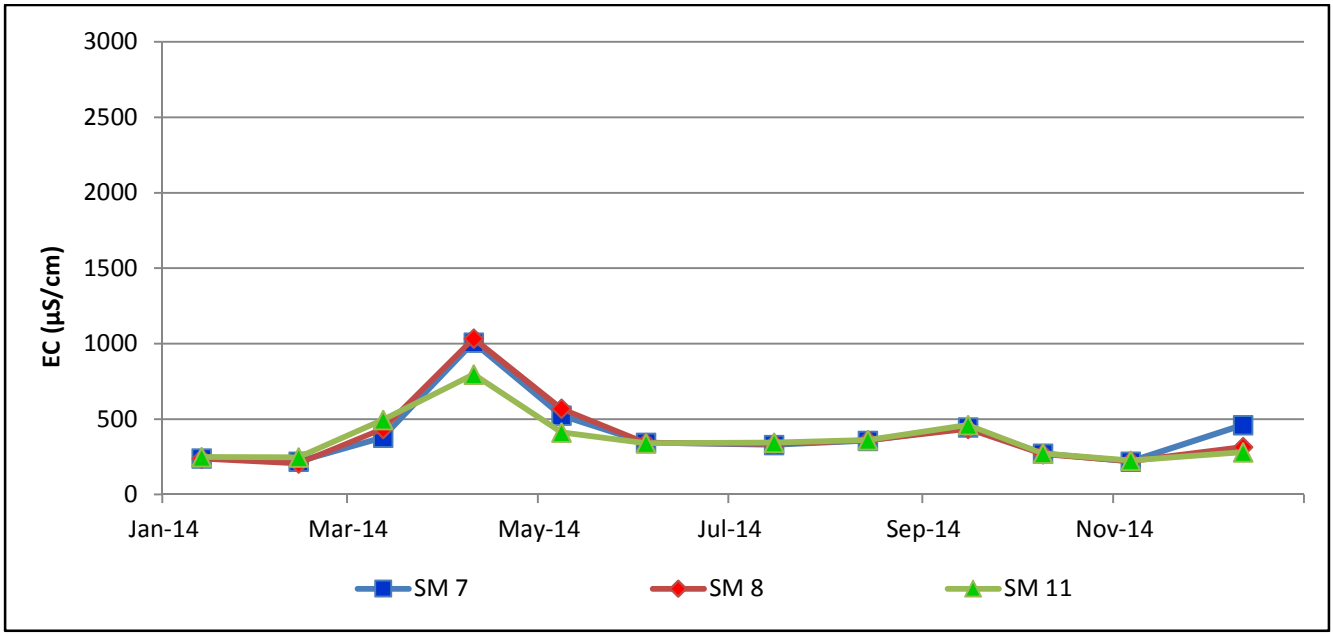

Figure 18: Glennies Creek EC during 2014

Hunter River (SM9, SM10, SM12, SM13 and SM14) EC levels were generally low throughout the year, as shown in Figure 19. SM12 exhibited lower EC readings compared to other monitoring locations throughout the reporting period. SM12 is downstream of the confluence with Glennies Creek and therefore receives the regulated flow from Lake St Clair, reducing EC levels.

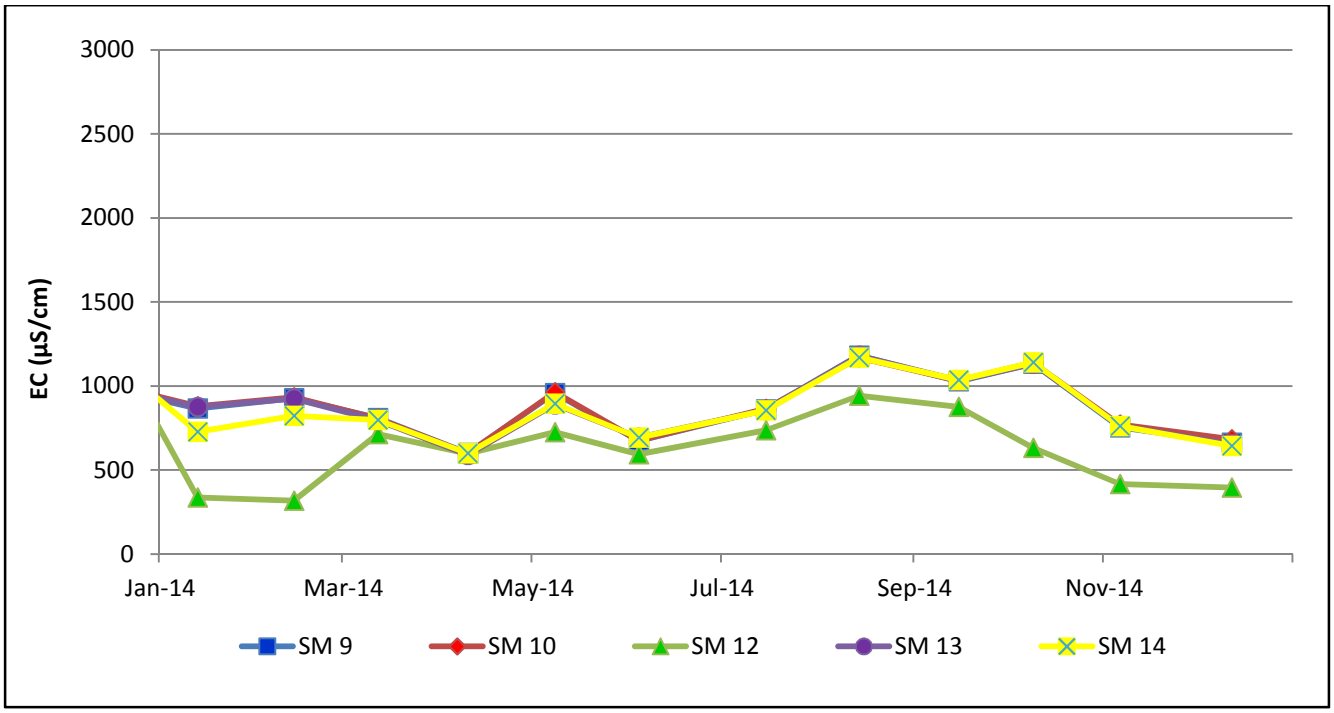

Figure 19: Hunter River EC during 2014

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.

3.4.2.3 Oil and Grease

Oil and grease monitoring consistently reported lower than the threshold value of 5 milligrams per litre in all sample locations, indicating no oil and grease contamination in surrounding waterways.

3.4.3 Reportable Incidents

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

3.4.4 Further Improvements

ACOL will continue to manage the segregation and reuse of mine water to minimise impacts to the natural watercourse. 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 survey

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:

- 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. Pebble counts are compared to natural reaches of the creek; and
- Channel geometry survey of the creek diversions, including cross-sectional (bed and bank) and long-sectional (thalweg) surveys of the two creek diversions.

The eastern creek diversion pebble count 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.

The Wolman Pebble Count analysis of the Western Creek Diversion showed that the majority of the diversion is functioning within a natural range. Only two sites exceeded the upper tolerance limit for the very coarse gravel class only. The results indicate the creek is of a similar condition to the 'one-year' survey and has continued to improve from the 'six-month' survey where a larger number of exceedances were recorded in different grain size classes. The exceedances in this survey can be attributed to the presence of larger sediment in the channel at the respective sites due to natural riffle formation.

The majority of cross sections in the Eastern Diversion channel identified no evidence of significant scour, accumulation of sediment or variation in grade levels. However each cross section exhibited some localised variation in survey levels, typically within close proximity to the thalweg. The results of the long-section (thalweg) survey of the Eastern Diversion for the most part showed general consistency with those of the previous survey.

In some localised areas of the diverted channels some scour or sedimentation processes have started to materialise, reflecting the natural creation and development of pool and riffles sequences within the channels. The majority of the cross sections for the Western Diversion channel identified no evidence of significant scour, accumulation of sediment or variation in grade levels. The result of the long-section survey of the Western Diversion indicated that scour of the channel bed had occurred in the last 12 months. The sections containing the deepest scour have occurred in the relatively straight section (first half) of the diversion, prior to the first major meander halfway along the channel. Subsequently the last quarter of the channel contains transported deposition material.

Development consent condition 7.2 states if there is a variation of more than 20% in the statistics of the data from the diversions compared to the existing channel, ACOL will commission an appropriately qualified geomorphologist to investigate the causes and recommend any remedial actions. A more detailed investigation of the Western Diversion bed scour is to be undertaken in 2015.

Weed control works, rehabilitation and ecological monitoring of the Bowmans Creek diversion rehabilitation were conducted during the reporting period (refer to Section 3.8, 5.3.1 and 3.7.2.1, respectively). Tree planting in the Bowmans Creek diversions continued, with over 30, 000 plants including trees, grasses and shrubs planted in the diversion.

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.

ACOL'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.

ACOL's approved groundwater monitoring program has established impact assessment criteria. Impact assessment criteria can be described as trigger 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 reporting period the new dewatering borehole, 4A was constructed.

Condition 9.2(d) of the development consent required the AEMR to contain a Groundwater Management Report. This is contained as Appendix 1 of this document, and details further information on Groundwater Management during the reporting period.

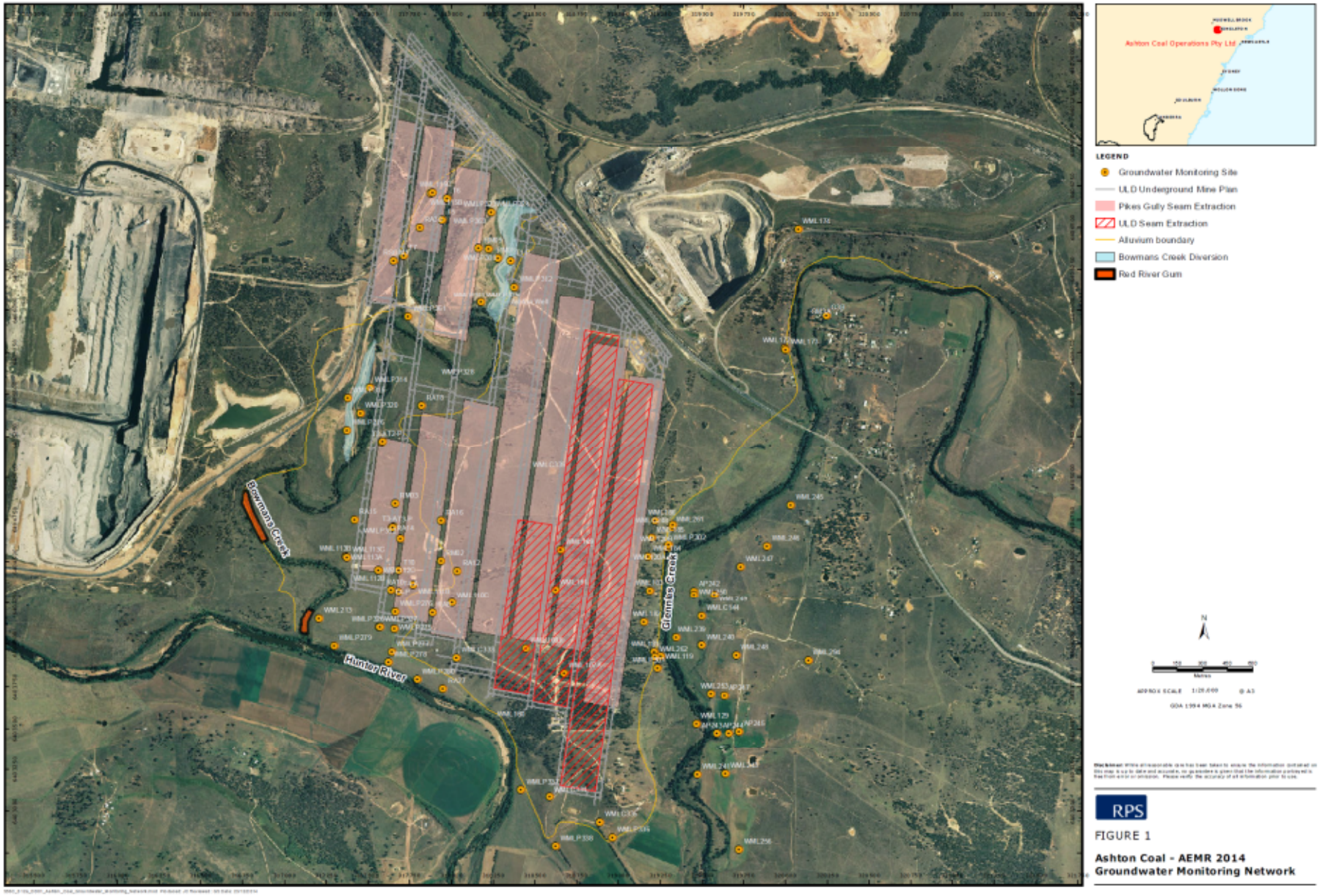

Figure 20: ACOL's groundwater monitoring locations

3.5.2 Environmental Performance

Table 22 provides a comparison of the observed impacts over the 2014 review period and the predictions as detailed in the projects groundwater impact assessments (Aquaterra, 2009 and RPS Aquaterra, 2012).

Table 22: Summary of groundwater monitoring results

Impact Description	Observed	Predicted [1]	Trigger Value	Impact Assessment Reference
Glennies Creek Alluvium – Groundwater Drawdown				
South of LW101	Nil	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	Nil	0.18m	>0.18m	
Hunter River Alluvium – Groundwater Drawdown				
South of LW104	Nil	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	Nil	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 1m	Partly dewatered	NA	
Groundwater dependent ecosystems south east of LW7A.	Nil	<0.5m	0.5m	
Reduction in Baseflow[5]				
Glennies Creek	Nil	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	>0.59L/sec	0.59L/sec	drawdown in excess of 115% of predictions	
Hunter River	Nil	0.13L/sec	Drawdown in excess of 115% of predictions	
Mine Inflows				
Inflow Rate	29.8L/sec	15.7L/sec [3]	23.5L/sec [4]	2012 WMP: Section 7.3.5 – Table 7.5 2012 WMP: Section 10.4.4
Total Underground Inflows [3]	638ML	509ML	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. No active mining occurred in this locality during the reporting period.

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

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

[5] Refer Section 4.4 for discussion on baseflow observations.

Water levels within the alluvial lithologies during the review period remained within the predictions made in the 2009 EA (Aquaterra 2009). Drawdown observed within the BCA, particularly in the northern area, is greater than that predicted in the 2012 GIA.

Drawdown was observed in the BCA above LW6B and LW7B. This alluvium was predicted to be partially to fully dewatered following PG extraction (2009 EA) and the observed response is considered to be consistent with predicted levels (2009 EA). A number of water levels in the southern BCA area have dropped slightly below historical water level elevations.

There was no mining related drawdown observed within the GCA or HRA over and above the natural climatic variations. Most water levels in the HRA units showed fluctuations consistent with rainfall recharge and have fallen slightly below historical water level elevations.

Depressurisation of the Permian lithologies above active mining areas is generally as expected and predicted. Greater than predicted propagation of depressurisation within the PG Seam is observed at WML213, with up to 100m decline in potentiometric level having taken place since the commencement of mining in the PG Seam. The depth of cover at this location has prevented the propagation of this depressurisation upwards and the depressurisation is observed to attenuate with decreasing depth of cover. No impacts are noted in the shallow CMOB. This increased depressurisation of the PG seam does not pose any risk to the shallow groundwater system, GDEs, or other groundwater users.

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 for comparison. Net dewatering volumes are calculated using a water balance method.

The LW6B inflow event that commenced in October 2013 resulted in an exceedance of the WMP trigger value for mine inflows. The three month exceedance of greater than 50% of predicted inflows was reached in January 2012, triggering an investigation into the cause of the inflows in accordance with the WMP. This was reported to DP&E and NoW and proposed actions agreed and actioned.

In accordance with the WMP an investigation into the cause of the inflows was undertaken (RPS, 2014), as well as an update and recalibration of the groundwater model (RPS, 2014b). The investigation concluded that increased permeability resulting from bed separation and non-connected fracturing resulted in an enhanced connection of the longwall goaf with more permeable units within the CMOB and the overlying BCA. No direct connecting fracturing between the goaf and the BCA was indicated. The groundwater model has been updated to reflect more recent actual flows and the water management plan has been reviewed and submitted for approval by DP&E.

A number of smaller inflow events have taken place subsequent to the LW6B inflow, however no further triggers have been reached.

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 surface 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 river red gum area is located next to Bowmans Creek between the southern end of the western diversion and the Hunter River (Figure 2). The trigger value for an impact in this area is 0.5m outside of natural fluctuations. The closest piezometers to the southern River Red Gum area are VWP WML213 and HRA piezometer WMLP279, no drawdown attributable to mining was observed in the HRA or shallow CMOB in this area.

With a few noted exceptions, ACOL 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 from November 2013 to January 2014. This exceedance of a WMP TARP has been investigated and reported.
- Key water quality indicators of EC and pH were not monitored quarterly at all piezometers over the review period. Water quality monitoring was undertaken at increased frequencies (fortnightly / weekly) at key piezometers most likely to be impacted by mining activities. No impacts or significant variations from baseline ranges were observed.

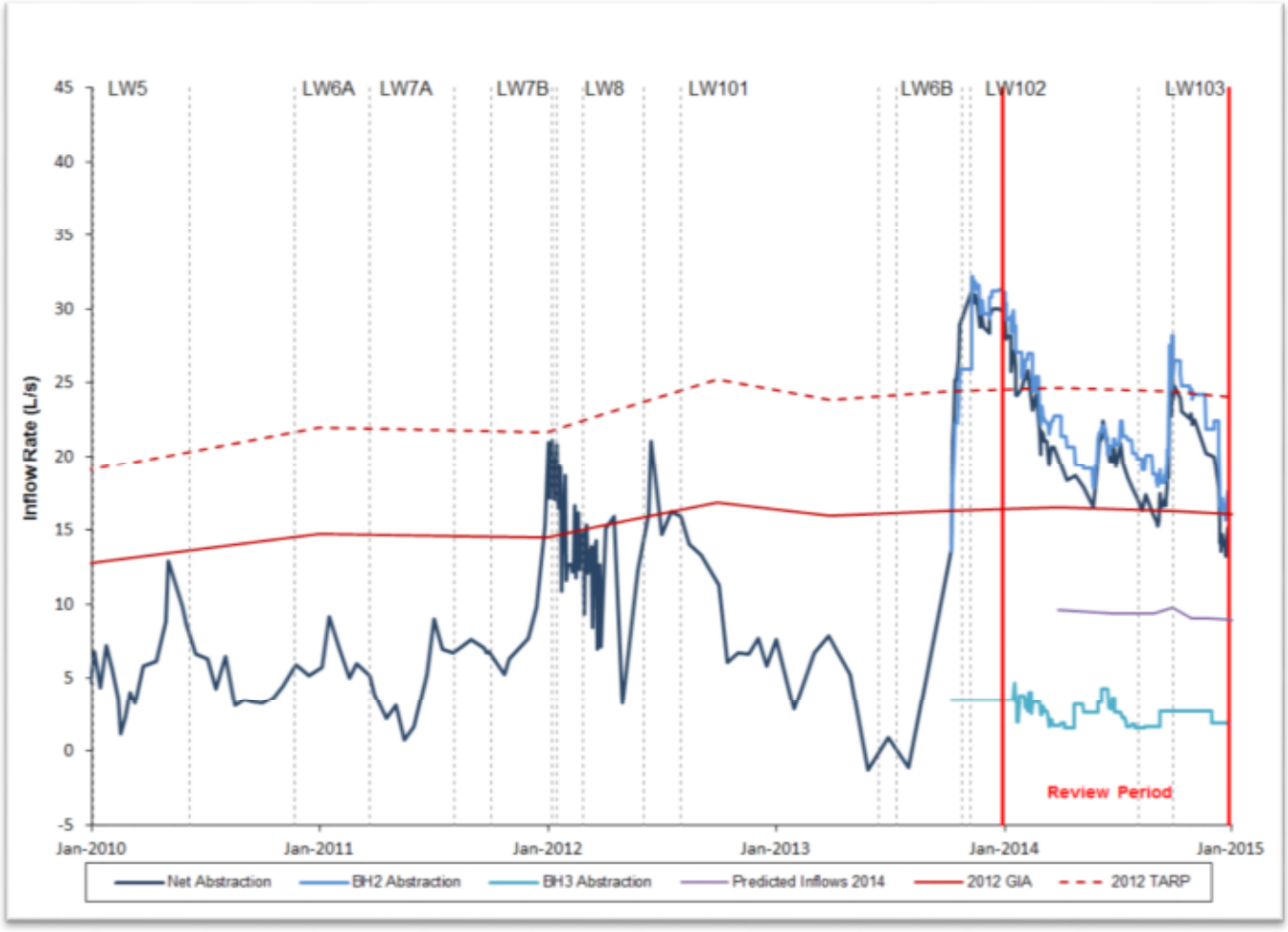

Figure 21: Mine dewatering and predicted inflows

3.5.3 Reportable Incidents

In June and August 2012, ACOL submitted applications for two Bore Licenses to the NSW Office of Water. These licences were issued to Ashton in January 2013 and water extraction commenced after the date of issue. Following the issuing of the licences, it was identified that the construction of boreholes had occurred after the submission of applications, but prior to licences being issued. Consequently, ACOL received two penalty infringement notices during the reporting period for 'construction of a water supply work without approval' from the 2012 works. The penalty infringement notices have been paid.

3.5.4 Further Improvements

The current groundwater monitoring programme at ACP is considered to be overly detailed with numerous monitoring bores providing duplicate information. A revised Water Management Plan incorporating a reduced monitoring programme has been submitted for approval. During 2015 it is hoped that the revised water management plan will be implemented.

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 ACOL 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, ACOL 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.

As part of the 2013 AEMR inspection, it was requested that ACOL prepare a Hydrocarbon Management Plan and provide it to the DP&E by the end of August 2014. The action was not undertaken in 2014; however, following consultation with the DP&E an internal review of hydrocarbon management will be completed and reported to the DP&E in the first half of 2015.

3.6.3 Reportable Incidents

ACOL 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

ACOL will continue to provide environmental awareness training in 2015, 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 relevant 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 Rehabilitation Strategy (Appendix F of the 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. This reporting period marks the end of the second year of the seven year rehabilitation programme.

Each year Ashton Coal undertakes extensive terrestrial and aquatic 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. The monitoring program includes terrestrial and aquatic monitoring, weed and vertebrate pest monitoring and associated management measures where required. This monitoring programme complements the rehabilitation monitoring of Bowmans Creek, which commenced in 2013 and is discussed in section 5.3.1.

ACOL undertakes a vertebrate pest control programme to mitigate the impacts of wild dogs and foxes on native fauna. Throughout 2014 ACOL undertook a vertebrate pest control programme using 1080 baits to target wild dogs and foxes and cat traps were installed near the operations. This is the fourth consecutive year the programme has been operating on land owned by ACOL, and is aimed at building on the success of previous years in lowering the number of feral pest in the area.

During the reporting period, the FFMP has been under review to incorporate the Biodiversity Offset Management Plan guidelines issued by DP&E in late 2013. The revised FFMP will be finalised and submitted to DP&E for approval during 2015.

3.7.2 Environmental Performance

Aquatic fauna and flora as well as terrestrial fauna are discussed in this section, which has significant overlap with the rehabilitation monitoring discussed in Section 5. Bowmans Creek rehabilitation, farmland condition monitoring and NEOC rehabilitation monitoring are all discussed in Section 5.3.

3.7.2.1 Ecological Fauna monitoring

Fauna monitoring (including in the Southern Woodland Conservation Area) was undertaken during winter and summer 2014. All surveys were completed in ideal climatic conditions, during which no survey limitations were identified that could potentially influence findings. Summer storms necessitated minor changes to the survey structure, but provided optimum conditions for amphibians during afternoon storms and morning diurnal surveys of birds. The surveys covered both impact sites and analogue (control) sites across the Ashton Coal Project (Table 23).

In total, 12 fixed position sample plots (temporal replication plots of 100m x 30m area) are surveyed for at least 1 hour each per day, over 10 days and nights of each sample period, for a total survey time of 240 hours per annum. Surveys include small and large mammal trapping, spotlighting, nocturnal and diurnal call playback, drift netting, Anabat detection, frog and reptile surveys, diurnal bird surveys, thermal motion sensor cameras and wildlife acoustic remote call play and recording (commenced this year).

Extant populations of the following significant species were identified as having either stable or increasing occupation of the study area, including:

- Four captures of three Squirrel gliders (vulnerable marsupial), including a breeding female, were made at the South East Open Cut area 1 (SEOC1-1), resulting in a likely (not enough data to estimate probabilities) population increase from 2013;
- Successful breeding events were recorded for Grey-crowned Babbler and Speckled warbler. Troop and unit sizes were either stable or have expanded since 2013;

- Threatened bats and less common bird species are stable;
- Home range estimations generated from field surveys indicate that Grey-crowned Babbler and Speckled warbler sub-populations across the study area are either stable or have expanded since 2013; and,
- The vulnerable bird species Spotted Harrier, which was first recorded in 2012 and again in 2013 was not recorded during 2014.

Additional significant species identified in 2014 include:

- Two individuals (captured once each) of the vulnerable marsupial Brush-tailed Phascogale (vulnerable marsupial) were trapped within the Southern Woodland (SW-1) and the South East Open Cut area 1 (SEOC1-1) respectively;
- One positive identification of a call for the vulnerable bird species Barking Owl was made using remote activated wildlife acoustic monitoring devices;

Significant observations were made relating to changes in monitored populations during 2014 surveys, including:

- Grey-crowned Babbler expanded into more of the underground (UG) impact area;
- Grey-crowned Babbler was recorded using a larger portion of the OC area ;
- Grey-crowned Babbler troop expanded its home range in the SEOC1 area;
- Speckled warbler expansion into UG impact sites and the Open Cut (OC) area;
- Spotted Harrier absent from site, known to move around and be quite sensitive to prey availability and foraging effort required, so may return under improved conditions.
- A breeding female Squirrel glider was recorded in SEOC1 area for the first time.
- Two sub-populations of Brush-tailed Phascogale were recorded in the study area for the first time.

Table 23: 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 winter 2014 and summer 2014.
SW; Southern woodland, NW; northern woodland, OC; Open cut regeneration area, UG; Underground Area, SOEC1; South east open cut area 1, SEOC2; South east open cut area 2.

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. As predicted the identification of additional woodland bird species is starting to plateau in the study area. In the regional area there are approximately 198 bird species that could be expected to occupy woodland and forest habitats. To date 112 (56%) bird species have been recorded in the study area, with only 2 new species being recorded this year.

Diversity within the southern woodland conservation area has seen a trend towards increasing diversity over the study period (2009-2014).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.

Reptile diversity has consistently increased, with diversity increasing to 22 species, however of all fauna groups, mammals have improved the most over the life of the study, especially in the last two years. Two vulnerable species, Squirrel glider and Brush-tailed Phascogale have been trapped, and in the case of Squirrel glider, breeding events have been recorded. Overall, there are now 31 mammal species, of which 6 are vulnerable species.

River red gum individuals have been located downstream of impact areas and in other not impacted areas of the study area. 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. 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 is completed annually for the Ashton Coal Conservation Area and is included in the AEMR. ACOL commissioned Pacific Environmental Associates to undertake this work during the reporting period. The OEH monitoring form is located in Appendix 3.

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 2013 and the initial surveys during the EIS phase in 2001. Monitoring was conducted in autumn 2014 and spring 2014 in Bowmans Creek and Glennies Creek and included the second year of formally monitoring 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 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.

The number of sites utilised for the 2014 reporting year are shown in Table 24.

Table 24 sites utilised for aquatic monitoring during the reporting period

Indices	Bowmans Creek Autumn 2014	Bowmans Creek Spring 2014	Glennies Creek Autumn 2014	Glennies Creek Spring 2014
Water quality profiling	12	13	2	2
Over-night fish trapping	3	5	0	0
Macroinvertebrate sampling plus aquatic habitat assessment	9	9	2	2

The macroinvertebrate sample program included the following Bowmans Creek sites:

- The creek upstream site (BCUp),
- A creek monitoring site above the start of the Eastern Diversion Channel (EDC) (BC1),
- A monitoring site within the excised section of creek adjacent the EDC (BCLW6B),
- A monitoring site in the upstream end of the constructed EDC (BCED1),
- One site within Bowmans Creek immediately downstream of the EDC connection (BC3),
- A monitoring site within the excised section of creek adjacent the Western Diversion Channel (WDC) (BCLW7A),
- A monitoring site in the downstream half of the constructed WDC (BCWD2),
- A creek monitoring site downstream of the WDC (BC6),
- The creek downstream monitoring site BCDown.

Stream flows in Bowmans Creek were relatively stable around 1ML/day from early January to mid-April, with a larger flow (up to 285ML/day) immediately prior to the autumn sampling (29 to 30 April). For the autumn 2014 sampling there was surface flow between all sites and water level in the two diversion channel monitoring sites BCED1 and BCWD2 was around 20cm higher compared to the previous spring 2013 survey. There was evidence of flood impacts at a number of sites throughout the Bowmans Creek study area; mobilisation and redistribution of cobble banks, bank undercutting and slumping of riparian trees, downstream transport of large woody debris.

In contrast, there was very little rainfall for the six month between the autumn and spring 2014 surveys and there was little or no surface expressed flow through the creek and diversions for most of the time other than a period of about three weeks following a small rain event in late August. Mean flow rates remained around 0.6ML/day for most of the period and the creek and diversions were reduced to a series of disconnected pools.

The riparian and instream vegetation communities within both of the diversion channels had proliferated since the autumn 2014 survey. The upper band of planted riparian casuarinas had grown to 6 to 8m in height and naturally recruited casuarinas have become established along the water's edge throughout the lengths of the EDC and WDC, ranging between small seedlings (to 30cm high) to 2m high trees.

The quality of the aquatic ecosystems within the diversion channels has continued to improve over the period between the 2013 and 2014 surveys, with improvements in the complexity of aquatic habitats, creek substrates, and riparian habitats.

In autumn 2014 the riparian woody vegetation corridor had grown in height and the density of vegetation on the lower stream banks had increased via natural recruitment of grasses and a number of weeds, which complement the planted species (primarily *lomandra* and *Carex appressa* grasses). Both of the diversion channel sites supported higher amounts of sandy sediment drifts compared to the spring 2013 survey.

Both sites supported the same macrophyte assemblages as the former survey and there was newly established growth of emergent macrophytes (particularly on the new sandy sediment drifts) including river clubrush and slender knotweed.

In spring 2014 filamentous green algae was present in high amounts throughout the study area, particularly

within the WDC, forming floating mats along shallow edge areas within the downstream half of the channel. This was similar to the conditions in spring 2013 where the creek and diversions were also reduced to disconnected pools with no surface flow connections.

Diversion channel stream bottom habitat complexity would not have varied substantially from that observed in autumn 2014 due to the lack of flood events that could have introduced detrital matter or sediments from upstream sources. Further, the relatively immature status of the diversion channel riparian corridors results in limited contributions of logs, sticks and leaves to the aquatic environment of the diversion channels. Notwithstanding, riparian casuarina trees have become established along the immediate water's edge within both of the diversion channels this year, a process of natural recruitment which replicates what occurs throughout the entire length of Bowmans Creek within the study area.

As the riparian casuarina communities in the diversion channels continue to grow they will likely develop the potential to influence the flow channel area by stabilising banks and sediments during scouring flood events in a similar fashion to the large secured wooden structures that have been deployed throughout the diversion channels, in turn creating aquatic habitat complexity associated with snags and undercut banks. The removal and redistribution of large riparian casuarinas by flood events and scouring has been commonly noted over the baseline survey period.

Notwithstanding the remaining habitat differences between the natural creek and diversion channel survey pools, the macroinvertebrate sampling over autumn and spring 2014 indicate that the diversion channel sites are supporting a macroinvertebrate 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 diversity and abundance of fish recorded from within the diversions channels in 2014 match the overall diversity and distribution of fish in natural in-line creek pools up- between and down-stream of the diversions. The fish results demonstrate that the diversion channels have continued to provide fish passage during periods of extended flow and provide refuge habitat during periods of low flow.

Figure 23 Juvenile Long Necked Turtle from Bowmans Creek Monitoring site BCLW6B Au 14

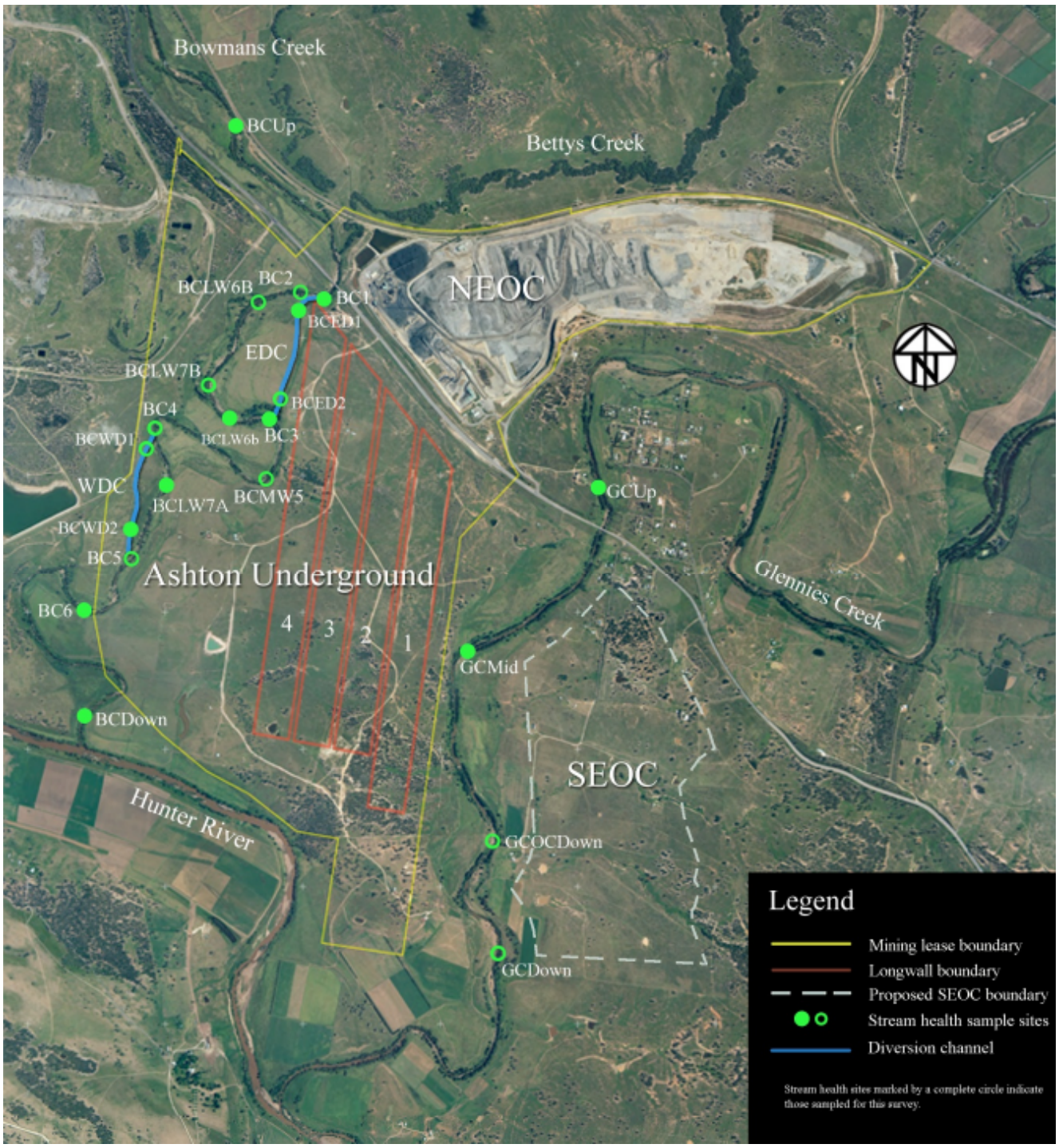

Figure 24: Aquatic monitoring locations

3.7.3 Vertebrate Pest Control

A wild dog and fox baiting programme was conducted in winter 2014 with 33 bait stations set and checked on three separate occasions over a three week period. Some bait points are also monitored by movement activated cameras. All baits not taken after the three weeks are removed. The baiting program was successful, with 25 of the 99 presented baits positively identified as being taken by foxes and eight baits taken by wild dogs.

With the use of cage traps, a trapping program was implemented in December to target feral cats and small dogs around the site. One fox was captured during the program. There was no kangaroo culls carried out at Ashton over the reporting period. Kangaroo numbers will be monitored and culls organised where necessary.

The baiting program continues to show success over the past four years, with an effective number of baits presented being taken by foxes and dogs, as shown in Figure 25

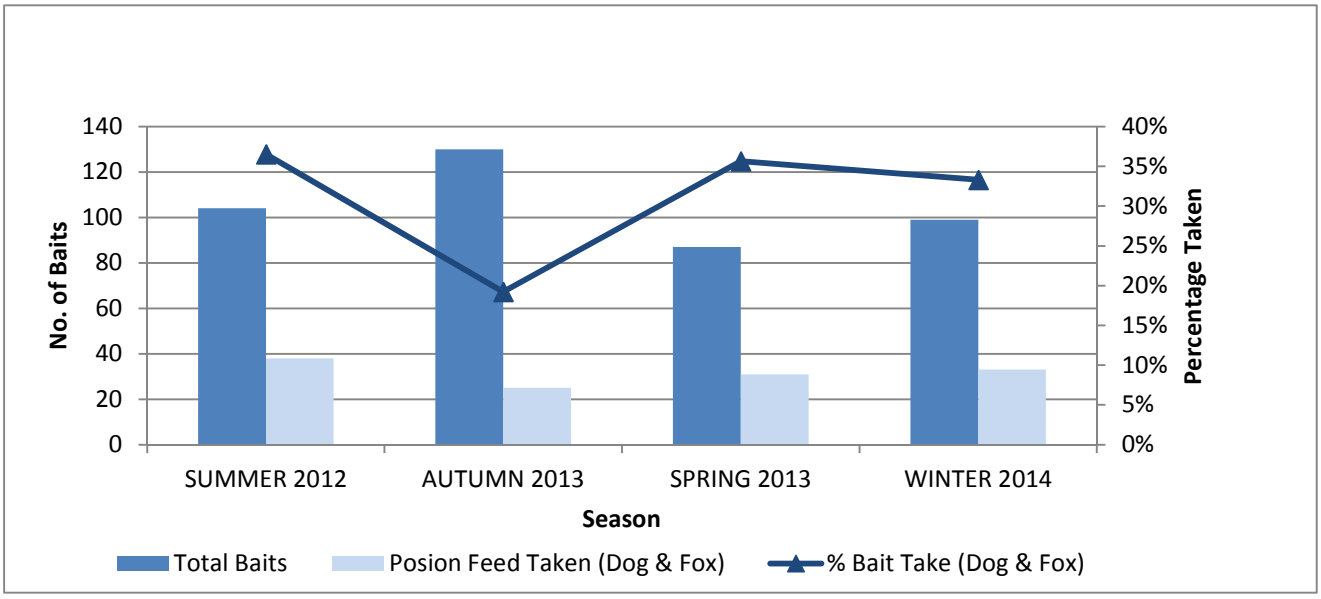

Figure 25: Seasonal 1080 baiting consumption

3.7.4 Reportable Incidents

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

3.7.5 Further Improvements

During 2015 the FFMP will continue to be revised to incorporate DRE's Biodiversity Offset Management Plan requirements and will be submitted for approval.

3.8 Weed Management

3.8.1 Environmental Management

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

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 John's 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 treated extensive areas of the site during the reporting period. Priority areas for treatment included the mine site boundary, Bowmans and Glennies Creeks, rehabilitation areas and selected offset and conservation areas. Weed treatment is summarised in 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.

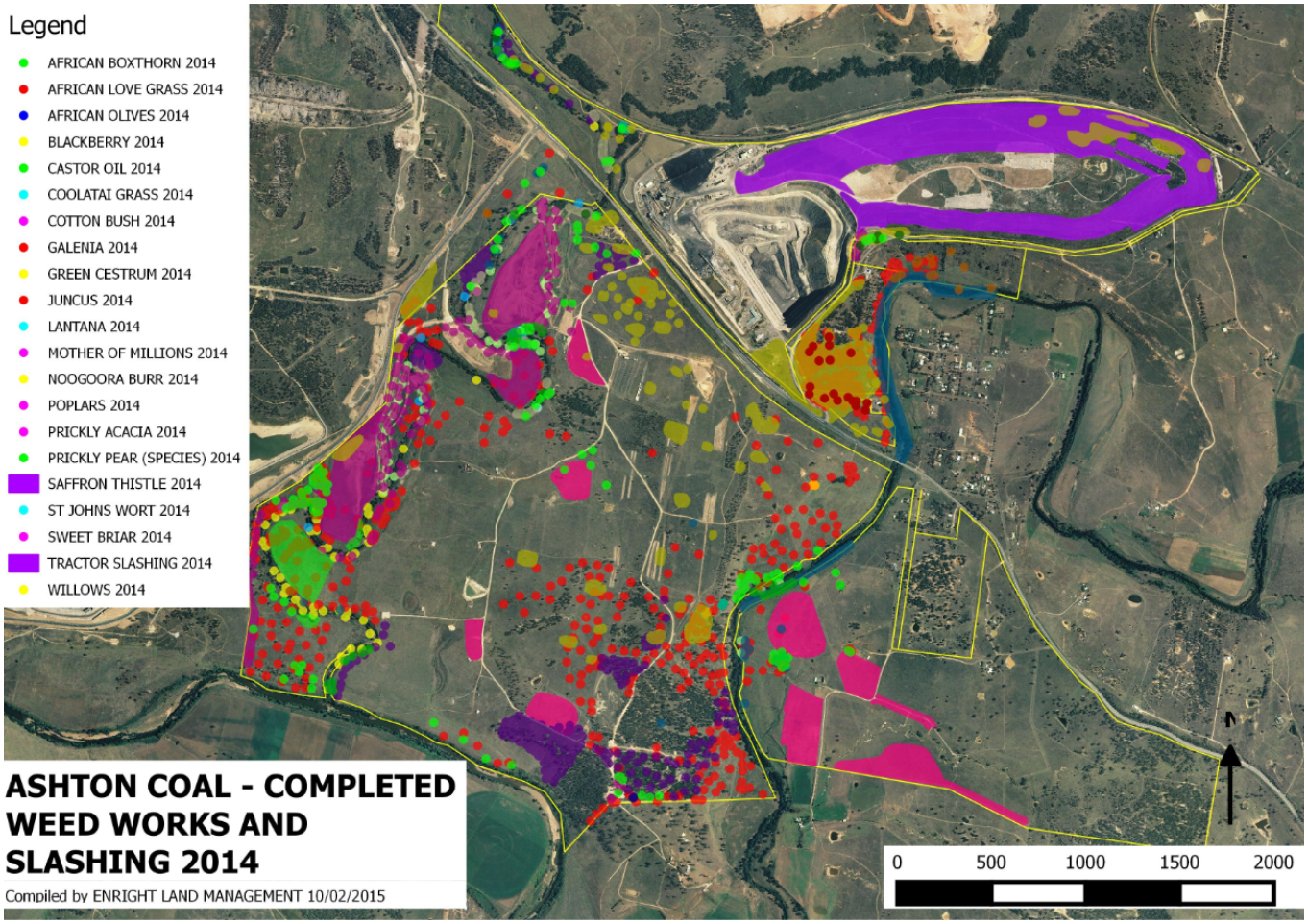

Figure 26: Weed management undertaken in 2014

3.8.3 Reportable Incidents

ACOL 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, ACOL 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 2014. ACOL has not blasted since September 2011.

3.10 Noise

3.10.1 Environmental Management

Noise management at ACOL is managed in accordance with the Noise Management Plan. This plan was revised and approved by DP&E in April 2014. The Noise Management Plan was updated to reflect the current nature of the ACPs operations (no open cut operations and minimal pit top operations have resulted in minimal noise impacts to Camberwell over the past few years) and align with current monitoring practices expected by the community and regulators. Main changes to the monitoring program are detailed in Table 25.

Table 25 Monitoring changes in revised noise management plan

	Old NMP	Revised NMP	Reason for change
Monitoring frequency	Quarterly	Monthly	To gather additional data and align with current regulator expectations
Attended monitoring sites	5	3	Three sites adequately cover sensitive receptors in the local area.
Monitoring periods	Day, Evening and Night	Night only	Night time noise results typically reflect worst case scenario for mine noise. Monitoring data over the past two years have shown no exceedances and so it seems reasonable given the change in operations that night time monitoring compliance can demonstrate compliance during other time periods.

ACOL 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 monthly basis[1] at three statutory monitoring locations as shown in Figure 27. 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 night time periods.

Received levels from various noise sources are noted during attended monitoring and particular attention is paid to the extent of ACOL's contribution. During 2014, potential noise generating activities from ACOL 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 ACOL was measurable and where meteorological conditions resulted in criteria

[1] Monthly monitoring has been undertaken since May 2014, after the approval of the revised Noise Management Plan in April. Prior to that the old management plan required quarterly monitoring.

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 ACOL is described in the noise management plan.

3.10.2 Environmental Performance

Noise generated by the ACP 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 ACOL's operations were not audible at any monitoring location during monitoring periods with the exception of September. Noise did not exceed the relevant criterion at any location at any time. A summary of results from ACOL's attended noise monitoring is provided in Table 26.

Table 26: $L_{Aeq\ (15min)}$ attended noise monitoring results

$L_{Aeq\ (15min)}$	N2	N3	N4
Noise impact assessment criteria (Intrusive criteria) ($L_{Aeq\ (15min)}$) Night	36	36	36
Predicted noise level for 2014 for each monitoring location (2002 EIS)	37	N/A	N/A
February	IA	IA	IA
May	IA	IA	IA
June	IA	IA	IA
July	IA	IA	IA
August	IA	IA	IA
September	25	29	IA
October	IA	IA	IA
November	IA	IA	IA
December	IA	IA	IA

IA – Ashton Coal's operations were inaudible. Note: the first part of the year operated under the old NMP and required only quarterly monitoring, hence some months missing from the table.

In addition to the operational noise, the noise from ACP must not exceed 46 dB (A) $L_{A1\ (1\ minute)}$ 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 2014 the $L_{A1\ (1\ minute)}$ noise from ACP was inaudible. The only exception was that Ashton Coal was audible and measurable at N2 and N3 during the September 2014 monitoring. The measured $L_{A1\ (1\ minute)}$ noise did not exceed the sleep disturbance criterion at any location at any time.

3.10.3 Reportable Incidents

One community complaint was recorded during the reporting period. The complaint was recorded in November. Real time noise recordings were assessed and it was determined that the mining noise could not be attributed to Ashton's operations. In addition, the Noise Impact Assessment Criteria was not applicable at this time due to the presence of a strong temperature inversion (>6degC/100m). Ashton Coal did not receive any government fines or penalties related to noise during the reporting period.

In 2014, ACP did not receive any written requests for additional noise mitigation or investigation monitoring for privately owned residences, as defined in the Development Consent.

3.10.4 Further Improvements

Following the approval of the revised noise management plan ACOL will continue to monitor its effectiveness and application to current operations. The management plan will be reviewed and revised if necessary within three months of the lodgement of this AEMR. During 2015 an application to vary the EPL will be prepared, including variations to align the EPL noise monitoring conditions to the revised Management Plan.

3.11 Visual Amenity and Lighting

3.11.1 Environmental Management

Visual amenity and lighting management at ACOL are 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. Earthen bunds are constructed and tree screens planted as a visual screen for infrastructure screening where possible. During 2014 the Lighting Management Plan was revised and approved by DP&E.

3.11.2 Environmental Performance

Landscaped areas, including earth bunds and tree screens installed along the New England Highway continue to successfully screen the ACOL operation.

3.11.3 Further Improvements

Lighting from the ACP will continue to be managed to minimise impacts on the local community whilst maintaining the minimum level necessary for operational and safety needs. Further tree screening works are planned over the next few years to maintain visual amenity from the New England Highway. Works include maintenance of existing tree screens and the extension of the SEOC tree screen.

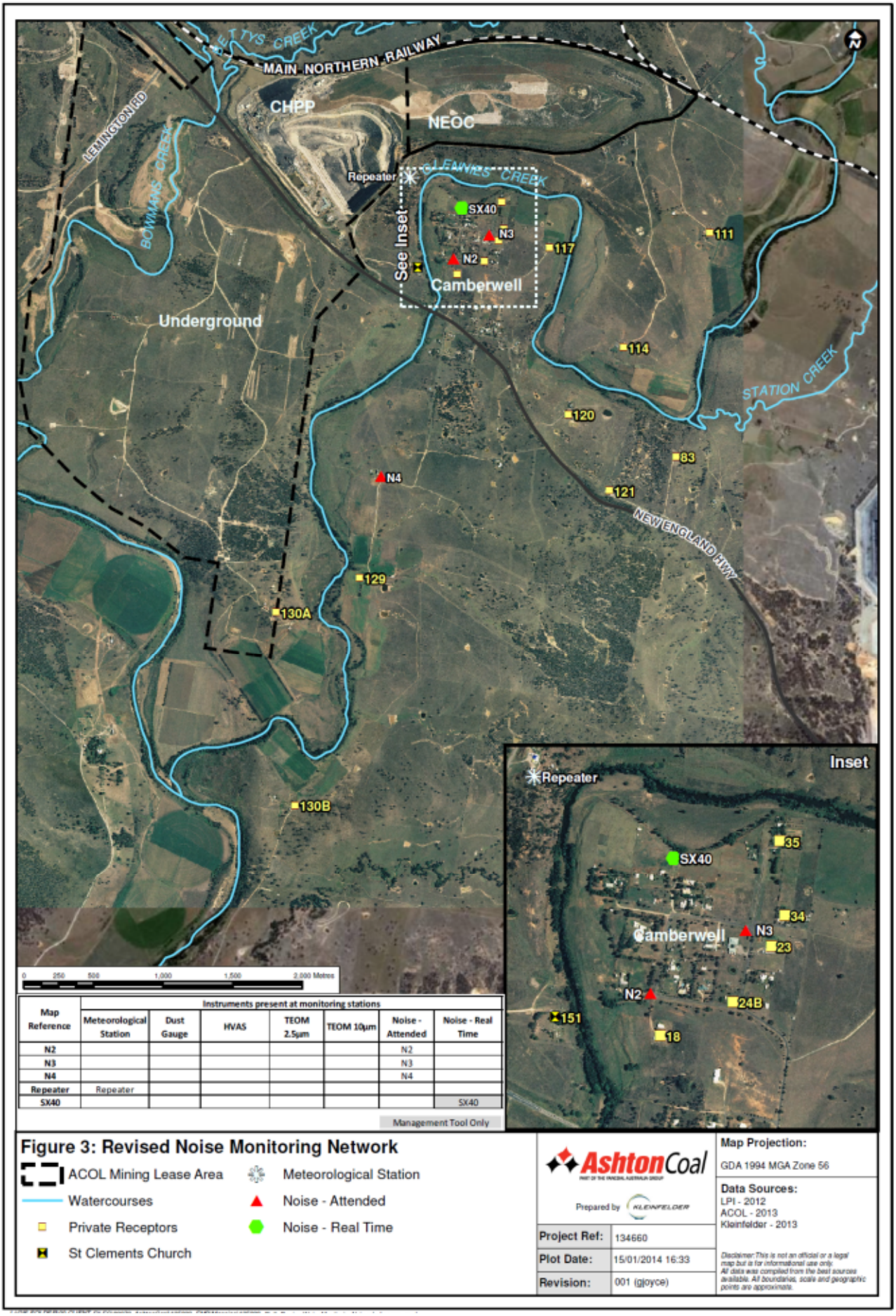

Figure 27 Noise Monitoring Locations

3.12 Aboriginal Cultural Heritage

3.12.1 Environmental Management

Aboriginal cultural heritage at ACOL is managed in accordance with the approved Aboriginal and Cultural Heritage Management Plan (ACHMP), which was approved in August 2012. As part of the ACHMP, ACOL operates under two Aboriginal Heritage Impact Permits (AHIP); 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 ACOL 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 ACOL 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 as shown in Table 27 which details works undertaken under the two AHIP areas during 2014. These works were all completed with involvement of archaeologists and Registered Aboriginal Parties (RAPs) to assess both archaeological and cultural values of the sites to be surveyed.

Table 27: Summary of Archaeological works undertaken in 2014

Date	Location	Activity	Results
03.02.14 - 13.02.14	LW1-4	Archaeological salvage works LW3 &4 southern end	Open area excavation LW4 South end A total area of 74m2 excavated. 4072 artefacts were recovered from this open area excavation. Grader scrapes over LW3 & LW4 southern ends completed
17.03.14-21.03.14	LW1-4	Archaeological salvage works northern end subsidence zones LW 3&4	Archaeological salvage works northern ends of LW3&4 ULD subsidence zone. A total of 44 Artefacts were recovered from surface collections (including 6 previously recorded sites), test pits (50) and grader scrapes. AFA116 was expanded to 10m². Salvage works also undertaken for geological boreholes 01, 02, 03, 06 & C1.
24.03.14-27.03.14, 31.3.14-04.04.14, 14.04.14-15.4.14	LW1-4	Oxbow Site Archaeological Salvage Works ULD subsidence zone.	Archaeological salvage excavations of the Oxbow Site. • 27 Test Areas were marked for initial testing. • Test Area 3 expanded as it was located in the least disturbed area of the PAD, and the test pits in the area produced the largest and most diverse body of artefacts. • Test Area 3 eventually expanded to 57m², meeting up with Test Area 1. • Approximately 4000 artefacts recovered from OA and an additional ~2000 from surface collections
05.05.14-13.05.14	LW5-8	Archaeological salvage works LW5-7A ULD subsidence zone.	Commenced archaeological salvage works. Surface walkover and test pits. Excavations in two locations within LW7 have not been completed. Work placed on hold following

Date	Location	Activity	Results
			breakdown on grader. Grade scrapes have not been completed.
28.05.14	LW5-8	LW6A & LW7A	Due diligence assessment for LW6A & 7A SW corners
November			Salvaged artefact analysis with RAPs undertaken with about 600 artefacts analysed.

ACOL 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 ACOL, 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 2.

3.12.3 Oxbow site salvage

During 2014 the Oxbow site was salvaged ahead of mining LW103 in accordance with AHIP 1131017. The landscape context for the Oxbow Site is in a central location for environmental diversity with good water access. It has been inferred in previous environmental assessments as an optimal location for long term Aboriginal occupations and has been regarded with great interest to the aboriginal community, archaeologists and regulators.

There were 27 Test Areas marked for initial testing. Salvage was undertaken using surface collection and test pitting. Test pits were excavated in 100mm spits until the stratigraphy was identified, once stratigraphy was identified test pits were excavated stratigraphically. Open area spoil was wet sieved to reduce artefact damage in 3mm sieves. Approximately 4000 artefacts were recovered from the Oxbow area. The artefacts are currently being stored onsite in a temporary keeping place.

Initial analysis indicates that the site may have been a communal camping area where women, children and men would congregate. This is supported by the findings in Test Area 3, where there is little evidence of tool manufacture, a large variety of stone material, and the discovery of a broken training / child's axe.

Much of the evidence for stone tool production was found on the outskirts of the Oxbow area with very dense but discrete knapping events found during test excavations. An example of this is from Area 26 which was expanded to 5.5m². The centre of the test area had 58 artefacts with the surrounding test pits dropping almost immediately to <3.

The following observations were made during initial artefact analysis/observation.

- Clean up and disposal: Sweeping up the living space after a period of time has been ethnographically documented for Aboriginal camps. This should result in the redistribution of materials. Throughout the site there were patches of low and high densities of artefacts, residual deposits (including caches), and the disassociation of manufacturing products.
- Heterogeneity of material and artefact types: Over the long term a wide variety of materials can be expected to be brought in and different kinds of tools made, some of which would escape cleaning up. Use-wear on flake platforms (resharpening flakes) and edges on small tools were frequent.

Following the salvage mining has occurred in LW103 and it is anticipated that parts of the Oxbow Site may experience subsidence in 2015.

Figure 28 Oxbow site excavation area - facing east

3.12.4 Reportable Incidents

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

3.12.5 Further Improvements

During 2014 field work protocols developed by a working party formed from ACCF members was developed and accepted by the ACCF. The protocols are dynamic documents and will be discussed and revised as necessary by the ACCF.

3.13 European Cultural Heritage

There are a few European heritage sites identified within and surrounding 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.

Two sites of historic occupation have been identified on the surface overlying Longwall 8. One site, which relates to the earlier agricultural history of the holding, is a standing ruin and consists of a timber shed and yard area. This structure comprises a concrete slab, timber frame constructed shed clad with weatherboard, corrugated

iron gable roof and adjacent corrugated iron water tanks. The yard area consists of a small timber post and wire enclosure.

These structures were assessed by Umwelt (2010) as not forming part of any identified significant grouping of rural farm buildings and are not heritage listed items. Umwelt concluded that these items have nil to low significance and no research potential.

The second site was identified in November 2011 by Insite heritage as a possible shepherd's hut/outstation located on the Ashton Coal mine lease. The known site elements are a probable chimney and small area of brick floor. The site is likely to be associated with the original Ashton property dating to the late 19th/early 20th Century.

No management of these sites are proposed, other than to secure the site and prevent injury during/ following subsidence.

3.14 Spontaneous Combustion

3.14.1 Environmental Management and Performance

A Spontaneous Combustion Management Plan has been prepared and implemented on site. The plan was revised and approved by DRE during the first quarter of 2014. 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 (TEOP). Part of this management includes regular monitoring by CHPP personnel. Monitoring during this period has shown a decrease in instances of spontaneous combustion, due mainly to remedial works undertaken by both ACOL and Glencore operations. During the reporting period there were no new reports of spontaneous combustion.

3.14.2 Reportable Incidents

ACOL 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

Spontaneous Combustion will continue to be monitored and managed where required in accordance with the Spontaneous Combustion Management Plan.

3.15 Bushfire

3.15.1 Environmental Management and Performance

Bushfire at ACOL 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.

The Bushfire Management Plan was reviewed and updated during 2013, and approved by the Rural Fire Service and Singleton Shire Council in late 2013 and early 2014, respectively. Specific prevention and fire suppression control measures are included in the management plan and implemented in order to protect remnant vegetation communities and ACOL 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 ACOL

owned land. ACOL also maintained a trained emergency response team on each shift, and fire extinguishers are fitted in vehicles and buildings.

3.15.2 Reportable Incidents

ACOL 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

ACOL will continue to ensure that bushfire prevention and control measures are implemented across the site.

3.16 Greenhouse Gas and Energy

3.16.1 Environmental Management and Performance

During 2014 the gas drainage and flare plant was commissioned. The plant allows for methane to be flared and creates potential to utilise the gas captured as a beneficial energy source.

Ashton measures and reports its greenhouse gas emissions under the National Greenhouse and Energy Reporting Act 2007 (NGER). NGER is reported annually, on a financial year cycle.

Table 28 Scope 1 and Scope 2 emissions breakdown

	2013/14 (tCO_2-e)	**2012/13** (tCO_2-e)	**Variance** (tCO_2-e)	**Variance** (%)
Total Scope 1 Emissions	399,611	304,786	94,825	31%
Total Scope 2 Emissions	36,383	31,759	4,624	15%
Total GHG Emissions	435,994	336,545	99,449	30%

In the 2013/14 reporting period there was a 94,825 tCO2-e (31%) increase in scope 1 emissions compared to the prior year, due to:

- An increase in fugitive emissions from mining, notably a combined increase of 85,220 tCO2-e from ventilation and gas drainage. During 2013/14 Ashton extracted LW6B and LW102 – deeper and gassier than that mined in 2012/13.
- There was a further 7,655 tCO2-e increase in fugitive emissions from post-mining activities. This correlates to an increase in production during the 2013/14 reporting period.
- Flaring during 2013/14 contributed a further 2,553 tCO2-e to scope 1 emissions when compared to 2012/13.
- There was a 4,624 tCO2-e (15%) increase in Scope 2 emissions in 2013/14 compared to the prior year, due to higher production during the 2013/14 reporting period.

3.16.2 Reportable Incidents

ACOL 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

ACOL will continue to monitor and report greenhouse gas emissions and expand its gas drainage and flaring network during 2015.

3.17 Waste Management

3.17.1 Environmental Management

ACOL'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 ACOL's waste contractor conducted weekly site inspections of all areas where wastes were being generated and stored.

During the reporting period the Waste Management Plan was revised and approved by the DP&E.

3.17.2 Environmental Performance

During the reporting period ACOL's mining and related activities generated approximately 400 tonnes of waste that was sent off site for management, which was approximately a 15 per cent decrease on the previous year's results.

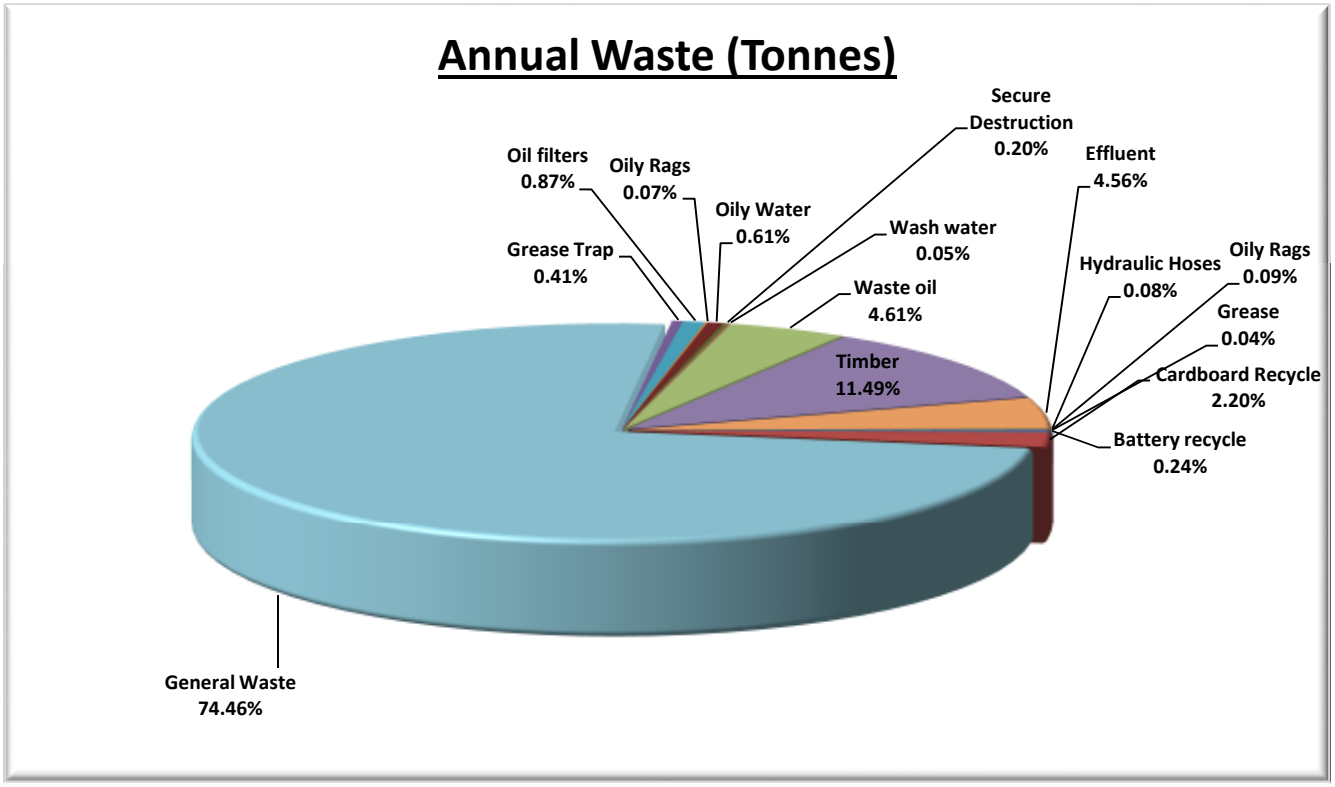

Figure 29 Waste generated at ACOL, 2014

3.17.3 Reportable Incidents

ACOL 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 ACOL achieves high levels of compliance in the areas of waste segregation and tracking.

3.18 Mine Subsidence

During the reporting period, mining operations occurred in Longwalls 102 and 103, both in the Upper Liddell Seam. Mining height is nominally in the range of 2.3 to 2.6 metres. The seam dips to the southwest at a grade of up to 1 in 10. The final extraction void is nominally 216m wide. This includes the 5.5m width of development drivage either side of the longwall block. Maingate chain pillars are nominally at a centre to centre width and length of 30m and 150m respectively. Tailgate chain pillars are nominally at a centre to centre width and length of 30m and 150m respectively.

Longwall 102 (LW102) began extraction on 10 November 2013, and extraction works were completed on 8 August 2014. Longwall 102 is 2,240m long, 205m wide. Overburden ranges in thickness from 165m near the start of the longwall panel to 105m at the take-off end. No unexpected impacts to the surface environment or infrastructure resulted from secondary extraction of LW102.

Longwall 103 (LW103) began extraction on 21 of August 2014. LW103 is 2,460m long and 205m wide. Overburden ranges in thickness from 180m near the start of the longwall panel to 110m at the take-off end. At the end of 2014, LW103 had been extracted to 1,428m chainage. This is equates to 1,032m extraction. There were no unexpected impacts to the environment or infrastructure during this reporting period.

The effects of subsidence were monitored in accordance with the document 'Ashton Coal Project Upper Liddell Seam Extraction Plan, Longwalls 1 to 8'; this included both regular survey monitoring and visual inspection of both environmental, land and infrastructure features.

Longwall operations at the Ashton Coal Project commenced in February 2007. Mining of the Pikes Gully seam and ULD seams LW101 and 102 are completed. Operations are currently mining LW103. The progress of ULD longwall extraction is shown in Figure 30.

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.

3.18.1 Subsidence Monitoring and Remediation

ACOL has monitored the subsidence movement on the surface during the extraction of all Longwalls 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 subsidence monitoring lines relevant to LW102 are LW102-CL1&2 and XL5. The subsidence monitoring lines relevant to LW103 to date are LW103-CL1, LW3-CL1 and XL5 as shown in Figure 31 and subsidence monitoring information can be found in the relevant mid- and end of panel reports available on the Ashton Coal website.

Table 29 outlines the maximum subsidence parameters predicted and recorded during regular survey of subsidence lines as the longwalls passed each location. The frequency and results of monitoring have been maintained in accordance with 'Ashton Mine Subsidence Monitoring Programme Longwall 101 to 104'. Further

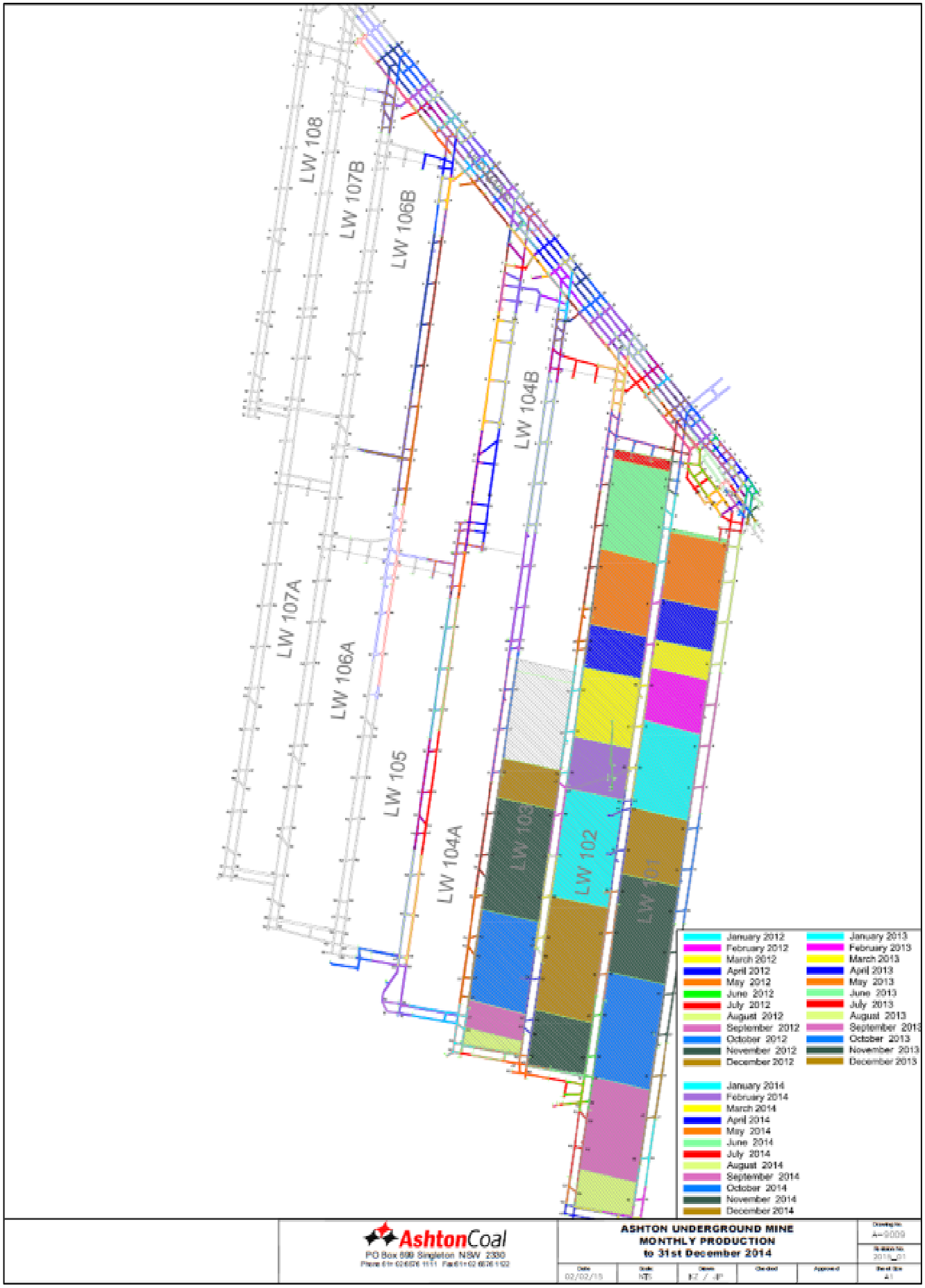

Figure 30: Progression of ULD Longwall Extraction

subsidence monitoring information can be found in the relevant mid- and end of panel reports available on the Ashton Coal website.

Table 29 Subsidence of ULD Longwall Panel 101 - 103

	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Maximum Strain (mm/m)
Longwall 101			
Predicted SMP/EP	4.40	235	94
PG LW1 CL1 Measured	2.76	60	49
PG LW1 CL2 Measured	2.91	110	38
XL1 Measured	2.49	42	23
XL5 Measured	3.23	101	20
XL8 Measured	2.78	136	28
Longwall 102			
Predicted SMP/EP	4.00	189	76
LW102CL1 Measured	3.20	38	12
LW102CL2 Measured	3.40	**190**	**83**
XL5 Measured	3.20	54	24
Longwall 103			
Predicted SMP/EP	4.00	162	65
LW103CL1 Measured	2.20	18.6	8.4
LW3CL1 Measured	2.46	35.7	7.3
XL5 Measured[1]	3.3	60.4	16.4

[1] XL5 subsidence monitoring data was obtained on 3/2/2015 which is not the final results for the completion of LW103.

The latest subsidence monitoring survey of LW102 and LW103 indicate a maximum of 3.4m of subsidence has been measured which is less than predictions. The maximum measured values of tilt and strain are close to and only just greater than the predicted maxima at the completion of mining LW102. Estimation of tilts and strains was recognised as likely to be more uncertain due to the multi-seam subsidence effects and the lack of previous experience of monitoring subsidence above multi-seam extraction. For most of the panel, the maximum tilts and strains are much less than the maxima predicted, but the predictions were locally exceeded at the stacked geometry near the end of the panel. At this stacked location, the tilts and strains returned to only slightly above predicted values by the end of the panel.

The maximum subsidence movements detected over Longwalls 102 and 103 are less than those predicted in the Subsidence Management Plan (SMP) for all centreline (CL) survey monitoring lines and cross lines. Horizontal movement has occurred in the coal seam up dip direction (East North -East) above each of the Longwall panels. This movement has predominantly occurred within the longwall panels with limited displacement detected outside the panel edge.

To manage subsidence impacts the 132kV power poles were reassessed and replaced with concrete poles prior to longwall extraction. The power lines have been fitted with rollers prior to longwall extraction. Visual and survey monitoring of the 132kV transmission line power poles was undertaken regularly whilst mining LW102 and LW103. Consistent with the 2013 AEMR, maximum subsidence of power poles was within predictions. There has been no adverse impacts on the power poles and the transmission line remains serviceable.

A section of primary Right of Way (ROW) access to Property 130 was undermined by LW102 during the reporting period. This section of ROW traversing the active longwall panel was predicted to suffer perceptible subsidence impacts (e.g. surface cracking). This section of access road was closed off in late 2013 prior to undermining and an alternate access was adopted, with a suitable detour being activated. Remediation works were completed in

July 2014 and the ROW reopened. No damage was observed to farm gates, grids or fences during the reporting period.

Rehabilitation of the surface cracks has been occurring as extraction continues with a small excavator smoothing cracks. Affected surface roads have been graded to smooth compression humps and minor cracks. The extent of ULD seam subsidence remediation at the goaf edge is outlined in Figure 32.

Ponding has become evident in some subsided areas after rainfall events, 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.

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.

Since the commencement of subsidence over the longwall area, signage has been erected on the Right of Way 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

ACOL did not receive any community complaints, 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.

Figure 31: Subsidence Monitoring Lines

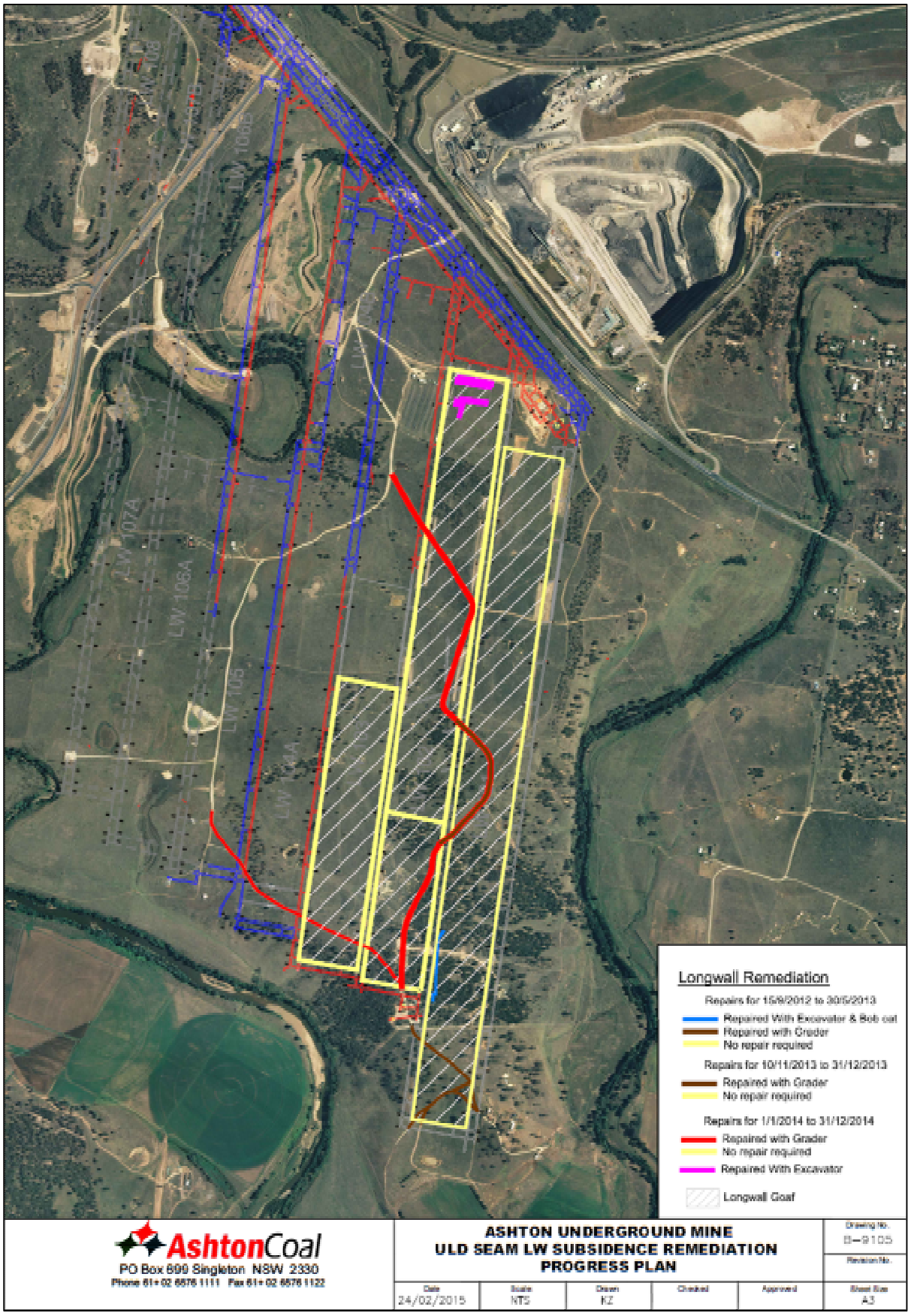

Figure 32: ULD Seam Subsidence Remediation Progress

4 Community Relations

ACOL 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

ACOL 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. ACOL also provides summary reports to CCCs and government agencies as requested, and reports in the AEMR annually.

During the reporting period, ACOL received one complaint from a community member related to noise. Noise recordings were assessed and it was determined that the mining noise could not be attributed to Ashton's operations. In addition, the Noise Impact Assessment Criteria was not applicable at this time due to the presence of a strong temperature inversion (>6degC/100m).

A number of enquiries were logged, discussing issues such as monitoring equipment on private land and operational changes onsite.

A comparison of complaints received during previous years is shown in Figure 33.

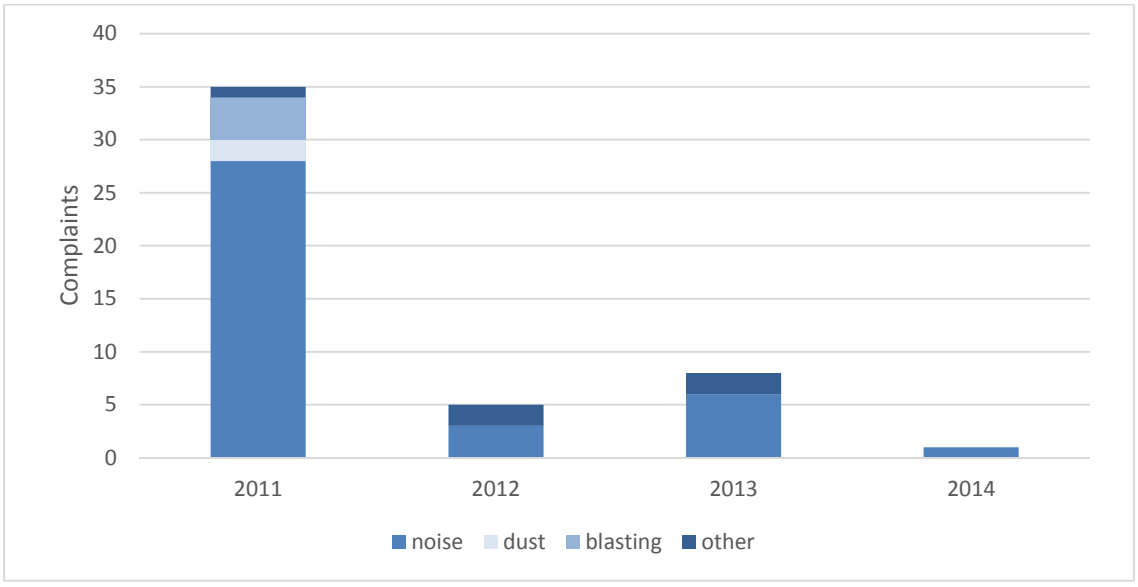

Figure 33: Comparison of complaints received during current and previous years

4.2 Community Liaison

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

4.2.1 Keeping in touch with Local Neighbours

Ashton keeps in contact with local neighbours on an as-needed basis. Neighbours, particularly those that have the potential to be directly impacted by operations are kept up to date with operations and key projects through phone calls, weekly emails and face to face meetings as required.

4.2.2 Website and Media

ACOL 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.

4.2.3 Community Consultative Committee

As required by ACOL's development consent (DA No. 309 -11- 2001-i, condition 10.1), the Community Consultative Committee (CCC) meet on a quarterly basis. The committee is chaired by a representative from the Singleton Council and is made up of representatives from the local community and ACOL.

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 ACOL's environmental monitoring performance, updates of current operations and upcoming projects. The CCC is kept informed of any upcoming exploration works as required by ACOL's Exploration leases.

The CCC regularly make suggestions on environmental controls and management over the site, which are incorporated where possible and reported back to the committee.

4.2.4 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.

4.2.5 Wonnarua Mine Rehabilitation Services

ACOL has continued to work closely with Wonnarua Mine Rehabilitation Services (WMRS), a company established by the Wonnarua Nation Aboriginal Corporation that provides land management services. In 2014, a significant proportion of the rehabilitation work undertaken along Bowman's Creek was completed with the support of WMRS.

ACOL has also continued to support WMRS with the establishment of a nursery at one of its properties in Camberwell Village. It is anticipated that the wholly owned aboriginal company will be successfully coordinating land management activities and propagating native seedlings from the Camberwell property during the next reporting period.

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. For areas that have been mined by open cut methods this consists of bulk reshaping of overburden dumps, using large bulldozers (i.e. Caterpillar D10 or equivalent), to slopes that average 10 degrees or less, and incorporating water management infrastructure to minimise the potential for erosion.

Water management 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.

For areas of underground mining, rehabilitation may also be required. Underground rehabilitation consists of using graders and where required excavators to remediate subsidence cracking on roads and in paddocks and bushland. Due to the multi-seam nature of ACOL's operations ponding caused by subsidence is monitored to ensure no significant diversion of water resources or flow occurs. Ponding will be addressed as necessary after the final seam is mined to prevent rework and the loss of resources that may be required to remediate the land.

During the 2012 reporting period ACOL completed all available areas of open cut rehabilitation, and during 2013 and 2014 continued maintenance activities on areas of subsidence and previous rehabilitation, as listed in Table 31. This aligns with the rehabilitation proposed in the MOP. The major rehabilitation activity over the past two years has been the rehabilitation of the Bowmans Creek Diversions which has been undertaken in accordance with the Bowmans Creek Diversion Rehabilitation Strategy and the MOP.

The Bowmans Creek Diversion (BCD) engineering works were completed in November 2012 with rehabilitation beginning soon after. The rehabilitation program is currently in the start of the third year which is approximately the midway point of Phase 1: Bank Stabilization (Bowmans Creek Diversion Rehabilitation Strategy, May 2010, Appendix D of the Water Management Plan).

During the reporting period over 30,000 plants have been grown and planted in the diversions. Survival rates have been mixed and depend on aspect, soil types and availability of water (some areas of the rehabilitation are irrigated).

In contrast to 2013, where there were three significant flood events in Bowmans Creek, no flood events were recorded in 2014. Some scour was recorded during stability monitoring, particularly in the Western Diversion (see section 3.4.5). During 2015 a geomorphologist will be commissioned to investigate the bed scour and provide recommendations on ongoing management.

As part of the AEMR development this reporting period, the Rehabilitation and Disturbance Rates during the life of the MOP were reviewed and revised. Revised rehabilitation figures are shown in Table 31: ACOL rehabilitation summary. These figures can be compared directly to MOP Table 34, and reflect a reduced rate of rehabilitation which is directly attributable to the reduced rate of production and therefore disturbance.

Table 30 Rehabilitation and Disturbance Rates during the life of the MOP

Year	Ashton Coal Project		
	Rehabilitation* (ha)	Disturbance (ha)	Rehabilitation Disturbance (ha)*
2013	51.8	0	54.4
2014	53.1	0	55.1
2015	44.6	0	58
2016	65	0	69.9
2017	28.2	0	72.4
Total	242.7	0	309.8

** Estimates only, equivalent to the goaf surface footprint.*

Table 31: ACOL rehabilitation summary

Domain	Area Affected / Rehabilitated (ha)	
	2014 (See Figure 34)	Planned 2015 (See Figure 35)
Mine Lease Area		
Mine Lease 1529, 1533 & 1623	909.6	909.6
Active Mining Area		
Active	44.4	44.4
TOTAL	44.4	44.4
Infrastructure Area		
Active	85	85
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	0	0
Ecosystem and Landuse Sustainability	0	0
TOTAL	85	85
Tailings Emplacement Facility		
Active	34	34
Decommissioning	0	0
Landform Establishment	0	0

Domain	Area Affected / Rehabilitated (ha)	
	2014 (See Figure 34)	Planned 2015 (See Figure 35)
Growing Media Development	0	0
Ecosystem and Landuse Establishment	0	0
Ecosystem and Landuse Sustainability	0	0
TOTAL	34	34
Water Management Area		
Active	13.9	13.9
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	0	0
Ecosystem and Landuse Sustainability	4.9	4.9
TOTAL	18.8	18.8
Pasture - Underground		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	31.5	51.2
Ecosystem and Landuse Sustainability	363.9	344.2
TOTAL	395.4	395.4
Southern Woodland Conservation Area[2]		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	7.4	0
Ecosystem and Landuse Sustainability	36.9	44.3
TOTAL	44.3	44.3
Pasture NEOC		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	0	0
Ecosystem and Landuse Sustainability	67.7	67.7

Domain	Area Affected / Rehabilitated (ha)	
	2014 (See Figure 34)	Planned 2015 (See Figure 35)
TOTAL	67.7	67.7
Bowmans Creek Riparian Zone[2]		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	30.2	30.15
Ecosystem and Landuse Sustainability	24.9	24.95
TOTAL	55.1	55.1
Bowmans Creek Diversion		
Decommissioning	0	0
Landform Establishment	0	0
Growing Media Development	0	0
Ecosystem and Landuse Establishment	13.5	13.5
Ecosystem and Landuse Sustainability	0	0
TOTAL	13.5	13.5
Trees over Grass – NEOC		
Decommissioning	0	0
Landform Establishment	0	0
Growth Medium Development	0	0
Ecosystem Establishment	0	0
Ecosystem Development	70.5	70.5
TOTAL	70.5	70.5
Trees over Grass – Underground[2]		
Decommissioning	0	0
Landform Establishment	0	0
Growth Medium Development	0	0
Ecosystem Establishment	66.2	66.2
Ecosystem Development	14.6	14.6
TOTAL	80.8	80.8

Notes: [2] Excludes areas outside of the Mining Lease

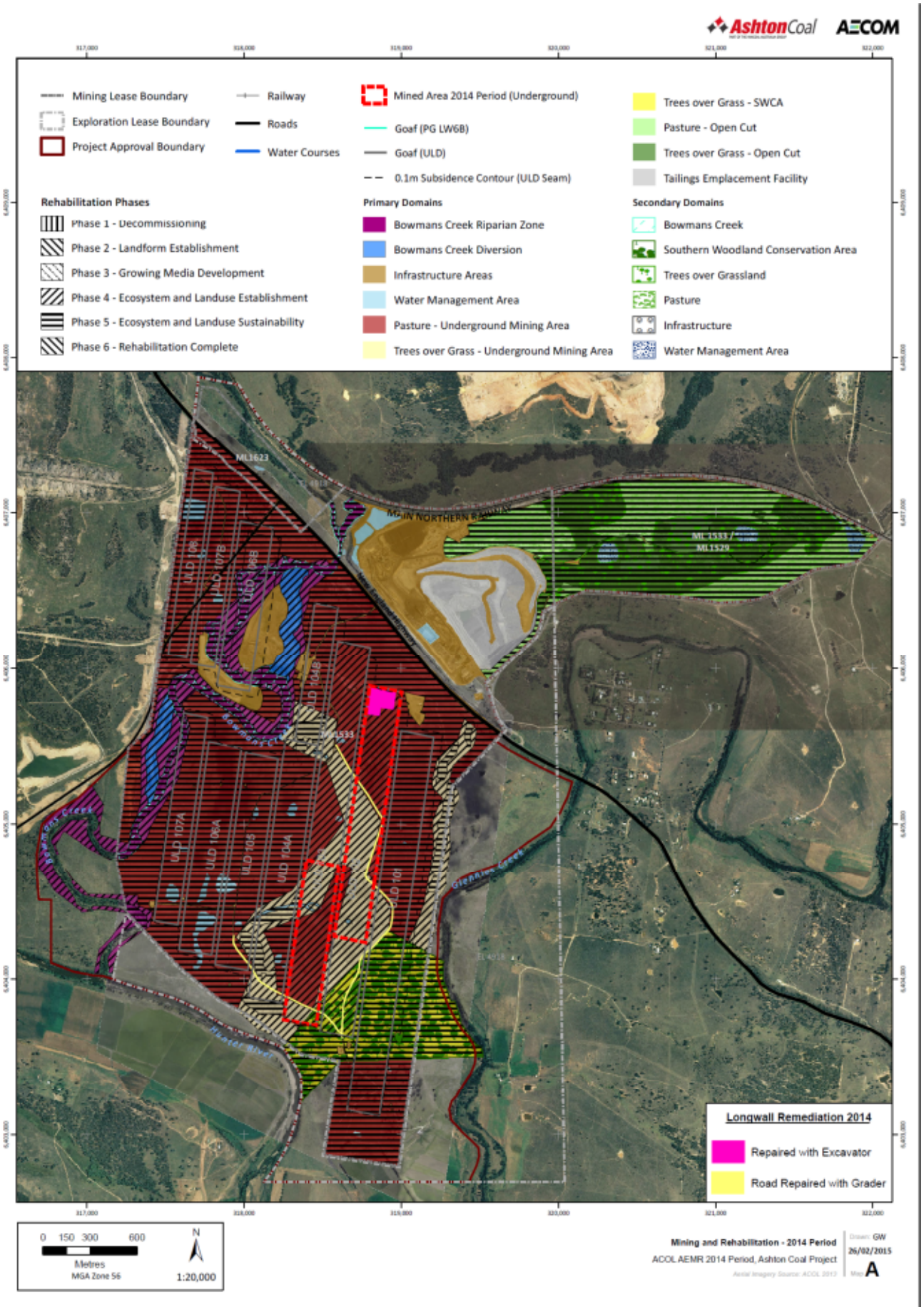

Figure 34 disturbance and rehabilitation, 2014

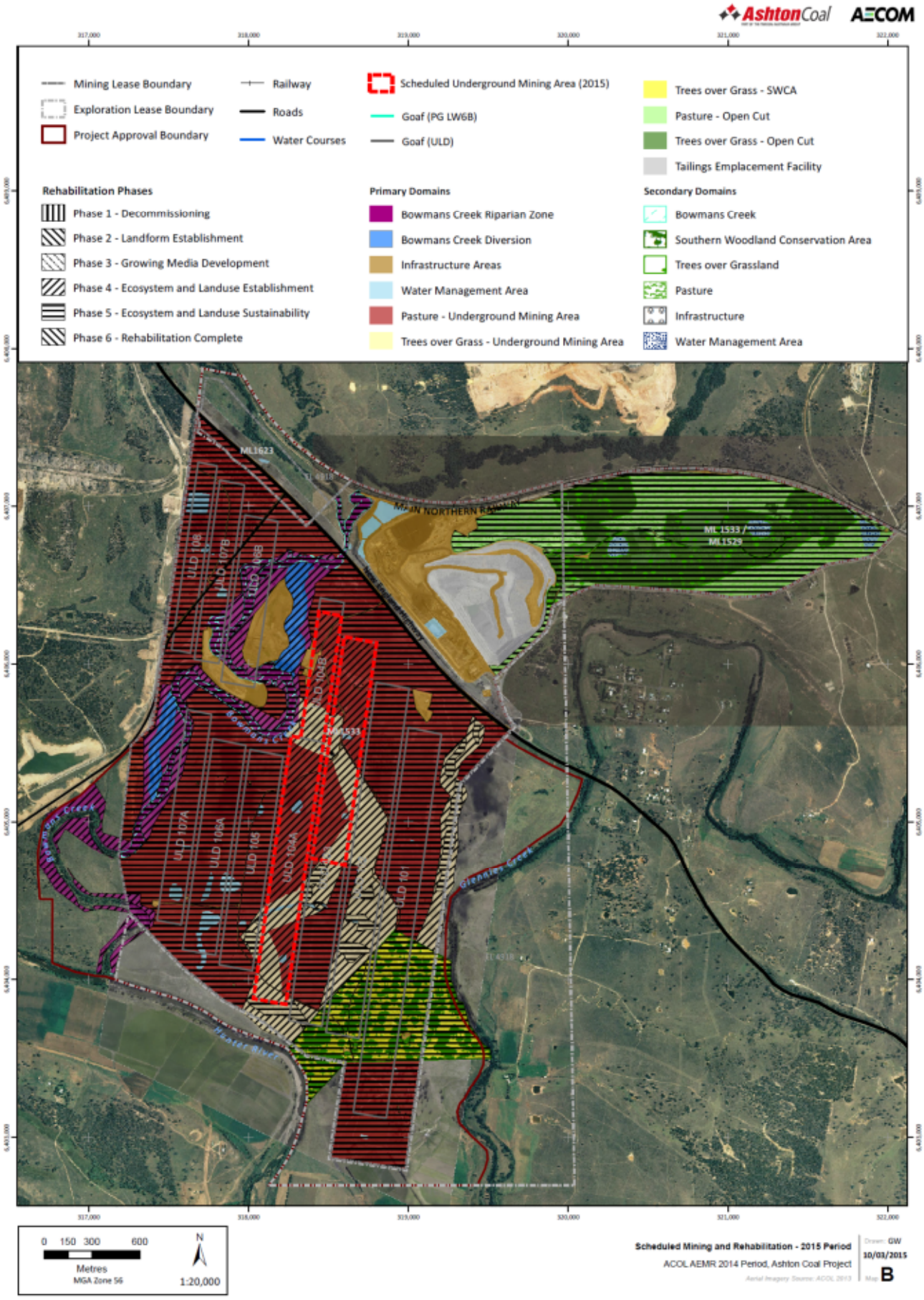

Figure 35 disturbance and rehabilitation planned, 2015

5.2 Rehabilitation Maintenance

Maintenance activities will continue to play a major role in the success of rehabilitation at ACOL. These activities include slashing, fencing, weed spraying, soil management, minor earthworks repairs and feral animal control. Sections 3.7 and 3.8 detail some of these management activities that were undertaken throughout the year.

After the success of the slashing undertaken on top of the Eastern Emplacement Area (EEA) in 2013, slashing was undertaken on the slopes of the NEOC rehabilitation during 2014. Slashing promotes lateral growth in the pasture species and increases the organic matter in the soil.

Due to the visible improvements in pasture quality and coverage from the slashing in 2013, the planned addition of Organic Growth Medium (OGM) was postponed in 2014. ACOL will reassess whether OGM is necessary during future rehabilitation monitoring programmes.

Table 32: Maintenance activities on rehabilitated land

Nature of treatment	Area affected or rehabilitated hectares			Comment, control strategies or treatment
	Reporting period 2014	Previous reporting period 2013	Next reporting period (estimate) 2015	
Additional erosion control works			0	
Re-topsoiling			0	
Soil treatment	68			Organic material (compost) at 10t/ha applied to assist rehabilitation program.
Pasture management	80	80	0	No grazing undertaken on rehabilitation. Pasture slashed in 2014
Reseeding and replanting	0		0	Legume species top dressed onto pasture areas
Weed Control	20	23.5	30	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 condition and monitoring results

Condition 3.47 the ACOL development consent (DA No. 309 -11- 2001-i) requires all regeneration and revegetation work to be monitored by an appropriately qualified person with the results of the monitoring reported annually.

Over the past few years the main rehabilitation focus has been on the BCD and subsidence management as it arises, as the open cut rehabilitation has been completed. Monitoring results are broken into three main areas: Bowmans Creek Diversion, NEOC open Cut Rehabilitation, and Farmland above the underground mine. Extensive land management and biodiversity monitoring activities have been undertaken during the year throughout these rehabilitation areas as part of all ACOL's land holdings. Biodiversity and Land Management is discussed in section 3.7, and should be read in conjunction with this section of the AEMR. Section 3.18.1 details subsidence monitoring, and also provides some context to the remedial works carried out where required throughout the reporting period.

5.3.1 Bowmans Creek Diversion

The BCD was completed in November 2012. Stability monitoring is required 6 months, one year and two years after the completion of the diversion. A summary of results of this monitoring are outlined in section 3.4.5. BCD rehabilitation monitoring continued on a quarterly basis during 2014. Results from the floristic survey showed a total of 73 species recorded from the plots, 53 exotic species and 20 native species. The key focus of rehabilitation monitoring is to gauge progress against the completion criteria for each domain as detailed in the MOP. Table 33 references the completion criteria detailed in the MOP and provides a summary of progress towards completion criteria.

As predicted in the EA for year 2 (2014) of rehabilitation works, the Landscape Functional Analysis results show that this is an immature, simplified landscape. The improvement in vegetation coverage as the revegetation of the BCD increases with age is reflected in the higher average Landscape Organisational Index (LOI) score at the November 2014 survey when compared to the November 2013 survey. The Stability, Infiltration/Runoff and Nutrient Cycling Indices have improved slightly and will follow the LOI scores with time.

Canopy planting survival is community and location dependent with River Oak Forest and Red Gum Woodland both having high survival rates (exceeding the 80 per cent target) on the east bank of the East Diversion, with River Oak Forest having high survival in portions of the western bank and sections of the Western Diversion. Survival rates can be seen in Figure 37 and Figure 38. Apart from the above mentioned area, only the area represented by monitoring plot R4 of the Red Gum Forest has above target survival. The west bank, West Diversion continues to present problems with survival of plantings due to aspect and lack of topsoil. Survival is down to 20 per cent, not taking into account that this area has been replanted and hence survival is actually overstated.

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. This will be examined during 2015.

Three exotic species listed as noxious weeds by the Upper Hunter County Council identified during the survey were *Senecio madagascariensis* (Fireweed) - common throughout the BCD and uncontrollable due to its almost ubiquitous presence; *Hypericum perforatum* (St. John's Wort) identified from plot R6; and a single *Salix spp* (Willow) in the stream channel itself in the Western Diversion. Galenia (*Galenia pubescens*) – not a listed noxious weed - has increased and requires further weed control.

Figure 36 Bowmans Creek Diversion Inspection

Table 33 Bowmans Creek Diversion Ecosystem and Landuse Sustainability Criteria, Measures and Indicators

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Current Status
Limit soil compaction and the spread of weeds by minimising site access by vehicles and stock	Fencing	Adequate fencing is installed and maintained	Vehicle access is restricted to nominated site access roads as far as practical.	ACOL Weed Management Plan Noxious Weeds Act 1993 Australian and NSW Weed Strategies TSC Act - Key Threatening Processes	**Achieved** Fencing is intact and in good condition restricting access to designated tracks Tracks are well delineated and maintained
			Stock is excluded.		**Achieved** • Stock have been successfully excluded
Invasive species, weeds and feral animals are effectively controlled or eliminated from site.	Distribution and density of weeds.	Annual Weed Inspection and findings reported in AEMR.	Weeds and pest animal species, and abundance are comparable to analogue sites.		**Partially Achieved** • Galenia has increased coverage both within and adjacent to the BCD • Other Noxious weeds reported are in low abundance (St John's Wort) or single individuals (Willow species)
	Distribution and number of feral animals.	Annual vertebrate pest survey and findings reported in AEMR.		*Rural Lands Protection Act 1998* FFMP	**Partially Achieved** Feral animal control is ongoing throughout ACOL owned lands
	Damage caused by feral animals.				**Achieved** • No evidence of feral animal damage • Some evidence of grazing by Macropods
Safety risks are eliminated as far as reasonably practicable.	Bushfire hazard.	Bushfire hazard reduction activities reported in AEMR.	Fire breaks and perimeter trails are maintained. The bushfire hazard is managed in accordance with the ACOL EMS.	*Rural Fires Act 1997*	**Achieved** • Fire breaks and perimeter trails are adequately maintained
	Revegetation species mix	Rehabilitation/planting activities reported in	Species mix used aligns to the	*Florabank Guidelines (1999)*	**Achieved**

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Current Status
	applied in accordance with Table 22.	AEMR including date of seeding and species mix used.	intended final land use.		• Species that have been planted to date are in accordance with Table 22 of the MOP.
Establish vegetation profile consistent with the planned final land use.	Structural complexity scores.	Reporting and monitoring protocol as per the Bowmans Creek Diversion Rehabilitation Strategy (ACOl, e) employing a modified vegetation complexity assessment method (Newsome & Catling 1979).	Groundcover includes tussock grass clumps, areas of open ground and fallen timber.	Bowmans Creek Diversion Rehabilitation Strategy (ACOL, e)	**Not Achieved** • as per Bowmans Creek Diversion Rehabilitation Strategy (ACOL, e) • Groundcover still predominantly composed of exotic grasses and herbs
			Mid-stratum is very open to sparse, > 2 metres in height.		**Partially Achieved** • Established mid-storey species are sparse, < 2m tall at this stage, but still relatively young in age • Mid-stratum plantings are starting/plants on order
			Over-storey structure ranges from forest (i.e. riparian corridor) to woodland (i.e. floodplain areas), with a diverse yet clumped species composition that is consistent with reference sites.		**Partially Achieved** • Overstorey establishment has been largely successful • River Oak Forest overstorey successful - **Achieved** • Red Gum Woodland partially successful – some planting failures in some areas of the BCD – **Partially achieved**
			Structural complexity scores are broadly comparable to reference sites.		**Not Yet Achieved** • Revegetation is in Phase 1 (first 2-3 years) of a long term rehabilitation project • Vegetation is still too young to be compared to mature reference sites.

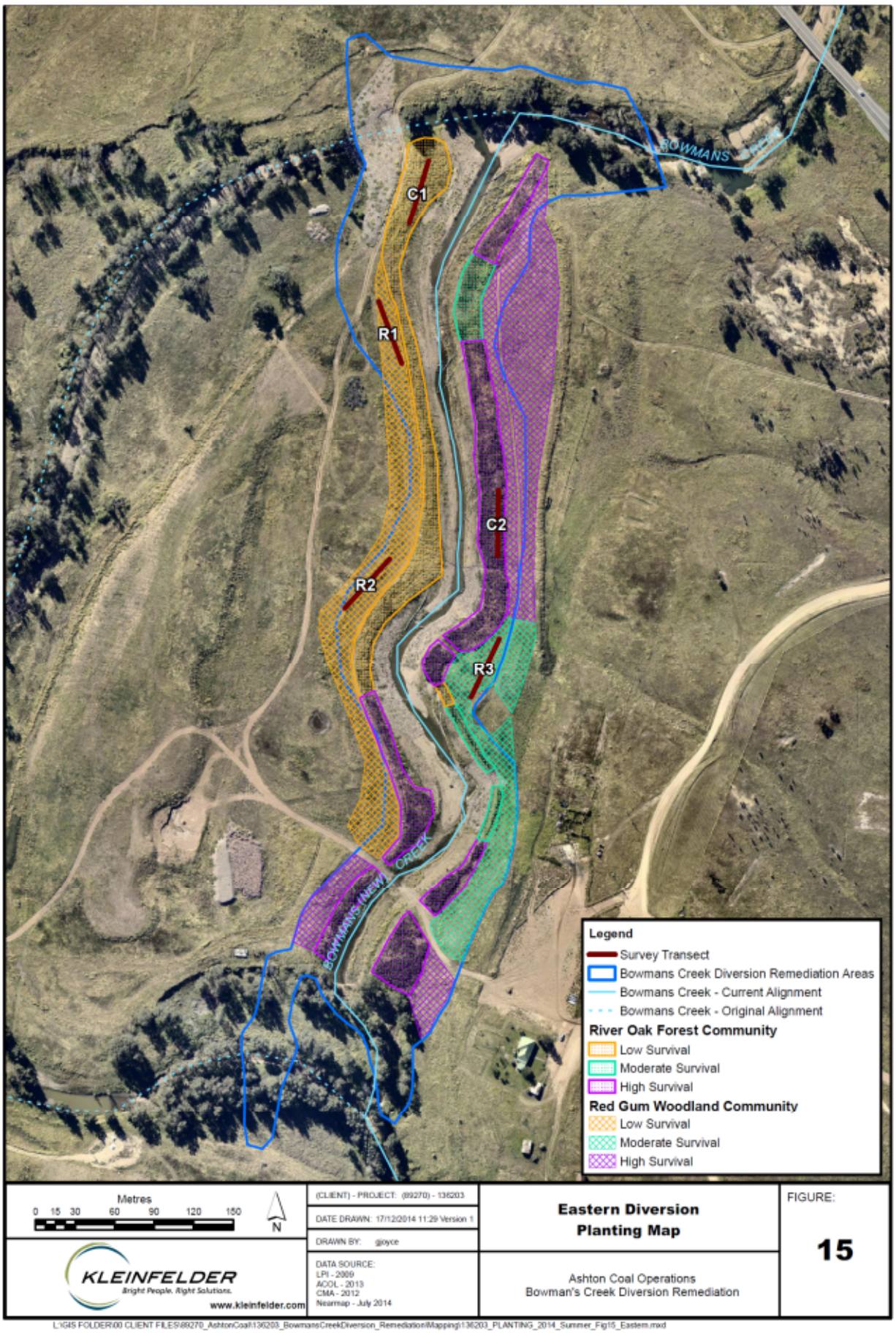

Figure 37 Rehabilitation survival rates, Eastern diversion

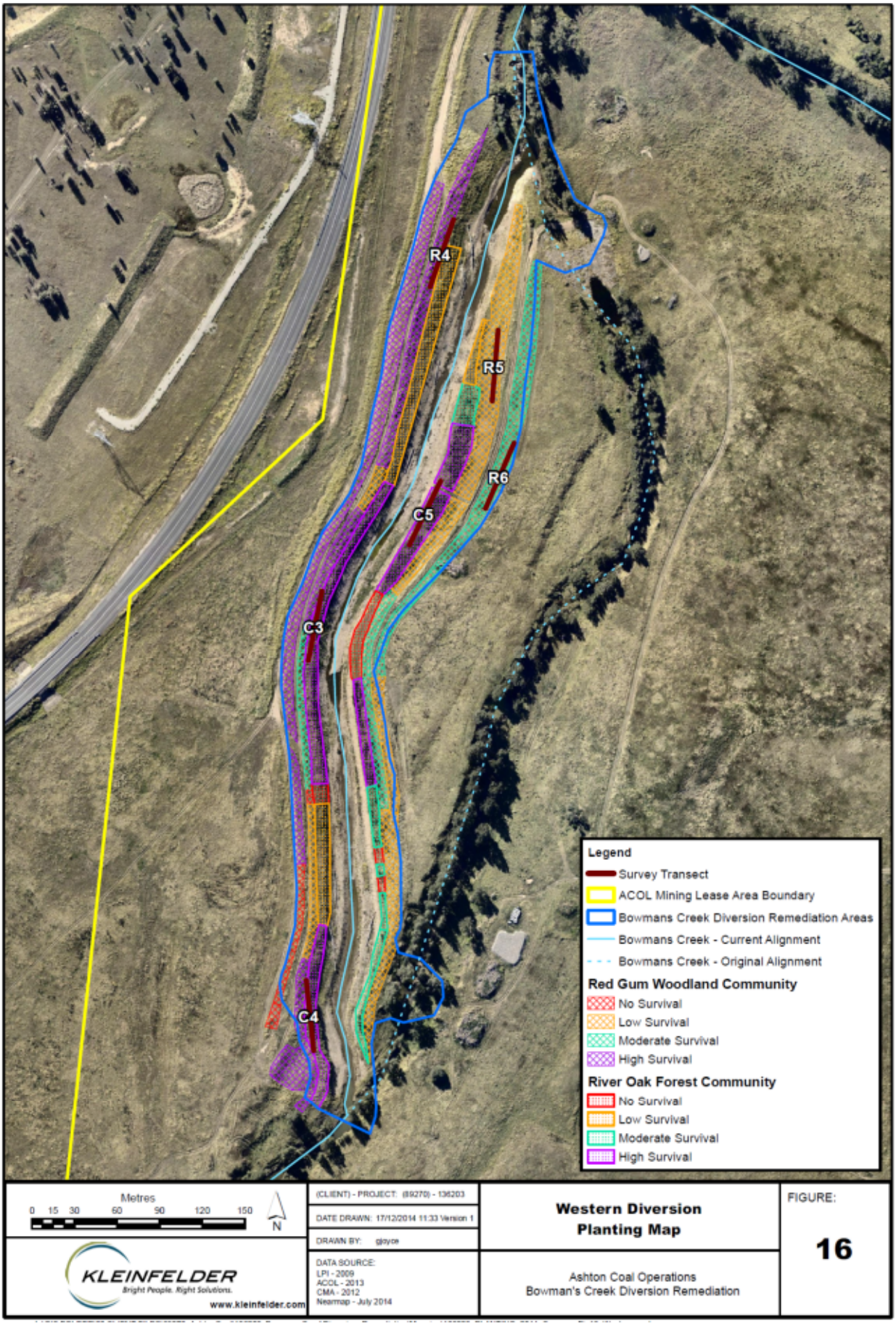

Figure 38 Rehabilitation survival rates, Western Diversion

5.3.2 NEOC Rehabilitation

Rehabilitation monitoring on the NEOC rehabilitation was undertaken during the reporting period in accordance with EA, Project approval and MOP requirements. The key focus of rehabilitation monitoring is to gauge progress against the completion criteria for each domain as detailed in the MOP. NEOC rehabilitation domains are shown in Figure 34. Domains monitored on the NEOC rehabilitation are Pasture – NEOC and Trees over Grass – NEOC. Completion criteria progress for each Pasture – NEOC and Trees over Grass – NEOC are shown in Table 35 and Table 36, respectively.

Table 35 and Table 36 are referenced from the Ashton Coal Mining Operations Plan – 2013 to 2017, Table 31 Ecosystem and Landuse Sustainability Criteria, Measures and Indicators. Current status comments are based upon the data and observations made during the annual survey conducted by Kleinfelder. Pasture – NEOC condition is based upon 12 monitoring plots (20m x 20m quadrats) and compared to three analogue grassland plots (same size) that are located on land owned by ACOL. Trees over Grass – NEOC condition is based upon three monitoring plots (20m x 20m quadrats) and compared to three analogue woodland monitoring plots of the same size that are located on land owned by ACOL.

During the reporting period the timing of the annual monitoring was altered to April from November. This was done to more accurately reflect the floral diversity occurring on the NEOC.

Floral results indicate a significant increase in the number of species recorded on the rehabilitation plots compared to the previous survey. Total species recorded in all monitoring plots (rehabilitation and reference) increased from 99 last survey to 123 this survey, an increase of 24% as shown in Table 34.

Table 34 species recorded on NEOC rehabilitation

Plot	Number of exotic species			Number of native species			Total Species Recorded		
Year	2013	2014	% Change	2013	2014	% Change	2013	2014	% Change
Woodland Reference	27	37	37.0	49	56	14.3	76	96	26.3
Grassland Reference	36	47	30.6	24	39	62.5	60	86	43.3
Pasture	28	42	50.0	8	18	125.0	36	60	66.7
Trees over Grass	21	27	28.6	20	19	-5.0	41	46	12.2
Total species (all plots)	45	54	20.0	54	69	27.8	99	123	24.2

The increase in species richness is a result of the improved rainfall over the autumn months prior to the most recent survey.

A noticeable paucity of pasture legume species was noted in all NEOC rehabilitation plots indicating that sustainability of good quality pasture may require additional management by sowing suitable legume species.

Landscape Function Analysis (LFA) results for the pasture plots were greatly improved compared to the 2013 survey. All plots met KPI's for Landscape Organisational Index (LOI) and Stability Index (SI), while two plots M200804 (North Facing) and M200801 (South Facing) did not achieve KPI for Infiltration & Runoff Index (IRI) or

Nutrient Cycling Index (NCI). These two plots either have severe Galenia infestation (M200804) or insufficient groundcover (M200801).

Trees over Grass plots achieved all KPI's for all LFA indices with one exception where M200803 was marginally under the SI score.

Analysis of the soil from the rehabilitated areas demonstrated that soils were able to support vegetation, but several of the chemistry parameters reflected the fact the underlying materials were not "soil" but crushed rock or spoil and would present results that will improve only with time and management. Electrical Conductivity (EC), Cation Exchange Capacity (CEC), individual cations, organic carbon and phosphorus have generally shown decreases from the last survey and may reflect the increased rainfall allowing the combination of increased plant growth and soil microbial activity removing available nutrients from the soil.

Soil microbiology has improved markedly from the previous two surveys. This can be attributed to a combination of the increased growth in the younger plots, the difference in timing of the survey from January and November to April and the application of microbial treatments in some areas.

The autumn invertebrate survey recorded significantly lower number of individual specimens but an increased diversity of morphospecies (no formal identification down to species level was undertaken – different species noted) when compared to the 2013 survey.

Table 35 Domain - Pasture (NEOC)

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Current Status
Restored and maintained to the same or higher land capability and agricultural suitability than prior to mining	LFA Organisation Index	Annual Rehabilitation Monitoring Report	Performance indicator is broadly comparable to that of analogue sites.	CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004) DA Schedule 2, Condition 3.55	**<u>Partially achieved over whole site</u>** • **Achieved for:** o 80% of NEOC • **Partially achieved for:** o 20% of NEOC (30 ha on North slope) contains smaller areas where *Galenia* infestation & subsequent treatment has resulted in areas of bare ground o Smaller sections of South slope have patchy groundcover
	LFA Stability Index				**Achieved**
	LFA Infiltration Index			CSIRO Methodology for Ecosystem	**<u>Partially achieved over whole site</u>** • **Achieved for:** o 80% of NEOC (80%) • **Partially achieved for:** o 20% of NEOC (30 ha on North slope) o Smaller sections of South slope

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Current Status
Restored and maintained to the same or higher land capability and agricultural suitability than prior to mining	Land Capability Class	Annual Rehabilitation Monitoring Report	Field data results are used to define land capability and include: - Climate - Soil texture - Position - Slope - Erosion - pH - Drainage - Rock	Function Analysis (Tongway, 2004) DA Schedule 2, Condition 3.55	**Achieved** • Pre-mining assessments rated the Land Capability at Class V (Murdoch, 2001) based on Soil Conservation Service Land Capability class system. • Class V land not suitable for regular cultivation due to limitations of slope, soil erosion, rockiness or shallowness, climate or combination of factors. Can be occasionally cultivated especially for fodder crops or pasture renewal. • Current land condition meets criteria for similar classification.
Final Landform is sustainable and resilient to environmental pressures	Weed species abundance and diversity		Performance indicator is broadly comparable to that of analogue sites		**Partially Achieved** • Galenia infestations on Northern slope require on-going treatment Listed weeds African Boxthorn and *Opuntia* cacti require treatment
	Groundcover				**Partially Achieved** • Northern Slope areas where Galenia is present and/or has been treated result in areas of bare ground during long periods of dry. • Smaller sections of South slope have patchy groundcover.

Table 36 Domain - Trees over Grass (NEOC)

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Current Status
Ecological diversity will be maintained or enhanced	Foliage Cover	Annual Rehabilitation Monitoring Report	Vegetation structure and complexity is broadly comparable to that of analogue sites	DA Schedule 2, Condition 3.55 CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004)	**Partially Achieved** • Age differential between the ToG (young) areas and the Woodland areas (older) used as analogues means that at present the ToG does not have the same foliage cover. With maturation, the ToG areas will be comparable.
	Tree Diversity		Diversity of maturing tree and shrub species is broadly comparable to that of analogue sites		**Achieved -** Diversity of maturing tree and shrub species is broadly comparable to that of analogue sites
	Tree Density		Density of maturing tree and shrub species is broadly comparable to that of analogue sites		**Partially Achieved** • **Achieved** - Canopy species density is comparable • **Partially Achieved** - Shrub density is higher than analogue sites
	Tree health/condition		Vegetation condition is broadly comparable to that of analogue sites		**Achieved**
	Flowers, fruit, new growth				**Partially Achieved**. • None observed during survey. Canopy species can be expected to flower 5 -7 years from planting. • Shrub species –seedlings observed during surveys.
Ecosystem function is restored	LFA Organisation Index		Index is broadly comparable to that of local remnant vegetation		**Achieved**
	LFA Stability Index				**Achieved**
	LFA Infiltration Index				**Achieved**

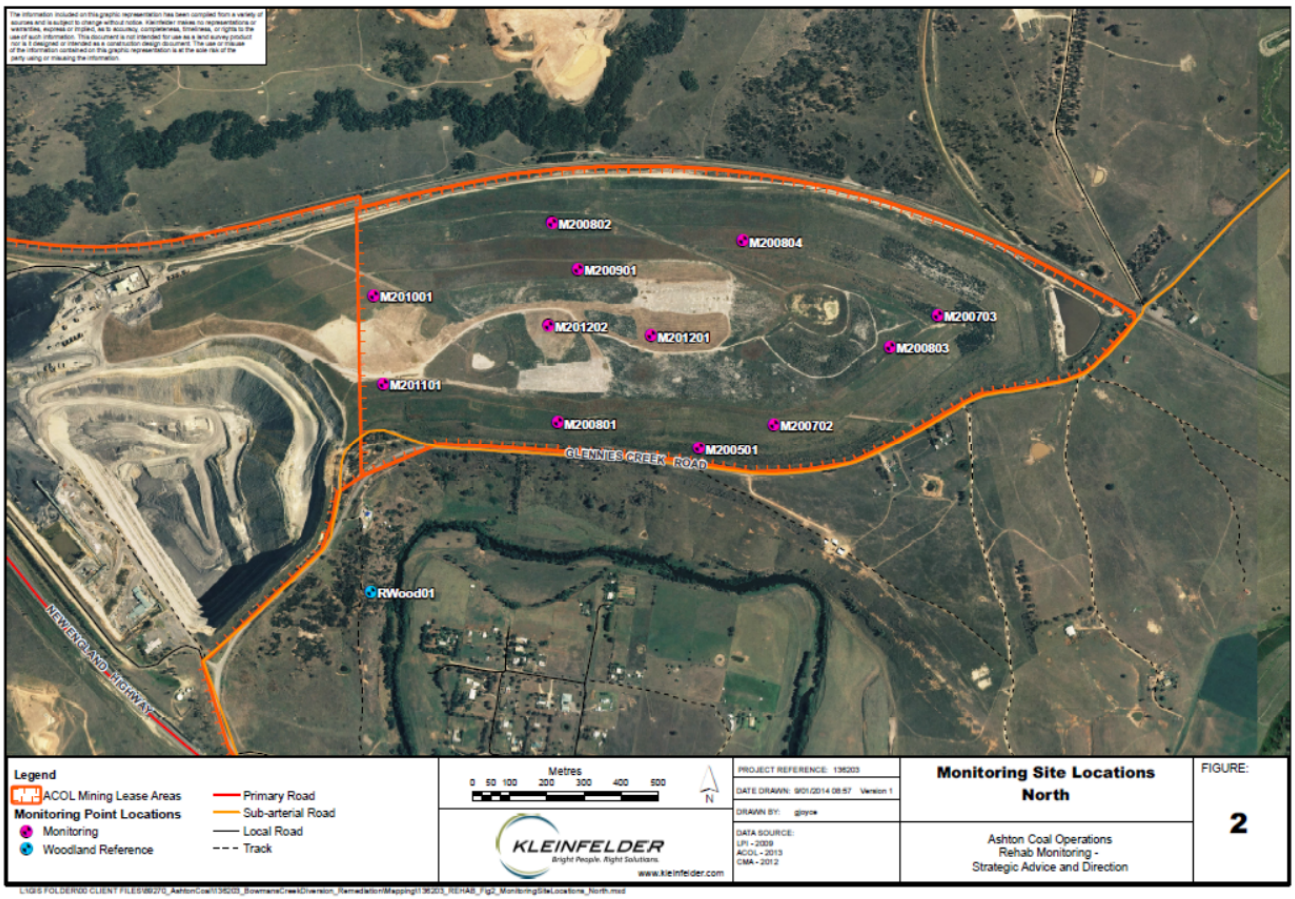

Figure 39: Rehabilitation monitoring site locations – north

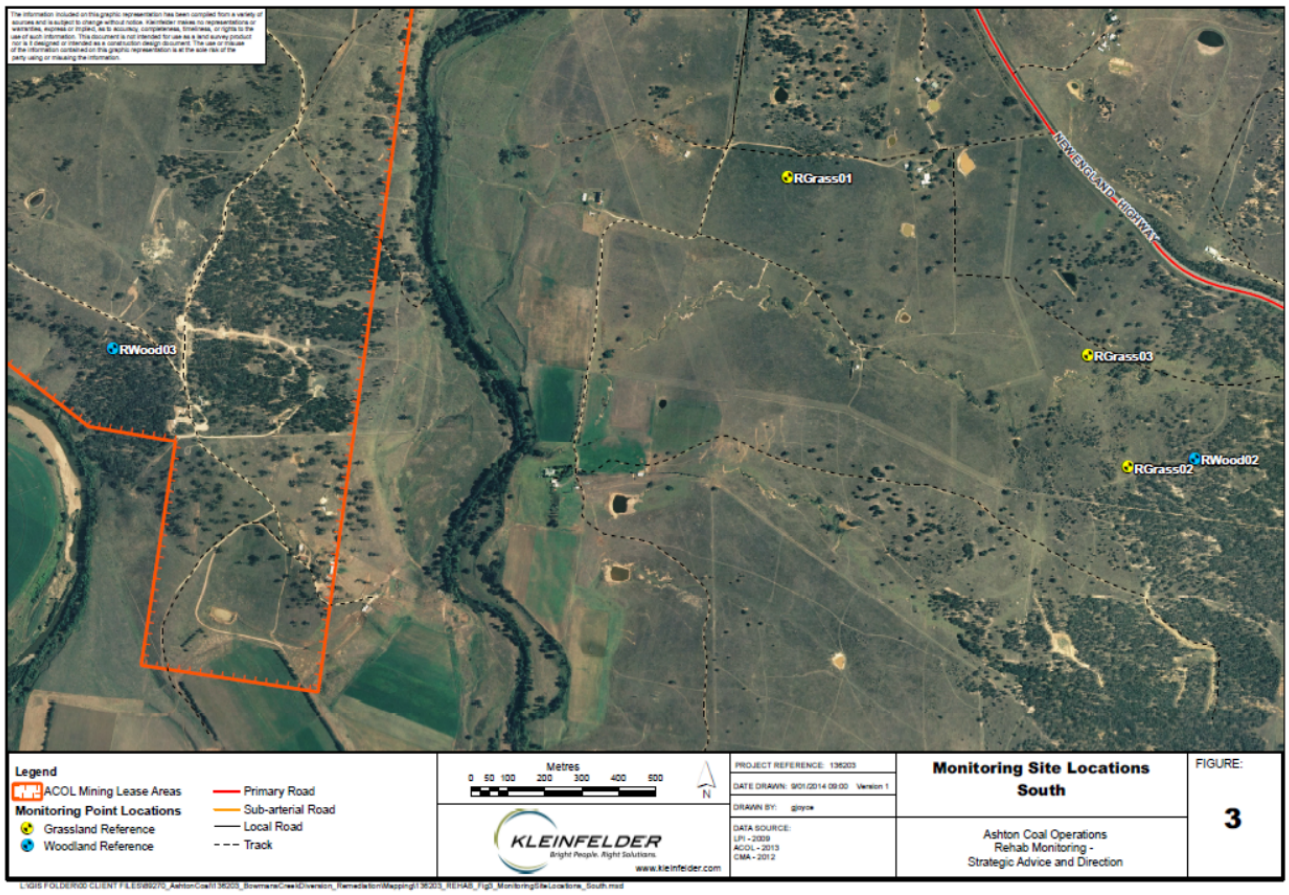

Figure 40: Rehabilitation monitoring site locations - south

5.3.3 Farmland monitoring

Condition 9.2(I) of the ACP development consent (DA No. 309 -11- 2001-i) requires the 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 grazing. Coal extraction by the retreating longwall method occurs under farm land areas and subsidence is expected to occur. Monitoring is required to be undertaken to determine what, if any, effects mining may have upon the land and the vegetation. Monitoring is undertaken to gauge progress against the completion criteria committed to in the MOP. The status of farmland above subsidence in comparison to the MOP completion criteria is shown in Table 37. This table is referenced from the *Ashton Coal Mining Operations Plan – 2013 to 2017, Table 31 Ecosystem and Landuse Sustainability Criteria, Measures and Indicators*. Current status comments are based upon the data and observations made during the annual survey. Pasture – Underground Mining Areas condition is based upon five monitoring plots (20m x 20m quadrats) and compared to three analogue grassland plots (same size) that are located on land owned by ACOL. Monitoring locations are shown in Figure 41.

In addition to farmland monitoring, the MOP details completion criteria for treed areas of the underground mine. A comparison of monitoring results against completion criteria for the Trees over Grass – Underground Domain are shown in Table 38.

The 2014 survey results show that the floristic biodiversity has increased with 73 species recorded from the farm land plots, compared to 52 species from the 2013 survey. Native species richness increased markedly with 20 more species recorded compared to the last survey.

Listed weeds recorded on the farm land plots include African Boxthorn (Class 3 weed) on MFarm06 and the cacti Prickly Pear (MFarm01) and Tiger Pear (MFarm06). These cacti are Class 4 weeds. Other weeds may become an issue with *Galenia pubescens* of particular concern, having increased its coverage in each of the monitoring plots. Spiny emex was recorded for the first time, a weed that has been known to cause lameness in stock.

Two of the LFA indices (Landscape Organisational Index (LOI) and Stability Index (SI)) remain stable when compared to last year's survey while the Infiltration/Runoff Index (IRI) and the Nutrient Cycling Index (NCI) show variations that are attributed to seasonality and increased rainfall promoting plant growth. This indicates that underground mining has had little if any impact upon the farm land ecosystem.

The results of the 2014 soil analysis show that several of the soil parameters measured are trending towards a reduction in fertility of the farm land system, although the trends can be plot specific. Organic carbon levels have decreased for most plots and are now below the stated target of above 4.5 per cent. Soil pH has decreased across the plots, but with the exception of MFarm06 it is within the desirable range of 5.6 – 7.3. Cation Exchange Capacity has recorded a further decrease from the previous survey. MFarm04 has elevated levels of CEC and exchangeable calcium, magnesium and phosphorus that can best be explained by past farm management practices such as addition of fertilisers. Salinity remains below the levels that can be expected to affect plant growth for all monitoring plots.

Overall these soil parameters indicate a reduction in soil fertility and hence the ability to support agriculture. It would be difficult to attribute this decline to mining activities, especially as MFarm05 and MFarm01- not directly over mining – are also affected. This suggests that management activities may be the reason, with fertiliser application the likely solution if agricultural production is to be maintained or increased.

Soil microbial analysis showed that with the change of monitoring season, activity has increased indicating the resilience of the microbial community and its response to increased plant growth.

The invertebrate survey was undertaken during a different season to the previous survey and therefore has some differences due to seasonality. Invertebrate specimen numbers were considerably lower, while morphospecies were slightly less than the previous survey. However the changes in morphospecies and specimen abundance are plot specific. MFarm06 has increased invertebrate abundance with the two grassy plots MFarm03 and MFarm04 less abundant. Future monitoring at this time of year will be able to track any changes in invertebrate abundance and morphospecies composition.

In conclusion, the physical landscape appears to be stable with the increase in flora biodiversity due to the change in the timing of the survey. The continuing decline of some of the key soil fertility parameters requires continued monitoring with the aim of changing management practices to maintain or increase fertility i.e. addition of fertiliser.

Farmland management strategies potentially include:

- Reviewing the target Organic Carbon levels to determine if a reduction is warranted;
- Establishing MFarm04 and MFarm05 as analogue sites. The MOP requires analogue sites for all monitoring activity;
- Removing MFarm06 from the farm land monitoring program due to its woodland flora assemblage and structure and including it and the previous data in monitoring for the Voluntary Conservation Area; and
- Continuing with weed control targeting *Galenia pubescens*, *Lycium ferocissimum* (African Boxthorn), *Emex australis* (Spiny emex) and the cacti *Opuntia stricta* (Prickly Pear) and *Opuntia aurantiaca* (Tiger Pear).

5.4 Rehabilitation Trials and Research

Two rehabilitation trials have been conducted at Ashton using soil ameliorants, using an Organic Growth Medium (OGM) and Bio solids. In conjunction with the OGM trial, various microbial sprays were applied to rehabilitation to investigate possible improvements in soil health.

Improved pasture groundcover and above ground herbage mass was significantly higher at an OGM application rate of 100t/ha, which was incorporated into rehabilitation of the NEOC, completed in 2012.

With no rehabilitation undertaken over the past two years there has not been further rehabilitation trials undertaken, works instead focussing on improving monitoring processes and ensuring comparisons to the completion criteria set out in the MOP are easily understood.

Ashton is a member of the Australian Coal Association and contributes to the research projects undertaken through that organisation, including rehabilitation trials.

In addition to ACARP funding, ACOL has focussed significant resources on the Bowmans Creek Diversion over the past four years. The design, construction and rehabilitation of the diversion to geomorphic principles has demonstrated significant success at this early stage of operation. Further monitoring and trials will be carried out on the diversions in the coming years.

Table 37 Domain - Pasture Underground Mining Areas

	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Current Status
Restored and maintained to the same or higher land capability and agricultural suitability than prior to mining	LFA Organisation Index	Annual Farmland Monitoring Report	Performance indicator is broadly comparable to that of analogue sites.	CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004) DA Schedule 2, Condition 3.55	**Achieved**
	LFA Stability Index				**Achieved**
	LFA Infiltration Index				**Achieved**
	Land Capability Class		Field data results are used to define land capability and include: - Climate - Soil texture - Position - Slope - Erosion - pH - Drainage - Rock -		**Achieved** • Pre-mining assessments rated the Land Capability ranging from Class I to Class V mapped at 1:100,000 (Murdoch, 2001) based on Soil Conservation Service Land Capability class system. • Class I - Land suitable for wide variety of uses, high potential for agriculture and may be cultivated for vegetables, fruit, cereals, grains and other high value crops. • Class II – Similar to above but site characteristics impose some limitations to production. • Class IV - Land not suitable for regular cultivation due to limitations of slope, soil erosion, rockiness or shallowness, climate or combination of factors. Can be occasionally
	Land Capability Class			CSIRO Methodology for Ecosystem	

	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Current Status
Restored and maintained to the same or higher land capability and agricultural suitability than prior to mining		Annual Farmland Monitoring Report	Field data results are used to define land capability and include:	Function Analysis (Tongway, 2004) DA Schedule 2, Condition 3.55	cultivated especially for fodder crops or pasture renewal. • Class V – Similar to Class IV but with lower productivity due to site restrictions. Current land condition meets criteria for similar classifications.
Final Landform is sustainable and resilient to environmental pressures	Weed species abundance and diversity		Performance indicator is broadly comparable to that of analogue sites		**Partially Achieved** • Listed weed Opuntia cacti requires treatment (limited occurrence in analogue and Pasture – Underground Mining areas) • Environmental weed Galenia is widespread but coverage is generally low in Pasture - Underground Mining areas – requires preventative treatment to limit spread
	Groundcover				**Achieved**

Table 38 completion criteria comparison - Trees over Grass - Underground

Domain Objective	Performance Indicator	Performance Measure	Completion Criteria	Justification/Source	Current Status
Ecological diversity will be maintained or enhanced	Foliage Cover	Annual Farmland Monitoring Report	Vegetation structure and complexity is broadly comparable to that of analogue sites	DA Schedule 2, Condition 3.55	**Achieved** Vegetation type classified as Grassy Woodland with a sparse shrub layer
	Tree Diversity		Diversity of maturing tree and shrub species is broadly comparable to that of analogue sites	CSIRO Methodology for Ecosystem Function Analysis (Tongway, 2004)	**Achieved** Area is long term regrowth with *E. moluccana* and *A. luehmannii* canopy species present
	Tree Density		Density of maturing tree and shrub species is broadly comparable to that of analogue sites		**Achieved**
	Tree health/condition		Vegetation condition is broadly comparable to that of analogue sites		**Achieved**
	Flowers, fruit, new growth				**Achieved**
Ecosystem function is restored	LFA Organisation Index		Index is broadly comparable to that of local remnant vegetation		**Achieved**
	LFA Stability Index				**Achieved**
	LFA Infiltration Index				**Achieved**

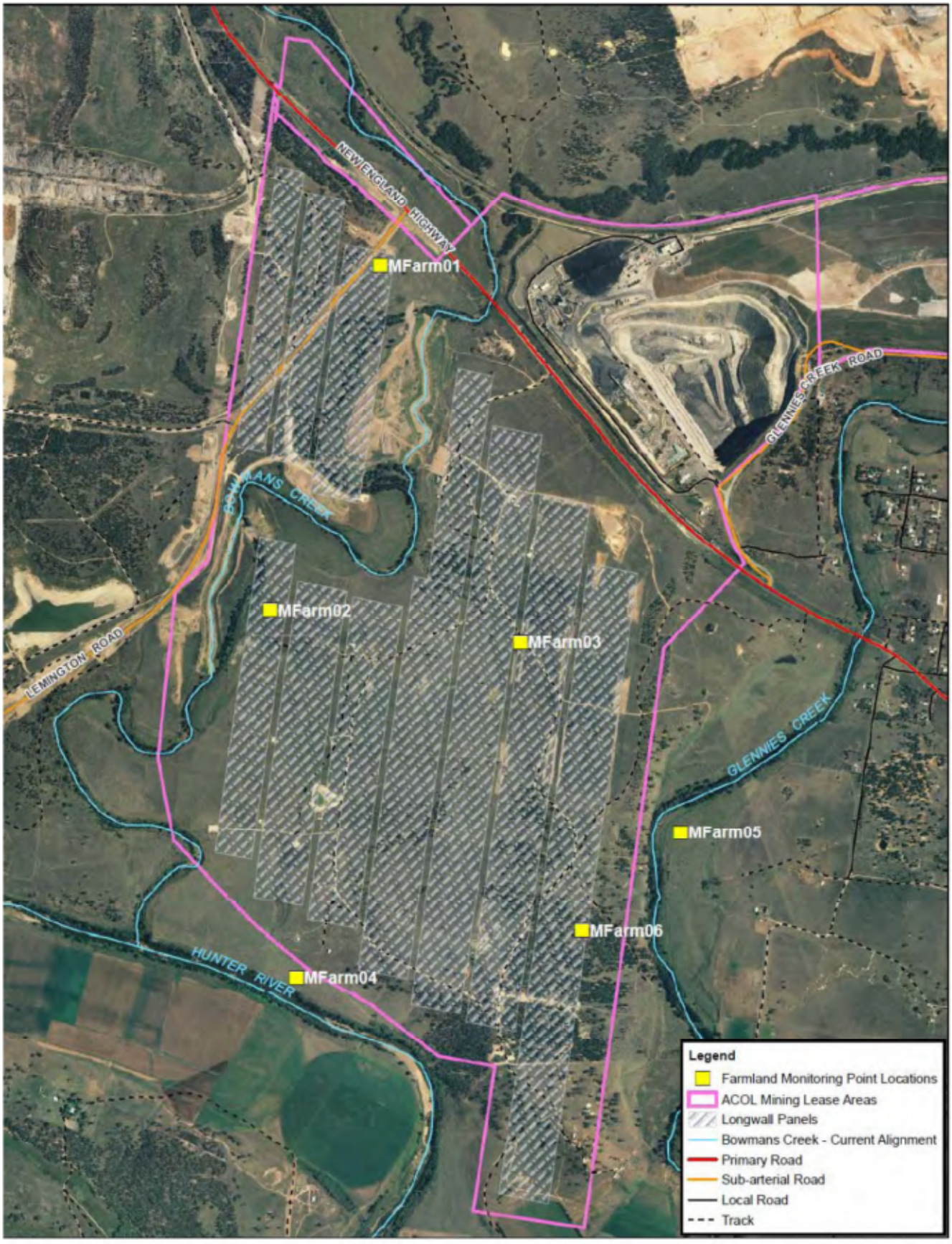

Figure 41: Farmland monitoring locations

6 Activities Proposed in the Next AEMR Period

ACOL 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.

ACOL has established the following targets for the next reporting period, calendar year 2015:

- Complete EPL variations, as discussed with EPA, and amend associated air quality and groundwater monitoring programs.
- Obtain Mining Purposes Lease from the NSW Department of Energy and Resources for the Tailings Dam and associated infrastructure.
- Prepare, consult and lodge the Extraction Plan for the Upper Liddell Seams 105 - 107B for approval from the NSW DP&E.
- Implement revised Water Management Plan, once approved by the NSW Department of Planning and Environment.
- Assess and commence remedial works as required in areas rehabilitated following the installation of pipework associated with boreholes and gas wells.
- Continue rehabilitation of the Bowmans Creek and the Bowmans Creek Diversion.
- Recalibrate site water balance model.
- ACOL to commission an appropriately qualified geomorphologist to investigate the Western Diversion bed scour and recommend any remedial actions.

Figure 42 Fines Plant, ACOL CHPP

7 Acronyms

ACCF	Aboriginal Community Consultation Forum
ACHMP	Aboriginal Cultural Heritage Management Plan
ACOL	Ashton Coal Operations Pty Limited
ACP	Ashton Coal Project
AEMR	Annual environmental management report
AHIP	Aboriginal Heritage Impact Permit
BCA	Bowmans Creek Alluvium
bcm	Bank cubic metres
CCC	Community consultative committee
CHPP	Coal handling preparation plant
CL	Centre Line
dB	Decibels
DP&E	NSW Department of Planning and Environment
DRE	NSW Department of Trade and Investment – Division of Resources and Energy
EA	Environmental assessment
EC	Electrical conductivity
EDC	Eastern Diversion Channel
EEO	Energy efficiency opportunities
EL	Exploration licence
EPA	NSW Environment Protection Authority
EP&A Act	NSW 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
kV	kilovolt
LB	Lower Barrett coal seams
LFA	Landscape Function Analysis
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
NSW	New South Wales
OC	Open Cut
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
ROW	Right of Way
SC	Singleton Council
TEOM	Tapered element oscillating microbalance samplers
TEOP	Tailings Emplacement Operations Plan
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
WDC	Western Diversion Channel
XL	Cross line
UG	underground
µS/cm	Micro Siemens per centimetre
$\mu g/m^3$	Micrograms per cubic metre
^oC	Degrees Celsius

Appendix 1. Groundwater Report (prepared by RPS)

ASHTON COAL OPERATIONS
2014 GROUNDWATER MANAGEMENT REPORT

ASHTON COAL OPERATIONS
2014 GROUNDWATER MANAGEMENT REPORT

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Revision A	24/12/2014	First draft for client review
Revision B	23/02/2015	Second draft for client review

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Disclaimer

EXECUTIVE SUMMARY

This Groundwater Management review is prepared by RPS as a supporting document for the 2014 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 2014 to 31 December 2014. The results of the groundwater monitoring are presented and summarised together with analysis of trends over a three year period.

Over the 2014 review period, the following activities were of relevance to the groundwater management at the Ashton Coal Project:

- The frequency of groundwater monitoring was increased to fortnightly and weekly at key piezometers during the mining of LW102 and LW103.
- The mining of LW102, the second longwall panel accessing coal from the Upper Liddell seam was completed. The following points are noted in relation to the mining of LW102:
  - No groundwater drawdown was observed within the Glennies Creek Alluvium.
  - No impacts to Glennies Creek baseflow were measured.
- In August 2014, mining commenced in LW103. The following observations are noted:
  - No groundwater drawdown was observed within the Glennies Creek Alluvium.
  - No impacts to Glennies Creek baseflow were measured.
- Groundwater drawdown continued to be monitored in parts of the Bowmans Creek Alluvium overlying and adjacent to LW6B.
  - An increased rate of mine inflows was observed from Permian lithologies, 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 generally consistent predictions in the 2009 EA.
- A LW6B inflows investigation was conducted into the LW6B Inflows event, which commenced in October 2013, and continued into the review period. The groundwater numerical model was updated and recalibrated to include the LW6B inflows information.

Compliance with the Water Management Plan

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 (WMP).

In early 2014 the trigger for mine inflows was exceeded following the continuation of the LW6B inflow event. The resulting investigation concluded that increased permeability resulting from bed separation and non-connected fracturing resulted in an enhanced connection of the longwall goaf with more permeable units within the CMOB and the overlying BCA. No direct connecting fracturing between the goaf and the BCA was indicated. The inflows were observed to gradually diminish over the review period.

For the remainder of the 2014 review period, the trigger value had been exceeded momentarily however was not sustained for any prolonged period of time. Under the 2012 WMP the trigger

level is required to be exceeded for a period of three months before a reportable exceedance is deemed to have occurred.

Table E1 provides a comparison of the observed impacts over the 2014 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	Nil	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	Nil	0.18m	>0.18m	
Hunter River Alluvium – Groundwater Drawdown				
South of LW104	Nil	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	Nil	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 1m	Partly dewatered	NA	
Groundwater dependent ecosystems south east of LW7A.	Nil	<0.5m	0.5m	
Reduction in Baseflow[5]				
Glennies Creek	Nil	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	>0.59L/sec	0.59L/sec	drawdown in excess of 115% of predictions	
Hunter River	Nil	0.13L/sec	Drawdown in excess of 115% of predictions	
Mine Inflows				
Inflow Rate	29.8L/sec	15.7L/sec [3]	23.5L/sec [4]	2012 WMP: Section 7.3.5 – Table 7.5 2012 WMP: Section 10.4.4
Total Underground Inflows [3]	638ML	509ML	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. No active mining occurred in this locality during the reporting period.

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

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

[5] Refer Section 4.4 for discussion on baseflow observations.

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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 wholly owned subsidiary of Yancoal Australia (Yancoal). Figure 1 provides a macro view of the ACP relative to surrounding mines and other infrastructure.

The ACP comprises 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 2).

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 being mined via eight longwall panels (LW101 to LW108) underlying the PG panels. Mining of the ULD seam occurred at LW101 from August 2012 to June 2013 and at LW102 from October 2013 to August 2014. Between LW101 and LW102, the longwall was relocated to complete the extraction of LW6B in the PG seam. Extraction of coal from LW103 began in August 2014 with completion planned for April 2015.

1.1 Scope of this Report

This report forms a Groundwater Management Report for the review period 1 January 2014 to 31 December 2014 (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 and monitoring 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:
  - 8 August 2014 – Completion of LW102 extraction in the ULD seam
  - 21 August 2014 – Commencement of LW103 extraction in the ULD seam
- Installation of dewatering service hole BH4A.

- End of Panel groundwater review for LW102.
- Mid Panel groundwater review for LW103.
- Monitoring compliance reporting completed for the periods; March, April, May, June, July-August, September and October-December.
- Completion of a preliminary mine inflow investigation into elevated inflows following LW6B extraction.
- Update of the ACOL Groundwater Model.

2. GROUNDWATER MONITORING PROGRAMME

2.1 Monitoring Network

An extensive groundwater monitoring network surrounding the ACP has provided a comprehensive baseline dataset. The monitoring network is detailed on Figures 2 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

There were no additional piezometers installed during the review period.

Communications were lost permanently to the following Vibrating Wire Piezometers due to subsidence:

- WML189
- WML191
- WMLC333 (partial)

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 LW102 and LW103 as detailed in Table 2.1.

Some of these piezometers were equipped with automatic data loggers recording measurements on six-hourly intervals.

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. Monitoring results are split into the three distinct alluvial systems – Glennies Creek, Bowmans Creek and Hunter River. EC results are presented in Tables 3.2, 3.3 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.

Groundwater Monitoring

Over the review period, water was removed from the underground mine via three main pathways: borehole pump no.2 (BH2) located south of LW5 in the PG seam, borehole pump no.3 (BH3) located south of LW101 in the ULD seam, 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
LW102/LW103 – Upper Liddell Seam (see Figure 3 and 4)		
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	

Piezometer ID	Piezometer Type	Monitored Strata and Hydrograph Reference
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	

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 661.7mm being above the long-term median (LTM) annual rainfall of 660.1mm (Table 3.1).

- In the period February through April, Ashton experienced wetter than normal conditions with rainfall above the LTM. The aggregate for the three months was 332.2mm which is 72% above the LTM for the same period (192.6mm).
- Significantly reduced rainfall followed in May and June (aggregate of 25mm versus an LTM of 73.1mm) which then again increased above the LTM for July through September. A total rainfall of 136mm was measured over the three month period July to September, some 71% above the LTM for the period of 79.7mm.
- November was unusually dry and December was significantly wetter compared with the LTM.

Table 3.1: 2014 Monthly Rainfall

Month	2014 Ashton Rainfall (mm)	Long-Term Median* (mm)
January	6.8	50.4
February	136.6	107.4
March	119.2	51.1
April	76.4	34.1
May	4	24.3
June	21	48.8
July	42.6	25.1
August	58.2	26.1
September	35.3	28.5
October	34.9	52.8
November	18	78.1
December	143.6	66.6
Annual	661.7	661.7

*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 aid in the interpretation of 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 (2012 to 2014) are presented in hydrographs to allow an observation of longer term trends (Figures 5 to 28). During the review period, the following observations are noted:

3.2.1 North East Open Cut – Figure 5

Groundwater in the vicinity of the NEOC is monitored at piezometer GM1. Piezometer GM1, which monitors the Upper Liddell seam, showed a decline in water level from January to February then remained reasonably static around 65mAHD throughout the LW102 extraction period. This

elevation is consistent with pre-mining water levels at this location. At the end of the reporting period the water level at GM1 had reduced to 64.56mAHD.

3.2.2 Bowmans Creek Alluvium – Figures 6 to 9

During the review period, the elevations of the water levels within the BCA are shown to range from approximately 48.5mAHD to 61.5mAHD.

Over the review period, water levels in the northern BCA continued to decline in response to the LW6B inflow event that commenced in late 2013. This drawdown response generally aligns with modelled predictions (Aquaterra 2009) and has been carefully monitored following identification in September 2013.

Northern BCA Area – Figures 6 (North-east) and 7 (North-west)

- At the cessation of mining in LW6B (October 2013), piezometer water levels increased due to significant rainfall in November 2013. Following the recharge event, water levels then decreased through to March 2014.
- A number of smaller recharge event followed by water level regression are observed over the review period.
- The observed water level decline following the recharge events is considered to be greater than the natural rate of water level regression and is considered to be associated with the LW6B inflow event.
- Water levels in the north-west (Figure 7) experienced significant drawdown from November 2013 through to March 2014 in association with the LW6B inflow event. Water levels in RA30 where observed to fluctuate at or below the base of the piezometer from March to September recovering slightly in late September. Recovery at RA30 was short lived and was dry for the remainder of the year. T5 also shows a minor increase in water level in September after levels being at the base of the piezometer in March.
- WML115C shows a gradual decline which has continued from extraction of LW6B and LW102. It is noted that the recharge events apparent in the north-eastern area (Figure 6) are not observed as strongly in the north-western area.

Central BCA Area – Figure 8

- Water levels in the central BCA area continued to decline in early 2014. The northern most piezometer (WMLP328) shows a response similar to the northern BCA piezometers (Figures 6 and 7) with a series of minor recharge and regression cycles over the review period. The piezometers located further south however, remained reasonably stable through to the end of the review period with only a subdued response to rainfall
- .

Southern BCA Area – Figure 9

- In general, water levels show a general decline during the review period with a slight recovery during the wet period February through April observed at RA10 and RA08. The decline is the continuation of a general water level regression following a large recharge event in January/February 2013 and again in late 2013. Any determination of mining induced drawdown above the natural variation is difficult to identify.
- Shallow bore T3-A is recorded as being dry during the period February to April and then again in June. During May a water level was recorded that is more consistent with the longer term trend. The apparent water level decline is not explained and is inconsistent with hydrographs of nearby BCA piezometers (Figure 9). Although short lived, a similar response was observed in May 2011.
- 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. Previously, T10 had been shown to display anomalously high water levels following large rainfall events, it is inferred that this response is due to the ingress of surface water through the bore annulus

rather than natural recharge infiltration.

3.2.3 Glennies Creek Alluvium – Figures 10 to 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 50.5mAHD to 52.5mAHD.

Despite the heavy rainfall period experienced in February through April 2014, water levels in the GCA piezometers do not appear to respond. Water levels did show a moderate increase in the latter stages of LW102 however again declined at the commencement of LW103.

Northern GCA Area – Figure 10

- Other than an initial decline at WML120B at the start of the review period, water levels are observed to remain relatively stable over the review period.

Central GCA Area – Figure 11

- Water levels in the central GCA gradually decline during the first half of the review period and then increase again in a delayed response to elevated rainfall during February to April.

Southern GCA Area – Figure 12

- In general, water levels show a similar response to those in the central GCA area (Figure 11). A general water level decline is observed following elevated rainfall in late 2013. Water levels decline through to May/June, and then increase again following the elevated rainfall in February/April.
- Water levels in the southern GCA are observed to remain within historical levels over the review period.
- Piezometers WML241, WML243 were measured less frequently over the review period to limit disturbances to local residents.
- WML243 appears to show a large response to rainfall in late January however this was not observed in any of the other southern GCA piezometers and may be erroneous.

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 47.9 to 49.5mAHD during the reporting period.

- All HRA piezometers show the continuation of a regression in water levels following a large recharge event in January/February 2013. Water levels are also shown to rise, albeit slightly, in response to rainfall recharge during the period February through April 2014.
- RA27 has been largely reported as being dry over the majority of the review period. While it is noted that there is still around 4m of saturated alluvium beneath the base of RA27, the response is inconsistent with the surrounding piezometers. Where water levels have been recorded in RA27 during the review period they are at elevations that are consistent with the other HRA piezometers.

3.2.5 Permian Coal Measures Overburden (BCA Area) – Figures 14 to 16

Northern Underground Area – Figure 14

- During the early review period there is a general continuation of declining water levels associated with the LW6B inflow event.
- WML115B was stopped being monitored after May following the reassessment of monitoring commitments for LW101-103.
- Water levels are shown to rebound significantly in response to the wet period of February through April. The recovery is shown to continue well after the rainfall events, indicating a continued infiltration and recharge from the overlying BCA. It is noted that WML325 shows a very similar response to nearby BCA piezometer WML323 (Figure 6).

Central Underground Area – Figure 15

- Water levels remained reasonably stable during the early review period with piezometric heads displaying gradual responses to rainfall variation and remaining within historical trends.
- In the latter half of the review period there is a water level decline observed at T2-P which may represent the propagation of depressurisation from the LW6B inflows. It is also possible that the depressurization is in response to the drilling of dewatering bore BH4A into the LW7A Maingate area. The drilling of BH4A resulted in increased inflows as discussed in Section 3.4.

Southern Underground Area – Figure 16

- Piezometric heads show a general declining trend over the review period and are observed to respond to significant rainfall recharge events.
- The hydrograph (Figure 16) appears to show a number of erroneous readings, specifically at T3-P in January. These reasons for this erroneous reading are currently not clear.
- RM02 appears to stabilize during the latter half of the review period.
- T4-P has shown a slightly stronger declining trend over the review period. T4-P historically responded to the extraction of LW4 and LW5 in PG seam (as did RM02) and then subsequently recovered. The current decline commences with the completion of LW8, with water levels declining below historical limits. This may indicate a gradual depressurisation of the CMOB at T4-P following extraction of the PG Seam, if so, such a decline would be consistent with modelled predictions.
- WMLP327 shows a depressurisation response towards the end of the review period. WMLP327 is considered to be too far from LW6B to be influenced by depressurisation from that event and the response is considered to be more likely associated with the drilling of BH4A.

3.2.6 Permian Coal Seams – Figures 17 to 26

Bayswater and Lemington Coal Seams – Figures 17 to 19

- RSGM1 in the Bayswater Seam (Figure 17) shows stabilized water levels of the last half of the review period following water level regression from a recharge event in late 2013.
- WML213 and WML113A in the Bayswater Seam (Figure 17) have historically responded to extraction of the PG seam with a depressurization and then recovery. Water levels have been stable for the majority of the review period but then decline in September, presumably in response to the BH4A inflows.
- Some piezometers monitoring the Lemington seam have previously exhibited responses following the extraction of the underlying PG seam (Figures 18 and 19). Over the review period:
  - Water levels continue to decline at WML113A (65m) and WML213 (110m), with a more subdued decline at WMLC361 (Figure 18).
  - Water levels at WMLC334 are generally fairly stable (Figure 18).
  - Water levels at WML213 and WMLC334 in Lemington 19 Seam continue to decline (Figure 19).
  - WMLC361 in Lemington 15 (Figure 19) shows a pronounced water level decline following LW6B extraction.

Pikes Gully – Figures 20 and 21

- Over the review period WML182 continues to show a gradual water level decline after extraction of LW101.

- WML183 (Figure 20) shows a significant water level decline in the early stages of the review period. The decline commenced during LW101 extraction in the ULD and then accelerated during LW6B extraction, possibly coinciding with the LW102 development headings. Water level rebounded briefly due to high rainfall in November 2013 before declining again with a gradual decline over the remainder of the review period.
- All other piezometer on Figure 20 show relatively stable trends ranging from minor declines to minor increase in water level.
- WML213 and WMLC335 (Figure 21) show continued declines over the review period in response to PG extraction. Since 2008, total depressurisation in the PG seam at WML213 has been of the order of 100m. This is considerably greater than the predicted depressurization and is discussed further in Section 4.1.
- WML189 and WML191 were both lost to subsidence with the extraction of LW102 (Figure 21).

Arties Seam – Figure 22

- WMLP301, WMLP302 show generally stable trends over the start of the review period. WMLP301 had previously shown a depressurization response to LW101 extraction.
- WMLC333 had shown an initial setting in following installation in early 2012. WMLC333 then showed a decline during LW101 extraction followed by a gradual decline until the commencement of LW103. At the commencement of LW103, WMLC333 in the Arties Seam underwent a major depressurization after which it appears false readings continue to be received, presumably due to the reactivation of PG LW4 subsidence.
- WML189 was lost due to subsidence as it was undermined by LW102.
- WMLC334 and WMLC335 continue a declining trend that commenced in response to LW101 extraction. This response is consistent with predictions following the extraction and resulting depressurisation of the underlying ULD seam.
- Piezometer WMLC361-161m shows a decline commencing during extraction of LW6B (2013) then stabilised throughout the current review period with approximately 15m piezometric head above the vibrating wire sensor.

Upper Liddell Seam – Figures 23 and 24

A continuation of a declining trend first observed in response to the extraction of the ULD development headings (10 January 2012) is observed at WML213 (Figure 23) and WML262, WMLC334, and WMLC335 (Figure 24).

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

Over the review period the following responses were observed:

- WML213 (Figure 23) and WML262 (Figure 24) show the continuation of a gradual depressurising trend first observed during the extraction of the PG seam.
  - The depressurisation trend at WML213-247m was first observed during PG extraction. 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 and WMLC335 (Figure 24) show the continuation of a gradual depressurising trend.

Middle and Lower Liddell Seams – Figure 25

- Piezometers monitoring the Liddell seams underlying the ULD are shown to display generally stable to slight depressurisation trends following the commencement of ULD extraction with the following exceptions.
- WML213-275m shows a gradual depressurisation response initially observed during extraction of the LW101 development headings. An increased rate of depressurization is observed with LW103 extraction. It is noted that this increased depressurization is also observed in the shallower seams at WML213, notable in the Bayswater Seam (Figure 17) and has been associated with the BH4A inflows. This may indicate that the seams in this area are interconnected possibly via unsealed historical drill holes.
- WMLC334-175m shows a large depressurisation in response to the extraction of LW101 through LW102. The depressurisation is larger than would be expected and may indicate an interconnection between the seam, such as through old drill holes. The sensor records erratic water levels due to LW103 extraction.

Barrett and Hebden Seams – Figure 26

- A number of piezometers in the Barrett and Hebden seams (WML245, WMLC248, WMLC333, and WMLC334) display initial and subsequent depressurisation with ULD extraction. Over the reporting period there is a continued decline observed at sensors in WML248 and WML333. It is unclear if this pressure response is due to vertical leakage through the formation and natural structures or through connecting drill holes.

3.2.7 Paired Monitoring Sites – Figures 27 and 28

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

Prior to mining, the piezometric pressure within the CMOB is 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 for four of the five paired sites, the exception being T3-A set in the Bowmans Creek Alluvium (BCA) (Figures 27 and 28). However, as previously discussed in Section 3.2.2, the water levels recorded at T3-A are under question and needs to be reassessed.

The depressurisation trend in CMOB piezometers T2-P and T4-P (Figure 27) is observed to be increasing and continues since the CMOB water levels diverged from the shallow alluvial water levels. Prior to the extraction of LW5 in PG, water levels at T4-P were elevated above the corresponding shallow alluvial water table at T4-A. Towards the end of the review period a further decline is noted at T2-P, T3-P and T4-P that is attributed to the BH4A inflows.

At WMLP324 and WMLP325 (Figure 28) there is a significant depressurisation response in the CMOB in response to mining at LW6B. Over the review period there has been a recovery in these CMOB water levels. The corresponding alluvial water levels are also shown to respond to the LW6B inflow event, however, these piezometers are more responsive to rainfall and streamflow recharge that has offset the decline.

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. During the extraction of LW6B, an accelerated drop in water levels within the CMOB was observed with 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. The general recovery in water level in all piezometers on Figure 28 since around March 2014 may be indicative of the partial healing or silting of any induced fracturing and indicates the dominance of recharge over dewatering or drainage to the underground, at least in the vicinity of LW6B. Depressurisation of the CMOB as observed at T2-P and T4-P (Figure 27), situated above LW7A and LW6A, respectively, appears to be sustained.

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 any impacts from mining. The trigger value for salinity is set as a greater than 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 227µS/cm to 3540µS/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 and on Figure 29. The following observations are noted in regard to the BCA salinity levels over the review period:

- Salinity levels ranged from 844µS/cm to 1,481µS/cm EC with an average of 1,077µS/cm.
- EC levels within the BCA have been generally stable and below 1500µS/cm over the review period.
- A slight increasing EC trend is noted at WMLP311 and WMLP328, albeit with few data points. The minor increase remains within the baseline range.
- Prior to the review period, an EC decline is apparent in piezometers T7 and WML115C. This is attributed to a reduction in upwards leakage from the CMOB.

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

Note: Piezometers T5, 6, 7 and RA30 were indicated to be either blocked, dry, or too low to read hence do not have recent data.

Glennies Creek Alluvium – Figure 30

The EC data monitored in the GCA over the review period is presented in Table 3.3 and on Figure 30. The following observations are noted in regard to the salinity levels within the GCA:

- The groundwater salinity levels in the GCA ranged from 227µS/cm to 1,059µS/cm with an average of 1,059µS/cm.
- All piezometers show EC levels to remain within baseline ranges over the review period.
- Piezometers WML120B and WML129 show a rising EC level through the first half of the review period. EC levels are then observed to decline again over the remainder of the review period. WML240 also shows a similar rise and fall over the review period albeit with very limited data.
- The fluctuations are well within baseline limits and are inferred to be a natural variation. The

increasing trend is observed to follow large rainfall events and may be in response to the mobilization of salts within the soils due to 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 627µS/cm to 3,540µS/cm with an average of 2,024µS/cm.
- The EC levels in piezometers WMLP278, WMLP280, and WMLP337 are observed to fluctuate in response to rainfall recharge. The piezometers do, however, show a slow increase through to the completion of LW102 followed by a rapid decline from 3,540 to 2,800µS/cm during the longwall move. It is noted that as this response is observed in all three piezometers, it is unrelated to longwall extraction.

The EC range observed in the HRA over the review period is generally within the baseline range (1,375–2,540µS/cm) as detailed in the 2012 WMP (section 8.3.2, Table 8.2), with the exception of WMLP337. The maximum value observed at WMLP337 during the review period was 3,540µS/cm. Under the WMP, this level does not constitute the breach of a trigger, which for water quality, is defined by "a variation from baseline salinity or other parameter by 50%". In this case the upper baseline trigger for salinity would be 3,810µS/cm. It is also noted that WMLP337 was installed in 2012 and was not used for the establishment of the baseline dataset, the comparison with WMLP337 salinity against baseline data, therefore is not strictly valid. The piezometer will, however, be closely scrutinised to assess for any potential adverse trends.

3.3.2 Alluvial Groundwater pH Levels

Groundwater pH levels provide a key determinant of water quality. The groundwater in the saturated alluvium of the ACP area is historically neutral to slightly basic with a pH range from 5.70 to 8.71.

Over the review period, the pH was observed to be generally consistent with the baseline range with data ranging from 6.17 to 8.48 with an average of 7.34.

Bowmans Creek Alluvium – Figure 32

The pH data monitored in the BCA collected over the review period are 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 6.71 to 8.38 and an average of 7.44 pH units.
- In general a trend of increasing pH was observed from January to May, followed by a decline to the end of the review period. The decline is attributed to recharge from the elevated rainfall from February to April.
- The majority of pH values measured are within the ANZECC guideline limits for freshwater ecosystems (6.5 to 8) over the review period.

The pH range observed in the BCA 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).

Note: Piezometers T5, 6, 7 and RA30 were indicated to be either blocked, dry, or too low to read hence do not have recent data.

Glennies Creek Alluvium – Figure 33

The pH data monitored in the GCA over the review period are 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 6.17 to 8.48 and an average of 7.36.
- pH values at WML120B and WML129 show a gradual increase through the first half of the review period to May. There is then an abrupt decline in pH. The decline is most rapid at the upstream location (WML120b), occurring over a period of two weeks, and is spread out over two months downstream at WML129. The decline is inferred to be in response to the flushing through of recharge waters following elevated rainfall from February to April.
- 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). However, 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. It is also noted that the majority of pH values observed outside of the baseline range were individual spikes and were not sustained.

Hunter River Alluvium – Figure 34

The pH data monitored in the HRA over the review period are 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 6.60 to 8.48 and an average of 7.31.
- As with the BCA and GCA, a general increasing trend is apparent through the first part of the review period until May and is then followed by a fairly rapid decline.
- The majority of 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). However, 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	8-Jan-14	22-Jan-14	5-Feb-14	19-Feb-14	5-Mar-14	19-Mar-14	2-Apr-14	16-Apr-14	30-Apr-14	28-May-14	2-Sep-14	25-Nov-14
RA10	-	-	-	-	-	-	-	-	-	-	1490	-
RA18	-	-	-	-	-	-	-	-	-	-	1040	1013
RA30	1345	1308	1354	-	-	-	-	-	-	-	-	-
T2-A	-	-	-	-	-	-	-	-	-	-	1040	1024
T5	937	931	1176	-	-	-	-	-	-	-	-	-
WML115C	1052	1067	-	-	974	844	1111	-	1068	-	-	-
WMLP311	977	1003	1052	1069	1075	1002	988	990	917	1011	1400	-
WMLP328	1006	1046	1033	1023	1020	1009	968	911	930	977	1080	1298

Note:
- indicates no data from this date

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

Piezometer ID	8-Jan-14	22-Jan-14	5-Feb-14	19-Feb-14	5-Mar-14	19-Mar-14	2-Apr-14	16-Apr-14	30-Apr-14	28-May-14	8-Jul-14	18-Aug-14	2-Sep-14	16-Oct-14	25-Nov-14
WML120B	698	547	686	681	701	671	663	606	596	681	736	635	660	727	613
WML129	305	227	321	374	378	367	346	352	442	498	617	437	425	518	380
WML239	-	-	-	-	-	-	-	-	-	-	-	-	800	-	783
WML240	-	-	-	-	-	-	-	-	-	-	-	-	-	1010	971

Note:

- indicates no observation from this date.

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

Piezometer ID	8-Jan-14	22-Jan-14	5-Feb-14	19-Feb-14	5-Mar-14	19-Mar-14	2-Apr-14	16-Apr-14	30-Apr-14	28-May-14	8-Jul-14	18-Aug-14	2-Sep-14	1-oct-14	25-Nov-14

Piezometer ID	8-Jan-14	22-Jan-14	5-Feb-14	19-Feb-14	5-Mar-14	19-Mar-14	2-Apr-14	16-Apr-14	30-Apr-14	28-May-14	8-Jul-14	18-Aug-14	2-Sep-14	1-oct-14	25-Nov-14
WMLP278	1911	1932	1984	1953	1955	-	1837	1688	1985	2012	2209	1812	1927	1832	1805
WMLP279	-	-	-	-	-	-	-	-	-	-	-	-	-	920	-
WMLP280	1732	1701	1768	1751	1760	1699	1761	1576	1831	1902	2124	1772	1850	1823	1837
WMLP337	2630	2810	2970	2900	3020	2960	2900	2610	3160	3130	3330	2800	3020	2950	2800

Note:

- indicates no data from this date.

Table 3.5: Bowmans Creek Alluvium Groundwater Quality – pH

Piezometer ID	8-Jan-14	22-Jan-14	5-Feb-14	19-Feb-14	5-Mar-14	19-Mar-14	2-Apr-14	16-Apr-14	30-Apr-14	28-May-14	8-Jul-14	18-Aug-14	2-Sep-14	25-Nov-14
RA18		-	-	-	-	-	-	-	-	-	-	-	-	7
RA30	6.71	7.42	6.72	7.62	-	-	-	-	-	-	-	-	-	-
T2-A	-	-	-	-	-	-	-	-	-	-	-	-	-	7.1
T5	6.72	7.78	6.82	-	-	-	-	-	-	-	-	-	-	-
WML115C	7.5	7.93	-	-	7.8	7.91	7.54	-	7.81	-	-	-	-	-
WMLP311	6.86	7.54	7.05	7.57	7.76	7.48	7.2	8.06	7.4	8.2	-	-	7	-
WMLP320		-	-	-	-	-	-	-	-	-	-	-	6.9	-
WMLP323	6.87	7.68	7.11	7.42	7.3	7.78	7.18	7.8	7.44	8.12	-	-	7.1	-
WMLP328	7.15	7.76	7.26	7.8	7.84	7.87	7.37	8.16	7.55	8.38	-	-	7.1	7

Note:
- indicates no data from this date

Table 3.6: Glennies Creek Alluvium Groundwater Quality – pH

Piezometer ID	8-Jan-14	22-Jan-14	5-Feb-14	19-Feb-14	5-Mar-14	19-Mar-14	2-Apr-14	16-Apr-14	30-Apr-14	28-May-14	8-Jul-14	18-Aug-14	2-Sep-14	16-Oct-14	25-Nov-14
WML120B	6.71	7.22	6.78	7.47	7.71	7.55	7.36	7.4	7.44	6.57	6.7	7.2	6.72	6.85	6.75
WML129	7.08	7.71	7.25	7.67	7.8	7.91	7.31	7.88	7.71	7.81	7.04	7.83	7.07	7.04	7.52
WML239	-	-	-	-	-	-	-	-	-	-	-	-	7	-	6.9
WML240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7

Note:
- indicates no data from this date

Table 3.7: Hunter River Alluvium Groundwater Quality – pH

Piezometer ID	8-Jan-14	22-Jan-14	5-Feb-14	19-Feb-14	5-Mar-14	19-Mar-14	2-Apr-14	16-Apr-14	30-Apr-14	28-May-14	8-Jul-14	18-Aug-14	2-Sep-14	16-Oct-14	25-Nov-14
WMLP278	6.92	7.27	7.07	7.45	7.5	-	7.15	8.13	7.24	7.49	7.33	7.44	7.2	6.84	6.98
WMLP279	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
WMLP280	7.34	7.58	7.12	7.52	7.77	7.59	7.27	8.26	7.42	7.58	7.38	7.52	7.1	6.93	7.05
WMLP337	6.97	7.26	7.12	7.39	7.37	7.42	7.38	7.89	7.22	7.36	7.41	7.48	6.99	7.04	6.96

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 35. The groundwater model predictions from the 2012 ULD groundwater assessment are included on Figure 35 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:

- Elevated inflows occurred prior to the start of the review period (October 2013) following the extraction of LW6B. The inflows peaked at 31.2L/s (2.7ML/d) in November 2013 and were sustained through until January 2014 when they started to decline.
- Net dewatering approached the predicted inflow rate in May 2014. A large recharge event to the BCA and shallow CMOB above LW6B occurred following elevated rainfall from February through to April, which resulted in another smaller and shorter increase in inflow.
- Net dewatering then declined and reached the predicted dewatering rate in September 2014 before increasing again following the breakthrough of dewatering service hole BH4A to the underground. This temporary inflow resulted from difficulties in sealing BH4A allowing water to drain from shallow coal seams to the underground and BH2. The inflows are observed to gradually decline from the initial peak. The bore was successfully sealed in December and the inflows are shown to return to below the predicted rates at the end of the review period.
- Figure 35 shows the LW6B inflows to exceed the trigger values for a period of 98 days, thereby reaching the trigger action response level of a of an exceedance of 50% of predicted inflows sustained for a period of three months.
- In accordance with the WMP an investigation into the cause of the inflows was undertaken (RPS, 2014), as well as an update and recalibration of the groundwater model (RPS, 2014b). The investigation concluded that increased permeability resulting from bed separation and non-connected fracturing resulted in an enhanced connection of the longwall goaf with more permeable units within the CMOB and the overlying BCA. No direct connecting fracturing between the goaf and the BCA was indicated.
- It is noted that the increased inflows during May/June 2014 did not reach the trigger value, and that while the increase in September exceeded the trigger value, the inflows were not sustained for a period of three months or more.
- The calculated net dewatering rates ranged from approximately 15.2 to 29.8L/s (1.3 to 2.57ML/d) over the review period.

- Table 3.8 presents a comparison of the actual versus predicted annual dewatering volumes to date. The total dewatering volume for the review period is approximately 638ML at an average of 2L/s (1.75ML/d). This is greater than the original EIS predicted inflow of 567ML/yr (18L/s) and the revised predictions of 509ML/yr (16L/s) from the 2009 GIA, for the equivalent stage of mining.

Table 3.8: Mine Dewatering Volumes

Year	2008	2009	2010	2011	2012	2013	2014	Total
Predicted * (ML)	240	347	432	459	490	505	509	2982
Actual (ML)	188	160	169	216	400	242	638	2013

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 surface 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 river red gum area is located next to Bowmans Creek between the southern end of the western diversion and the Hunter River (Figure 2). The trigger value for an impact in this area is 0.5m outside of natural fluctuations. The closest piezometers to the southern River Red Gum area are VWP WML213 and HRA piezometer WMLP279, no drawdown attributable to mining was observed in the HRA or shallow CMOB in this area.

4. DISCUSSION

4.1 Groundwater Levels

Water levels within the alluvial lithologies during the review period remained within the predictions made in the 2009 EA (Aquaterra 2009). However, the drawdown observed within the BCA, particularly in the northern area, is greater than that predicted in the 2012 GIA.

Drawdown was observed in the BCA above LW6B and LW7B. This alluvium was predicted to be partially to fully dewatered following PG extraction (2009 EA) and the observed response is considered to be consistent with predicted levels (2009 EA). A number of water levels in the southern BCA area have dropped slightly below historical water level elevations.

There was no mining related drawdown observed within the GCA or HRA over and above the natural climatic variations. Most water levels in the HRA units showed fluctuations consistent with rainfall recharge and have fallen slightly below historical water level elevations.

Depressurisation of the Permian lithologies above active mining areas is generally as expected and predicted. Greater than predicted propagation of depressurisation within the PG Seam is observed at WML213, with up to 100m decline in potentiometric level having taken place since the commencement of mining in the PG Seam. The depth of cover at this location has prevented the propagation of this depressurisation upwards and the depressurisation is observed to attenuate with decreasing depth of cover. No impacts are noted in the shallow CMOB. This increased depressurisation of the PG seam does not pose any risk to the shallow groundwater system, GDEs, or other groundwater users.

4.2 Water Quality

In general, water quality in the alluvial piezometers is shown to be dominantly influenced by climatic variations. No detrimental impacts due to mining are observed.

4.3 Increase in Mine Inflows

The LW6B inflow event that commenced in October 2013 resulted in an exceedance of the WMP trigger value for mine inflows. The three month exceedance of greater than 50% of predicted inflows was reached in January 2012, triggering an investigation into the cause of the inflows in accordance with the WMP.

In accordance with the WMP an investigation into the cause of the inflows was undertaken (RPS, 2014), as well as an update and recalibration of the groundwater model (RPS, 2014b). The investigation concluded that increased permeability resulting from bed separation and non-connected fracturing resulted in an enhanced connection of the longwall goaf with more permeable units within the CMOB and the overlying BCA. No direct connecting fracturing between the goaf and the BCA was indicated.

A number of smaller inflow events have taken place subsequent to the LW6B inflow, however no further triggers have been reached.

4.4 Baseflow

No alluvium was undermined during the review period, however, ongoing inflows and water level decline associated with the LW6B inflow event has occurred.

Groundwater modelling for the 2009 EA, 2012 GIA and the recent groundwater model update, have assessed potential baseflow losses for the Bowmans Creek, Glennies Creek and the Hunter River. Predicted impacts to baseflow for the end of ULD mining are summarised in Table 4.1.

Table 4.1: Predicted Baseflow Impacts (End of ULD Mining)

	2009 EA	2012 GIA (LW101 -104)	2014 Model Update
Bowmans Creek	1.0 L/s	0.8 L/s (0.59 L/s)	1.5 L/s
Glennies Creek	2.7 L/s	3.0 L/s (2.9 L/s)	0.9 L/s
Hunter River	0.7 L/s	0.2 L/s (0.13 L/s)	1.0 L/s

Note: Values in brackets are for the end of ULD LW101 - LW104 extraction.

Actual baseflow impacts are difficult to quantify, and accounting for water allocation purposes must rely on modelled predictions. Baseflow contribution to a water source (or conversely seepage from a water source to groundwater (negative baseflow)) is dependent of the difference between the stage height of the surface water flow, the groundwater elevation surrounding or beneath the surface water feature and hydraulic connection between the groundwater and surface water sources (leakage factor). With the available data it is only possible to provide a qualitative assessment of potential baseflow impacts.

For Bowmans Creek, as the observed drawdown is generally consistent with predictions, it is fair to assume that baseflow impacts to Bowmans Creek for the current stage of mining would also be consistent with predictions, and be of the order of 0.69L/s or less. This can be expected to increase to 1.5L/s following the completion of ULD extraction.

The 2012 WMP specifies a trigger for Bowmans Creek baseflow losses as being in excess of 115% of the predicted drawdown. Drawdown was observed to be greater than predicted in the northern area of the BCA. In this area, Bowmans Creek is protected by the diversions and cannot be impacted by water level decline. In the southern BCA area, no water level decline above natural variation has been identified.

For Glennies Creek and the Hunter River, as there has been no identified drawdown in excess of natural water level variation, no baseflow reduction as a result of mining has resulted.

5. GROUNDWATER MODEL

In accordance with Consent Condition 9.2, the performance of the groundwater management measures 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) and the 2009 EA.

The groundwater model was updated during preparation of the 2012 EP GIA (RPS Aquaterra 2012).

Updates to the model in 2012 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 generally found to be consistent with the timing and predicted impact in the 2012 ULD Groundwater Impact Assessment (RPS Aquaterra 2012), and those presented in the 2012 WMP. The following exceptions are noted:

- The 2012 GIA predicted a maximum drawdown of 1 m in the BCA at end of ULD LW104, increasing to a maximum of 3 m above LW106B, and 4 m above the southern end of LW107 at the end of ULD mining. The 2009 impact assessment predicted almost complete desaturation of the BCA above active longwall panels by the end of mining in the ULD.
- The observed response in the BCA is somewhere between the two predictions, with a maximum of 5m drawdown noted in the BCA following the LW6B inflow event, but generally observed to be 3m or less in the northern BCA area.
- In the southern BCA area it is currently difficult to distinguish any drawdown impacts above the natural variation, although there is likely to be a component of drawdown particularly in the vicinity of LW7A in the PG seam.
- The predicted drawdown in the PG seam at end of LW102 (2012 GIA) at the equivalent location to WML213 is between 10 and 30m (0 to -20mAHD). Observed depressurisation to date at WML213 is almost 100m (-60mAHD). This would indicate a greater than anticipated hydraulic conductivity in the PG seam. The large depth of cover at this location has prevented the transmission of this depressurisation to the shallow CMOB and alluvial formations.
- Net mine dewatering requirements during the current reporting period have generally been well above predictions and are mostly attributable to the LW6B inflow event. Incremental inflow increase due to mining in the ULD are minor and of the order of up to 3L/s (as recorded at BH3).

5.1 Groundwater Model Update

Following the LW6B inflow event, the groundwater model for the ACP was refined and recalibrated to facilitate further investigation into the inflows and to predict any implications for effective groundwater management measures (RPS, 2014b).

The update and recalibration comprised a general increase in the level of detail represented in the model. The refined model was recalibrated and used for prediction simulations.

Refinement of the model comprised:

- Update of the mining sequence of PG and initial ULD to as implemented from expected.
- Refinement of the mining sequence to monthly increments from 2 - 3 monthly to yearly (both calibration and prediction simulations).
- Refinement of timing of construction of the BCD to as implemented from expected.
- Application of historical monthly rainfall and evaporation rather than long-term average.
- Addition of mining operations at Glendell.
- Refinement of mine progress at Ravensworth Underground.

- Recalibration of model representation of subsidence-induced change to hydraulic properties.
- Minor changes to hydraulic properties in the Bowmans Creek Alluvium, Glennies Creek Alluvium, Hunter River Alluvium and distribution of interburden outcrop at Glennies Creek.

There were no changes to model geometry.

The results of modelling indicate that the inflow event between October 2013 and February 2014 is a potentially separate hydrogeological process to that encountered during normal mine operation.

A conclusion of the modelling report (RPS, 2014b), which was noted to require confirmation through field investigation, was that the inflow event at LW6B was associated with the same hydrogeological process that was responsible for the minor increase in inflow rates experienced in LW7B (January 2012) and, potentially also, the minor increase in inflow rates experienced in LW7A (June 2011).

The updated model matches the observed drawdown and short-term recovery (in response to large episodic rainfall) of groundwater levels in the shallow alluvium in the vicinity of LW6B. It is concluded that inflow from the alluvium to the mine is not sufficient to account for the magnitude of the observed inflow event.

Model predictions of mine inflows for ULD extraction were prepared and partitioning between various groundwater and surface water sources for the purpose of water licensing was undertaken.

In general, refinements to the groundwater model indicate desaturation of BCA may not be as extensive as previously considered. Predicted mine inflow rates were generally consistent with that predicted in the 2009 BCD EA (Aquaterra, 2009) and 2012 ULD Extraction Plan.

Review of modelled licensing requirements, calibrated to historical mine operation, against current licences held by ACP indicate that there are sufficient licences available to meet modelled requirement.

5.1.1 Mine Inflows

The total mine inflows predicted with the updated groundwater model peak at 13L/s during mining of the ULD LW105 to 108. The predicted peak inflow rate of 13L/s is slightly lower than the rates predicted for the same stage of mining in the 2009 and 2012 groundwater assessments.

5.1.2 Impact to Groundwater Levels

The modelled impact to groundwater levels was determined by calculating the difference in groundwater pressure or level between the calibration and prediction simulation and null cases at equivalent times.

The modelled change in groundwater level in the BCA indicated a maximum 3.5m decline in the Northern BCA following ULD mining and is, in general, less than that predicted in the 2009, but slightly greater than that of the 2012 groundwater assessments. In the 2009 assessment, the BCA was predicted to be extensively dewatered by the end of mining of the PG extraction, which has not been observed. It is noted that the tabulated values of drawdown presented in the 2009 EA were with respect to areas within the BCA that were not fully dewatered. The drawdown within desaturated areas was not tabulated.

The modelled change in groundwater levels in the GCA and HRA following mining of the ULD seam were less than 0.5m.

5.2 Impact to Baseflows

The modelled impact to surface water flows in Bowmans Creek, Glennies Creek and the Hunter River was determined by calculating the difference in flux, into and out of the defined river boundary conditions (using the Modflow River package) between calibration and prediction simulations and null cases (ie. no mining) at equivalent times.

Bowmans Creek is a ‘gaining’ water course and transitions to a ‘losing’ water course under both scenarios, i.e., with mining and null case. As explained in the 2009 BCD EA, this is due to the impact on Bowmans Creek by the Ravensworth Underground Mine regardless of the presence of

ACP Underground. The predicted impact of ACP Underground on Bowmans Creek is a 'take' of up to 132m^3/d. In comparison, the predicted impact to Bowmans Creek in the 2009 BCD EA was a 'take' of up to 71m^3/d. It is noted that the BCD EA presents a 'gaining' water course as a positive flux, i.e., there is positive baseflow (groundwater contribution to surface water feature). In the model upgrade report, due to the need to partition the 'take' from various water courses, a 'gaining' surface water feature represents a loss of groundwater to surface water, therefore is a negative flux.

Glennies Creek is a 'gaining' water course under both mining and null case scenarios. The predicted impact of ACP Underground is a small reduction in groundwater contribution to Glennies Creek. The predicted 'take' is up to 76m^3/d. The predicted impact to Glennies Creek in the 2009 BCD EA was higher, being up to 230m^3/d. The difference in predicted 'take' from Glennies Creek is due to a change in the configuration of the model at that location during the calibration process. The updated approach is more conservative whilst also fitting observed inflow volumes.

The Hunter River is a 'gaining' water course and remains so under both mining and null case. The predicted impact of ACP Underground is a small reduction in groundwater contribution to the Hunter River. The predicted 'take' is up to 87m^3/d. In the BCD EA, the predicted impact was up to 63m^3/d and accordingly the refined model prediction is consistent with previous findings.

6. Summary

During the review period coal extraction occurred within the Upper Liddell Seam at LW102, and LW103. The elevated inflows associated with LW6B extraction that commenced in 2013 continued into the current review period. Groundwater monitoring over the review period was concentrated on the potential impacts from these events.

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 that are attributable to mining operations have been observed.
- No significant impacts to GDEs or other groundwater users in the area have been identified.
- The continuation of declining BCA water levels is noted over the review period. This decline is a predicted impact from mining activities and is approved under Development Consent DA No. 309-11-2001-i.
- Continued inflows in excess of the WMP TARP resulted in the investigation into the inflows. The investigation into the LW6B inflows and subsequent upgrade and recalibration of the groundwater model were completed during the current review period.
- Total mine dewatering over the review period has been greater than that predicted for the equivalent stage of mining, however, cumulative dewatering volumes to date remain within model predictions.

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

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

With a few noted exceptions, 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 from November 2013 to January 2014. This exceedance of a WMP TARP has been investigated and reported.
- Key water quality indicators of EC and pH were not monitored quarterly at all piezometers over the review period. Water quality monitoring was undertaken at increased frequencies (fortnightly / weekly) at key piezometers most likely to be impacted by mining activities. No impacts or significant variations from baseline ranges were observed.
- The current groundwater monitoring programme at ACP is considered to be overly detailed with numerous monitoring bores providing duplicate information. A revised Water Management Plan incorporating a reduced monitoring programme has been submitted for approval.

7. REFERENCES

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FIGURES

LEGEND

- Underground Mine Workings
- Alluvium boundary
- Saturated alluvium boundary
- ULD Underground Mine Plan
- Pikes Gully Seam Extraction
- ULD Seam Extraction

N

250 0 250 500 750

Metres

APPROX SCALE 1:20,000 @ A3

GDA 1994 MGA Zone 56

RPS

FIGURE 1

Ashton Project Area

012b_Figure_1_Ashton_Coal_Project.mxd Produced: JC Reviewed: GS Date: 10/02/2015

S56C_012a_DD01_Ashton_Coal_Groundwater_Monitoring_Network.mxd Produced: JC Reviewed: GS Date: 23/12/2014

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

RPS

FIGURE 1

Ashton Coal - AEMR 2014
Groundwater Monitoring Network

LEGEND

- 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 3

Ashton Coal - AEMR 2014

Northern Groundwater Monitoring

S56C_012a_DD03_Northern_Groundwater_Monitoring.mxd Produced: JC Reviewed: GS Date: 23/12/2014

LEGEND

- 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

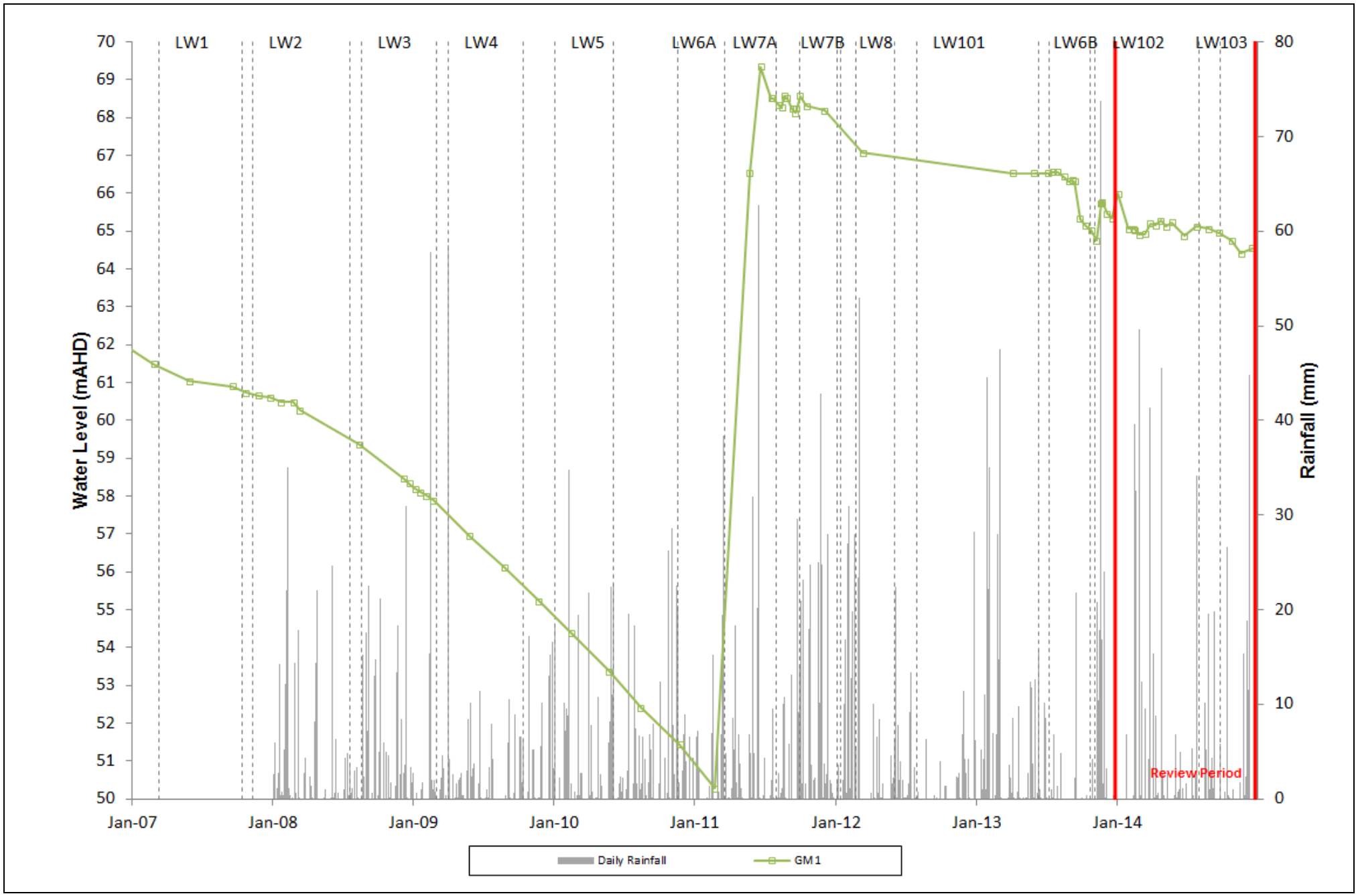
GDA 1994 MGA Zone 56

RPS

FIGURE 4

Ashton Coal - AEMR 2014
Southern Groundwater Monitoring

S56C_012a_DD04_Southern_Groundwater_Monitoring.mxd Produced: JC Reviewed: GS Date: 23/12/2014



RPS

HYDROGRAPH – NORTH EAST OPEN CUT FIGURE 5

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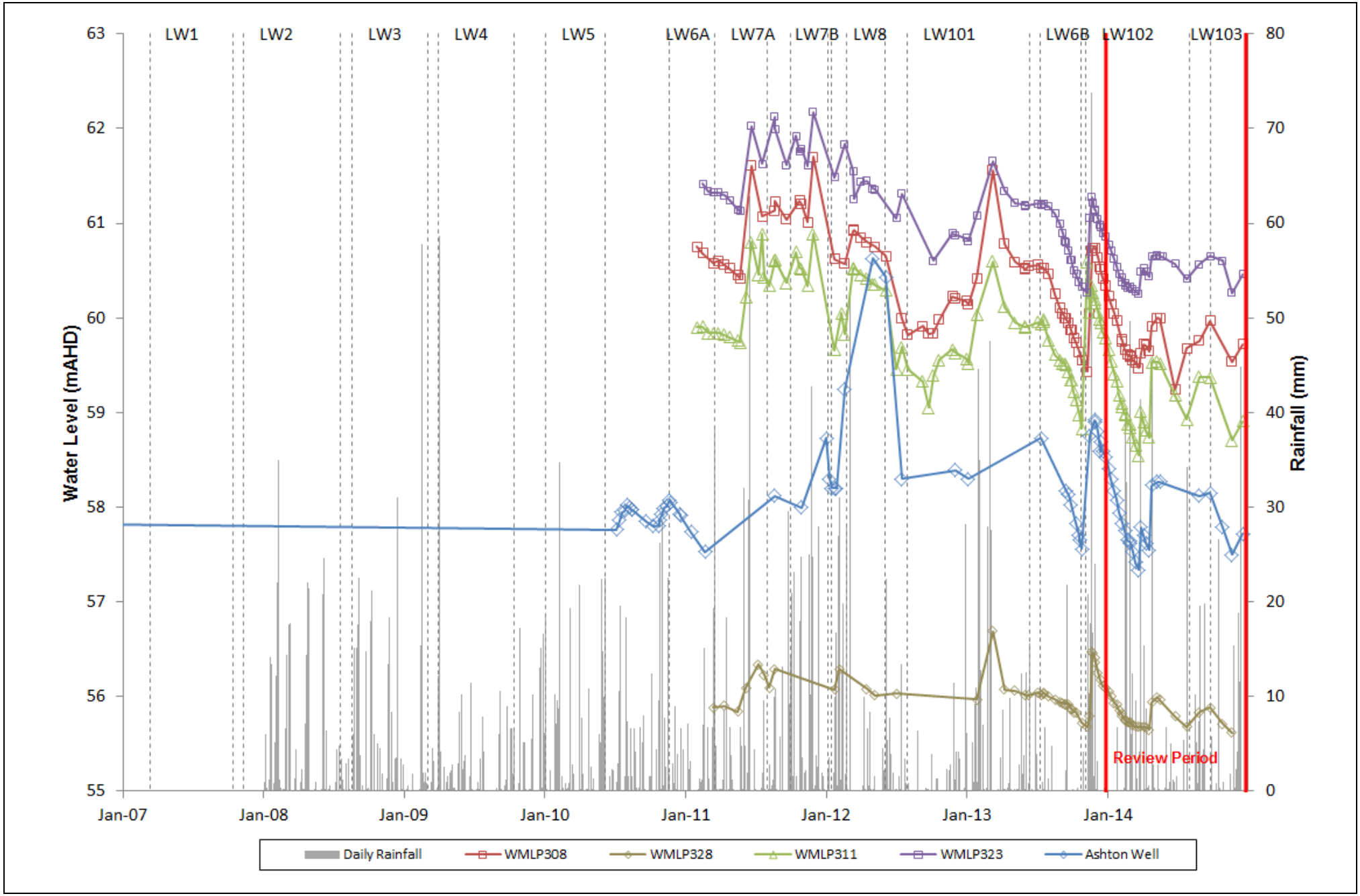

RPS

HYDROGRAPH – BOWMANS CREEK ALLUVIUM (NORTH EAST) FIGURE 6

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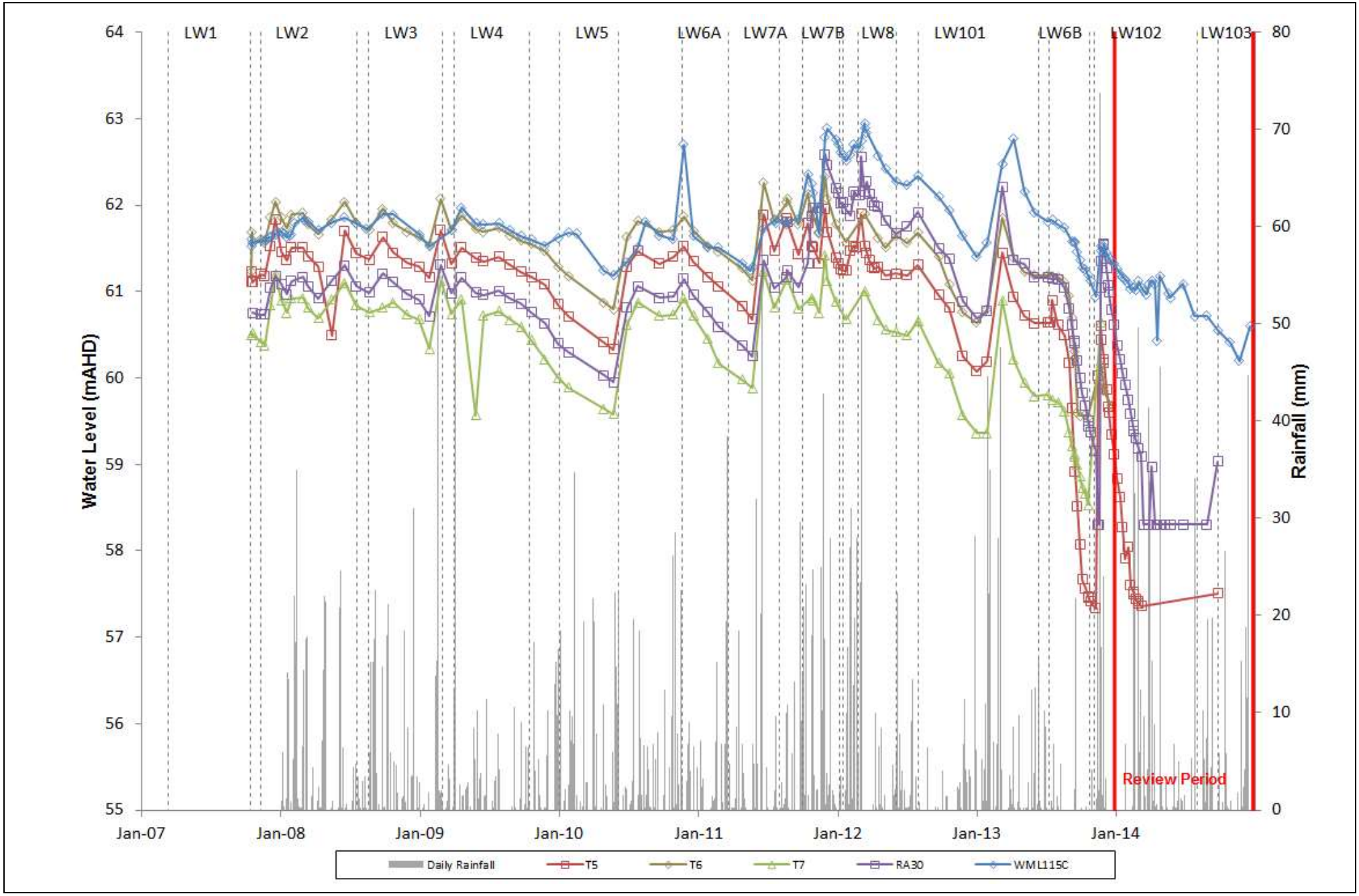

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HYDROGRAPH – BOWMANS CREEK ALLUVIUM (NORTH WEST) FIGURE 7

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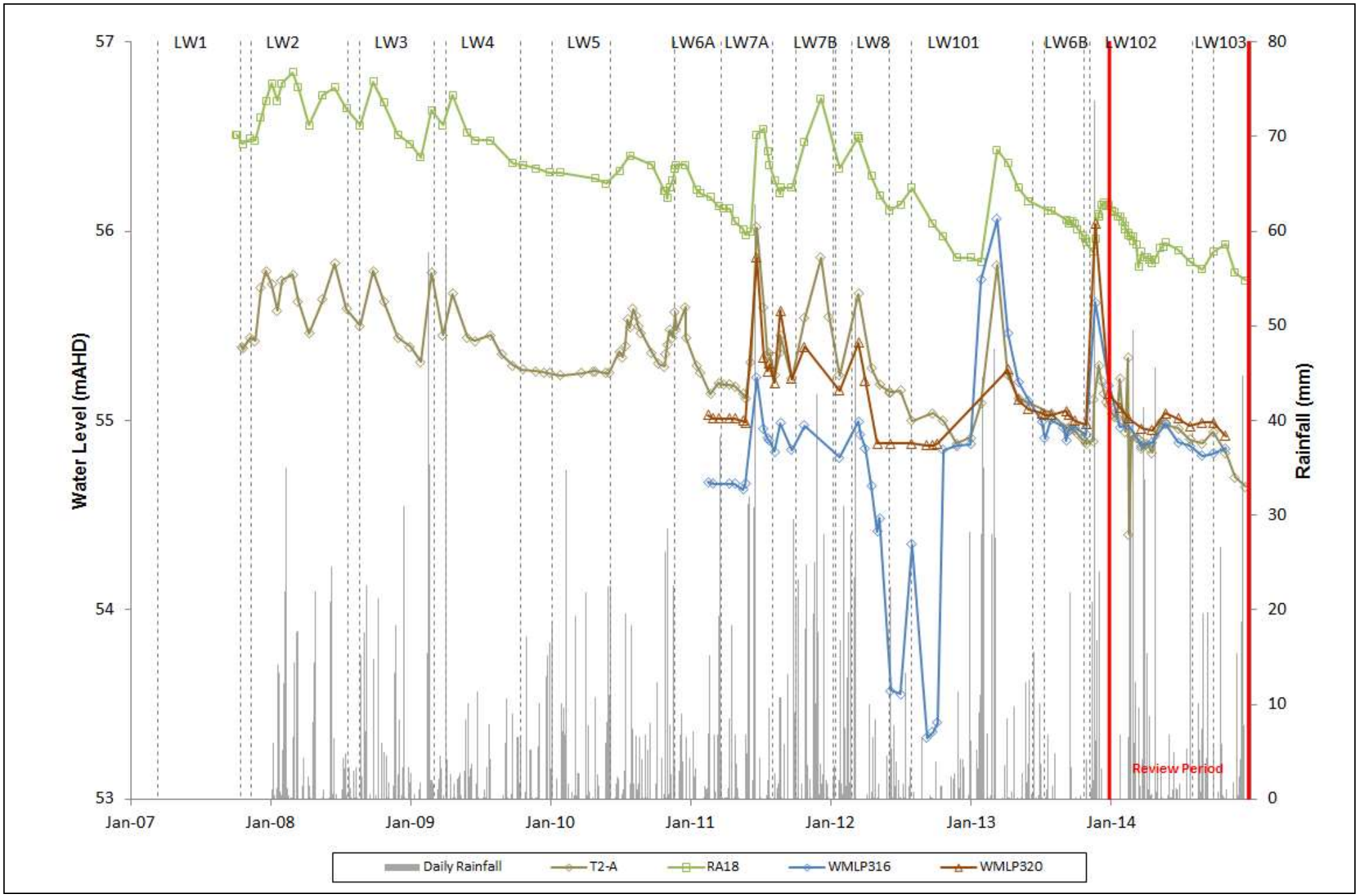

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HYDROGRAPH – BOWMANS CREEK ALLUVIUM (CENTRAL) FIGURE 8

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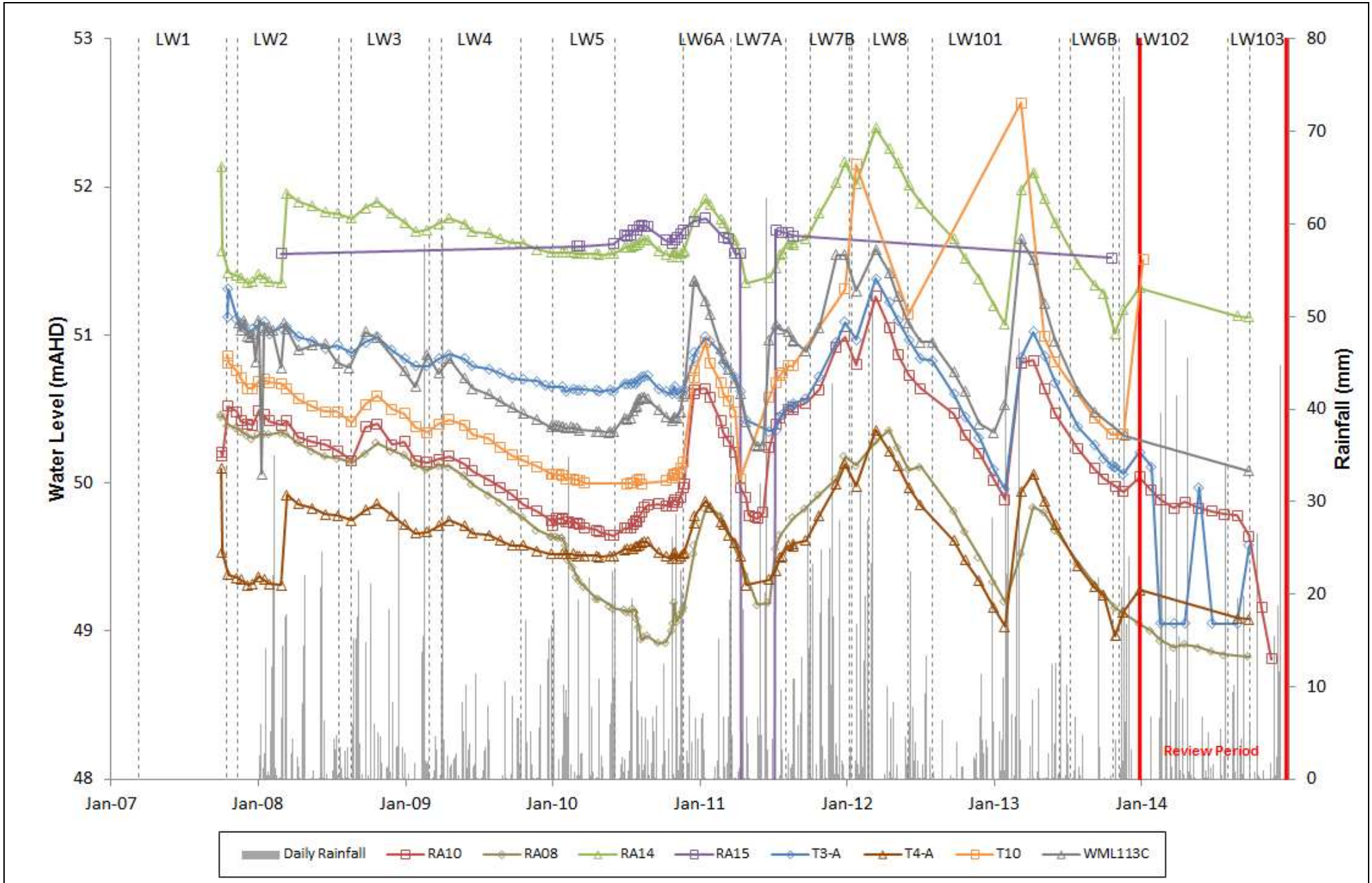

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HYDROGRAPH – BOWMANS CREEK ALLUVIUM (SOUTH) FIGURE 9

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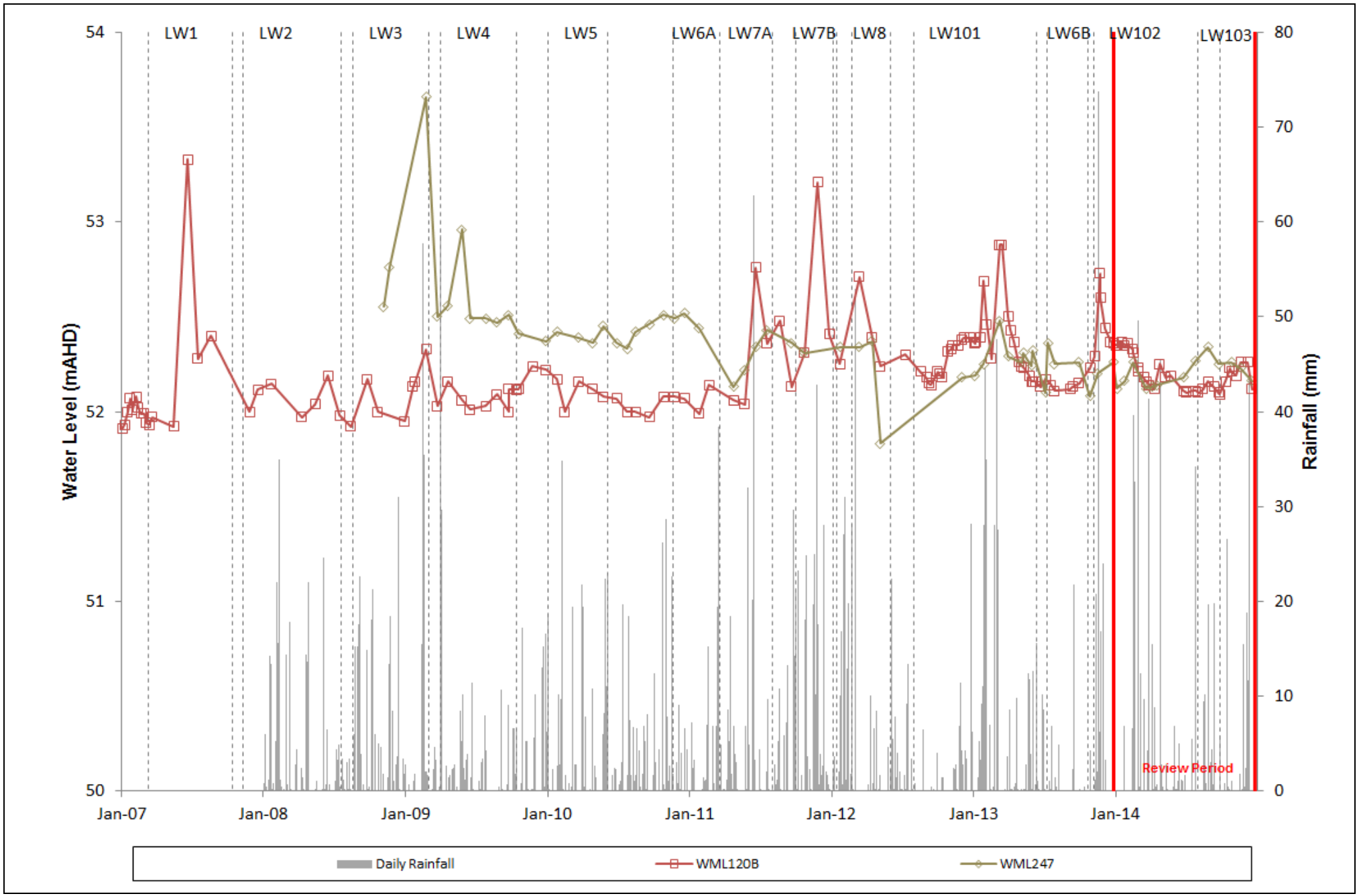

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HYDROGRAPH – BOWMANS CREEK ALLUVIUM (NORTH) FIGURE 10

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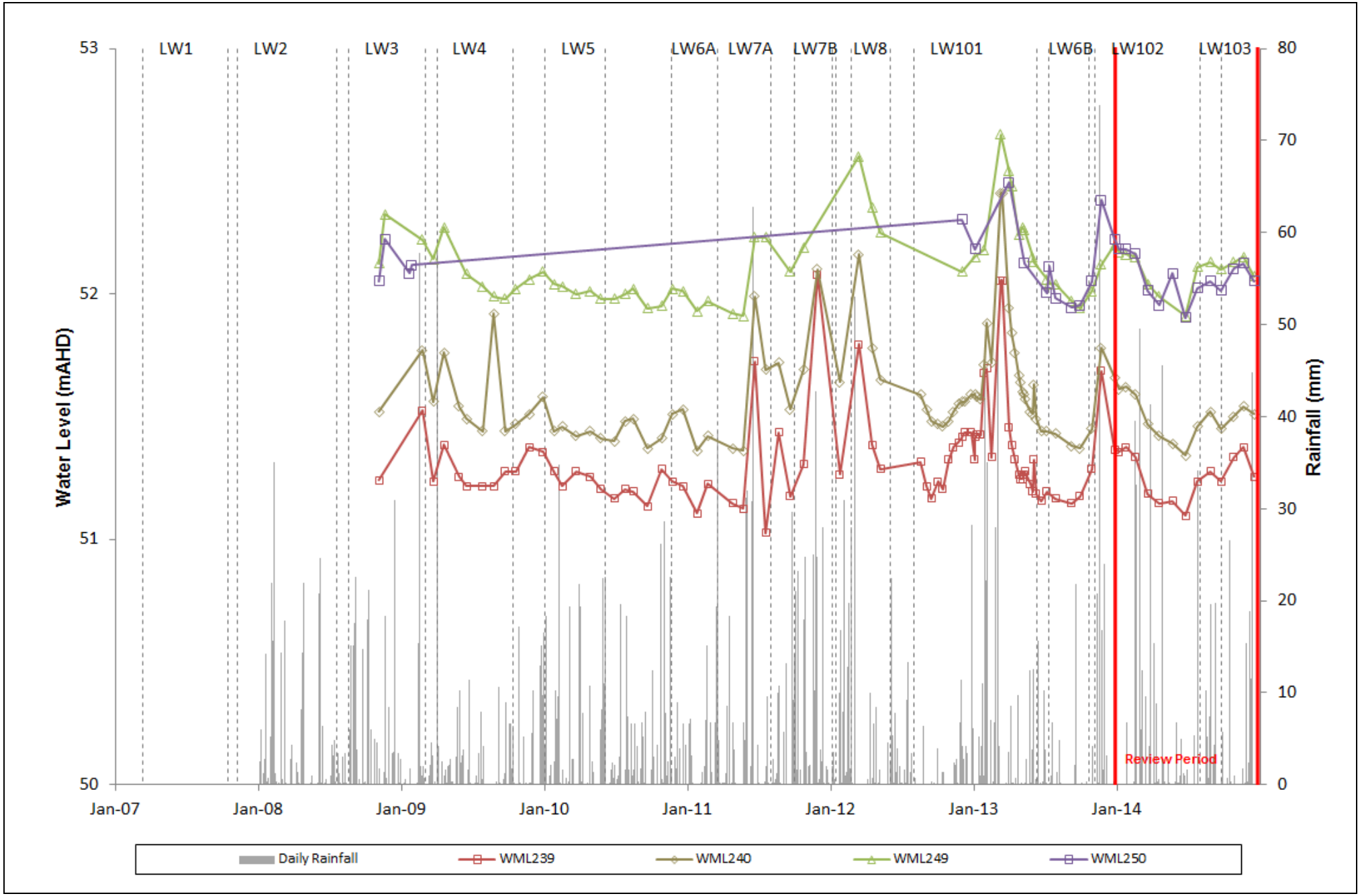

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HYDROGRAPH – GLENNIES CREEK ALLUVIUM (CENTRAL) FIGURE 11

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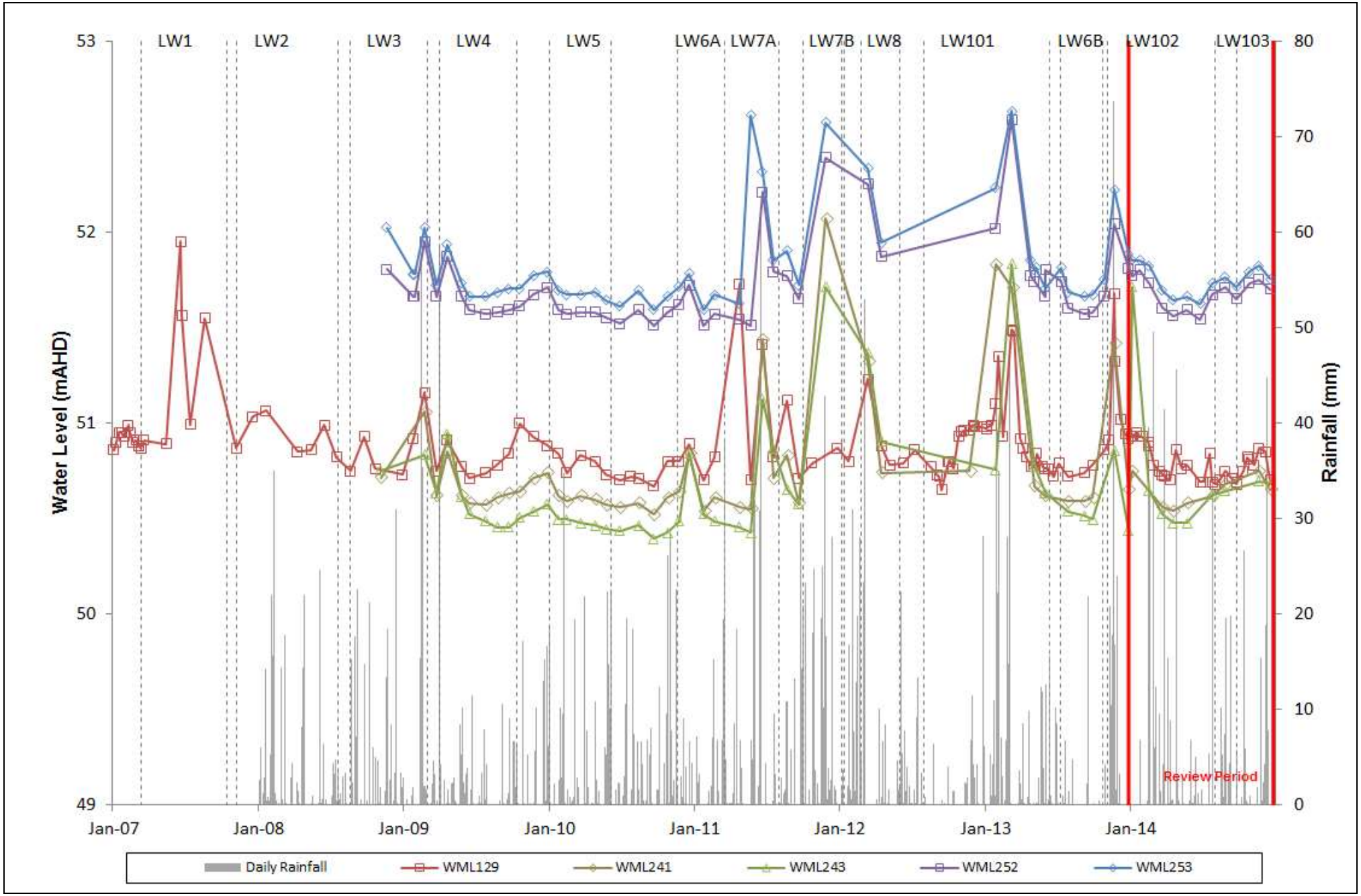

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HYDROGRAPH – GLENNIES CREEK ALLUVIUM (SOUTH) FIGURE 12

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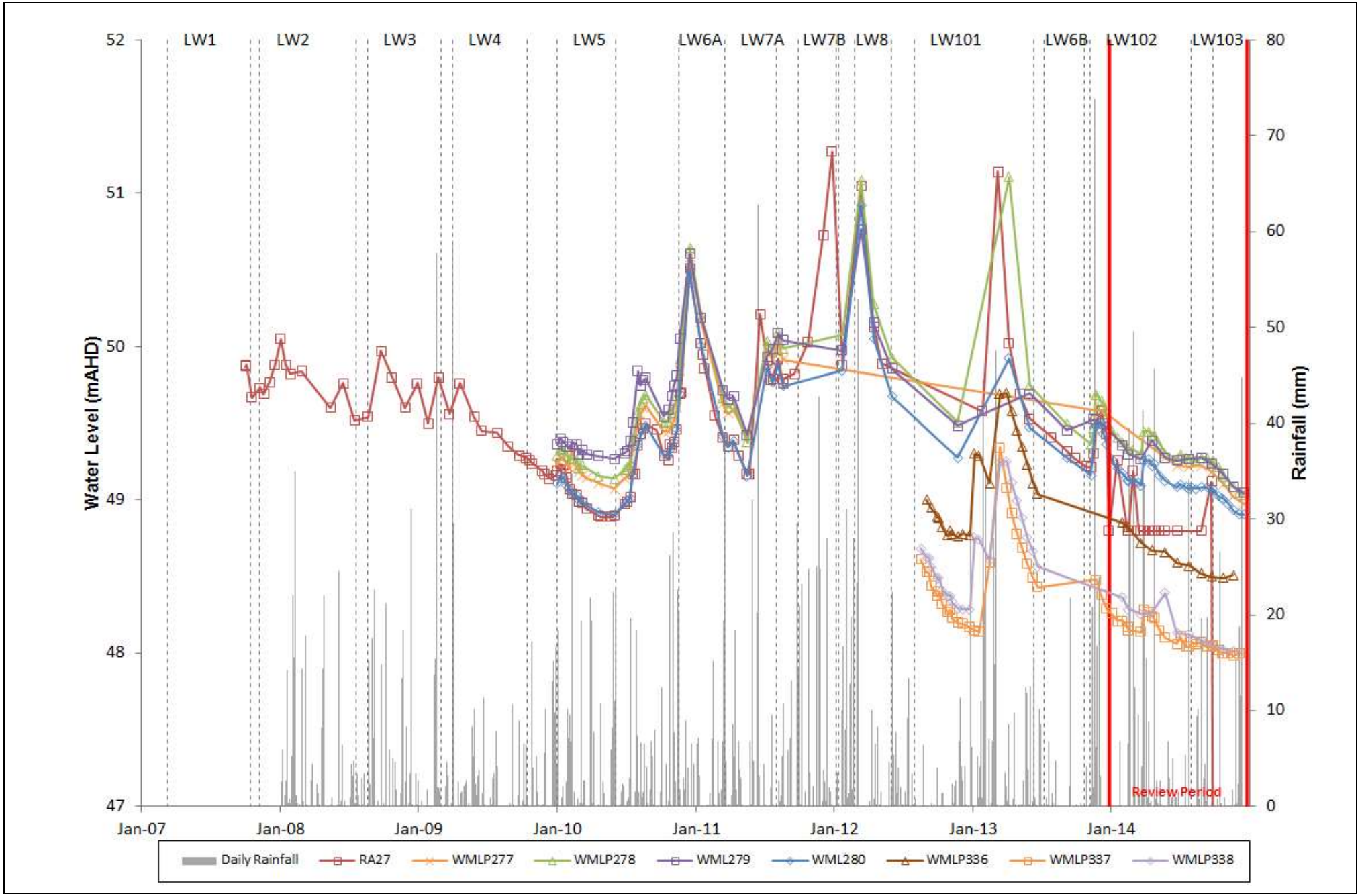

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HYDROGRAPH – HUNTER RIVER ALLUVIUM FIGURE 13

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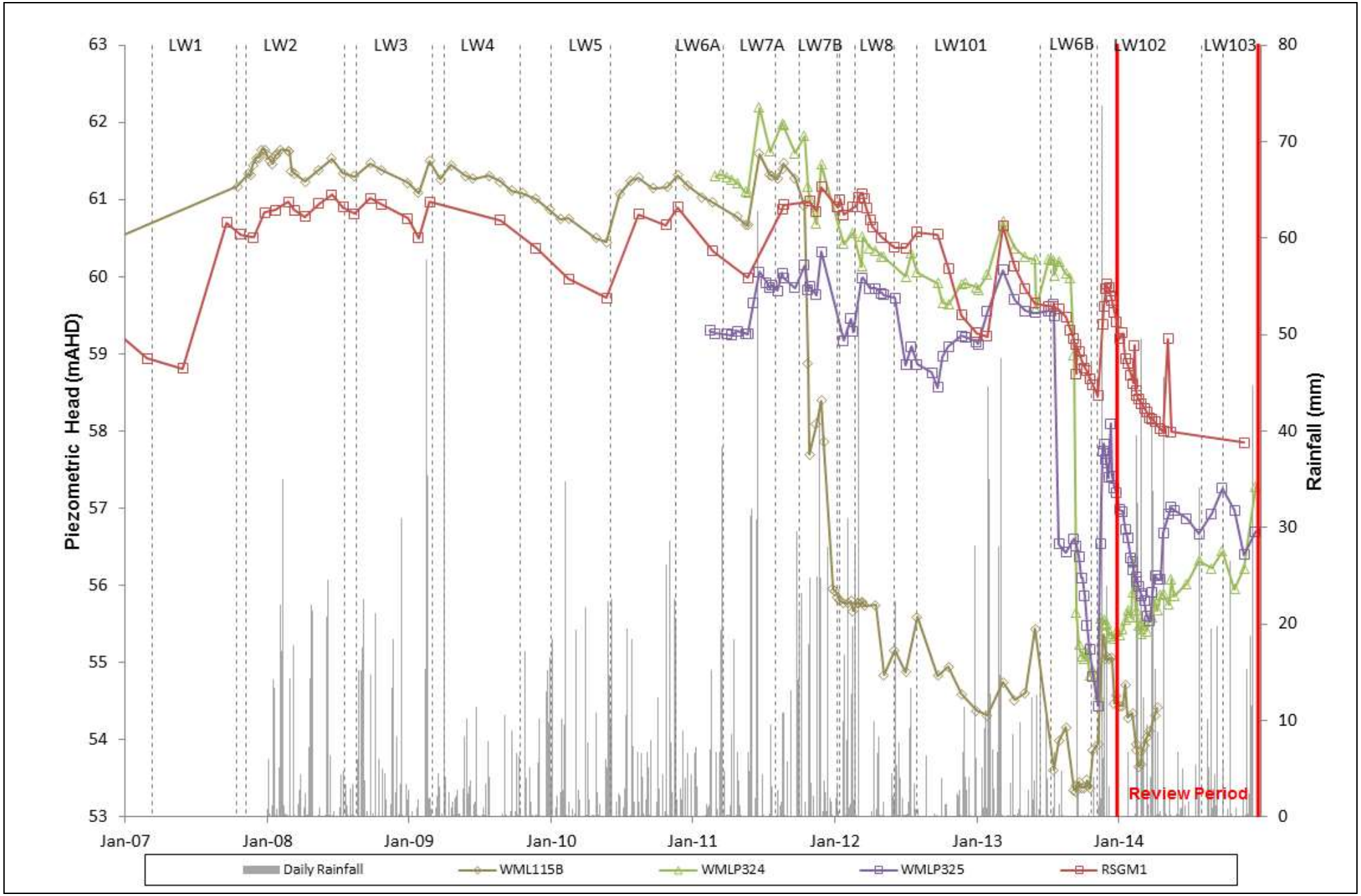

RPS

HYDROGRAPH – COAL MEASURES OVERBURDEN (NORTH) FIGURE 14

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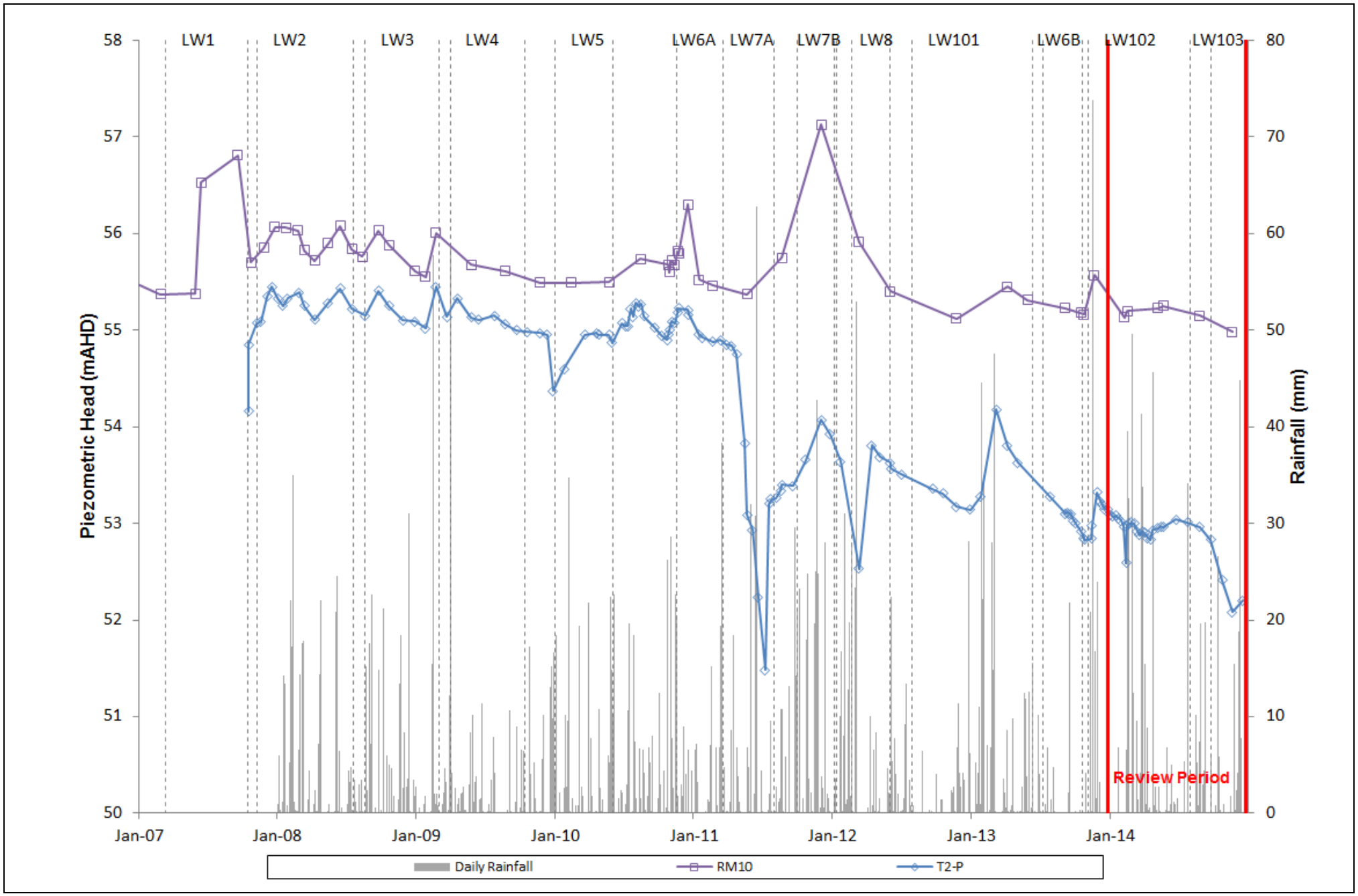

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HYDROGRAPH – COAL MEASURES OVERBURDEN (CENTRAL) FIGURE 15

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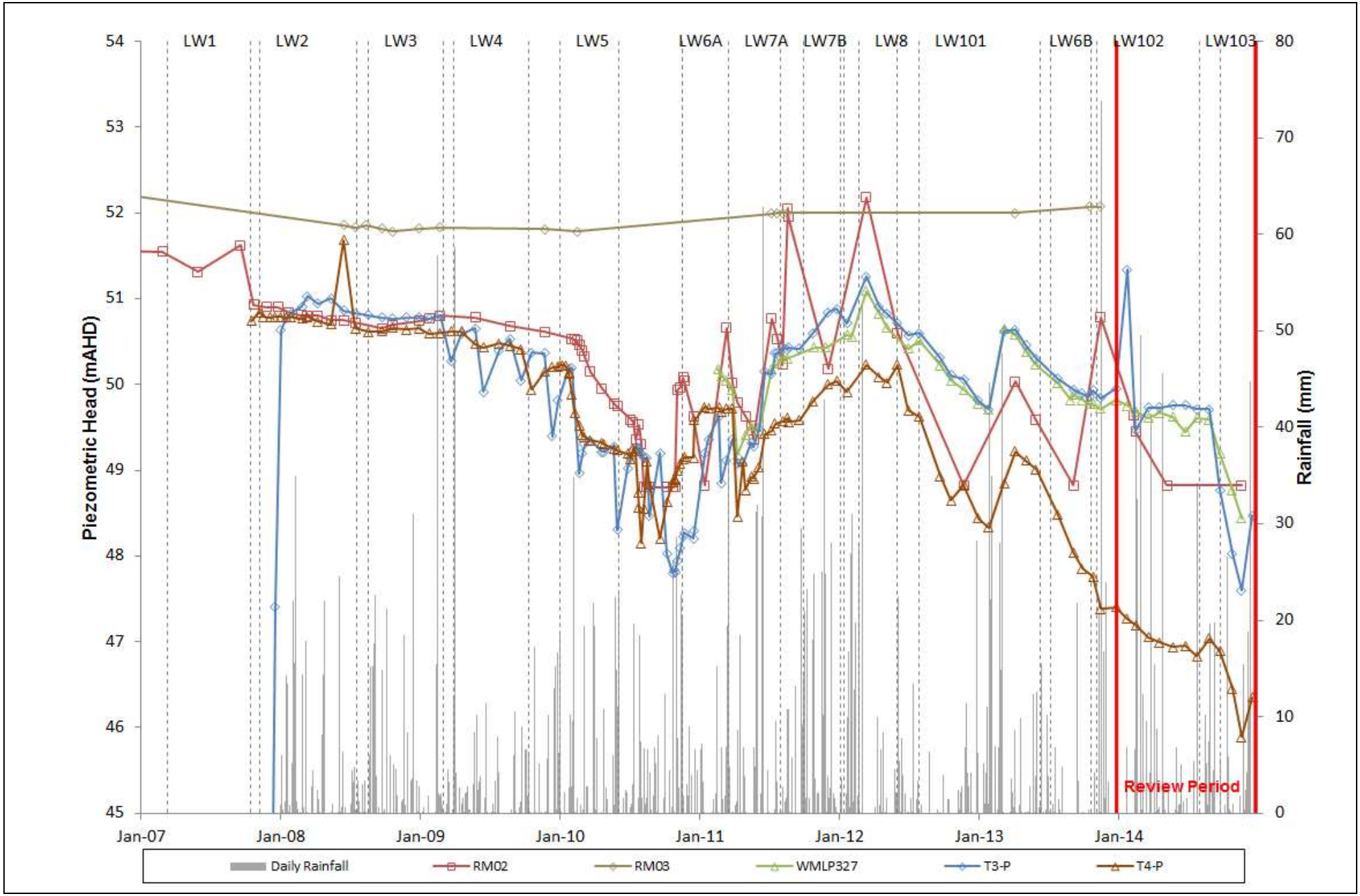

RPS

HYDROGRAPH – COAL MEASURES OVERBURDEN (SOUTH) FIGURE 16

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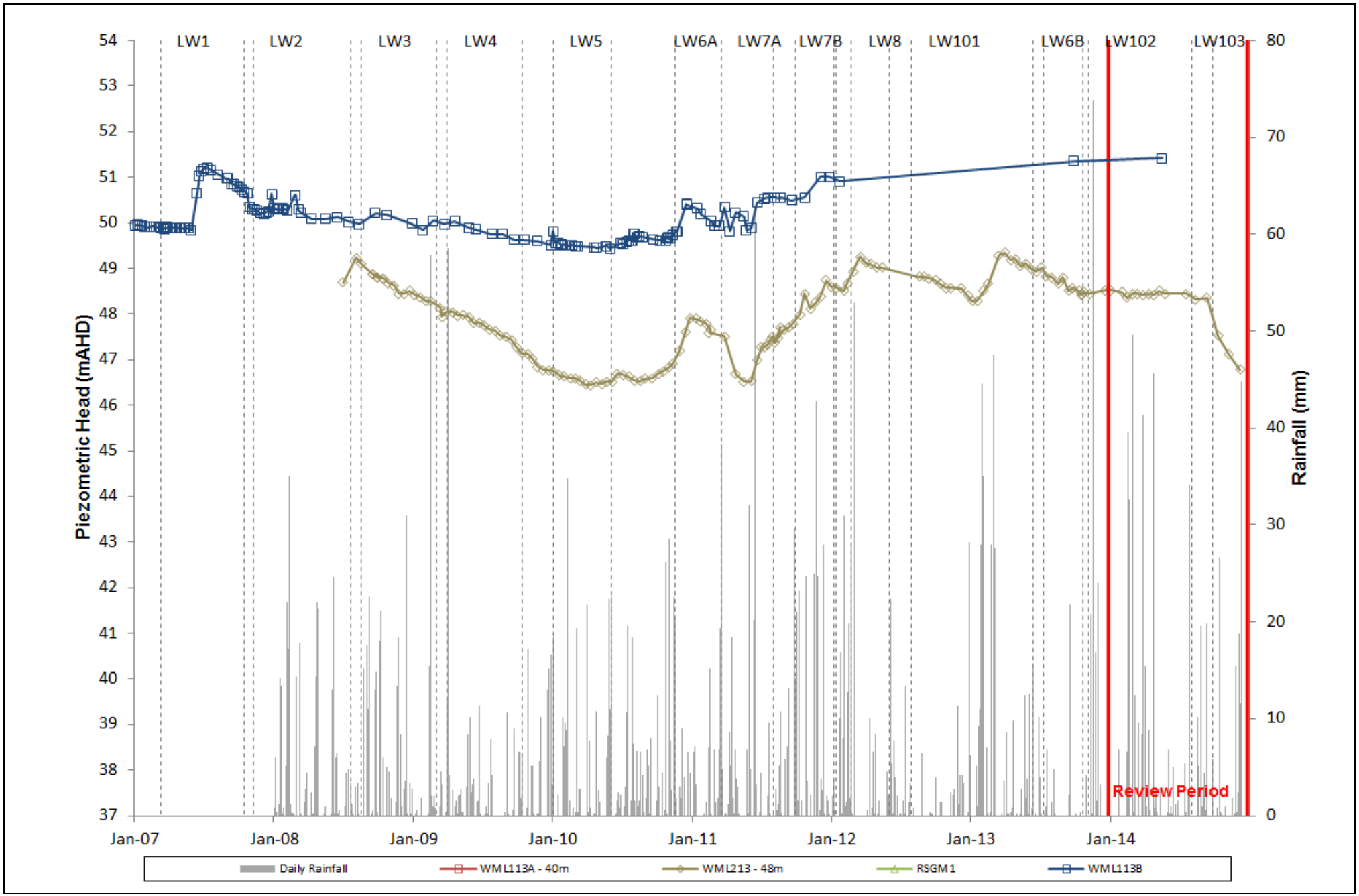

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HYDROGRAPH – BAYSWATER SEAM FIGURE 17

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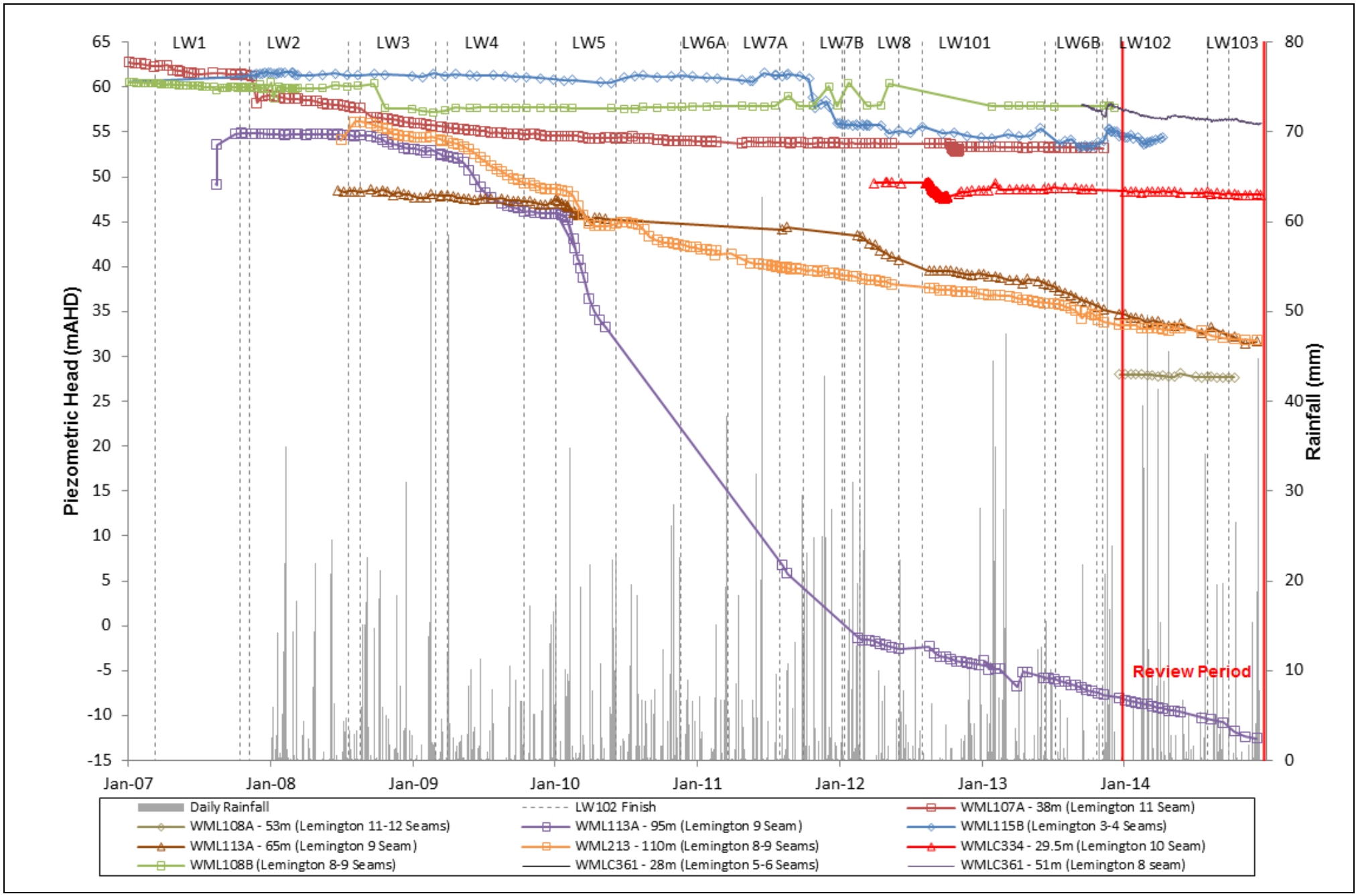

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HYDROGRAPH –LEMINGTON SEAMS 2, 3, 4, 10, 11 AND 12 FIGURE 18

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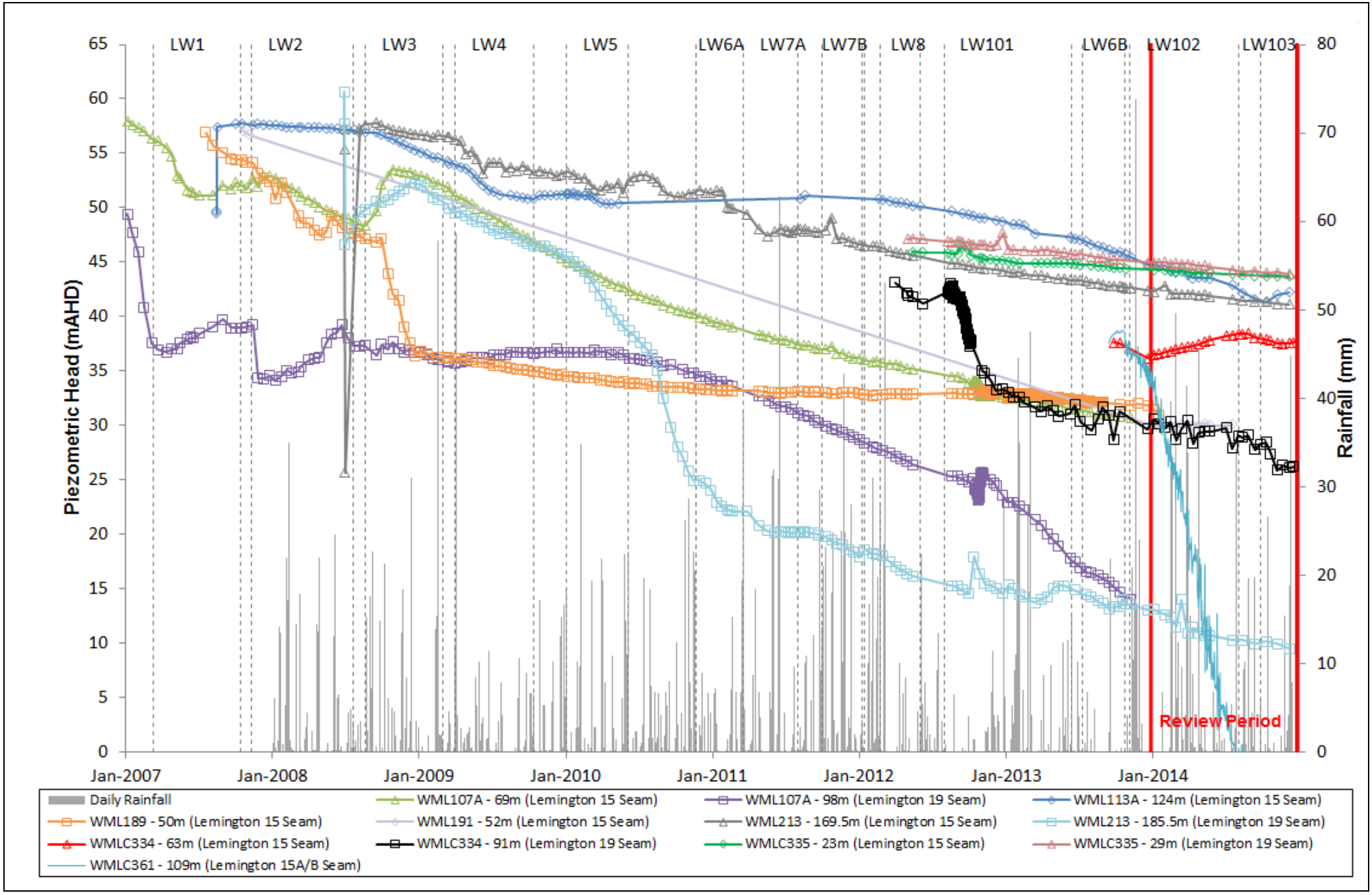

HYDROGRAPH –LEMINGTON 15 AND 19 FIGURE 19

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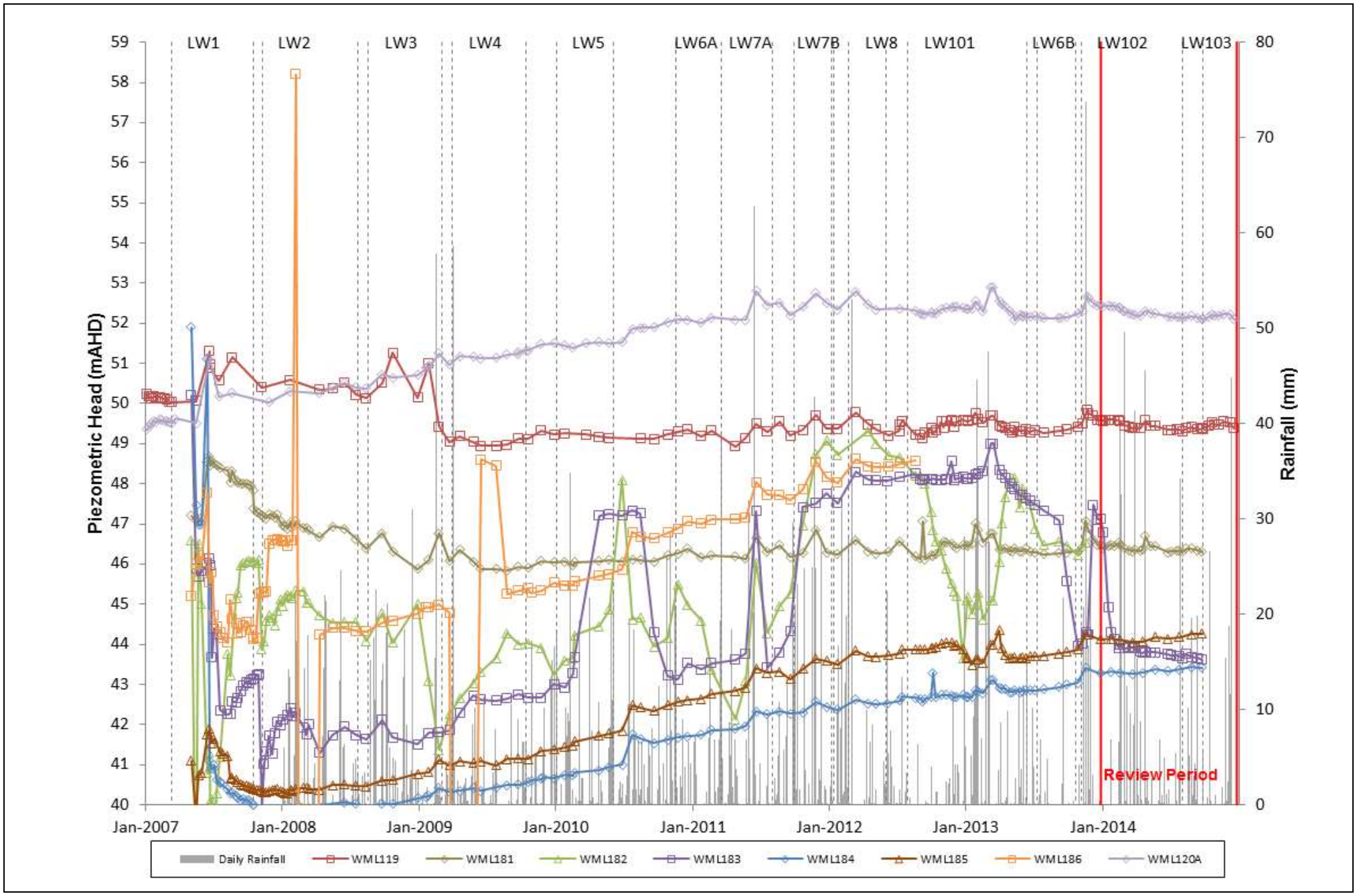

RPS

HYDROGRAPH –PIKES GULLY (EAST OF LW1) FIGURE 20

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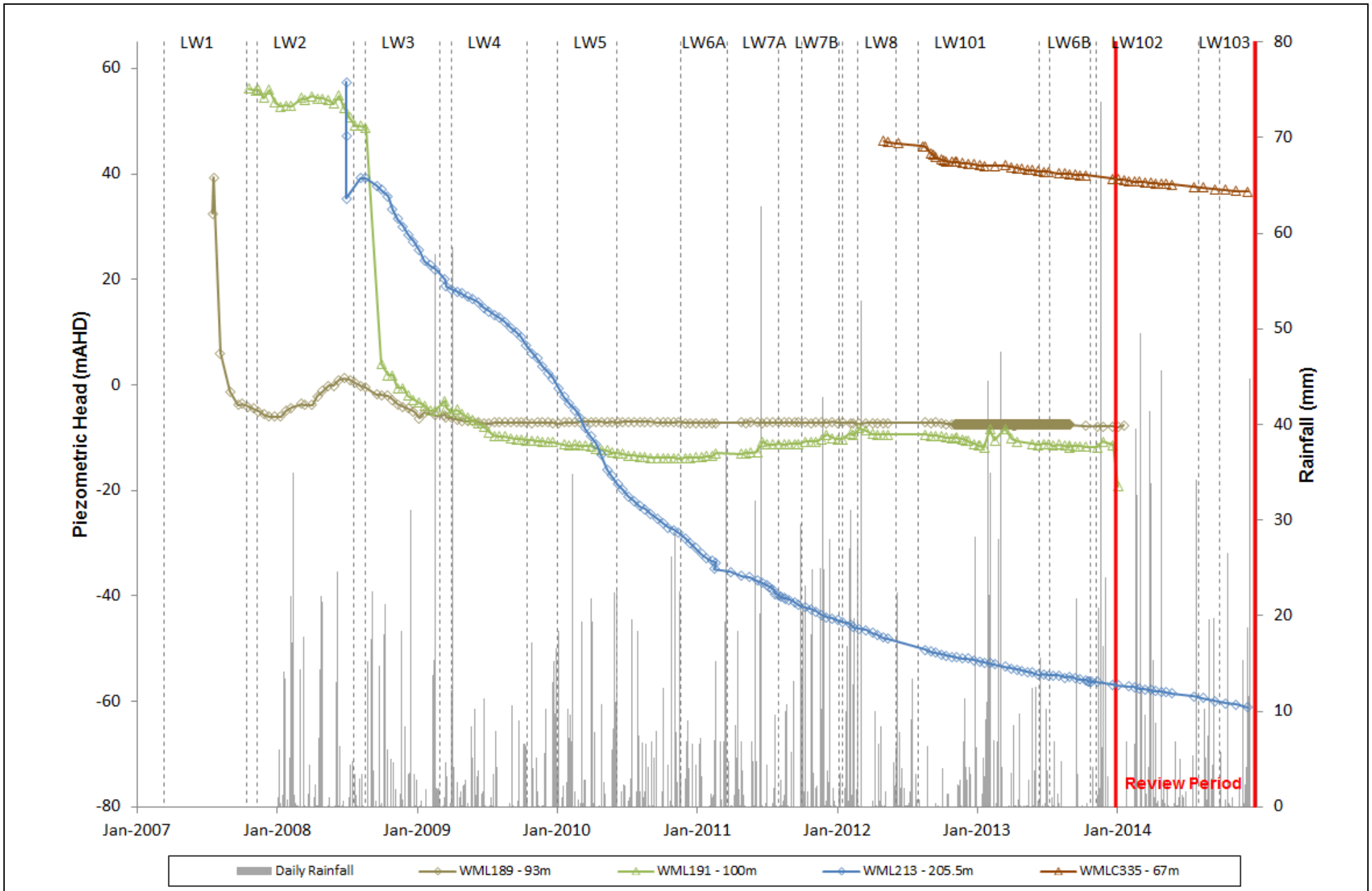

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HYDROGRAPH –PIKES GULLY SEAM (UNDERGROUND AREA) FIGURE 21

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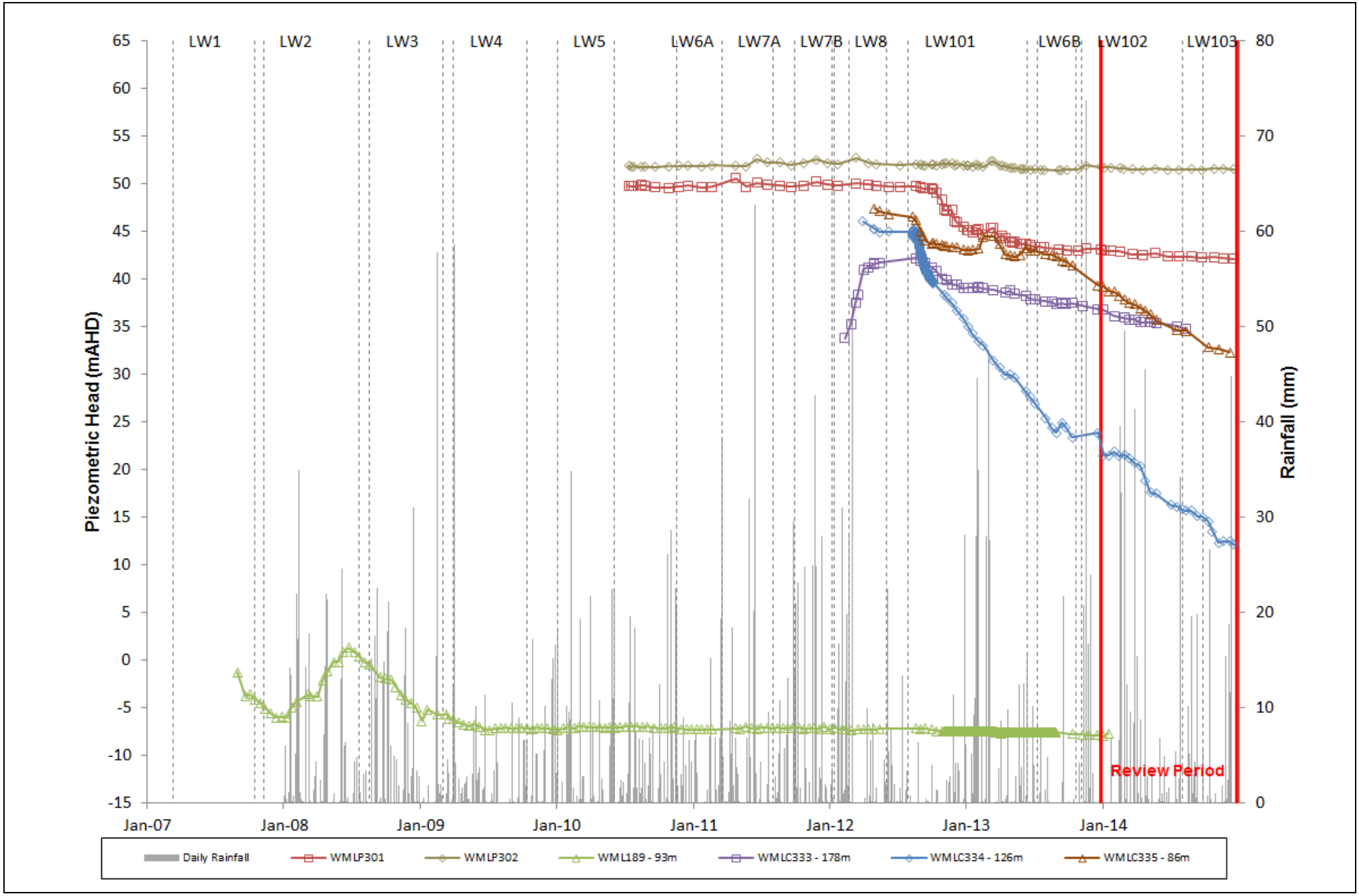

RPS

HYDROGRAPH – ARTIES SEAM FIGURE 22

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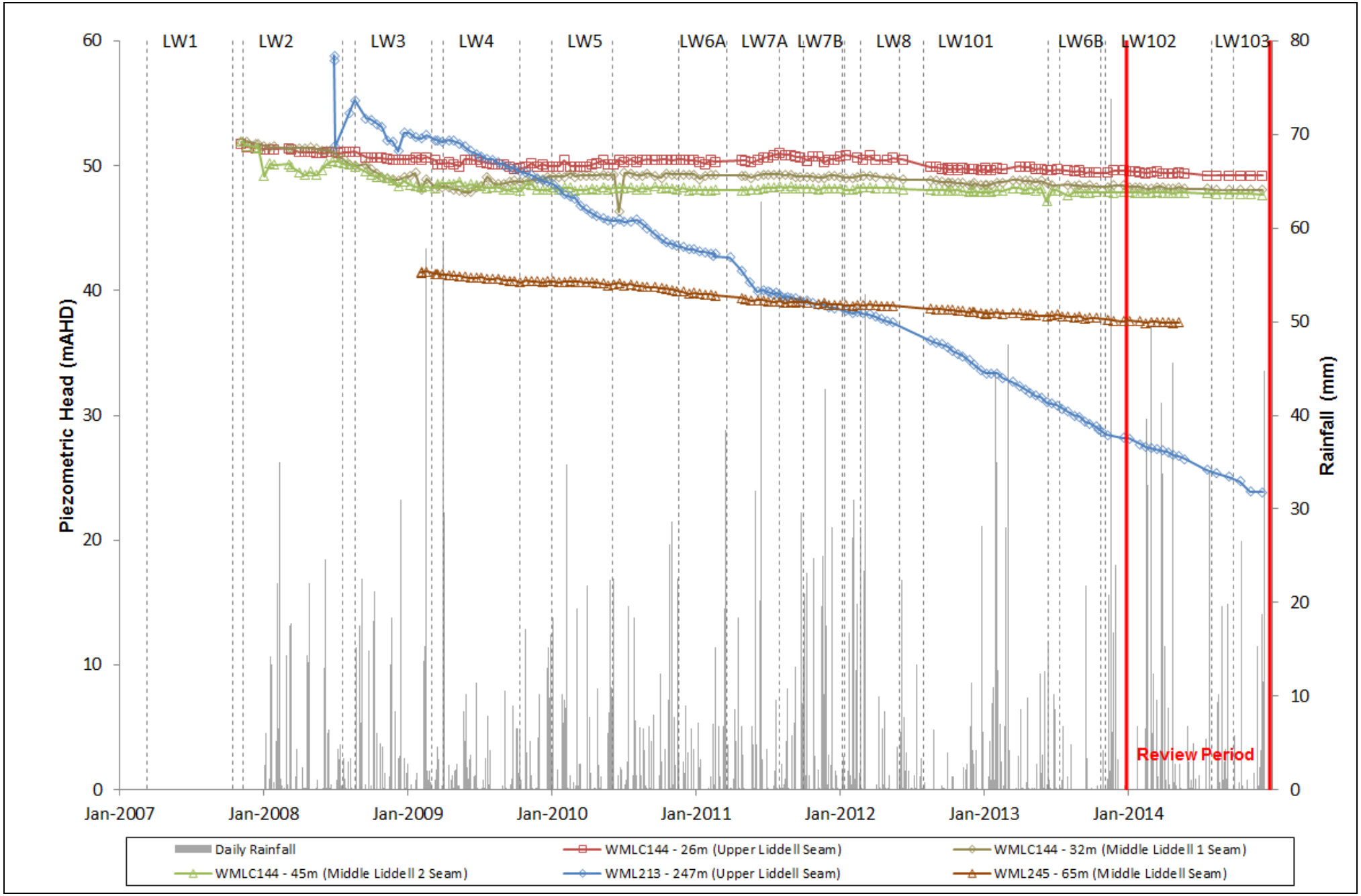

RPS

HYDROGRAPH – UPPER LIDDELL SEAM (1) FIGURE 23

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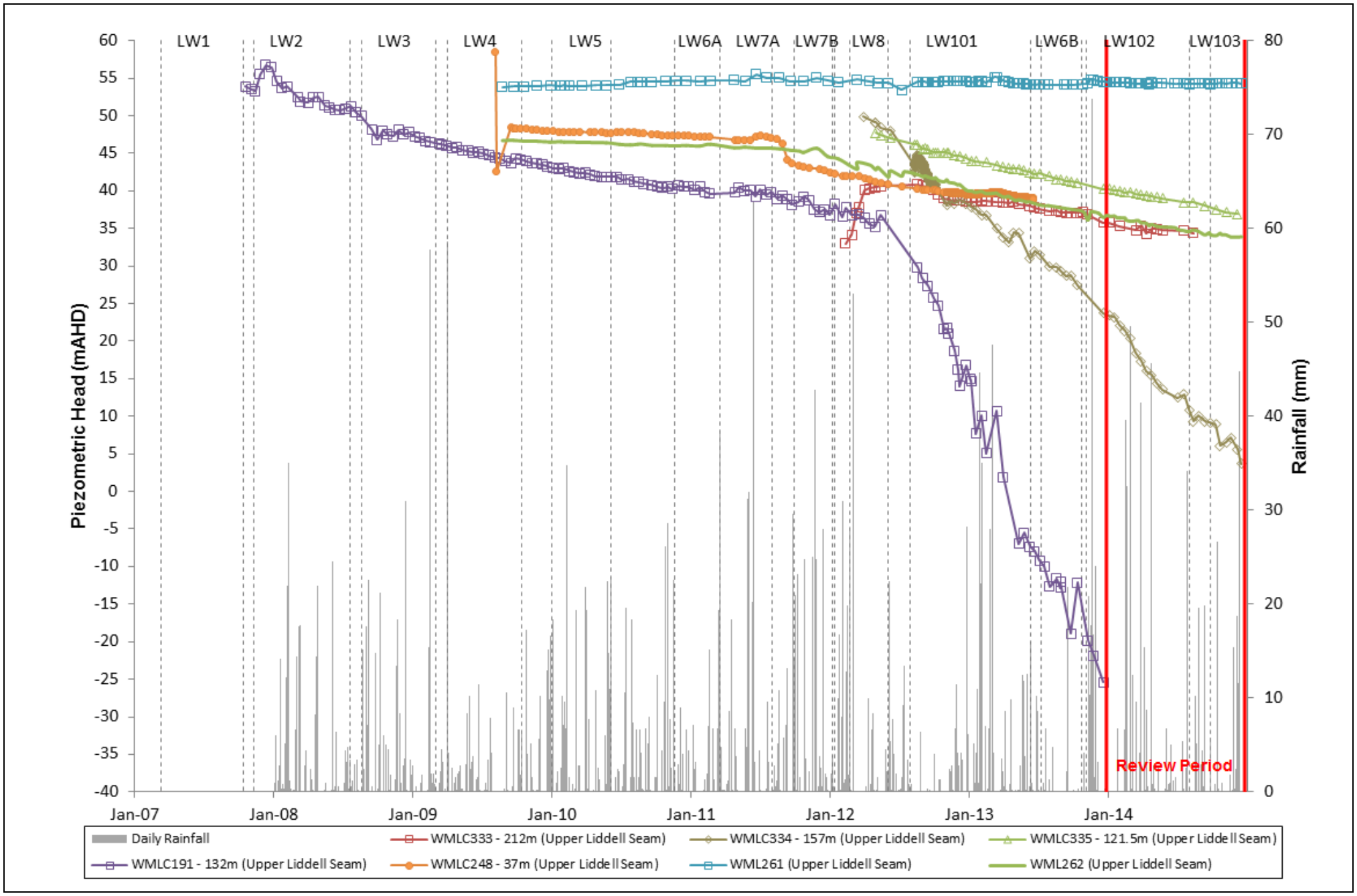

HYDROGRAPH – UPPER LIDDELL SEAM (NEAR LW101) FIGURE 24

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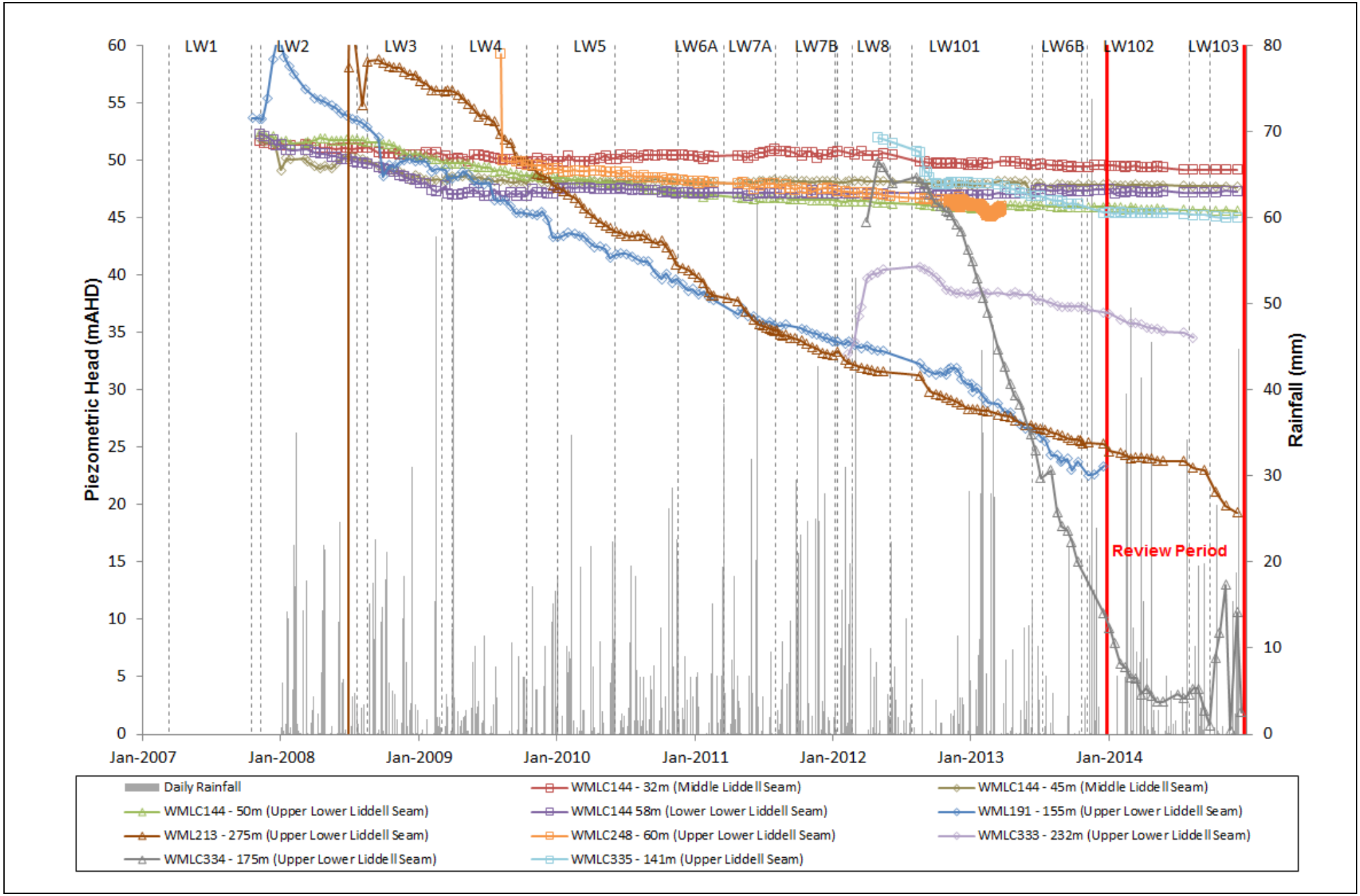

RPS

HYDROGRAPH –MIDDLE AND LOWER LIDDELL SEAM FIGURE 25

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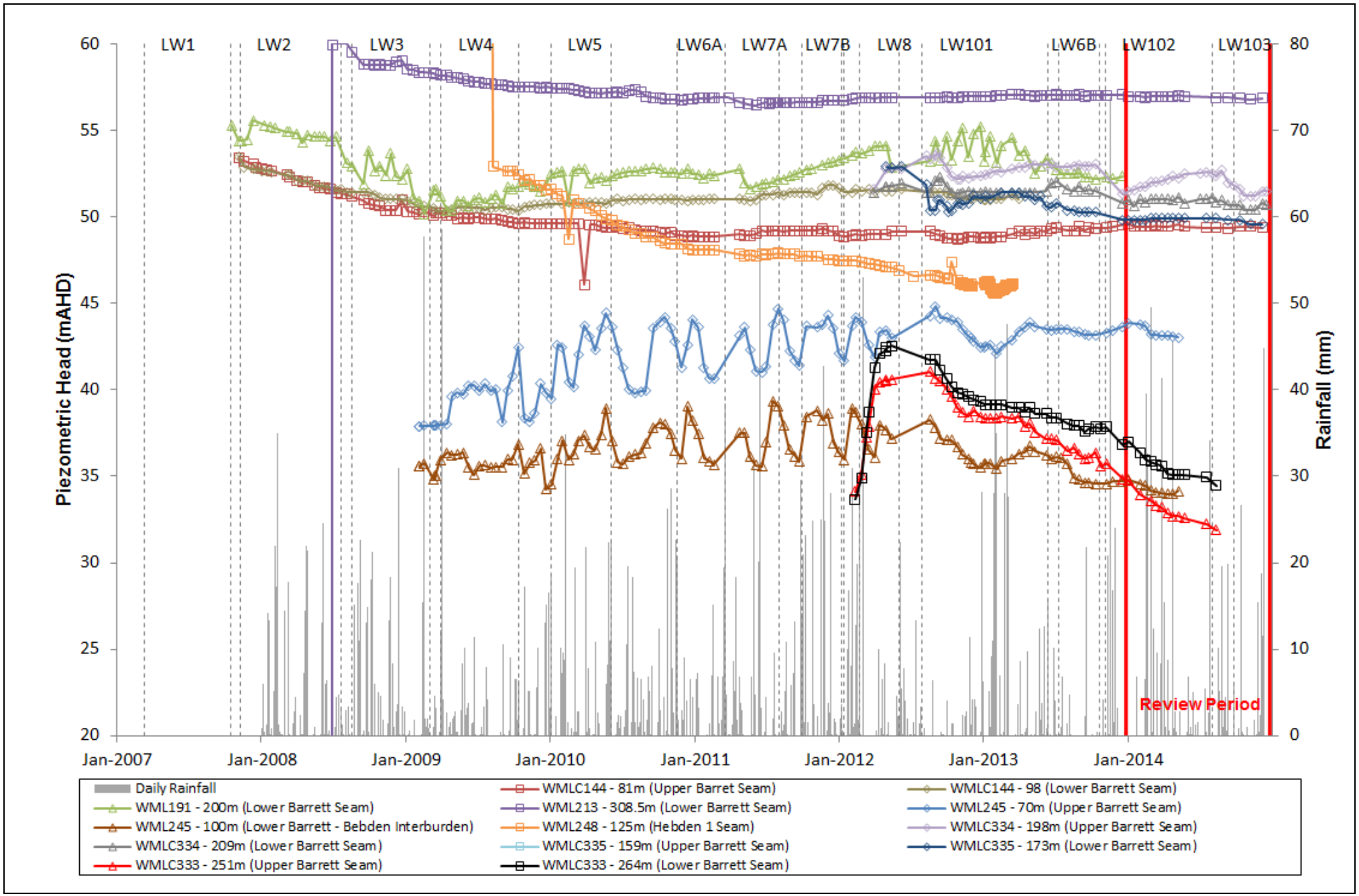

HYDROGRAPH –BARRET AND HEBDEN SEAMS FIGURE 26

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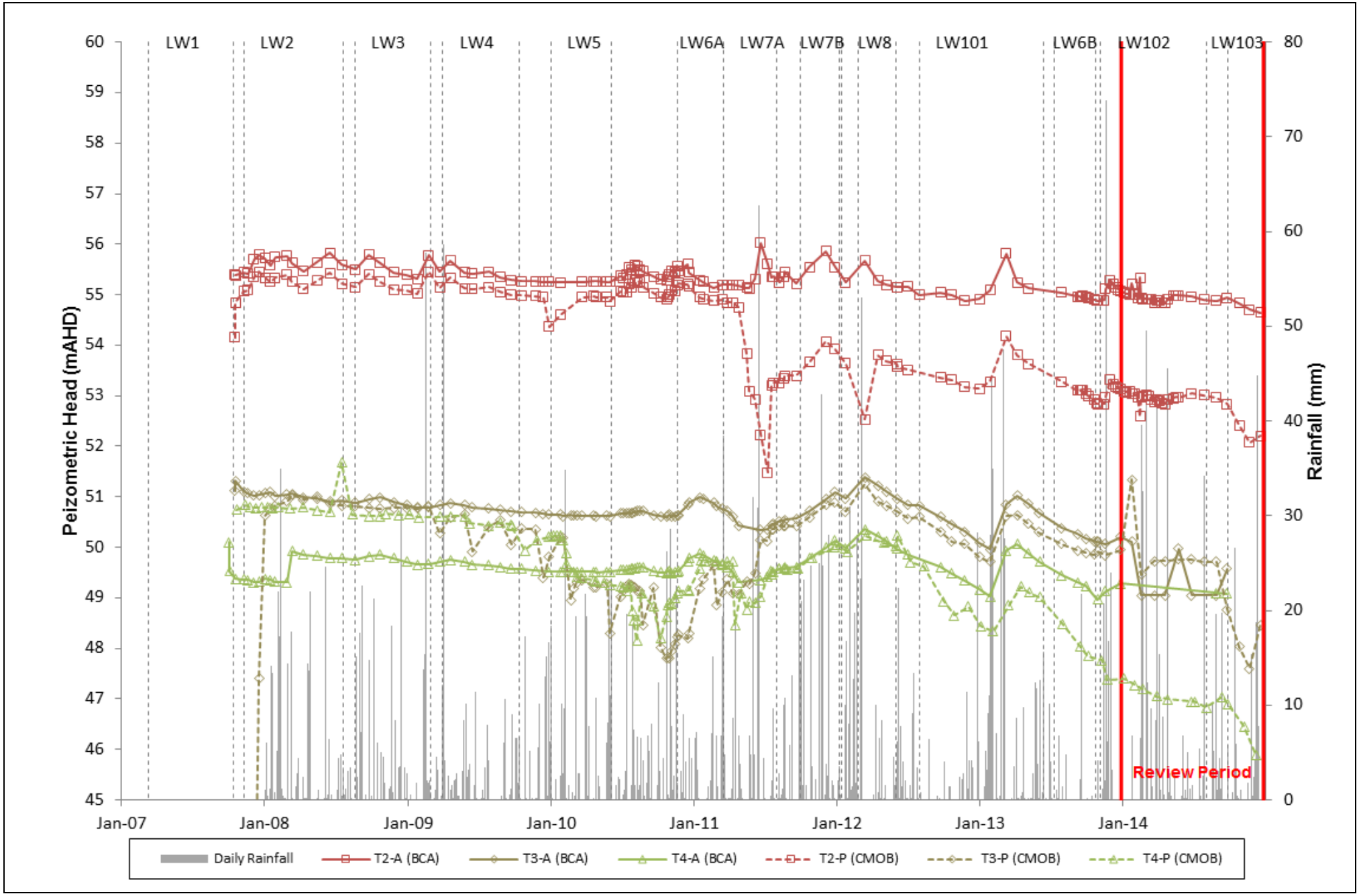

RPS

HYDROGRAPH –PAIRED STANDPIPES (1) FIGURE 27

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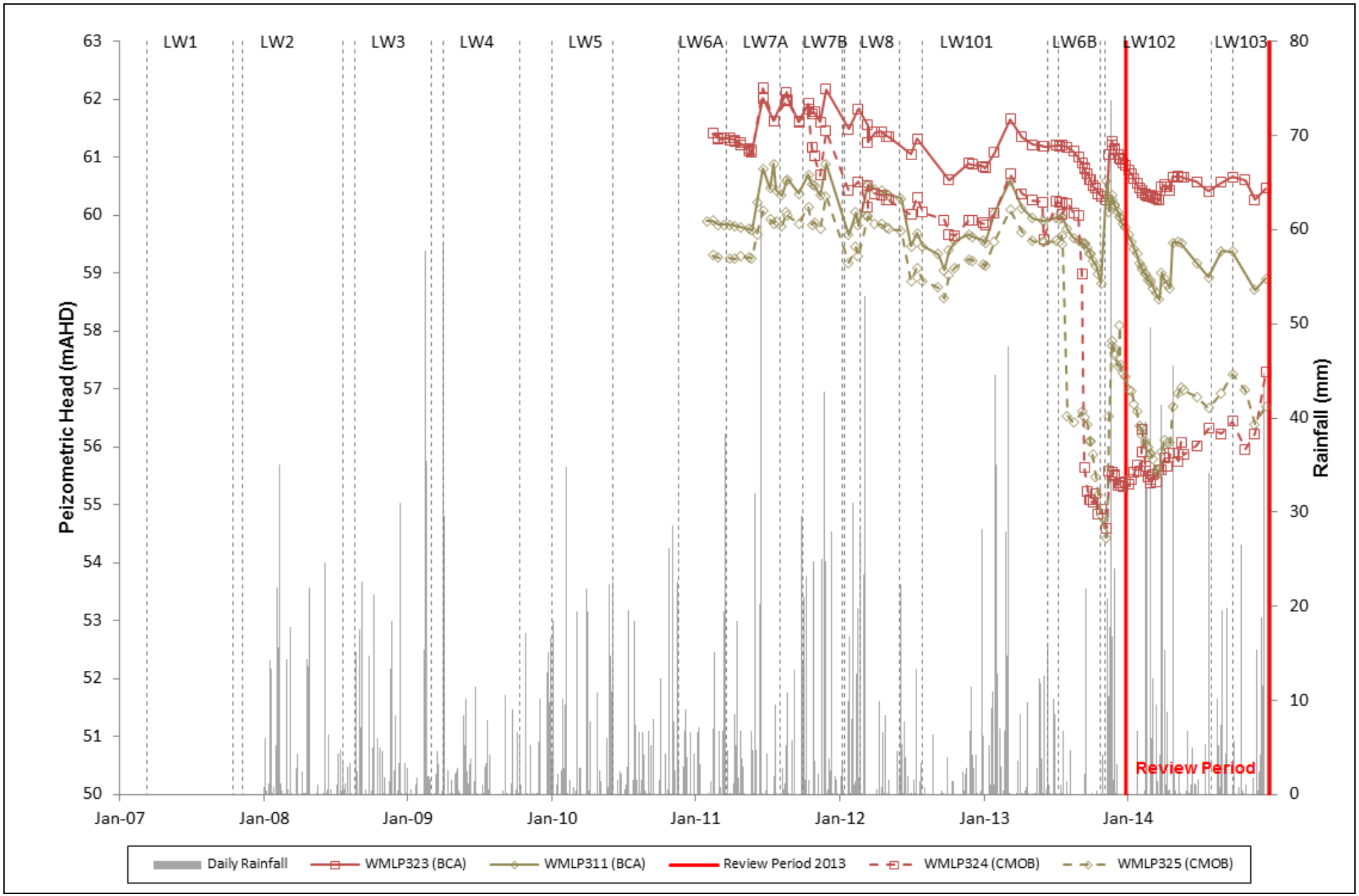

RPS

HYDROGRAPH –PAIRED STANDPIPES (2) FIGURE 28

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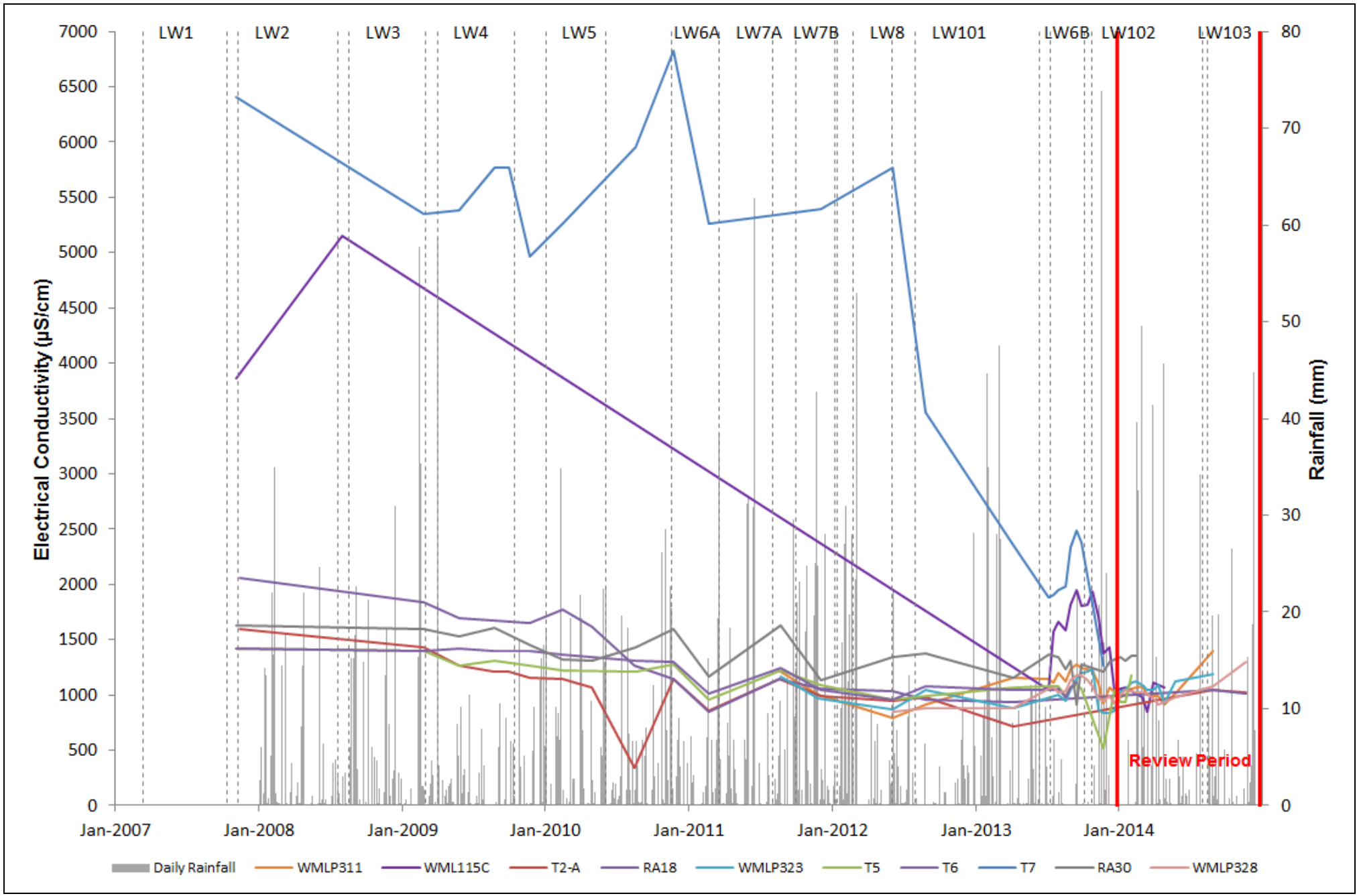

RPS

GROUNDWATER SALINITY –BOWMANS CREEK ALLUVIUM FIGURE 29

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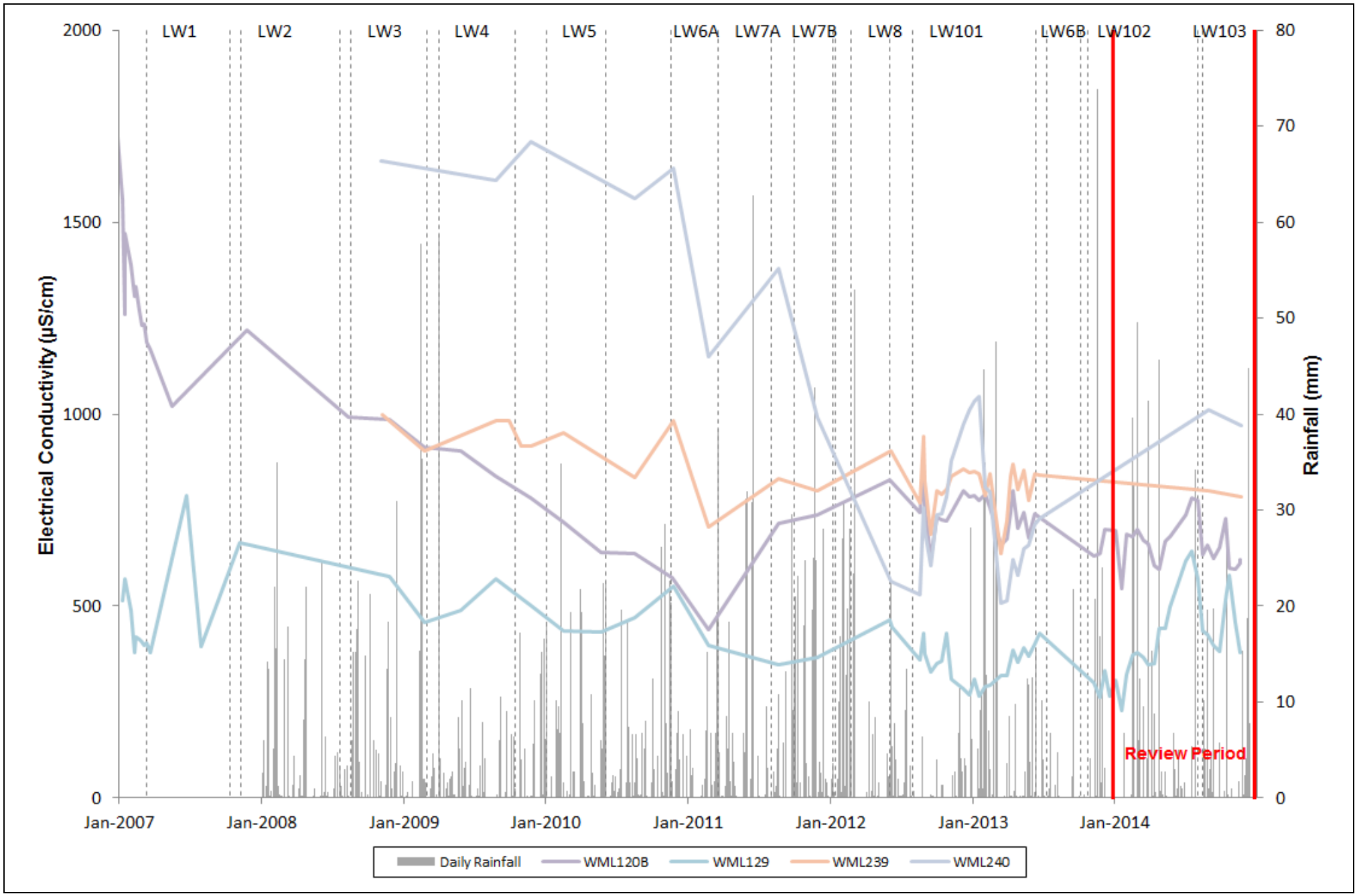
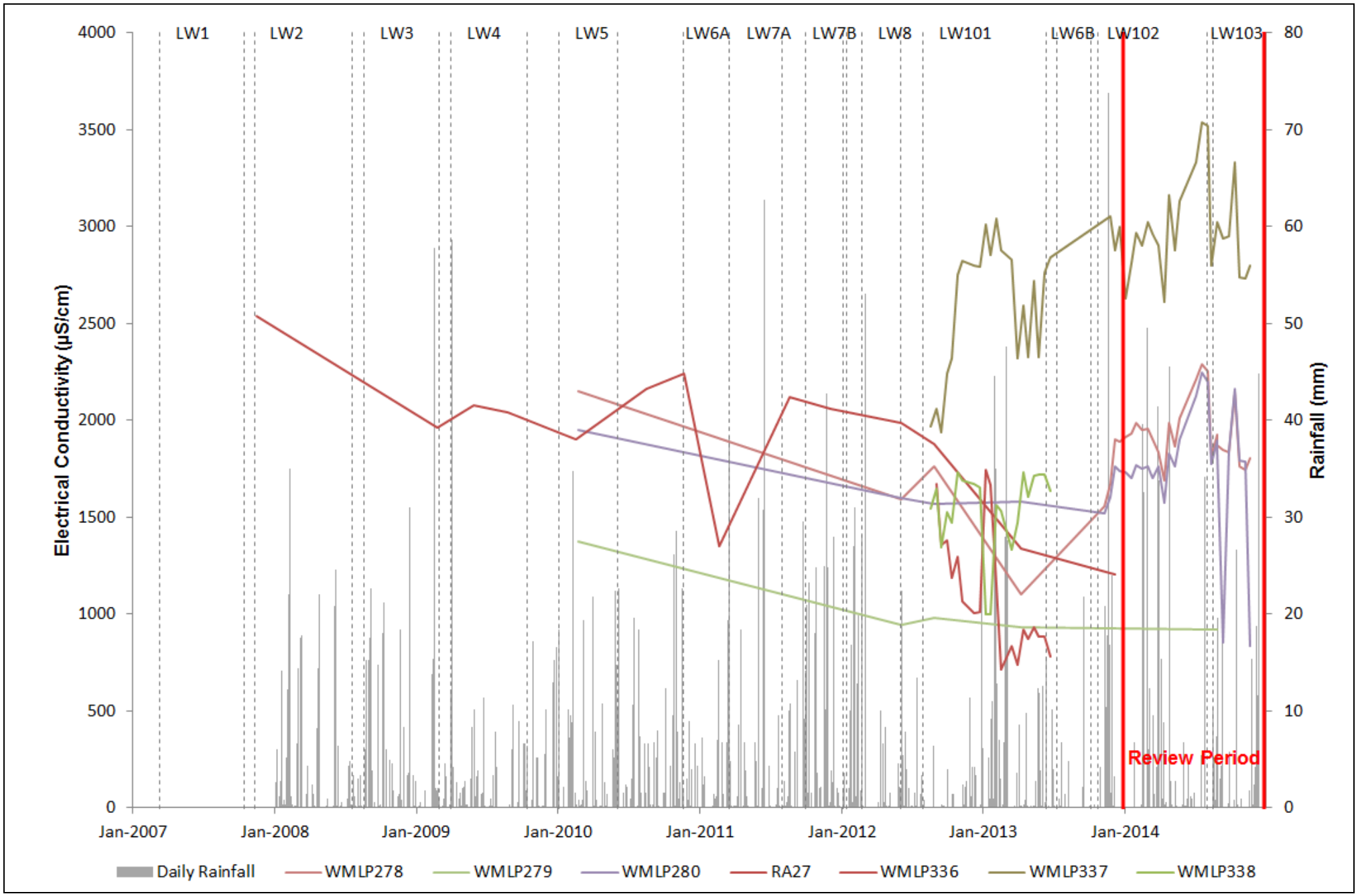


RPS

GROUNDWATER SALINITY –GLENNIES CREEK ALLUVIUM FIGURE 30

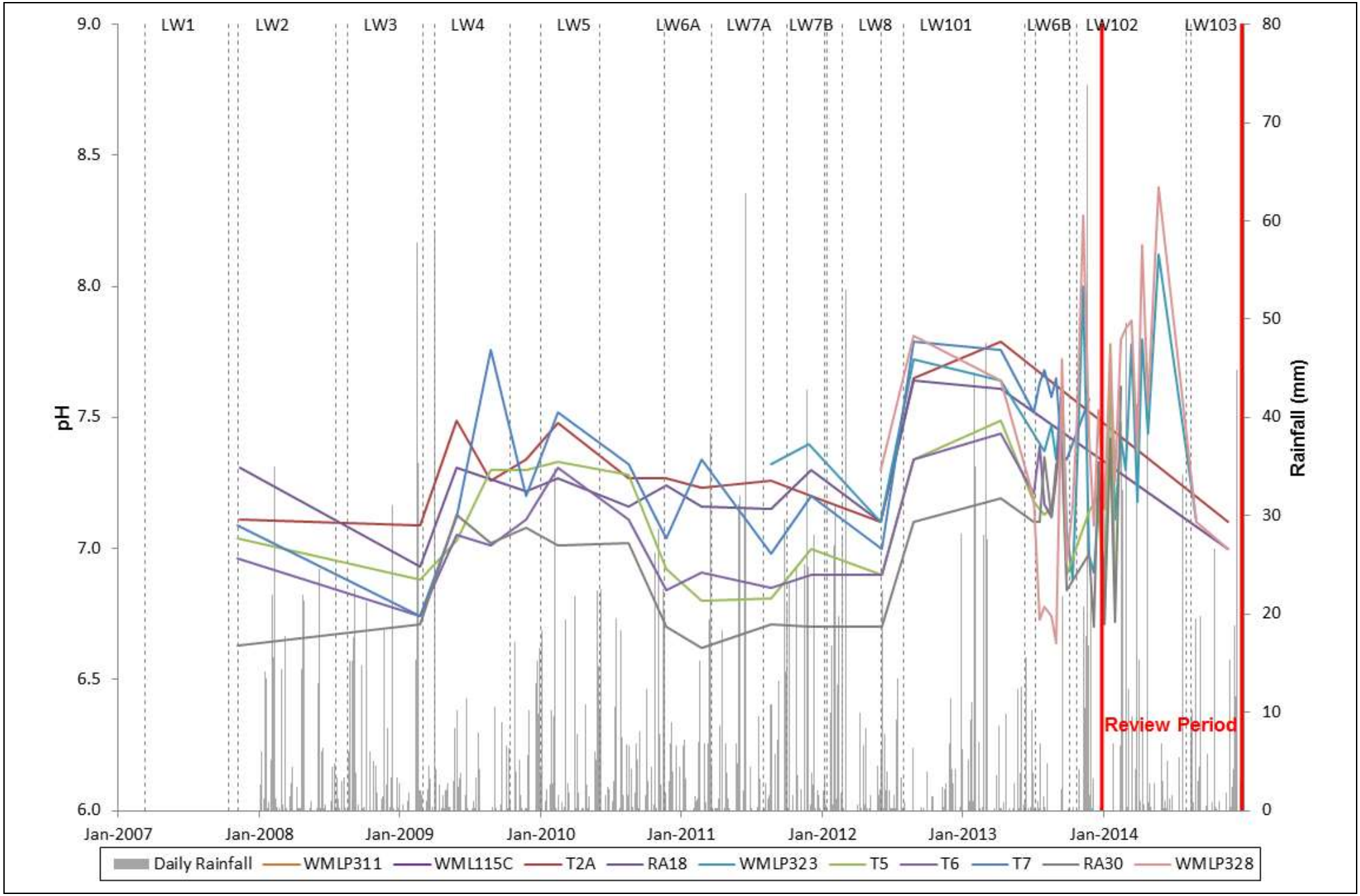
f:\jobs\s56c\300\excel\012b\outputs\figure30.docx



RPS

GROUNDWATER SALINITY –GLENNIES CREEK ALLUVIUM FIGURE 31

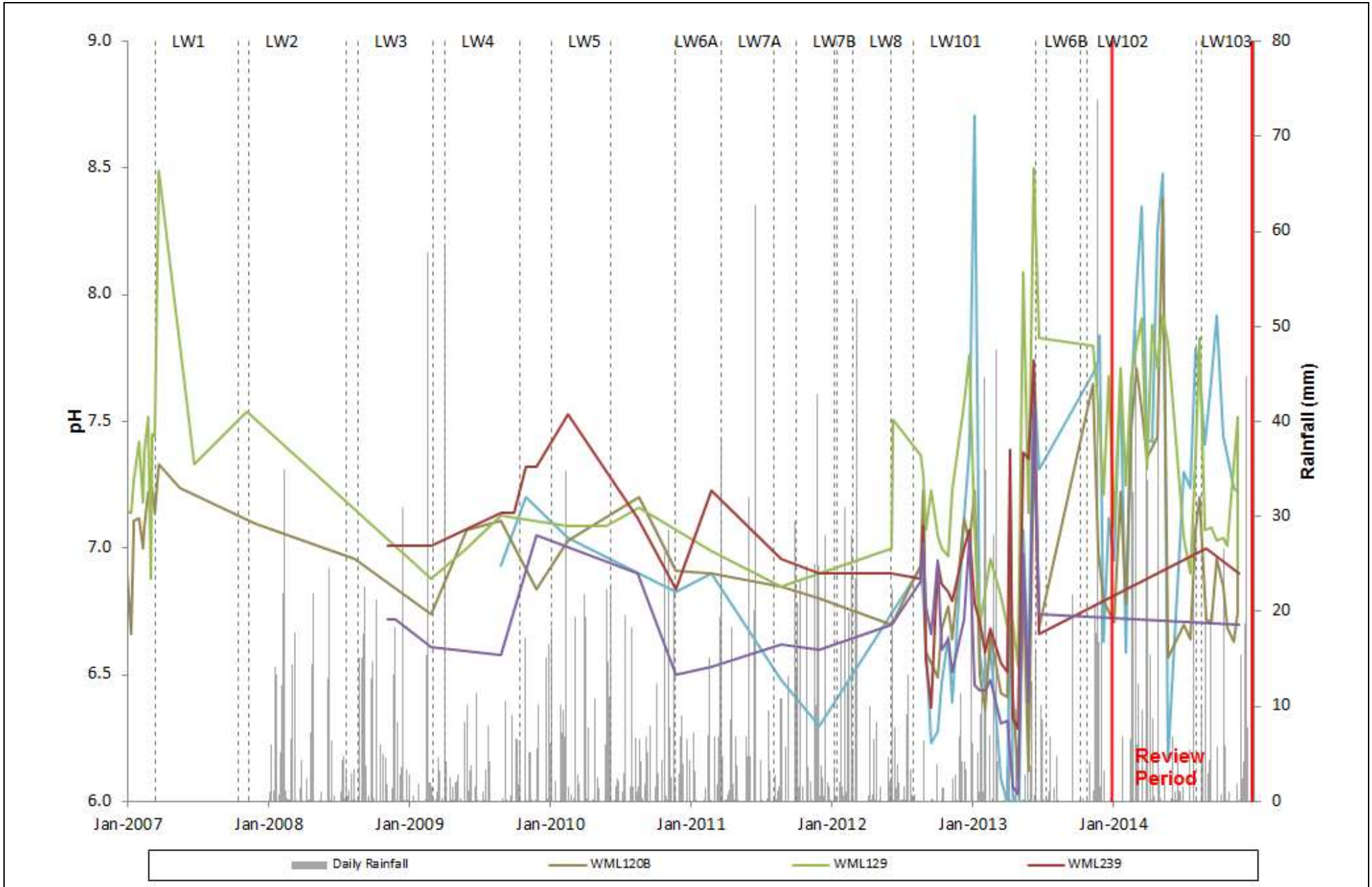
f:\jobs\s56c\300\excel\012b\outputs\figure30.docx



RPS

GROUNDWATER PH –BOWMANS CREEK ALLUVIUM FIGURE 32

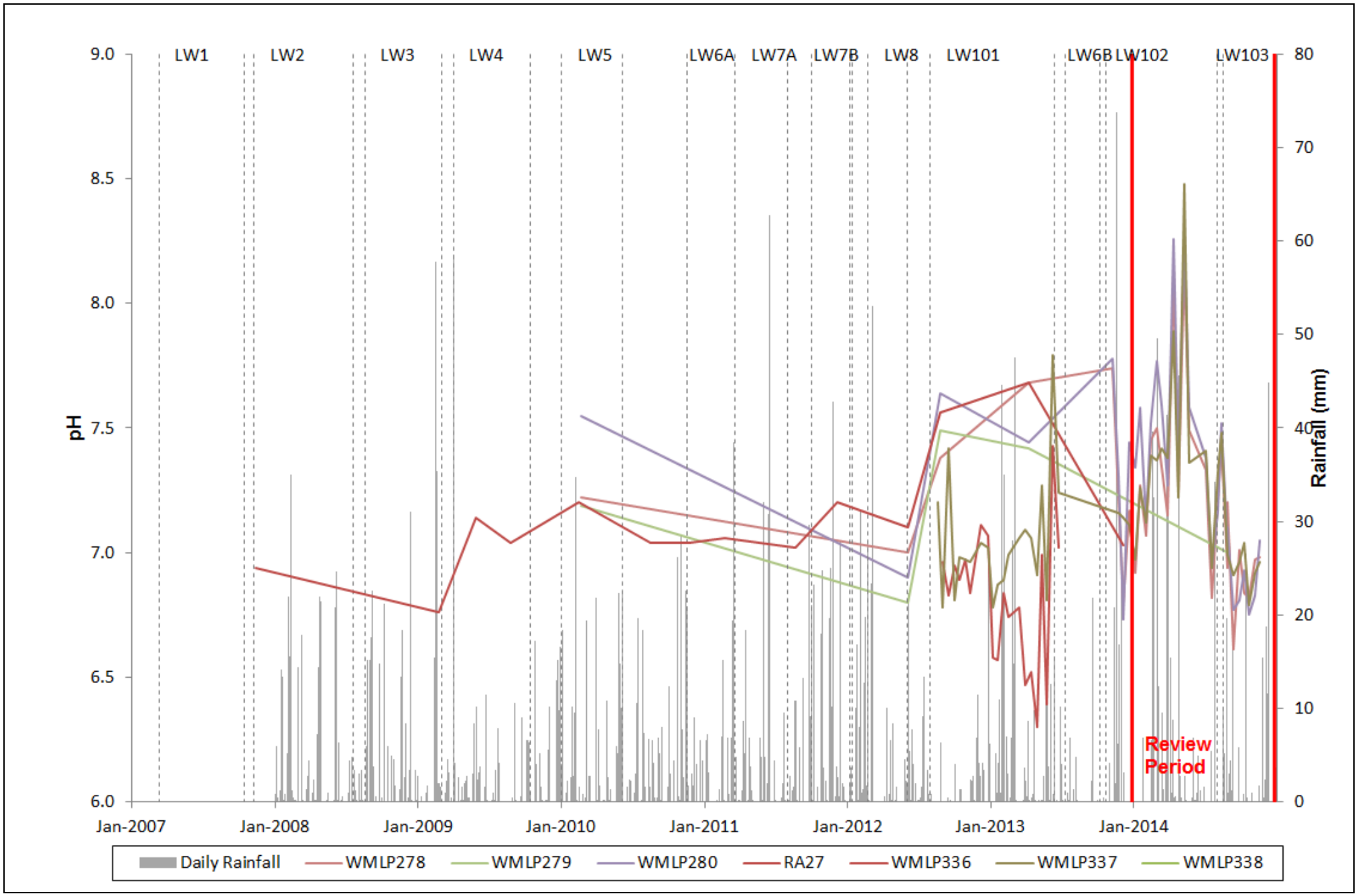
f:\jobs\s56c\300\excel\012b\outputs\figure30.docx



RPS

GROUNDWATER PH –BOWMANS CREEK ALLUVIUM FIGURE 33

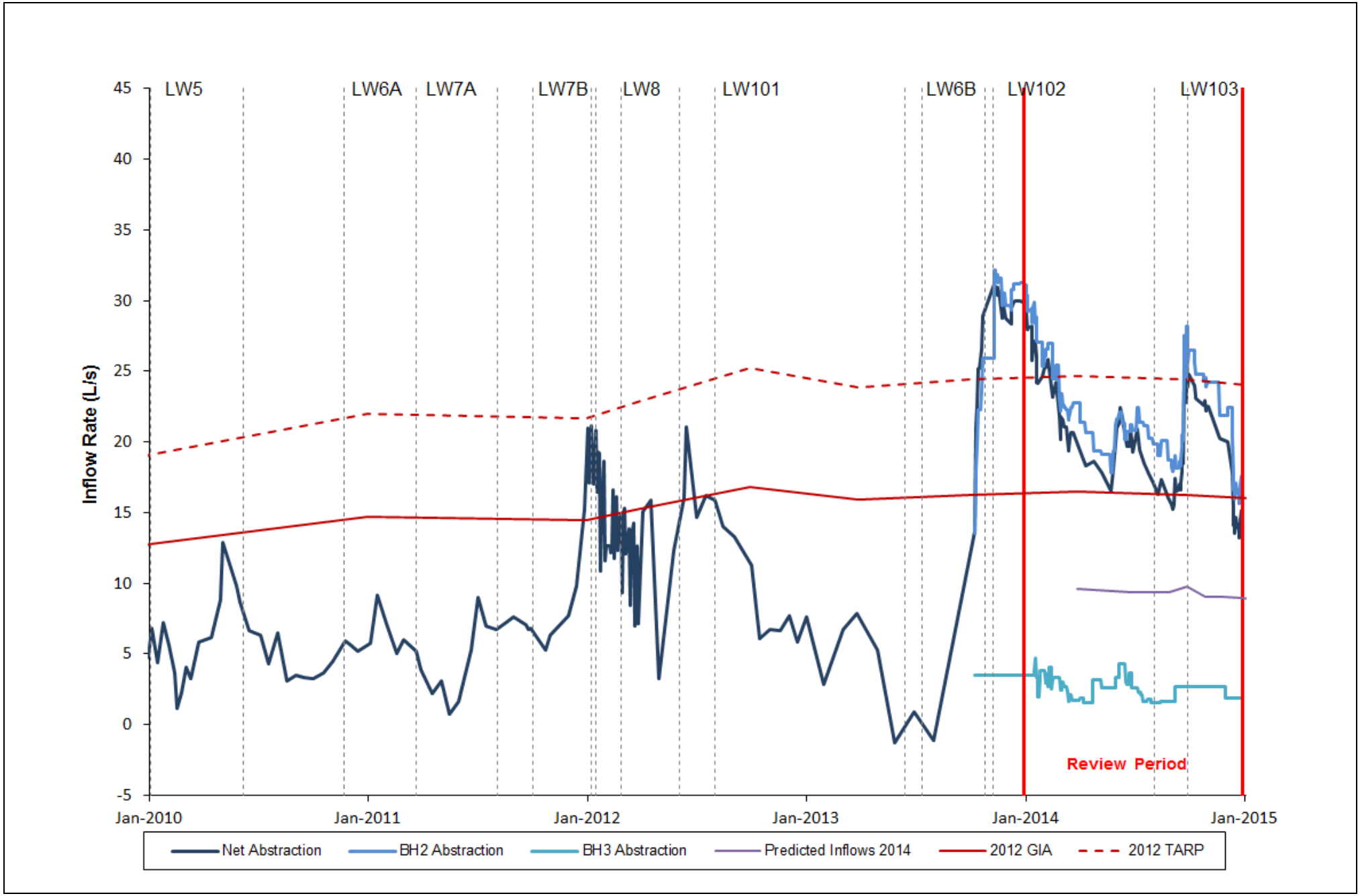
f:\jobs\s56c\300\excel\012b\outputs\figure33.docx



RPS

GROUNDWATER PH –HUNTER RIVER ALLUVIUM FIGURE 34

f:\jobs\s56c\300\excel\012b\outputs\figure34.docx



RPS

MINE DEWATERING FIGURE 35

f:\jobs\s56c\300\excel\012b\outputs\figure35.docx

Appendix 2. Aboriginal consultation

The following activities were undertaken in 2014 in partnership with the Registered Aboriginal Parties, and the broader Aboriginal Community. All activities involved consultation with RAPs. Further details can be provided upon request.

Date	Activity
3 – 13 February 2014	Archaeological salvage works LW3 &4 southern end
3 March 2014	Aboriginal Community Consultation Forum meeting, Singleton
17 -21 March 2014	Archaeological salvage works northern end subsidence zones LW 3&4
24 -27 March, 31 March – 04 April, 14 – 15 April 2014	Oxbow Site Archaeological Salvage Works ULD subsidence zone.
05.05.14-13.05.14	Archaeological salvage works LW5-7A ULD subsidence zone.
28.05.14	LW6A & LW7A
3 June 2014	Aboriginal Community Consultation Forum meeting, Singleton
24 September 2014	Aboriginal Community Consultation Forum meeting, Singleton
November	Salvaged artefact analysis with RAPs undertaken with about 600 artefacts analysed.
17 December 2014	Aboriginal Community Consultation Forum meeting, Singleton

Appendix 3. 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 Operations Pty Ltd
Property Name	Southern Woodland conservation area
Property Address	New England Highway, Camberwell
CA number	
Area (ha)	65 and 45 hectares
CMA Region	Hunter
Agreement signed	
Date of last monitoring visit	12 December 2014 (PEA Consulting)
Date of visit	
Officer undertaking visit	

B LANDHOLDER OVERVIEW SINCE LAST VISIT

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

Points to note	*Comments*

☐ **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*
Repair of subsidence cracking.		Ongoing

3 FIRE HISTORY MONITORING

Date of fire	*Area burnt (% of c.a./approx ha)*	*Reason (hazard red./wild)*	*Intensity (low/medium/high)*
N/A			

4 VISITATION

Average No. of Visitors per year	*Purpose of Visitation*	*Visitation effects*	*Strategies to overcome effects*
N/A			

5 COMMUNITY CONSULTATION AND INPUT INTO DECISION MAKING

Type of Involvement	*Numbers involved*	*Outcomes*
N/A		

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					
Biological - Vegetation Communities - Flora - Fauna & habitat - Water bodies	Woodland Birds, EEC vegetation, Brush tailed Phascogale habitat, Barking Owl	I I I I	Weeds and Pests such as Cactus spp and dog, fox and cat.	Moderate – manageable but requires ongoing works to control	
Geological					
Cultural Heritage - Aboriginal - Historic					
Research/ education					
Other					

**** 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 level where impacts on fauna are being found in monitoring.	Weed management is an important part of the land management plan. Weed management is an ongoing commitment onsite.
Pest Animals - Feral - Domestic - Native	Fral animals are controlled by a combination of baiting and habitat management	1080 baiting program and removal of grazing
Fire Management	A control burn will be required during the next three years	implemented
Threatened species; endangered ecological communities etc	Brush tailed phascogale trapped onsite. Barking owl recorded. Expansion of GCB and Speckled warbler onsite.	Nothing required.
Cultural Heritage Management		Cultural Heritage Management Plan is implemented.
Visitor Impact Management		
Community Consultation and input into decision making.		
Research/ Education programs		
Other permitted uses -vehicle access - use of timber -seed collection - etc	Underground mining results in minor subsidence impacts which need remediation from time to time.	Subsidence repair with small earthmoving equipment to minimise disturbance.

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)*

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: _____ _____
Landowner Visiting OEH/NPWS Officer, if applicable

Date report completed: _____

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.

Appendix 4. Consultation for the development of this AEMR

COMPANY: ASHTON COAL OPERATIONS PTY LIMITED

SITE: Glennies Creek Road
Camberwell NSW 2330
POSTAL: PO Box 699 Singleton NSW 2330
PHONE: +61 2 6576 1111
FAX: +61 2 6576 1122
EMAIL: info@yancoal.com.au
WEBSITE: www.ashtoncoal.com.au
ABN 22 078 556 500

31 October 2014

Scott Brooks
Team Leader Compliance (Mining)
Mining & Industry Projects
Planning & Environment
Suite 14, Level 1, 1 Civic Av
PO Box 3145
Singleton NSW 2330

Dear Scott

Ashton Coal Mine – AEMR 2014

Ashton Coal Operations Limited (ACOL) has commenced the preparation of the 2014 Annual Environmental Management Report (AEMR). In accordance with condition 9.3 of Project Approval 309-11-2001i ACOL is required to consult with Planning and Environment during the preparation of the report.

The AEMR will contain the requirements of condition 9.2 of the Project Approval including environmental monitoring summaries and a summary of operations during 2014. It will also address the feedback received in the letter send on 11 June 2014 documenting your AEMR review and site visit.

If there is any other information that you would like ACOL to consider including in the report, please contact James or me to discuss at your earliest convenience on 02 6570 9219.

Yours Sincerely,

Digby Short
Manager Environment & Community Relations
Ashton Coal

YANCOAL
兖煤澳大利亚有限公司

AshtonCoal
PART OF THE YANCOAL AUSTRALIA GROUP

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WEBSITE: www.ashtoncoal.com.au
ABN 22 078 556 500

31 October 2014

Hemantha De Silva
Department of Primary Industries
NSW Office of Water
PO Box 2213
DANGAR NSW 2309

Dear Hemantha,

Ashton Coal Mine – AEMR 2014

Ashton Coal Operations Limited (ACOL) has commenced the preparation of the 2014 Annual Environmental Management Report (AEMR). In accordance with condition 9.3 of Project Approval 309-11-2001i ACOL is required to consult with NSW Office of Water during the preparation of the report. The AEMR will contain a summary of monitoring data throughout the reporting period, a Groundwater Monitoring Report, and other requirements of condition 9.2 of the Project Approval.

Consistent with past reporting periods ACOL has commissioned RPS to complete the Groundwater Management Report to meet condition 9.2(d) of the Project Approval. If this does not meet the Department's satisfaction please contact us by 30 November to discuss, as the report preparation will need to commence in early December to meet the required deadlines.

If there is any other information that you would like Ashton to consider including in the report or if you would like to discuss the AEMR preparation further please contact James or me on 02 6570 9219.

Yours Sincerely,

Digby Short
Manager Environment & Community Relations
Ashton Coal

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兖煤澳大利亚有限公司

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ABN 22 078 556 500

31 October 2014

John Trotter
Department of Trade & Investment – Resources & Energy
PO Box 344
Hunter Region Mail Centre, NSW 2310

Ashton Coal Mine – AEMR 2014

Ashton Coal Operations Limited (ACOL) has commenced the preparation of the 2014 Annual Environmental Management Report (AEMR). In accordance with condition 9.3 of Project Approval 309-11-2001i ACOL is required to consult with Resources and Energy during the preparation of the report.

In accordance with ESG3, and to meet point 4 of the Action Plan provided in the DRE's review of the 2013 AEMR, the 2014 AEMR will contain reporting against Section 8.5 of the Mining Operations Plan (MOP), and will report against section 7 of the MOP in relation to rehabilitation. Please contact me if you have further requirements in order for ACOL to meet the requirements of point 4 of the Action Plan.

The AEMR will be prepared to meet the requirements of condition 9.2 of the Project Approval including environmental monitoring summaries and a summary of operations during 2014. It will also address all feedback received in the letter send on 11 June 2014 documenting your AEMR review and site visit.

If there is any further information that you would like ACOL to consider including in the report, please contact me to discuss at your earliest convenience on 02 6570 9219.

Yours Sincerely,

Digby Short
Manager Environment & Community Relations
Ashton Coal

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ABN 22 078 556 500

31 October 2014

Peter Mathews
Regional Operations Unit, Hunter
NSW Environment Protection Authority
PO Box 488G
NEWCASTLE NSW 2300

Dear Pete,

Ashton Coal Mine – AEMR 2014 and requested change of Annual Return reporting period

Ashton Coal Operations Limited (ACOL) has recently submitted the Annual Return for the period 2 September 2013 to 1 September 2014, and is commencing the preparation of the 2014 Annual Environmental Management Report (AEMR) covering the 2014 calendar year.

Annual Environmental Management Report

In accordance with condition 9.3 of Project Approval 309-11-2001i, ACOL is required to consult with the NSW Environment Protection Authority (EPA) during the preparation of the AEMR.

The AEMR will contain the requirements of condition 9.2 of the Project Approval including environmental monitoring summaries and a summary of operations during 2014.

If there is any other information that you would like ACOL to consider including in the AEMR please let us know on the details below as soon as practicable to enable discussion and possible inclusion in the report.

Annual Return

The information presented in the annual return is similar to some of the information required by the AEMR. The two different reporting periods covered by the AEMR and the Annual Return lead to duplication of reporting. In order to minimize the administrative load of preparing and reviewing this documentation, we politely ask that you consider our request to change the reporting period of the Annual Return. This was included in an application to vary the EPL lodged with the EPA on the 1 July 2014.

If you are able to process this request, ACOL would prepare an interim annual report covering 2 September 2014 to 31 December 2014 before reporting future calendar years. We believe this will lead to less work preparing and reviewing both documents, and will lead to greater transparency of public reporting with all data covering identical time periods.

If you would like to discuss further, please contact me on 02 6570 9219 at your convenience.

Yours Sincerely,

Digby Short
Manager Environment & Community Relations
Ashton Coal

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WEBSITE: www.ashtoncoal.com.au
ABN 22 078 556 500

31 October 2014

Ms Melinda Hale
Environment Officer
Singleton Council
Civic Avenue
PO Box 314
SINGLETON NSW 2330

Dear Melinda

Ashton Coal Mine – AEMR 2014

Ashton Coal Operations Limited (ACOL) has commenced the preparation of the 2014 Annual Environmental Management Report (AEMR). In accordance with condition 9.3 of Project Approval 309-11-2001i ACOL is required to consult with Singleton Council during the preparation of the report.

The AEMR will contain the requirements of condition 9.2 of the Project Approval including environmental monitoring summaries and a summary of operations during 2014.

If there is any other information that you would like ACOL to consider including in the report, please contact James or me to discuss at your earliest convenience on 02 6570 9219.

Yours Sincerely,

Digby Short
Manager Environment & Community Relations
Ashton Coal