



Annual Review

2017



DURALIECOAL


Part of the Yancoal Australia Group

DURALIE COAL MINE

ANNUAL REVIEW

Reporting Period: 1st July 2016 to 30th June 2017

Table 1 – Annual Review Title Block

Name of operation	Duralie Coal Mine
Name of operator	Yancoal Australia Ltd
Development consent/ project approval #	PA (08_0203)
Name of holder of Development consent/ project approval #	Duralie Coal Pty Limited
Mining lease #	ML1427, ML1646
Name of holding of mining lease	CIM Duralie Pty Ltd
Water licence #	20BL168404, 20WA202053, various monitoring bore licences.
Name of holder of water licence	CIM Duralie Pty Ltd & Duralie Coal Pty Ltd
MOP/ RMP start date	18 th March 2015
MOP/ RMP end date	31 st December 2019
Annual Review start date	1 st July 2016
Annual Review end date	30 th June 2017
<p>I, (Insert Authorised Reporting Officer Name), certify this audit report is true and accurate record of the compliance status of Stratford Mining Complex for the period of 1st July 2015 to 31st December 2015 and that I am authorised to make this statement on behalf of Yancoal.</p> <p>Note.</p> <p>a) The Annual Review is an 'environmental audit' for the purpose of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of the corporation, \$1 million and for an individual \$250,000.</p> <p>b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement – maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents- maximum penalty 2 years imprisonment or \$22, 000, or both).</p>	
Name of authorised reporting officer	Mr John Cullen
Title of authorised reporting officer	Operations Manager – Duralie Coal
Signature of authorised reporting officer	
Date	26 th SEPTEMBER 2017

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1 STATEMENT OF COMPLIANCE

Table 2- Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
Project Approval No. 08_0203	No
ML1427, ML1646	Yes

Table 3 – Non-compliances

Relevant Approval	Condition #	Condition Description (summary)	Compliance Status	Comment	Section addressed
PA (08_0203)	Schedule 3 Condition 17	Emitting of offensive odours.	Non-Compliant	29/07/2016 – Odours emitted from mine site. Incident report submitted to DP&E and EPA. No further action requested.	Section 6.11
PA (08_0203)	Schedule 5 Condition 19	Air quality criteria.	Non-Compliant	14/02/2017 – High PM10 results during January 2017. Monitor located on mine owned property. Not consistent with mine contribution. Incident report submitted to DP&E. No further action requested.	Section 6.3.3.2
PA (08_0203)	Schedule 3 Condition 22	Dust emissions.	Non-Compliant	11/04/2017 – Dust emissions from operations. Activities ceased to implement additional controls. Incident report submitted to EPA. No further action requested.	Section 6.3.2

Table 4 – Compliance Status Categories

Risk Level	Colour Code	Description
High	Non-Compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-Compliant	Non-compliance with potential for serious environmental consequences, but is unlikely to occur; or potential for moderate environmental consequences, but is likely to occur
Low	Non-Compliant	Non-compliance with potential for moderate environmental consequences, but is unlikely to occur; or potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non-Compliant	Non-compliance which does not result in any risk of environmental harm

2. INTRODUCTION

The Duralie Coal Mine (DCM) is located approximately 80km north of Newcastle in New South Wales, between the villages of Stroud Road and Wards River. Refer **Figure 1 (Appendix 1)**.

Development Consent for the mine was granted by the NSW Minister for Urban Affairs and Planning on 21 August 1997 and Mining Lease Number 1427 was issued by the NSW Minister for Mineral Resources on 6 April 1998.

In October 1998 a Statement of Environmental Effects (SEE) was produced to consider proposed alterations to the Duralie Mine. These proposed alterations were approved by the NSW Minister for Urban Affairs and Planning on 5 February 1999.

Construction commenced in June 2002 with mining production commencing in March 2003 and the first coal railed to the Stratford Mine for processing in the same month. Duralie Coal Pty Ltd (DCPL) received Project Approval for the Duralie Extension Project (PA 08_0203) in November 2010 for mining activities to extend until 31 December 2021 and Mining Lease 1646 was issued on 4 January 2011. The Project Approval has since been modified on two occasions on 1 November 2012 and 5 December 2014.

Duralie Mine consists of an open-cut, truck and excavator mine producing run of mine (ROM) coal which is processed at the Stratford Coal Mine Coal Handling and Processing Plant (CHPP).

This Annual Review (AR) has been prepared in accordance with PA (08_0203) Schedule 5 Condition 3 and covers the environmental protection, pollution control and rehabilitation activities at the Duralie Coal Mine for the period 1 July 2016 to 30 June 2017. This report is also prepared in accordance with the annual reporting requirements for ML 1427 Condition 3 and ML 1646 Condition 4. Where applicable, comparisons of performance have been undertaken against the plans outlined in the Environmental Assessment (EA) and regulatory requirements. Environmental activities planned for the next 12 months are also discussed.

2.1 MINE CONTACTS

Site personnel responsible for mining, rehabilitation and environmental issues at the end of the reporting period were:

Position	Name	Contact
Operations Manager, Stratford & Duralie Operations	Mr John Cullen	02 4999 5108
Environment & Community Superintendent	Mr Michael Plain	02 4999 5117

3. APPROVALS

3.1.1 Status of Leases, Licences, Permits and Approvals

The Duralie Mine has the following approvals:

Table 5 – Status of Leases, Licences, Permits and Approvals

Instrument	Relevant Authority	Date of Grant	Duration of Approval	Comment
Project Approval (as Modified)	NSW Department of Planning and Environment (DP&E)	5/12/2014 (as Modified)	The Applicant may carry out mining operations on site until the end of 2021.	<ul style="list-style-type: none"> Grant 26/10/2010. MOD 1 (Rail Hours) 1/11/2012. MOD 2 (Open Cut variations) 5/12/2014.
ML1646	DRG	4/1/2011	21 years. (4/1/2032)	
ML1427	DRG	6/4/1998	21 years.(6/4/2019)	
Environment Protection Licence (EPL) 11701	NSW Environment Protection Authority (EPA)	4/9/2002	Until the licence is surrendered, suspended or revoked. The licence is subject to review every three years.	As modified by subsequent variations (refer to EPA website).
Commonwealth Approval (EPBC 2010/5396)	SEWPaC	22/10/2010	22/10/2020	
AUTH 315	DRG	14/10/2013	28 November 2017.	
Mining Operations Plan (MOP)	DRG	18/01/2016	31/12/2019	As modified by subsequent amendments.
Water Supply Works Approval 20WA202053	DPI-Water	1/7/2004	1 October 2018.	Coal Shaft Creek diversion and various on-site water management structures.
20BL168404	DPI-Water	22/09/2002	22/9/2017.	Bore Licence for the Duralie Open Cut extraction.
Groundwater licences – various monitoring bores.	DPI-Water	Various	Various	

Various environmental management plans are also approved for the DCM. The current versions approved by DP&E are available on the Duralie Coal website.

- Environmental Management Strategy (revised), DP&E approved as of 23 June 2015.
- Air Quality and Greenhouse Gas Management Plan (revised), DP&E approved 23 June 2015.
- Biodiversity Management Plan (revised), DP&E approved 14 January 2016, DotE approved 14 March 2016.
- Blast Management Plan (revised), DP&E approved 27 September 2013.
- Giant Barred Frog Study, DP&I approved 6 March 2012.
- Giant Barred Frog Management Plan (revised) DP&E approved 17 December 2015, DotE approved 14 January 2016.
- Heritage Management Plan (revised), DP&E approved as of 23 June 2015.
- Noise Management Plan (revised), DP&E approved as of 25 August 2017.
- Waste Management Plan, DP&E approved 23 June 2015.

- Water Management Plan (revised), DP&E approved 22 July 2016.
- Rehabilitation Management Plan (revised), DRE confirmed as of 21 October 2015.
- Duralie Extension Project Study of Dust Emissions from Rail Transport under condition 21A of the Project Approval, approved 2012.
- Consultation Plan – Additional Rail Noise Mitigation Measures, approved December 2012.
- Pollution Incident Response Management Plan (revised), April 2017.

3.1.2 Amendments to Approvals/Licences during the Reporting Period

Table 6 lists approvals and amendments that were granted during the reporting period.

Table 6 – Amendments to Approvals/Licences

Licence/Approval	Amendment type	Date of amendment
Mining Operations Plan & Rehabilitation Management Plan	<p>An amendment was prepared for the Mining Operations Plan and now incorporates the Rehabilitation Management Plan. The MOP was also amended to include a mine closure planning schedule.</p> <p>The MOP amendment was submitted on 31 August 2017.</p>	Yet to be approved.
Environmental Management Plans <ul style="list-style-type: none"> • Biodiversity Management Plan, • Giant Barred Frog Management Plan, • Noise Management Plan, • Water management Plan, and • Pollution Incident Response management plan. 	Revised and updated	During the 2016-17 reporting period.

4. OPERATIONS SUMMARY

A summary of operations (Production), during the preceding and current reporting period as well as a forward forecast for the next reporting period is provided below in **Table 7**.

Table 7 - Production Summary

Material	Approved limit (specify source)	Previous reporting period (tonnes)	This reporting period (tonnes)	Next reporting period (tonnes)
Waste Rock/ Overburden (BCM)	N/A	8,519,391	4,684,990	1,978,000
ROM Coal	3 million tonnes per annum	1,446,349	871,448	360,000
Codisposal Reject (Stratford Consent)	Approx. 12.3 million tonnes over life of project.	432,133	282,043	135,000
Saleable product (Stratford Consent)	N/A (Process limit of 5.6 million tonnes per annum)	1,176,916	657,183	225,000

Product coal utilising Duralie ROM coal is produced at the Stratford Mining Complex. Blending of Duralie ROM coal with other ROM coals and rewash reject material occurred during processing to produce a saleable product coal. Saleable coal production for the period July 2016 to June 2017 was 657,183 tonnes comprising 244,587 tonnes of coking coal and 412,592 tonnes of thermal coal.

ROM production for the reporting period is listed in **Table 8** below by month.

Table 8: Monthly ROM Coal Production

MONTH	ROM PRODUCTION (tonnes)
July 2016	75,070
August 2016	125,465
September 2016	79,280
October 2016	59,563
November 2016	106,938
December 2016	37,837
January 2017	47,293
February 2017	77,966
March 2017	48,045
April 2017	41,854
May 2017	50,770
June 2017	121,367
Total	871,448

Coal production to date by month is shown in **Table 9**.

Table 9: Product Coal Produced by Month

MONTH	Coking Coal	Thermal Coal	Total Product Coal
July 2016	26,641	69,789	96,430
August 2016	15,409	61,932	77,340
September 2016	26,318	29,301	55,620
October 2016	32,426	20,819	53,246
November 2016	42,941	37,516	80,457
December 2016	25,347	14,076	39,423
January 2017	18,724	18,291	37,015
February 2017	24,967	33,317	58,284
March 2017	-1,886	16,578	14,693
April 2017	4,792	13,430	18,223
May 2017	16,367	29,410	45,777
June 2017	12,541	68,133	80,675
Total Annual	244,587	412,592	657,183

4.1 EXPLORATION

No exploration activities were undertaken during the 2016-2017 reporting period. At the time of publication, only minor exploration activities are proposed for Authorisation 315 to the north of the existing Weismantel Pit during the 2017-2018 reporting period.

4.2 ESTIMATE MINE LIFE

In accordance with PA 08_0203 (DoPI 2011), mining operations are permissible until 31 December 2021. This date remains the same under the Project Modification granted on 5 December 2014.

Mining operations at the DCM are expected to continue during this period.

4.3 MINING

The Duralie Mine is an open cut truck shovel operation located approximately 20km south of the Stratford Mine facilities. The workings extract coal from the Weismantel and Clareval seams at the base of the Gloucester Coal Measures. The deposit forms a synclinal structure with the open cut area located at the southernmost crop line within the main axis of the Gloucester Basin. The operation is now situated on the west limb of the syncline with seams dipping at about 50 degrees east. Approval of ML1646 has allowed an extension of the Weismantel pit to the North West of current operations and the inclusion of the Clareval seam parallel and to the west of the Weismantel seam.

Dips within the deposit vary from a shallow 5 degrees to an almost vertical profile. Consequently, a method of horizontal 3m to 4m benches is used as the primary extraction method. An average of 5m of free dig material is generally experienced at Duralie after which all waste material generally requires blasting.

Mining continued concurrently in both the Weismantel and Clareval pits during the 2016/17 reporting period. Clearing in advance of mining has now been completed up to the proposed disturbance limit in both Weismantel and Clareval.

During the reporting period waste rock produced was used to progress backfilling in the Weismantel pit with a maximum approved waste dump height of RL135.

Mining operations are permitted 7 days per week, however mining is currently undertaken during Monday to Friday with no weekend work.

Surface facilities at the mine and current mine development as at 30 June 2017 are indicated within **Figure 3**, provided in **Appendix 1**.

The truck fleet currently comprises predominantly Cat 785XQ model trucks supported by a lesser number of attenuated Cat 789C trucks.

4.3.1 Mining Equipment and Method

The mining equipment currently in use at DCM up until the 30 June 2017 is listed in **Table 10** provided below.

Table 10: Current Mining Fleet*

Plant Item	Number
Excavators	3
Haul Trucks	10
Drills	2
Dozers	3
Water Carts	2
Graders	1
Loader (ROM feed)	1

*Total fleet not all used concurrently.

The mining sequence is summarised below and is conducted in accordance with the approved Mining Operations Plan and supporting approvals including relevant Environmental Management Plans and respective licences (refer Section 1.1) as required. The mining sequence generally occurs in the following manner:

- Fauna/flora assessment (as required) is undertaken and review of approvals and previous assessments of the area including cultural heritage surveys.
- A sedimentation control plan is prepared for the area to be disturbed (or an existing plan utilised).
- Sedimentation controls are implemented (as required).
- Tree clearing is limited to the minimum required for ongoing operations and undertaken ahead of the advancing face or dump.
- Topsoil is removed in accordance with a topsoil stripping plan.
- Overburden removal is undertaken by a hydraulic excavator. Generally, the first one to five metres of clay overburden is ripped and/or free-dug. Deeper overburden requires blasting prior to excavation.
- Overburden waste material is deposited within/above a void section of the mining excavation until at final approved height in readiness for shaping to the approved final landform profile.

4.4 COAL HANDLING AND BENEFICATION

4.4.1 Coal Washery Rejects Management

Rock greater than 140 mm is removed from ROM coal using a rotary breaker at the DCM. The separated rock is conveyed to a bin from which it is loaded out and trucked to be buried on site as potentially acid forming (PAF) waste. All other reject fractions are generated at the Stratford Mine and deposited along with processing waste fractions produced from the washing of Bowens Road North

and Stratford deposit coals. The Stratford Mine utilises a co-disposal method that combines the coarse rejects with the intermediate sized materials and tailings. The co-disposal area is managed in accordance with the Stratford Mining Complex Life of Mine Reject Disposal Plan.

4.4.2 ROM Coal Processing On Site

ROM coal is processed through a rotary breaker to produce a coal fraction less than 140 mm. The essential elements of the coal processing plant on site and their design capacities are as follows:

ROM conveyor handling rate	1400 tph
Train load out rate	2400 tph

4.4.3 Coal Stockpile Capacity (ROM)

The ROM pad stockpile is utilised for temporary ROM coal storage which is transported by loader directly to the ROM hopper. Additionally, a temporary ROM coal stockpile (RL69), located within the approved surface development area, was utilised during the MOP term. ROM coal temporarily stored at this stockpile will be transported by truck to the DCM coal handling area.

Stockpile	Capacity (tonnes)
Duralie ROM pad	20,000
Duralie RL69 ROM	150,000

4.4.4 Product Transport

All ROM coal is transported from site to Stratford Mining Complex by rail. The approved hours of operation of the Duralie shuttle train are between 6 am and midnight. In exceptional circumstances, the Duralie shuttle train may operate on the North Coast Railway between midnight and 1am in accordance with Condition 8, Schedule 2 of the NSW Project Approval. This condition was not utilised during the reporting period.

0.87 million tonnes of ROM coal was transported from the Duralie Mine in the reporting period to the Stratford Mine Site. A total of 392 train movements (Duralie-Stratford-Duralie circuit) occurred during the July 2016 to June 2017 period. There was a maximum daily movement of 4 trains. A summary of the ROM coal transported from site and the shuttle train movements is available on the Duralie Coal website in accordance with Condition 48, Schedule 3 of PA 08_0202 and is also shown in **Appendix 9**.

4.5 WASTE MANAGEMENT AND RECYCLING

A fully accredited waste contractor was engaged during the reporting period to manage all waste streams from the Duralie operations. This contract includes general waste and recycling, scrap metal, hydrocarbons including waste grease and oil and hazardous waste.

4.5.1 Sewerage Treatment and Disposal

Sewage treatment at the mine site involves multiple systems at the offices and crib rooms that manage all generated sewage. Sewage is processed using a Garden Master 7100 Elite Aerated Waste Water Treatment System. The system works on the combined principles of primary settlement and aerobic treatment. Treated effluent is discharged via a spray system into a grassed area located to the southwest of the Main Office.

The sewage treatment facility is registered with Great Lakes Council and serviced on a quarterly basis by an approved contractor.

4.5.2 Fuel, Oil and Grease Containment and Disposal

Fuel (diesel) storage at the mine site consists of two 100,000 litre capacity above ground double-skinned storage tanks (Transtanks). The storage area is subject to Dangerous Goods Acknowledgement Number 35/036328 (Workcover NSW). Potential hydrocarbon contaminated runoff from fuel fill points is captured on concrete pads and directed through an oil water separator. Dirty water runoff from the fuel pad is captured and directed to the main water dam.

Bulk oil is stored onsite within a bunded area and double-skinned tanks near the workshop.

Used engine oils (lubricating oils), hydraulic oils and grease are recovered during plant and vehicle servicing in the workshop and in the field.

Within the workshop area, separate bunded areas hold a 28,000 litre waste oil tank and bulk storage of oils, greases and lubricants (tanks and drums). A washpad is utilised to clean vehicles and plant either prior to leaving site or for general servicing/repair. Off the washpad is a concrete sump which serves to trap silt and from which oil is removed using an oil water separator. Waste oil collected is removed from site by a commercial contractor for subsequent recycling off-site.

In addition, Aurizon – the train contractor at site – provides temporary storage for waste oil prior to periodic removal by the waste oil contractor who services the Duralie site. Waste oil is stored in 200 litre drums mounted upon a bunding device.

Contractors are generally required to manage and remove from site all waste oil generated during their operations.

4.5.3 Rubbish Disposal

All domestic rubbish (e.g. food scraps, paper etc) are deposited in industrial rubbish bins which are periodically emptied by a waste contractor for subsequent disposal.

Scrap metal produced by the workshop is collected and transferred off site by a scrap metal merchant. The merchant collects the scrap metal following inspections by the waste contractor.

Paper, cardboard, aluminium drink cans and other recyclables are collected for recycling as part of site waste segregation. Waste is transported to licenced facilities and waste tracking sheets recorded.

All contractors are responsible for the collection and removal of their own rubbish.

4.6 HAZARDOUS AND EXPLOSIVE MATERIALS MANAGEMENT

Hazardous materials are stored and used in accordance with relevant safety data sheets (SDS). SDS's are kept in a file inside the First Aid Room and are available from an online database on the company intranet.

4.6.1 Status of Dangerous Goods Approval

An "Acknowledgement of Notification of Hazardous Chemicals on Premises" (Acknowledgement Number NDG 036328) issued by Workcover NSW is held by Duralie Coal Pty Ltd. This Acknowledgement addresses:

- Above-ground tanks (diesel)
- External magazine (detonators and boosters)
- Above-ground tank (oxidising liquid)
- Roofless bulk storage (ammonium nitrate)

4.7 OTHER INFRASTRUCTURE MANAGEMENT

4.7.1 Prescribed Dams - Dams Safety Committee

The Main Water Dam, Auxiliary Dam 1 and Auxiliary Dam 2 are all prescribed under the Dams Safety Act 1978.

Management plans for the prescribed dams have now been combined into single documents. A DCM Prescribed Dams Operation and Maintenance Manual was prepared and approved by the DSC in July 2013. A Prescribed Dams Safety Emergency Plan (DSEP) has been prepared in consultation with the DSC and review comments have been provided by the SES. The plan is now waiting to be finalised with DSC.

Routine visual inspections of the prescribed dams are undertaken three (3) times per week. Monthly monitoring of piezometers terminating beneath the dam's clay core and within the clay core is also undertaken and water levels interpreted. Monuments located along the crests of the dams were surveyed for any indication of movement during the reporting period. No significant movement has been identified in any of the dam walls during the reporting period. Routine maintenance of vegetation on the dam walls has been undertaken.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The Department of Planning & Environment (DPE) provided notification on 13 December 2016 that the revised Duralie Coal Annual Review 2015/2016 was generally in accordance with the project approval requirements. Actions to be addressed are listed in **Table 11**. Additionally, DPE conducted a site inspection of the DCM on 15 December 2016

Table 11: DPE Action Items from 2015-2016 AR Review

Action	Due Date	Comments/status
Provide evidence of submission of Irrigation Area Monitoring Report 2016 to NOW & OEH to the Department.	21 December 2016	Letters were submitted to OEH and DPI-Water on 21 December 2017. Evidence of the submission of the Irrigation Area monitoring Report 2016 to OEH and NOW was provided to DPE on 21 December 2017
Provide a status update on the 2014 IEA RAR to the Department.	31 January 2017	A status update on the 2014 IEA Recommendations and Responses was provided to DPE on 25 January 2017. DPE further requested the response table to be included in this report. Accordingly the status of actions against each audit recommendation are include in Section 10 and Appendix 10 .
Revise the DCPL Surface Water Management Plan to incorporate the recommendations of the <i>Summary Interpretation of Duralie Coal Mine Ecotoxicity Testing Results</i> .	8 March 2017	A revised Surface Water Management Plan was submitted to DPE on 7 February 2017. Review comments were received from DPE on 7 August 2017 and a final version of the SWMP was resubmitted to DPE on 1 September 2017.
Revise the DCPL Noise Management Plan to incorporate the changes to the SWL's for the reduced mobile fleet.	8 March 2017	A revised Noise Management Plan was submitted to DPE on 7 February 2017. Review comments were received from DPE on 7 August 2017 and a final version of the SWMP was approved by DPE on 25 August 2017.

The Department of Industry, Resources & Energy (DRE (now DRG)) provided “Notice of Satisfactory AEMR” on 23 December 2016 which was accepted subject to the action items summarised in **Table 12**. A site inspection of the DCM was undertaken by DRE on 14 December 2016.

Table 12: DRE Action Items from 2015-2016 AR Review

Issue/Observation	Action	Due Date	Comments/status
<p>Mining is proposed to be completed within 2 years. Site has not engaged the Department to commence development of a closure plan.</p>	<p>Develop and submit to the Department a Mining Operations Plan (MOP) with:</p> <ul style="list-style-type: none"> an updated risk assessment for closure; and a schedule for mine closure planning activities to be completed prior to the cessation of mining. <p>The Department considers that the MOP satisfies the requirement for a Rehabilitation Management Plan (RMP) in accordance with Project Approval PA08_0203. Accordingly, the MOP is to be provided to agencies for comment as specified in PA08_0203 Condition 57.</p>	31 March 2017	<p>DCPL representatives met with DRG on 24 May 2017 to discuss the DCM Mining Operations Plan and mine closure planning for the Duralie operation.</p> <p>A MOP Amendment (Amendment B) was prepared following the issue of a notice under section 240(1)(C) of the <i>Mining Act 1992</i> by the Department of Planning and Environment (DP&E). In accordance with the notice, the MOP Amendment included the addition of a mine closure planning program, which includes a schedule of all technical and/or environmental assessments that will be required to undertake final rehabilitation following the cessation of open-cut mining at the DCM. Additionally, the MOP Amendment was prepared to address comments from the DRG regarding the inclusion of additional detail on a strategy for designing the Coal Shaft Creek alignment, rehabilitation indicators and completion criteria and the development and inclusion of additional rehabilitation monitoring.</p> <p>The MOP Amendment was submitted to DRG on 31 August 2017.</p> <p>Refer Section 8.5.</p>
<p>Works are required on the Coal Shaft Creek permanent alignment which cannot be completed until mining ceases. The detailed design for these works has not been developed.</p> <p>The 2015 AEMR approval (our reference OUT16/20375) required Duralie Coal Pty Ltd to provide the Department an update regarding development of an approved design by 31 December 2016.</p>	<p>Include within the MOP a strategy to develop a detailed design for the Coal Shaft Creek alignment, to be submitted to DPI - Water with sufficient time to obtain approval for the reinstated Creek prior to the completion of mining. The strategy is to address all regulatory requirements for the alignment and include consultation with all relevant stakeholders, and the timing of actions required to submit a detailed design for approval.</p>	31 March 2017	<p>As above. Refer Section 8.5.</p>

6. **ENVIRONMENTAL PERFORMANCE**

6.1 **REVIEW OF ENVIRONMENTAL PERFORMANCE**

A brief review of environmental performance in relation to the Environment Protection Authority (EPA) issued Environment Protection Licence (EPL) 11701, together with NSW Project Approval conditions, is provided below. This performance is further discussed in the sections on environmental management activities and environmental monitoring.

6.1.1 **EPA Environment Protection Licence 11701**

- All monitoring has generally been carried out in accordance with licence conditions.
- Records of environmental monitoring activities have been kept.
- A record of pollution complaints has been maintained.
- Dust suppression measures are in place. Dust monitoring to date (dust deposition gauges, high volume (PM10) air samplers and a TEOM monitor) shows that current dust suppression systems have been effective and dust levels were below limits set by EPA (upon exclusion of non-dust contamination of dust deposition gauges).
- Quarterly noise compliance monitoring was undertaken in September 2016, November 2016, February 2017 and April 2017. The surveys determined that monitored mine operational noise at the time of the surveys complied with EPA noise level criteria at all monitored locations.
- No sediment dam spills occurred during the reporting period.
- A Pollution Incident Response Management Plan (PIRMP) was maintained and is available on the DCPL website
- An Annual Return from EPL 11701 was prepared
- There were two incidents/non-compliances reported to the EPA during the reporting period as shown in **Table 3**. No further action was taken by the EPA on either of the incidents.
- During the reporting period the EPA requested reports on the following complaints which were received via the EPA hotline:
 - 23 August 2016 – Odour complaint
 - 5 December 2016 – Odour complaint
 - 13 April 2017 – Blast fume complaint
 - 9 May 2017 – Noise complaint
 - 28 June 2017 – Blast vibration complaint
 - DCPL provided the requested information to the EPA and on all occasions no further action was requested.

6.1.2 **Development Consent or Approval Conditions**

Duralie Coal continues to operate in accordance with the existing PA 08_0203.

Development Consent conditions which were met during this reporting period include those related to administrative and reporting conditions, operation of a meteorological station and inversion towers, operation of dust monitoring equipment including real-time dust, operation of a real-time noise unit, operation of a community hotline, operation of a community consultative committee, surface and ground water monitoring including biological monitoring, blast monitoring including a blast hotline, and rehabilitation monitoring. Environmental monitoring data was regularly reported as required by the development consent and associated environmental management plans.

No Independent Environmental Audit of the DCM was scheduled during the reporting period.

6.2 METEOROLOGICAL MONITORING

A meteorological station (i.e. weather station) is operated at the mine site as required by the Project Approval Conditions. The location of the meteorological station and the two inversion monitoring towers is shown on **Figure 2 (Appendix 1)**.

6.2.1 Rainfall

Table 13 provided below summarises the rainfall record obtained from the site Weather Station rain gauge. Graphical representation of the historical average and monthly recorded rainfall during the reporting period is provided in **Appendix 2**.

Table 13: Duralie Mine - Monthly Rainfall Records

MONTH	YEAR				STROUD DISTRICT
	2017 (to end reporting period)		2016		AVERAGE ²
	Monthly Total (mm)	No. of Rain Days/Month ¹	Monthly Total (mm)	No. of Rain Days/Month ¹	1889-2010
January	50.8	8	255.6	14	115.3
February	63	13	97.8	8	125.0
March	267.6	21	57.8	8	147.3
April	74.8	13	28.8	10	100.9
May	14.2	8	17	4	91.5
June	99	15	166.4	8	101.1
July			51.4	5	75.1
August			83.4	10	65.3
September			61	12	63.1
October			37	9	78.3
November			99.2	6	83.3
December			51	7	100.8
TOTAL	569.4	78	1006.4	101	1147.0

- Notes:
1. No. of Rain Days/Month - the number of days in the month on which rain fell.
(When tipping bucket rain gauge data used, a "rain day" by definition requires a minimum recording of >0.25mm comprising dew, heavy fog or light rain (or a combination thereof).
 2. Average based on Stroud Post Office records until mine site weather station commissioned in 2002.

The 2016 calendar year rainfall total was slightly lower than the long-term district average with four of the twelve months in this period exceeding their respective long term average.

The rainfall total for the reporting period (July 2016 to June 2017) was 952.4 mm, slightly below the historical average.

6.2.2 Evaporation

Table 14 shows minimum, average and maximum evaporation rates for the reporting period. The graphical representation of the daily minimum, average and maximum evaporation rates recorded for each month during this review period is provided in **Appendix 2**.

Table 14: Monthly Minimum, Average and Maximum Evaporation Rates

MONTH	MINIMUM EVAPORATION RATE (mm/day)	AVERAGE EVAPORATION RATE (mm/day)	MAXIMUM EVAPORATION RATE (mm/day)
July 2016	0.2	1.5	3.9
August 2016	0.4	1.7	3.9
September 2016	0.6	2.7	4.6
October 2016	1.1	3.7	5.9
November 2016	2.1	4.8	8.3
December 2016	0.5	3.1	5.5
January 2017	0.8	3.0	4.5
February 2017	0.8	3.1	4.2
March 2017	0.4	1.7	3.4
April 2017	0.8	1.9	3.7
May 2017	0.7	1.4	2.3
June 2017	0.2	0.8	2.0

6.2.3 Wind Speed and Direction

Table 15 below indicates the monthly average and maximum wind speeds and dominant wind directions for the period July 2016 to June 2017, inclusive. The graphical representation of the daily average and maximum wind speeds recorded and monthly wind roses for each month during this period are provided in **Appendix 2**. The Duralie weather station was struck by lightning in December 2016. A new circuit board was installed during December however further damage to the wind sensor was identified and was not replaced until late March 2017. Wind data is unavailable from the Duralie weather station for December 2016 to March 2017 but could be sourced from another nearby station if required, i.e. Real-time noise monitor.

Table 15: Monthly Average and Maximum Wind Speeds and Dominant Wind Directions by Month

MONTH	AVERAGE WIND SPEED (k/hr)	MAXIMUM WIND SPEED RECORDED (k/hr)	DOMINANT WIND DIRECTIONS
July 2016	6.6	55.6	W
August 2016	6.0	42.1	WSW
September 2016	8.5	51.1	W
October 2016	9.6	57.1	W
November 2016	8.7	51.8	S
December 2016	NA	NA	NA
January 2017	NA	NA	NA
February 2017	NA	NA	NA
March 2017	NA	NA	NA
April 2017	6.4	52.7	S-SW
May 2017	5.4	30.3	SSW-WSW
June 2017	5.0	30.7	SW

NA = Data unavailable due to damage caused by lightning strike.

6.2.4 Temperature

Table 16 summarises monthly air temperatures.

Table 16: Monthly Minimum, Average and Maximum Air Temperatures

MONTH	MINIMUM AIR TEMP RECORDED (deg C)	AVERAGE AIR TEMP (deg C)	MAXIMUM AIR TEMP RECORDED (deg C)
July 2016	-2.1	12.1	26.2
August 2016	2.9	12.6	24.6
September 2016	4.3	16.1	25.0
October 2016	5.8	17.7	33.1
November 2016	8.8	21.1	37.0
December 2016	14.7	23.2	36.6
January 2017	14.2	25.3	41.8
February 2017	13.5	25.6	45.9
March 2017	12.6	21.4	33.9
April 2017	6.5	16.8	27.2
May 2017	1.6	14.8	25.1
June 2017	3.8	12.7	19.9

The graphical representation of the daily minimum, average and maximum atmospheric temperatures recorded for each month is provided in **Appendix 2**.

6.3 AIR QUALITY

6.3.1 Dust Control Procedures

Dust is controlled by a range of methods, including but not limited to:

- Minimising disturbed areas,
- Prompt reshaping, topsoiling and revegetation;
- Watering haul roads and other dust generating roads;
- Watering dig faces prior to and during digging;
- Utilising water sprays on the drill;
- Water sprays on the ROM dump hopper and transfer point between the ROM and train loading bins;
- Water sprays during train coal loading; and
- Modifying operations during adverse weather conditions.

A number of Pollution Reduction Programs (PRP) required under EPL11701 have previously been completed. Work was completed on the PRP title Coal Mine Wind Erosion of Exposed Land Assessment and was submitted on 28 August 2016. Results will be made available on the Duralie Coal website.

6.3.2 Dust Monitoring and Criteria

DCM has an approved Air Quality and Greenhouse Gas Management Plan (AQMP) that establishes a dust management strategy which:

- Identifies air quality criteria;
- Outlines proactive and responsive dust management and control measures;
- Establishes dust management protocols;
- Formulates an air quality monitoring programme;
- Establishes stakeholder consultation protocols; and
- Details reporting and review requirements.

In order to monitor air quality (dust) surrounding the mine site, DCM utilises a network of nine (9) static dust fallout gauges, four (4) high volume PM₁₀ air samplers, one real time dust monitor (TEOM) and a meteorological monitoring station (i.e. weather station). The locations of these monitoring sites are shown on **Figure 2 (Appendix 1)**.

Monthly dust fallout levels are measured so that dust deposition rates in g/m²/month can be determined at each monitoring site. The EPA annual average limit for dust deposition is 4.0g/m²/month.

The high volume air samplers (HVAS) (PM₁₀) are located near company owned rural dwellings along Johnsons Creek Road ("Hattam" – located to the northeast of the mine, "Twin Houses" – located to the east of the mine and "High Noon" – located to the south of the mine). A HVAS unit is also located on private land along the Bucketts Way ("Edwards" – located west of the mine). Sampling occurs for a 24 hour period every 6 days in accordance with AS 2724.3. The EPA goal for air quality is an annual average limit of 30ug/m³/day and a National Environmental Protection Measure (NEPM) 24-hour average limit of 50ug/m³/day.

A Tapered Element Oscillating Microbalance (TEOM) analyser measuring PM₁₀ and PM_{2.5} is used to continuously measure particulate matter. Trigger levels are in place under the approved AQMP which also includes a dust management protocol to respond to elevated results. The real-time dust system provides a management tool to notify operations when particulate emissions have potential to exceed licence criteria triggering a hierarchy of management actions to mitigate potential impacts.

6.3.3 Review of Dust Monitoring Results

6.3.3.1 Dust Deposition Gauges

Table 17 shows the dust deposition results for nine (9) dust deposition gauges. Gauge D7 is located within the Village of Wards River. **Table 18** shows the annual average dust deposition results at the end of the reporting period (June 2017).

Table 17: Dust Deposition Gauge Results

	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
D3	3.0	3.1	2.1	4.7 _{D,V,S}	0.6	4.9 _{D,V,I,S}	2.5	1.8	4.1 _{D,V,I,S}	0.5	1.5	4.9 _{D,I,S}
D4	0.3	0.4	0.5	0.3	0.8	4.7 _{D,V,I,S}	0.5	0.5	0.7	0.2	4.1 _{D,C,I,V,S}	0.8
D5	1.8	6.5	0.9	0.7	9.5 _{D,V,S}	4.2 _{D,V,I,S}	1.4	1.6	6.7 _{D,V,I,S}	1.5	25.2	12.8
D7	0.4	0.7	0.3	0.2	1.0	1.7	0.7	1.1	0.5	0.3	0.6	1.4
D8	0.9	0.7	0.6	1.1	1.0	5.7 _{D,V,I,S}	1.2	2.1	0.7	0.6	1.1	0.7
D9	0.7	1.0	0.7	0.4	1.7	3.7	0.7	1.9	1.3	0.5	1.0	0.7
D10	0.5	0.5	0.4	0.7	0.6	1.3	0.8	0.8	1.4	0.4	0.4	0.3
D12	1.0	0.8	0.9	0.6	1.5	1.7	0.5	1.3	2.0	0.8	1.3	0.6
D13	2.7	1.7	0.9	0.2	1.3	1.6	2.7	1.2	1.2	0.3	2.8	2.5

Notes/excluded results, Visual Description Guide:

D=Dirt: Subhedral to euhedral crystalline grains including fine sand, clay and other fine mineral particulates.

C=Coal: Black sharp angled grains with glossy conchoidal fractures or dull with cellular feature.

I=Insects: Whole insects eg spiders, ants, moths or outer parts of insects including wings, legs and exoskeletons.

S=Polysaccharide Slime: Slimy gelatinous material including decomposed soft body parts of insects and vegetation.

V=Vegetation: Plant debris and algae including trichomes, decomposed organic matter and particulates showing characteristic cellular structures.

B=Bird droppings: The most common contamination.

O=Other contaminants not included above.

Dust levels recorded had an average value of 1.5 g/m²/month (contaminated results not counted). Elevated values were at times affected by various degrees of contamination from insects, bird droppings, vegetation (seeds/grasses) and algae. Elevated results at Gauge D5 in May and June 2017 were observed and were found not to be contaminated by bird droppings or vegetation. Consistently low HVAS results at the nearby Twin Houses site during the month and low results at all other dust gauges would support an outlying result conclusion. In addition, winds predominantly from the NW for the duration of the month and the location of the gauge would also support an outlying result. The results from D5 will continue to be analysed.

Table 18: Annual Average Dust Deposition Gauge Results

D3	D4	D5	D7	D8	D9	D10	D12	D13	EPA Limit
1.9	0.5	5.8	0.7	1.0	1.2	0.7	1.1	1.6	4.0

Results compared with the EPA annual average upper limit of 4 g/m²/month were generally very low. One exceedance against criteria at the end of the reporting period was observed at D5. As discussed above this was due to outlying results skewing the annual average. Graphical representation of dust gauge results and annual rolling averages are provided in **Appendix 3**.

Results of depositional dust monitoring were generally similar to previous reporting periods and are in concurrence with the Duralie Environmental Assessment (EA) (2010) which predicts the annual average criteria of 4 g/m²/month will not be exceeded at any receiver and that project only incremental increases in annual average dust deposition will not exceed the applicable 2 g/m²/month EPA criterion at any receiver.

6.3.3.2 High Volume Dust Samplers

Table 19 shows the PM₁₀ high volume air sampler (HVAS) monitoring results for the four HVAS in ug/m³/day (24 hours) for the monitoring sites during the reporting period.

Results show that all monitoring locations (in terms of monitored days) did not exceed the National Environmental Protection Measure (NEPM) of 50 ug/m³/day during the reporting period listed under Condition 19, Schedule 3 of the DEP Approval. One exception was the mine owned "Hattam" property that exceeded the criteria on two occasions (31 December 2016 and 12 January 2017).

Table 19: High Volume Air Sampler (PM₁₀) Results

Date	High Noon	Twin Houses	Hattam	Edwards
4-Jul-16	1	7	2	3
10-Jul-16	4	2	1	1
16-Jul-16	3	11	8	5
22-Jul-16	7	2	1	1
28-Jul-16	6	6	7	1
3-Aug-16	12	5	8	6
9-Aug-16	8	3	3	7
15-Aug-16	3	8	8	10
21-Aug-16	4	14	11	8
27-Aug-16	1	3	5	5
2-Sep-16	3	3	5	3
8-Sep-16	6	6	7	9
14-Sep-16	7	6	7	10
20-Sep-16	3	5	6	4
26-Sep-16	1	3	4	2
2-Oct-16	5	7	7	8
8-Oct-16	15	24	33	9
14-Oct-16	4	2	2	1
20-Oct-16	7	8	8	7
26-Oct-16	6	8	12	11
1-Nov-16	8	10	18	9
7-Nov-16	14	21	25	19
13-Nov-16	3	14	14	11
19-Nov-16	20	23	44	20
25-Nov-16	11	21	35	10
1-Dec-16	5	3	6	4
7-Dec-16	6	6	5	9

Date	High Noon	Twin Houses	Hattam	Edwards
13-Dec-16	12	16	25	14
19-Dec-16	11	14	13	13
25-Dec-16	9	13	12	10
31-Dec-16	22	24	108	22
6-Jan-17	5	5	3	4
12-Jan-17	23	26	53	34
18-Jan-17	9	18	46	14
24-Jan-17	18	8	26	20
30-Jan-17	13	7	14	15
5-Feb-17	11	12	14	15
11-Feb-17	9	10	38	37
17-Feb-17	6	0	24	17
23-Feb-17	9	0	15	19
1-Mar-17	0	0	6	1
7-Mar-17	7	5	6	6
13-Mar-17	9	5	7	11
19-Mar-17	4	9	1	2
25-Mar-17	0	3	4	1
31-Mar-17	3	0	10	5
6-Apr-17	3	1	3	4
12-Apr-17	1	0	0	0
18-Apr-17	3	3	5	6
24-Apr-17	3	6	9	0
30-Apr-17	6	8	11	7
6-May-17	5	5	7	6
12-May-17	2	5	4	7
18-May-17	6	7	7	7
24-May-17	1	2	6	3
30-May-17	2	7	5	5
5-Jun-17	0	2	1	1
11-Jun-17	0	1	0	1
17-Jun-17	6	7	8	3
23-Jun-17	3	6	2	3
29-Jun-17	2	3	4	2

Graphical representation of the annual rolling average for the four HVAS including PM₁₀ and TSP during the reporting period is provided in **Appendix 3**. The HVAS rolling averages remained generally steady throughout the reporting period. The rolling average at the end of the reporting period for “High Noon” was 6.8, “Twin Houses” was 8.0, “Hattam” was 13.1 and Edwards was 9.0 ug/m³/day. Thus, annual averages for all sampling locations were below the 30 ug/m³/day EPA limit.

Results of HVAS monitoring are in concurrence with the Duralie Environmental Assessment (EA) (2010) which predicts the annual average PM₁₀ criteria of 30 ug/m³ will not be exceeded at any receiver and that project only 24 hour PM₁₀ concentrations will not be above the 50 ug/m³ EPA assessment criteria at any privately owned receiver with the exception of “Hattam” which is in close proximity to the mining operations. “Hattam” exceeded the 50 ug/m³ 24 hour limit on two occasions during the reporting period (31 December 2016 and 12 January 2017). A report was provided to DPE with an investigation of the Hattam results. The Hattam property is mined owned. Based on the other HVAS results and a review of the weather conditions the results were not consistent with mine contribution. Additionally the mine was not operating on one occasion. HVAS results at all other locations did not exceed the 50 ug/m³ EPA assessment criteria on any occasion during the reporting period. The HVAS annual rolling averages remained low and fluctuations generally reflect changes in meteorological conditions throughout the year, i.e. rainfall and wind.

Concentrations of TSP are calculated, based on the results of the PM₁₀ HVAS and the assumption that 40% of TSP is PM₁₀, as per the relationship obtained from co-located TSP and PM₁₀ monitors operated in the Hunter Valley (NSW Minerals Council, 2000) as per the approved AGQMP. The TSP annual rolling average for the four HVAS are shown in **Appendix 3**. The TSP rolling average at the end of the reporting period for “High Noon” was 16.9, “Twin Houses” was 19.9, “Hattam” was 32.9 and Edwards was 22.4 ug/m³/day. Thus, annual averages for all sampling locations were below the 90 ug/m³/day EPA limit.

6.3.3.3 TEOM (PM₁₀)

A Tapered Element Oscillating Microbalance analyser (TEOM) which measures PM₁₀ on a real-time continuous basis is utilised as a management tool for operations to guide proactive and reactive mitigation measures.

24 hour average results for the reporting period and graphical representation of the running/cumulative average of PM₁₀ results are provided in **Appendix 3**.

The annual average from 1 July 2016 to 30 June 2017 is 11.1 ug/m³ for PM₁₀. The TEOM results are generally consistent with those measured by the HVAS units.

A register was maintained recording any trigger alarms from the TEOM system and the response implemented. All alarms during the reporting period resulted from either external events such as bushfires or system faults such as overheating or water infiltration.

6.3.4 Reporting

Air quality data continues to be provided quarterly to the CCC and is also made available in the EPL11701 monitoring data spreadsheet on the Duralie Coal website.

On 11 April 2017 a dust incident was reported the EPA. The dust had resulted from an area of very fine overburden which was being rehandled in the Weismantel pit. Dust emissions were reported internally and control measures implemented in accordance with the DCM AQMP. As the dust emissions were not able to be controlled the activity was ceased. Additional controls were implemented and a written report provided to the EPA.

6.3.5 Complaints

Fourteen (14) air quality related complaints were received during the reporting period. A detailed complaints list is provided in **Appendix 7**. Of the 14 air quality complaints received 13 related to odours and one related to visible dust. All complaints were responded to promptly and details of the complaint responses and outcomes are provided in **Appendix 7**.

6.4 BIOREMEDIATION

DCM operates an onsite bioremediation area for hydrocarbon contaminated soil where biological degradation of hydrocarbons is used to reduce the hydrocarbon concentration in the soil to an acceptable level. The management of hydrocarbon contaminated soils is detailed in the Duralie Coal Pollution Incident Response Management Plan. A logbook is kept which covers deposition, maintenance and disposal of materials from the bioremediation area.

Following testing of the soils placed in the bioremediation facility soils with suitably low hydrocarbon levels are removed and disposed in the pit. Any new contaminated material was placed in the active cells in the bioremediation area.

6.5 BIODIVERSITY

The Duralie Coal Mine Annual Biodiversity Report 2017 contains a review of environmental performance and progress against the requirements of the Duralie Coal Mine Biodiversity Management Plan (BMP). This report covers biodiversity management activities across both the Mining Lease areas and the Offset area. In accordance with Condition 33, Schedule 3 of the NSW Project Approval, DCM is required to implement the Offset strategy and achieve the broad completion criteria to the satisfaction of the Secretary of the DP&E.

In accordance with the BMP, the Duralie Coal Mine Annual Biodiversity Report 2017 is included in **Appendix 8**. A brief summary of main findings and conclusions are provided in the subsections below:

6.5.1 Vegetation Clearance Report

During 2016/17 approximately 2 hectares of vegetation was cleared from the northern extent of the Weismantel pit in advance of mining operations. Vegetation has now been cleared up to the northern boundary for the approved project. During the vegetation clearance operations for the reporting period no threatened species were observed or encountered. At the end of the reporting period a total of 2 tree hollows from two trees had been removed.

6.5.2 Nest Box Program

The nest box program currently involves:

- 18 nest boxes targeting the Squirrel Glider (*Petaurus norfolcensis*), installed between 4 February 2013 and 8 February 2013;
- 106 nest boxes targeting a variety of hollow-dependent species, installed between 21 August 2013 and 30 August 2013;
- 45 nest boxes targeting a variety of hollow-dependent species, installed between 9 September 2014 and 12 September 2014; and
- 42 nest boxes targeting a variety of hollow-dependent species, installed between 19 September 2016 and 23 September 2016.

Results of nest box monitoring are summarised below;

Squirrel Glider nest boxes installed during February 2013:

*During the monitoring of the Squirrel Glider nest boxes, the target species was recorded within one nest box. Other vertebrate species recorded included the Sugar Glider (*Petaurus breviceps*) and Brown Antechinus (*Antechinus stuartii*). All 18 Squirrel Glider nest boxes have been occupied or showed signs of previous occupancy at some stage since their installation. Management of European Bees (*Apis mellifera*) which had occupied a nest box in March 2015 was successful, with no live bees observed during April 2015. Four additional nest boxes had signs of previous occupation by bees. A dead Sugar Glider was recorded for the first time in two separate nest boxes, once during September 2015, and again in September 2016.*

Nest boxes installed during August 2013:

*Seventy-nine of the 106 nest boxes installed during August 2013 were occupied or shown signs of occupation at some stage since their installation. This is an occupancy rate of approximately 75%, 36 months after installation. Twelve species were recorded in the nest boxes or shown signs of previous occupation, during the period relevant to this report. Five of these species have not previously been recorded during the Nest Box Programme, including the Gould's Long-eared Bat (*Nyctophilus gouldi*), Lesser Long-eared Bat (*Nyctophilus geoffroyi*), White-throated Treecreeper (*Cormobates leucophaea*), Common Tree Snake (*Dendrelaphis punctulatus*) and the Bush Rat (*Rattus fuscipes*; probable).*

Nest boxes installed during September 2014:

Thirty-nine of the 45 additional nest boxes installed in September 2014 were occupied or shown signs of occupation at some stage since their installation. This is an occupancy rate of approximately 87%,

24 months after installation. Ten species were recorded in the nest boxes or shown signs of previous occupation, during the period relevant to this report. Two species, the Bush Rat (*Rattus fuscipes*; probable) and Carpet or Diamond Python (*Morelia* sp.), have not previously been recorded within the nest boxes during the Nest Box Programme. A small amount of bees wax was recorded in one nest box, but no bees were present.

Twenty vertebrate species have now been recorded within nest boxes during the Nest Box Programme. This includes eleven species of mammal (Brown Antechinus, Bush Rat [probable], Brush-tailed Phascogale, Common Brushtail Possum, Common Ringtail Possum, Feathertail Glider, Gould's Wattled Bat, Lesser Long-eared Bat, Gould's Long-eared Bat, Sugar Glider and Squirrel Glider), five species of bird (Australian King-Parrot, Eastern Rosella, Australian Owlet-nightjar, Australian Wood Duck and White-throated Treecreeper), one frog species (Peron's Tree Frog) and three species of reptile (Lace Monitor, Common Tree Snake and Diamond/Carpet Python).

The majority of nest boxes were in good condition, with little maintenance required. One Phascogale nest box required replacement due to significant degradation. The metal strap for one Feathertail Glider nest box detached and required fixing, and a large branch had broken off a nearby tree and hit two nest boxes which required repositioning. The two nest boxes at B17 were relocated to a different tree due to concerns regarding the safety of the original tree. Signs of bees were recorded at five nest boxes, but no bees were present at the time of the survey. Future monitoring will be important to ensure bees do not establish within nest boxes in the offset areas.

6.5.3 Weed Control

Follow-up weed treatment of all remnant enhancement and regrowth management VMUs recommenced in October 2016 and continued through to April 2017. Additional weed management activities within the Mining Lease areas recommenced in September 2016. The key species targeted include blackberry, lantana and Giant Parramatta grass. Revegetation works continued during autumn 2017 and pre-cultivation spraying was undertaken in preparation for the revegetation works. During 2016/17 the removal of privet adjacent to Mammy Johnsons River in the offset areas continued using mechanical removal and chemical spraying.

Success of weed management has been monitored and documented in the *DCM Biodiversity Offset Monitoring of Landscape Function and Vegetation Structure 2017* (available in the DCM environment office). The monitoring report indicated:

The number and density of weed species was generally very low with only Lantana camara (Lantana) being wide spread within the VMUs themselves. Ligustrum sinense (Small-leaved Privet) was recorded in riparian areas. Other weeds observed along access tracks included Ageratina adenophora (Crofton Weed), Andropogon virginicus (Whisky Grass) and Sporobolus fertilis (Giant Parramatta Grass).

6.5.4 Feral Animal Control

In accordance with the BMP Section 5.10 a follow-up feral animal survey was undertaken by AMBS Ecology & Heritage (AMBS) during April 2017 to monitor the success of control programs and determine priorities for ongoing control measures. A summary of the survey results is included in the Annual Biodiversity Report 2017(**Appendix 10**).

During the reporting period DCPL engaged MDP Vertebrate Pest Management to implement a wild dog and fox control program. The program was undertaken during October to December 2016 and covered the Biodiversity Offset area, the Duralie and Stratford Mining Leases and surrounding Yancoal owned property. The program involved a combination of trapping and shooting. A total of 24 dogs and foxes were caught during the program.

A second trapping program was undertaken during April 2017 and a further 17 dogs and foxes were caught across the offset and Mining Lease areas.

6.5.5 Controlling Access and Managing Grazing

During the reporting period contractors were engaged to undertake maintenance activities on access tracks, culverts, gates and fences. All livestock have continued to be excluded from the offset area with the exception of use for 'crash grazing' in preparation for revegetation activities following a field assessment by a qualified consultant.

6.5.6 Bushfire Management

To assist with bushfire management access tracks have been constructed in the offset area as shown in the BMP Figure 9. During the reporting period access tracks have also been maintained to assist with bushfire management.

DCPL engaged the RFS in August 2015 to assist in the development of a burn plan for hazard reduction burning in select areas of the biodiversity offset and surrounding Yancoal owned properties. The burn plan considered areas where fire was to be excluded for bush regeneration in the offset and areas where burning was required for hazard reduction prior to revegetation activities. Hazard reduction burning activities were planned for spring 2015, however due to the lack of suitable windows for undertaking burning and limited availability of the RFS, no activities were undertaken. Hazard reduction burning activities were again planned for winter/spring 2016, however further delays have resulted in no burning to date. Continued discussions have been held with the RFS to conduct fire management activities and any such activities will be assessed and implemented to ensure the most appropriate period for ecological burn activities whilst also giving due consideration to personnel and asset safety.

Due to the delays with burning DCPL have undertaken bushfire hazard reduction through slashing of areas along Johnson's creek road, in the biodiversity offset area and surrounding the Duralie Mining lease in autumn 2017.

6.5.7 Seed Collection, Propagation and Habitat Enhancement

Where possible all seed required for revegetation activities has been collected from within the biodiversity offset area and surrounds. Specific tree and shrub species which have not been available for collection have now been sourced through other suppliers. Further seed collection may be undertaken if found necessary to meet the completion criteria of the BMP offset revegetation and mine site rehabilitation.

During the reporting period cleared vegetation was managed as follows:

- Suitable trees and stumps salvaged and stockpiled for reuse. This includes vegetation cleared from Strip 16.
- No new vegetation was mulched, however mulch in stockpiles was used on the rehabilitation and incorporated into topsoil.
- Six stag trees were installed in the rehabilitation area.

6.5.8 Revegetation Management

Revegetation works in the Duralie biodiversity offset have been undertaken progressively since the implementation of the BMP. Revegetation works in VMUs AF, AE, AA and Z were undertaken during December 2016 and included ground preparation and direct seeding of approximately 80 hectares. Due to the inability to undertake controlled burning, slashing was undertaken as an alternative option prior to direct seeding.

Tubestock was propagated during summer 2017 in preparation for autumn planting. VMUs Y, AD and

S, approximately 40 hectares which are located on alluvial flats near Mammy Johnsons River were prepared for planting by slashing, spraying for weeds and ripping. This was followed by the planting of approximately 7,200 tubestock in April 2017.

6.5.9 Biodiversity Offset Monitoring

Annual monitoring of the biodiversity offset and Mining Lease areas has been undertaken and includes:

- Effectiveness of revegetation in the offset area VMU's;
- Usage of the offset by fauna;
- Effectiveness of weed control;
- Effectiveness of feral animal control;
- Nest box monitoring program.

Initial surveys were undertaken in 2013 and 2014. The annual vegetation and landscape function monitoring was repeated in January 2017 and the results are provided in the *DCM Biodiversity Offset Monitoring of Landscape Function and Vegetation Structure 2017* (available on request). A summary of the survey results is included in the Annual Biodiversity Report 2017 (**Appendix 10**).

The survey found overall the remnant and regrowth VMU areas are showing good signs of natural recruitment and enhanced biodiversity. Management recommendations include:

- *regular slashing of tracks to slow the spread of exotic grasses,*
- *continued weed control of Lantana;*
- *instigation of further monitoring to ascertain the extent and location of lantana infestations possibly through the use of drones;*
- *inclusion of infra-red camera on the drone to locate cattle and any other feral animals; and,*
- *a professional bush fire assessor to determine the bushfire risk and determine if and where controlled burns could be used for weed control and risk mitigation.*

6.5.10 Complaints

No complaints related to the management of biodiversity were received during the reporting period. A full detailed complaints list is provided in **Appendix 8**.

6.6 GIANT BARRED FROG MANAGEMENT

Management and monitoring of the Giant Barred Frog population is conducted in accordance with the approved Duralie Coal Mine Giant Barred Frog Management Plan (GBFMP). The GBF monitoring has been undertaken to establish baseline data of the frog population and monitor whether a greater than negligible impact on the Giant Barred Frog population has occurred as a result of rainfall runoff from the mine's irrigation areas. Monitoring results are used to assess the Project against performance measures detailed in the GBFMP.

Annual monitoring and reporting on the implementation of the Giant Barred Frog Management Plan was undertaken between 2011 and 2016.

During the previous reporting period (2015/2016), the GBFMP was revised with proposed changes to the GBF monitoring program. The GBFMP was approved by DP&E on 17 December 2015 and by the Commonwealth Department of the Environment (DotE), on 4 January 2016 and is available on the Duralie Coal website.

As stated in Section 7 of the GBFMP the timing and frequency of monitoring will be triggered upon commencement of irrigation within the Duralie Extension Project irrigation areas. To date, the DCM has yet to begin irrigation activities associated with the Duralie Extension Project and as such, the Project has not presented a potential impact on the Giant Barred Frog population.

No monitoring was required during 2016/17 in accordance with the GBFMP. An assessment of any future irrigation activities within the approved irrigation areas will be undertaken on an annual basis to inform ongoing survey effort.

6.7 BLASTING

6.7.1 Blast Criteria and Control Procedures

Blasting is conducted in accordance with conditions 8-15 of Schedule 3 of the Project Approval 08_0203 and respective EPL conditions and the approved Blast Management Plan (BLMP).

Blast monitors are located on the:

- Schultz Property (Bucketts Way, south west of mine);
- Moylan Property (West);
- Fisher-Webster Property (North); and
- Former Weismantels Inn (West).

The location of blast monitoring units are shown on **Figure 2 (Appendix 1)**.

EPL condition L5 state that overpressure caused by blasting at monitored locations may exceed 115 dB(L) for no more than 5% of blasts during the reporting period and must not exceed 120 dB(L) at any time. Similarly, ground vibration at monitored locations caused by blasting may exceed a peak particle velocity of 5 mm/s for no more than 5% of blasts during the reporting period and not exceed 10 mm/s. In accordance with Condition 13(b) of the Project Approval, a dedicated blasting hotline is available to provide current scheduled blasting times for the DCM. Persons living within two (2) kilometres of an active or approved operational area may also request advice of scheduled blasting activities.

Blasting activities are designed and managed in accordance with the BLMP.

6.7.2 Review of Blast Monitoring Results

Airblast overpressure and ground vibration results for all blasts undertaken during the reporting period are provided in **Appendix 5**.

- **Overpressure Results**

During the reporting period, there were no blasts events which exceeded the overpressure criteria limit of 120 dBL.

There was one (1) blast where overpressure exceeded 115 dBL during the reporting period. This exceedance was recorded at the Moylan monitor on 14 March 2017. The exceedance was investigated internally and management actions implemented as required. A total of 1.8% of blasts exceeded 115dB(L) during the reporting period which is below the allowed 5%.

- **Vibration Results**

During the review period (period ending 30 June 2017) there were no blasts where ground vibration exceeded 5 mm/s.

The 2010 EA provides predictions on blast emissions for various residential receivers. The blasting predictions indicate that blasting emissions would generally comply with airblast criterion of 115 dBL and ground vibration of 5 mm/s at nearby private receivers. During the reporting period, predicted blast emissions were generally consistent with measured values.

- **Fume Results**

During the reporting period, low level fume was recorded from seven blasts with the highest fume rating of 3A as recorded in accordance with the Blast Fume Management Procedure. No fume was recorded to exit the Mining Lease boundary from any blasts.

6.7.3 Building Condition Inspections

Building condition surveys of several privately owned dwellings located in the vicinity of the mine are routinely carried out by an independent structural engineer. In addition, surveys may be commissioned following an approach by a landowner concerned about dwelling damage which they consider may be related to mining activity (Condition 11, Schedule 3).

During the reporting period, no building inspections were undertaken. No requests were received from any landowners to undertake a building inspection or to update a previous inspection report. An inspection of the Former Weismantels Inn is scheduled for the next reporting period.

6.7.4 Complaints

No blast related complaints were received during the reporting period. A full detailed complaints list is provided in **Appendix 7**.

6.8 NOISE

6.8.1 Noise Criteria and Control Procedures

The Noise Management Plan (NMP) was revised and updated during the reporting period and approved in August 2017. Noise emissions from the DCM are managed in accordance with the criteria and procedures described in the NMP.

The noise monitoring program includes both attended noise surveys and real-time noise monitoring. Four (4) attended noise surveys were conducted during the reporting period. These surveys were conducted during September 2016, November 2016, February 2017 and April 2017.

A Sentinex real-time noise (RTN) monitor provides a management tool for operations to measure mine contribution noise emissions and implement management controls as outlined under the approved NMP.

6.8.2 Review of Noise Survey Results

The summary results of the attended noise surveys undertaken during the reporting period are provided in **Tables 20 to 27**. Noise monitoring locations are shown on **Figure 2 (Appendix 1)**. The full Noise Survey Reports are available at the Duralie Coal website (www.duraliecoal.com.au).

Note that the noise criteria do not apply on sites which are Yancoal owned or if there is a written agreement between Yancoal and the landowner (refer to footnotes).

- **September 2016 Survey**

Table 20: Noise Performance Assessment – Operations – September 2016 Survey

Location	Estimated DCM LAeq(15minute) Contribution dBA			Noise Criteria LAeq(15minute) dBA			Compliance		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
NM1 Woodley	I/A	I/A	<20	35	35	35	Yes	Yes	Yes
NM2 Zulumovski Nth ²	I/A	19	32	35	35	35	Yes	Yes	Yes
NM3 Mahony ³	I/A	I/A	<20	35	35	35	Yes	Yes	Yes
NM4 Fisher-Webster	I/A	18	29	35	35	37	Yes	Yes	Yes
RTNM1-Wards River Village	I/A	I/A	<15	35	35	35	Yes	Yes	Yes

I/A = Inaudible

² Yancoal owned property

³ Property under private agreement

Table 21: Performance Assessment – Sleep Disturbance – September 2016 Survey

Location	DCM LA1(1minute) Contribution	Noise Criteria LA1(1minute)	Compliance
NM1 Woodley	28	45	Yes
NM2 Zulumovski Nth ²	45	45	Yes
NM3 Mahony ³	27	45	Yes
NM4 Fisher-Webster	33	45	Yes
RTNM1-Wards River Village	39	45	Yes

I/A = Inaudible

² Yancoal owned property

³ Property under private agreement

Compliance with the relevant noise criteria was achieved at all noise monitoring locations during the day, evening and night periods during the September 2016 surveys.

Based on the measured DCM noise contribution, compliance with the relevant sleep disturbance noise criteria was achieved at all noise monitoring locations during the night-time noise monitoring period.

- **November 2016 Survey**

Table 22: Noise Performance Assessment – Operations – November 2016 Survey

Location	Estimated DCM LAeq(15minute) Contribution dBA			Noise Criteria LAeq(15minute) dBA			Compliance		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
NM1 Woodley	I/A	21	<20	35	35	35	Yes	Yes	Yes
NM2 Zulumovski Nth ²	I/A	I/A	<20	35	35	35	Yes	Yes	Yes
NM3 Mahony ³	I/A	I/A	<20	35	35	35	Yes	Yes	Yes
NM4 Fisher-Webster	I/A	I/A	12	35	35	37	Yes	Yes	Yes
RTNM1-Wards River Village	I/A	I/A	I/A	35	35	35	Yes	Yes	Yes

I/A = Inaudible

². Yancoal owned property³ Property under private agreement**Table 23: Performance Assessment – Sleep Disturbance – November 2016 Survey**

Location	DCM LA1(1minute) Contribution	Noise Criteria LA1(1minute)	Compliance
NM1 Woodley	36	45	Yes
NM2 Zulumovski Nth ²	38	45	Yes
NM3 Mahony ³	31	45	Yes
NM4 Fisher-Webster	29	45	Yes
RTNM1-Wards River Village	I/A	45	Yes

I/A = Inaudible

². Yancoal owned property³ Property under private agreement

Compliance with the relevant noise criteria was achieved at all noise monitoring locations during the day, evening and night periods during the November 2016 surveys.

Based on the measured DCM noise contribution, compliance with the relevant sleep disturbance noise criteria was achieved at all noise monitoring locations during the night-time noise monitoring period.

- **February 2016 Survey**

Table 24: Noise Performance Assessment – Operations – February 2017 Survey

Location	Estimated DCM LAeq(15minute) Contribution dBA			Noise Criteria LAeq(15minute) dBA			Compliance		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
NM1 Woodley	I/A	I/A	I/A	35	35	35	Yes	Yes	Yes
NM2 Zulumovski Nth ²	28	26	33	35	35	35	Yes	Yes	Yes
NM4 Fisher-Webster	I/A	I/A	22	35	35	37	Yes	Yes	Yes
NM5 Moylan	I/A	<20	<20	35	35	35	Yes	Yes	Yes
RTNM1-Wards River Village ²	<25	<20	29	NA	NA	NA	NA	NA	NA

I/A = Inaudible

². Yancoal owned property

NA = Not applicable – Yancoal owned property

Table 25: Performance Assessment – Sleep Disturbance - February 2017 Survey

Location	DCM LA1(1minute) Contribution	Noise Criteria LA1(1minute)	Compliance
NM1 Woodley	I/A	45	Yes
NM2 Zulumovski Nth ²	38	45	Yes
NM4 Fisher-Webster	23	45	Yes
NM5 Moylan	26	45	Yes
RTNM1-Wards River Village ²	30	NA	NA

I/A = Inaudible

². Yancoal owned property

NA = Not applicable – Yancoal owned property

Compliance with the relevant noise criteria was achieved at all noise monitoring locations during the day, evening and night periods during the February 2017 surveys.

Based on the measured DCM noise contribution, compliance with the relevant sleep disturbance noise criteria was achieved at all noise monitoring locations during the night-time noise monitoring period.

- **April 2016 Survey**

Table 26: Noise Performance Assessment – Operations – April 2017 Survey

Location	Estimated DCM LAeq(15minute) Contribution dBA			Noise Criteria LAeq(15minute) dBA			Compliance		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
NM1 Woodley	I/A	I/A	<20	35	35	35	Yes	Yes	Yes
NM2 Zulumovski Nth ²	35	38	30	35	35	35	Yes	No	Yes
NM4 Fisher-Webster	30	34	<20	35	35	37	Yes	Yes	Yes
NM5 Moylan	I/A	I/A	27	35	35	35	Yes	Yes	Yes
WR1	I/A	I/A	<20	35	35	35	Yes	Yes	Yes

I/A = Inaudible

².Yancoal owned property

Table 27: Performance Assessment – Sleep Disturbance - April 2017 Survey

Location	DCM LA1(1minute) Contribution	Noise Criteria LA1(1minute)	Compliance
NM1 Woodley	<20	45	Yes
NM2 Zulumovski Nth ²	37	45	Yes
NM4 Fisher-Webster	20	45	Yes
NM5 Moylan	31	45	Yes
WR1	28	45	NA

I/A = Inaudible

².Yancoal owned property

Compliance with the relevant noise criteria was achieved at all noise monitoring locations during the day and night periods during the April 2017 surveys.

Compliance with the relevant noise criteria was achieved at all noise monitoring locations during the evening period with the exception of NM2 (a Yancoal owned property). Given that compliance was measured at NM4, compliance with the relevant criteria at other non-mine owned receivers further north of DCM would have been achieved.

Based on the measured DCM noise contribution, compliance with the relevant sleep disturbance noise criteria was achieved at all noise monitoring locations during the night-time noise monitoring period.

To address any noise exceedances regardless of inversion presence DCM continue to implement the management measures described in the NMP Section 6. Additionally, DCM implement operational management measures in accordance with the real-time noise monitoring response protocol described in the NMP Section 7.3.5. Details of any RTN alarms recorded and the operational response implemented by DCPL are recorded in the RTN Response Register; further detail is provided in Section 6.8.4.

The 2010 EA and 2014 EA provide predictions on mine contributed noise emissions for various operational years. Year 5 (2015) was predicted as the maximum operational noise levels for the Modification Project with reduced operational noise from 2016 to 2019. During the previous reporting period the operational fleet was reduced from the maximum in 2015. In terms of the four monitoring locations ("Woodley", "Zulumovski", "Moylan" and "Fisher-Webster") predicted mine contributed noise emissions were consistent with measured values for all locations factoring in the current fleet operating at the DCM.

6.8.3 Rail Noise Monitoring

The NMP requires that rail noise monitoring is undertaken on a quarterly basis at existing Wards River and Craven locations. Rail noise monitoring is reported against rail noise criteria described in Section 4 of the NMP and is undertaken for general information purposes only (i.e. they are not DCM compliance requirements). Rail operations aim to progressively reduce noise levels to the goals of 65dB(A)Leq, (daytime from 7am – 10pm), 60dB(A)Leq (night-time from 10pm – 7am) and 85dB(A) (24hr) max pass-by noise, at one metre from the façade of affected residential properties. Additionally, Schedule 3 Condition 4(e) of PA 08_0203 includes a notification requirement for affected residents where the maximum rail pass-by noise exceeds 85dB(A).

Rail noise monitoring was conducted during the September 2016, November 2016, February 2017 and April 2017 Noise Surveys when shuttle trains were operating. Rail Noise Survey results are included in the Noise Survey reports which are available at the Duralie Coal website (www.duraliecoal.com.au). Attended noise measurements were conducted at all three locations, TN1 (Craven), TN2 (Wards River Village North) and TN3 (Wards River Village South).

During the September 2016 operator attended noise survey period there was no site rail activity. Consequently, no maximum pass-by rail traffic noise measurements were able to be undertaken.

During the November 2016 operator attended noise survey period there was no site associated rail activity. Consequently, no maximum pass-by rail traffic noise measurements were able to be undertaken.

During the February 2017 survey, maximum Duralie Shuttle rail pass-by noise levels were below 85dBA at all receiver locations, excluding the sounding of horns on approach to level crossings.

During the April 2017 survey, maximum Duralie Shuttle rail pass-by noise levels were below 85dBA at monitoring location TN2, excluding the sound of horns on approach to level crossings.

Notifications requirements in accordance with the NMP relate to the L_{Amax} levels and were deemed to be compliant for the annual reporting period.

6.8.4 Real Time Noise Monitoring Results

A real-time noise monitoring response protocol is described in the NMP Section 7.3.5. Details of any RTN alarms recorded and the operational responses implemented by DCPL are recorded in the RTN Response Register. RTN Response Register details for the reporting period are provided in **Appendix 6**.

In general, alarms during the reporting period related to abnormal meteorological conditions such as wind and rain. Additionally, several of the alarms were received at times when no operations were occurring, i.e. Weekends. DCPL continue to implement the noise management measures described in the NMP.

6.8.5 Mobile Plant Noise Assessments

The mobile plant fleet operating at the DCM was reduced during the reporting period. The current operational configuration typically involves only one digger and truck fleet and ancillary equipment. There was no mobile plant noise monitoring undertaken during the reporting period. Mobile plant monitoring will be undertaken during the next reporting period.

6.8.6 Complaints

Three (3) noise related complaints were received during the reporting period. There has been a significant reduction in noise complaints during in the reporting period when compared with the previous two reporting periods (39 & 10 respectively), which coincides with the reduced operational fleet and the location of operations. All complaints were responded to promptly and a full detailed complaints list is provided in **Appendix 7**.

6.9 LANDSCAPING AND VISUAL SCREENING

The overall visual impacts of the Duralie Mine are generally considered low. However, some local impacts will occur and undertakings such as the following have been, and will continue to be, adopted to lessen these impacts:

- Minimising (where possible) disturbance to native vegetation, especially where such vegetation is providing visual screening;
- Retention specifically of ridge Open Forest and regrowth forest (where possible);
- Retention of all riparian vegetation along Mammy Johnsons River and those out of pit sections of Coal Shaft Creek;
- Ensuring out of pit emplacement design produces a landform which integrates with the adjoining natural landform;
- Painting of substantial fabricated infrastructure with a colour ("Rivergum") that assists it to blend in with the adjoining landscape;
- Maintenance of infrastructure to retain the ability of such infrastructure to blend into the surrounding landscape over the life of the project; and
- Placement, configuration and direction of lighting to reduce offsite nuisance effects of stray light.
- Prioritising rehabilitation of exposed and outer batters of waste emplacements.

In accordance with project approval condition a visual screen has been constructed and maintained along a section of the Bucketts Way to the north-west of the mine in consultation with DPE, RMS, Great Lakes Council and DCM CCC. As predicted some additional vantage points of the mine have been exposed through the clearing of the northern extent of the Weismantel pit and landscaping works and progressive rehabilitation will continue to reduce the visual impact.

6.9.1 Complaints

No visual amenity related complaints were received during the reporting period. The complaints list is included in **Appendix 7**.

6.10 CULTURAL AND NATURAL HERITAGE CONSERVATION

Archaeological surveys conducted at the Duralie Mine site in the 1980's and 1990's did not identify any Aboriginal sites or items with the exception of one site. A tree, to be subsequently referred to as the "honey tree" was the subject of a site inspection involving various parties including representatives of NPWS in November 1998. The consensus at the time of inspection was that the "honey tree", an old ironbark, had had timber pieces inserted into the trunk in a spiral pattern to allow someone to scale the tree and access the crown – possibly to collect honey. It was not clear whether such timber insertion would have been performed by an Aboriginal person or early European settler. The "honey tree" was subsequently listed on the NPWS Aboriginal Heritage Information Management System (AHIMS) database.

The Duralie Extension Project Environmental Assessment identified 9 sites of Aboriginal heritage significance (DM2, DM3, DM4, DM5, DM6, DM9, DM10, DM11 and the "Honey Tree") on the Mining Lease. These sites have been protected by way of signpost and fencing where required. In addition, 4

sites (DM1, DM7, DM8 and Mammy Johnson's Grave) were identified outside of the Mining Lease. These 9 sites are tabulated below:

The Duralie Mine has a Heritage Management Plan (HMP) (Duralie Coal 2015b) that was revised and approved in June 2015. The purpose of the HMP is to address the requirements of Project Approval condition 46, (DoPi 2011).

In accordance with the HMP topsoil disturbance during earthworks, construction and operation of the mine has been monitored utilising officers of the Karuah Local Aboriginal Land Council (KLALC). During the reporting period topsoil disturbance was undertaken in the northern extent of the Weismantel pit and KLALC officers did not report any Aboriginal artefacts.

In accordance with the HMP, monitoring of the Aboriginal heritage sites at the Duralie mine was conducted each quarter during 2016/17.

Table 28: Aboriginal Heritage Sites within EA Study Area

Site Code (refer EA documentation)	Site Type	Status
DM2	Isolated Artefact	Salvaged by KLALC
DM3	Scarred Tree	Existing, no disturbance.
DM4	Scarred Tree	Existing, no disturbance
DM5	Scarred Tree	Salvaged by KLALC
DM6	Isolated Artefact	Existing, not located by KLALC
DM9	Open Artefact Scatter	Existing, no disturbance
DM10	Scarred Tree	Existing, no disturbance
DM11	Isolated Artefact	Disturbed, not located by KLALC.
38-1-0033	Scarred Tree – Honey Tree	Existing. No disturbance

A building inspection of the European heritage site, Weismantels Inn is conducted every two years and was last undertaken in August 2015. The inspection report concluded that:

“There is no evidence that the former Weismantel Inn building, Bucketts Way, Stroud Road, has been affected by blast induced ground vibrations from the nearby Duralie Mine.”

The next building inspection is scheduled for 2017.

6.11 SPONTANEOUS COMBUSTION

Any incidences of spontaneous combustion at the DCM are managed in accordance with a Spontaneous Combustion Management Procedure. Management and mitigation practices generally involve reducing the interaction of potentially reactive materials with water and oxygen by appropriate dumping practices, profiling and capping any materials likely to heat and reducing the time coal faces are exposed prior to mining.

During the reporting period isolated incidences of spontaneous combustion were identified in the open cut pits. On 29 July 2016 a spontaneous combustion incident was reported to DPE and EPA. Actions were taken to address the spontaneous combustion which included removing the affected material and extinguishing followed by capping of the area with inert material to restrict air flow and further heating.

Three complaints were received in relation to odours resulting from the spontaneous combustion on 29 July 2017. Responses were provided to all complainants with information provided on the potential cause of the odour and the actions taken by DCPL. Further follow-up with the complainants was undertaken where required. DCPL continued to monitor and manage areas with the potential for

spontaneous combustion or self-heating. DCPL also continued to monitor odour near the perimeter of the Mining Lease.

On 24 August 2017 the EPA notified DCPL a further complaint in relation to odours from the DCM. Inspections by Duralie Coal staff had identified odour near the ML boundary. DCPL had previously identified areas of self-heating on the Potentially Acid Forming (PAF) waste emplacements and were in the process of undertaking remedial works to these areas. A dozer had been working on the PAF emplacements to spread and cap the self-heating material. A response was provided to the EPA.

Following the initial incident there was no further spontaneous combustion identified, however self-heating on the PAF waste emplacements continued to be managed.

A total of 13 odour complaints were received during the reporting period. DCPL responded to all complaints promptly and provided information on the specific issues. On each occasion information was provided on spontaneous combustion and self-heating and the measures being implemented by Duralie to manage the issue. The full detailed complaints list is included in **Appendix 7**.

6.12 AGRICULTURAL REPORT

6.12.1 Cropping

As a consequence of the northerly advance of the Weismantel Pit there are currently no available areas suitable for cropping. No further cropping trials are proposed for the remaining life of the Duralie project.

6.12.2 Grazing

During the reporting period there were on average approximately 30 head of cattle grazing within the mining lease area and up to a maximum of 80 head on an agistment basis.

Works have been undertaken during the reporting period to repair or install fencing in areas previously isolated by the advancement of the pit to allow cattle grazing and improve pasture management.

In addition to the Mining Lease areas agistments are also managed for cattle grazing on the surrounding Yancoal owned properties.

7. WATER MANAGEMENT

Water management is undertaken in accordance with the approved Water Management Plan (WMP) and sub-components of the plan including surface water, ground water and site water balance required under Condition 29, Schedule 3 the DEP Project Approval.

The main principles of the water management system on-site are to:

- Minimise the generation of dirty water and divert clean water around disturbed areas;
- Minimise storage requirements by maximising re-use of dirty water;
- Remove potential impacts on downstream water resources by provision of secure containment on site and disposal by irrigation re-use;
- Implement a fail-safe system, whereby under extreme events in excess of design capacity, dirty waters would spill to the mine pit and not to the clean water catchments; and
- Not allow sediment laden water having an elevated suspended solids concentration to be discharged off site.

7.1.1 Water Supply and Demand

The main water supply storage on-site for use in irrigation and dust suppression is the Main Water Dam (MWD) (monitoring point SW3) located to the northwest of the Industrial Area. The MWD, Auxiliary Dam 1 (AD1) and Auxiliary Dam 2 (AD2) are the principal permanent mine water storages on-site. Water from these dams comprises pit produced water (runoff to/rainfall/seepage to), water from specific sediment dams and surface water runoff from the Industrial area.

The principal water losses in the water system are:

- Water applied to land by means of irrigation.
- Water used for dust suppression.
- Evaporation from the Main Water Dam, Auxiliary Dam 1 and Auxiliary Dam 2.
- Water retained in ROM coal and railed to Stratford.

The Mine Water Dam's current storage capacity is approximately 1405 ML whilst Auxiliary Dam 1 can contain approximately 460 ML and Auxiliary Dam 2 has an estimated storage capacity of approximately 2870 ML.

At the completion of the reporting period (30-Jun-2017) the Mine Water Dam contained 998 ML (77.1%), Auxiliary Dam 1 contained 164 ML (41.6%) and Auxiliary Dam 2 contained 2092 ML (80.6%).

7.1.2 Site Water Balance Review

A site water balance review is undertaken annually and captures all inflows and outflows from the water management system. The water which accumulates in the open pits through rainfall or groundwater seepage is measured at the point of dewatering. Prior to the water balance review servicing and verification of all flow meters at DCM was undertaken in August 2016. The results of the flow meter verifications were used to calibrate the site water balance in regard to water transfers.

A review of the Main Water Dam, AD1 and AD2 balance 2016 is as follows: Figures are based on Duralie Mine Site Water Balance Review for the 2016 calendar year. The full report is available on request.

Inflows (mL/pa)

Rainfall runoff	768
Pump from open cut pits	583
Pump from other storages	185
MWD diversion seepage	151
First flush capture	11
Total Inflow	1,531

Outflows (mL/pa)

Evaporation	664
Haul Road dust suppression	190
Irrigation and Evaporator Fan Loss	536
Total Outflow	1,390
INFLOW - OUTFLOW	141

Start of 2016 year total storage volume	3,018
End of 2016 year total storage volume	3,184
Change in Storage	166

The above values indicate only a very small change in stored water volume in the storage dams during 2016. Note that this does not include any increase in stored water volume in the Weismantel pit (estimated volume stored approximately 350 ML) and the adjacent waste rock emplacement (estimated volume stored possibly up to approximately 5,000 ML). The estimated volume of water contained in the Weismantel pit itself (based on recorded water levels) appears to have increased by at least 274 ML during 2016 and possibly by as much as 800 ML if this includes water stored in the adjacent in-pit waste rock emplacement in this period. Long term RL trend charts for Main Water Dam, AD1 and AD2 are provided in **Appendix 4**.

The volume of groundwater estimated reporting to Clareval pit in 2016 was 128 ML. Note that this volume includes seepage from adjacent in-pit waste rock which is recharged by rainfall and therefore the volume of actual groundwater inflow is likely to be lower. The 128 ML estimated volume is slightly higher than, but of a similar order of magnitude as, the 102 ML volume predicted from the groundwater model developed as part of the Duralie Extension Project (GCL, 2010).

DCPL holds an existing Bore Licence (20BL168404) issued by the NSW Department of Primary Industries, that allows for up to 300 ML of groundwater to be extracted from “works” in any 12 month period.

Total water stored at the Duralie Coal Mine is presented in **Table 29** (Volumes reported are at 30-June-2017).

Table 29: Stored Water

	Volumes Held (ML)		
	Start of Reporting Period	At end of Reporting Period	Storage Capacity
Mine Water	3228	3254	4591
Contaminated Water	0	0	0
Controlled Discharge Water	na	na	na

In addition to the water balance review a water balance forecast is also undertaken annually to predict the site water storage over the remaining life of the mine.

7.2 SURFACE WATER

7.2.1 Surface Water Management

Surface water management is managed in accordance with WMP: Appendix 2 Surface Water Management Plan (SWMP) under Condition 29, Schedule 3 of the DEP Approval and is divided into the management of clean water and mine water as outlined below. The SWMP was revised and submitted to DPE during the reporting period. Section 7.2.1.1 covers management of runoff from the overburden dump and sediment and erosion control.

7.2.1.1 Sediment and Erosion Control

Activities in relation to erosion and sediment control are undertaken in accordance with Condition 29 of the PA 08_0203, the approved Water Management Plan, inclusive of sub-section 7 under the Surface Water Management Plan – the Erosion & Sediment Control Plan.

The mine had the following dedicated erosion and sediment control structures in use during the reporting period;

- Two (2) rail siding sediment dams – designated as RS1 and RS6
- One (1) waste emplacement (rehabilitation) sediment dam – designated as VC1
- Temporary Sediment Dams in advance of mining operations (none active at the end of the reporting period).

Sediment dam sizing is described in the Erosion and Sediment Control Plan. Runoff in excess of the design capacity will result in a dam spilling in accordance with the design criteria. The quality of water collecting within sediment dam is managed (where practicable) to minimise suspended sediment load. This is achieved by a combination of promoting stabilising groundcover within the dam's catchment and introduction of a flocking agent such as gypsum (as required).

Sediment dams are inspected following receipt of sufficient rain whereby such dams have the potential to spill. Diversion structures and drains are also maintained, including vegetation management, to ensure integrity of the structures and capacity for flow.

In addition to dedicated sediment dams, clean water is directed around disturbed areas (where practicable) using diversion drains/bunds or in the case of Coal Shaft Creek, a creek diversion (refer discussion under *Water Management*) in order to minimise sediment laden water.

During the reporting period there were no spills from sediment dam at the DCM.

It should be noted that at all times pumping (where possible) of sediment dams in order to prevent or limit the amount of spilling water was undertaken. Prioritisation of pumping operations also took into account the likely quality of spilling water when a dam was considered vulnerable to spilling.

The control of sediment generation and erosion is primarily controlled by:

- Timely progressive rehabilitation and vegetation establishment on disturbed areas (e.g. completed sections of the overburden dump) to minimise the area exposed to erosion;
- The direction of runoff from disturbed areas into sediment dams; and
- The placement of silt fences, silt rolls (gravel filled), straw bales, geotextile fabric and/or rock in order to either trap or restrict the generation of silt or to dissipate flow energy.

All elements of sediment control are regularly monitored and maintained. Sediment dams are cleaned out when the storage volume is substantially reduced by sediment deposition (i.e. when 30% of storage volume is lost to sediment build up) and inspected after major rainfall events. During the reporting period desilting was undertaken of sediment dams including RS1 and the ROM Pad dam (spills to RS6).

Sloping areas under rehabilitation are stabilised by structural controls such as bench drains and contour banks (if required) to break up the effective slope length exposed to erosion. Final slopes will generally not exceed 14 degrees which will aid in the control of erosion and sediment generation.

Inspection of diversion structures and sediment control dams occurred during and following heavy rainfall events. The site contained all mine water on site within its water management system and control structures remained effective. Maintenance works were undertaken on the clean water diversion drains around the prescribed dams and Coal Shaft Creek diversion.

7.2.1.2 Clean Water Management

The main objective of clean water management is the segregation of clean water from mine water by the construction of diversion drains around disturbed areas, thereby minimising the quantity of 'dirty' water generated.

Surface water controls aim to prevent clean runoff water from entering the open mining pit and overburden dumping areas where practical. The main structures are:

- Diversion of Coal Shaft Creek. The diversion channel (built in stages) is required until the creek can be re-established at the conclusion of mining;
- Main Water Dam (MWD) diversion drain. This drain intercepts runoff from the catchment above the MWD and delivers that water to Coal Shaft Creek;
- Auxiliary Dam 1 (AD1) and Auxiliary Dam 2 (AD2) diversion drains;
- Clareval western diversion drain;
- Flood control embankments to prevent inundation of mining areas;
- A culvert under the Main Coal Haul Road which allows Coal Shaft Creek to flow through the site; and
- Various runoff control drains/bunds about disturbed areas, designed to divert clean water runoff around those areas.

The main elements of the clean water diversion system are shown in **Figure 3 (Appendix 1)**.

Inspections of diversion structures were undertaken during and after rainfall. Remedial and maintenance works were completed as required within the diversion drains and dams during the reporting period.

7.2.1.3 Mine Related Water Management

Dirty water management refers to the control, collection and re-use of water which may have become contaminated by mining operations and associated activities or which by its nature is considered to be undesirable for release to the environment. This water comprises mine water and sediment laden/turbid water. Mine water is water that has come into contact with mining activities. Sediment laden/turbid water has come into contact with disturbed areas but predominantly not core mining areas.

Mine waters are typically characterised by higher salinity and on occasion lower pH. Sediment laden waters are characterised by elevated suspended solids and elevated turbidity.

During the reporting period all mine water was contained on site and no spills occurred from mine water storage dams.

The main objectives of the dirty water control facilities are:

- On site storage to prevent escape to Coal Shaft Creek and Mammy Johnsons River; and
- Management of the stored quantity of dirty water by irrigation.

The principal sources of 'dirty' water are:

- (a) Mine Water
 - Incident rainfall
 - Groundwater seeping into mining pits;
 - Rainfall induced runoff and seepage from active sections of the overburden dump; and
 - Rainfall induced runoff from the Industrial Area.
- (b) Sediment Laden Water
 - Rainfall induced runoff from roads;
 - Rainfall induced runoff from areas stripped of topsoil (typically exposing clays);
 - Rainfall induced runoff from areas yet to adequately vegetate within sediment dam catchments; and
 - Direct rainfall falling on sediment laden water storages.

Dirty water uses and losses are:

- Evaporation and seepage losses from water storages;
- Haul road dust suppression;
- Railed coal dust suppression;
- Water retained in product coal railed to the Stratford Mine; and
- Stored water applied to land via irrigation (evapotranspiration) including evaporative sprays.

The dirty water storages on site are:

- Main Water Dam (MWD)
- Auxiliary Dam 1 (AD1)
- Auxiliary Dam 2 (AD2)
- Sediment Dam VC1 (rehabilitated waste dump)
- Sediment Dams RS1 and RS6 (rail siding dams)

The locations of mine and sediment laden water storage areas are shown in **Figure 3 (Appendix 1)**.

7.2.2 Surface Water Monitoring

DCM monitors surface water quality on and surrounding the mine site by sampling from a series of selected locations. These locations comprise both streams and water storage structures. A meteorological monitoring station (i.e. weather station) provides site rainfall data. The locations of these monitoring sites are shown on **Figure 2 (Appendix 1)**.

Surface water monitoring is conducted in accordance with the approved SWMP and the EPA Environment Protection Licence (EPL) 11701.

Surface water is sampled and analysed on a weekly, monthly, event basis or following a sediment dam spill.

Collected waters are analysed for a suite of physical and chemical parameters. Results are compared with water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000). "Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project" and EPA requirements (DCM Surface Water Management Plan Appendix B).

7.2.2.1 Review of Local Streams Monitoring Results

Reference should be made to accompanying data tables provided in **Appendix 4**:

- SW2 – Coal Shaft Creek (CSC)
- SW2 Rail Culvert – Coal Shaft Creek
- SW6 – Former RS3/4 Culvert

- SW9 – Un-named Tributary (UNT)
- SW10 – Coal Shaft Creek
- GB1 – Mammy Johnsons River (MJR)
- Highnoon – Mammy Johnsons River (MJR)
- Site 9 – Karuah River (KR)
- Site 11 – Mammy Johnsons River (MJR)
- Site 12 – Mammy Johnsons River (MJR)
- Site 15 – Mammy Johnsons River (MJR)
- Site 19 – Karuah River (KR)

The surface water monitoring results are used to assess the DCM against the performance indicators and performance measures as detailed in Table 7 of the Surface Water Management Plan. If data analysis indicates a performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the performance measure. If a performance measure is considered to have been exceeded, the Contingency Plan will be implemented (WMP Section 10). If data analysis indicates that the performance measure has not been exceeded, DCPL will continue to undertake monitoring.

Table 30: Summary of Surface Water Monitoring Results and Trigger Levels – pH, EC and TSS

Site	pH			EC		TSS	
	20 th %ile	80 th %ile	Trigger	80 th %ile	Trigger	80 th %ile	Trigger
MJR							
Site 11	7.0	7.6	7.1-7.6	436	370	94	15
GB1	6.8	7.8		329		27	
Site 12	7.1	7.6		372		18	
CSC							
SW2 (RC)	7.4	8.0	7.1-7.9	614	544	61	80
SW10	6.9	8.0		110		25	
UT							
SW9	6.5	7.8	6.4-7.1	210	461	65	57
SW10	6.9	8.0		110		25	

Table 31: Summary of Surface Water Monitoring Results and Trigger Levels – Copper, Turbidity, Zinc and Aluminium

Site	Copper		Turbidity		Zinc		Aluminium	
	80 th %ile	Trigger	80 th %ile	Trigger	80 th %ile	Trigger	80 th %ile	Trigger
MJR								
Site 11	0.003	0.002	31.6	24	0.012	0.011	1.55	1.24
GB1	0.003		40.0		0.013		1.07	
Site 12	0.006		31.2		0.023		1.13	
CSC								
SW2 (RC)	0.002	0.003	129.2	119	0.039	0.064	3.48	3.02
SW10	0.006		140.0		0.018		6.88	
UT								
SW9	0.003	0.004	70.8	94	0.014	0.024	1.18	2.96
SW10	0.006		140.0		0.018		6.88	

Assessment of the Performance Indicators and Performance outcomes are presented in **Table 30**.

Table 32: Surface Water Monitoring Performance Outcomes – 2016-17 Reporting Period

Performance Measure	Monitoring of Environmental Consequences			Data Analysis to Assess against Performance Indicators	Performance Indicators	Assessment of Performance Indicators	Assessment of Performance Measure	Relevant Management and Contingency Measures
	Sites	Parameters	Frequency					
No more than a negligible impact on water quality in Mammy Johnsons River as a result of the Duralie Extension Project	<ul style="list-style-type: none"> Site 11 GB1 Site 12 	<ul style="list-style-type: none"> EC, pH, turbidity, Copper (total), Zinc (total), Aluminium (total), Hardness, TSS, BOD and DO. 	<ul style="list-style-type: none"> Monthly / Event 	The 80th percentile concentration calculations for EC, pH, total copper, turbidity, total zinc, total aluminium, and TSS in addition to The 20th percentile value of pH at Site 11, GB1 and Site 12 are presented in Tables 27 & 28	Water quality at Site 11 is not worse than the pre-irrigation water quality at Site 11 whilst water quality is better at GB1 and Site 12 compared to the pre-irrigation water quality at these sites.	<p>Data analysis indicates Site 11 exceeded the performance indicator for EC, TSS, Turbidity, Copper, Aluminium and Zinc. Analysis of the monitoring data shows EC to be elevated on occasion under low flow conditions. EC was also elevated at upstream sites GB1 and Site 12 on these occasions. Whilst EC at Site 11 slightly exceeded the 80thile trigger it was found to not be significantly higher than EC concentrations at GB1 and Site 12. Hence similar trends observed upstream and downstream.</p> <p>Analysis of the monitoring data also shows similar trends observed upstream and downstream for TSS, Turbidity Al and Zinc.</p> <p>The performance indicator for DO was not exceeded except for one reading of 86% at Site 12. DO is consistently below 85% at Site 11, Site 12 and GB1.</p>	No further requirement for assessment of Performance Measure.	Continue monitoring.

Table 32 (Continued): Surface Water Monitoring Performance Outcomes – 2016-17 Reporting Period

Performance Measure	Monitoring of Environmental Consequences			Data Analysis to Assess against Performance Indicators	Performance Indicators	Assessment of Performance Indicators	Assessment of Performance Measure	Relevant Management and Contingency Measures
	Sites	Parameters	Frequency					
No more than a negligible impact on water quality in Coal Shaft Creek as a result of the Duralie Extension Project	<ul style="list-style-type: none"> SW2 (RC) SW10 	<ul style="list-style-type: none"> EC, pH, turbidity, Copper (total), Zinc (total), Aluminium (total), Hardness, TSS, BOD and DO. 	<ul style="list-style-type: none"> Monthly / Event 	The 80th percentile concentration calculations for EC, pH, total copper, turbidity, total zinc, total aluminium, and TSS in addition to The 20th percentile value of pH at SW2 (RC) and SW10 are presented in Tables 27 & 28	Water quality at Site SW2 (RC) is not worse than the pre-irrigation water quality at Site SW2 (RC) whilst water quality is better at SW10 compared to the pre-irrigation water quality at that site.	<p>Data analysis indicates Site SW2 (RC) exceeded the performance indicator for pH, EC, Turbidity and Aluminium.</p> <p>Analysis of the monitoring data shows EC to be elevated on occasion under low flow conditions. EC was also elevated at upstream site SW10 under low flow conditions. Whilst EC at SW2 (RC) slightly exceeded the 80thile trigger it was found to not be significantly higher than EC concentrations SW10. Hence similar trends observed upstream and downstream.</p> <p>pH only slightly exceeded the 80thile trigger at SW2 9RC) which was also the case at upstream site SW10.</p> <p>Analysis of the monitoring data also shows similar trends observed upstream and downstream Turbidity and Aluminium.</p> <p>The performance indicator for DO was not exceeded. DO is consistently below 85% at Sites SW2 (RC) and SW10.</p>	No further requirement for assessment of Performance Measure.	Continue monitoring.

Table 32 (Continued): Surface Water Monitoring Performance Outcomes – 2016-17 Reporting Period

Performance Measure	Monitoring of Environmental Consequences			Data Analysis to Assess against Performance Indicators	Performance Indicators	Assessment of Performance Indicators	Assessment of Performance Measure	Relevant Management and Contingency Measures
	Sites	Parameters	Frequency					
No more than a negligible impact on water quality in Unnamed Tributary as a result of the Duralie Extension Project	<ul style="list-style-type: none"> SW9 SW10 	<ul style="list-style-type: none"> EC, pH, turbidity, Copper (total), Zinc (total), Aluminium (total), Hardness, TSS, BOD and DO. 	<ul style="list-style-type: none"> Monthly/Event 	The 80th percentile concentration calculations for EC, pH, total copper, turbidity, total zinc, total aluminium, and TSS in addition to The 20th percentile value of pH at SW9 and SW10 are presented in Tables 27 & 28.	Water quality at Site SW9 is not worse than the pre-irrigation water quality at SW9 whilst water quality is better at SW10 compared to the pre-irrigation water quality at that site.	<p>Data analysis indicates SW9 exceeded the performance indicator for pH and TSS. Analysis of the monitoring data shows pH to be elevated on two occasions and TSS and to be elevated on one occasion with all other results well below the triggers. The one outlying high result for TSS occurred after rainfall.</p> <p>Analysis of the monitoring data also shows similar trends observed upstream and downstream for pH and TSS.</p> <p>The performance indicator for DO was not exceeded. DO is consistently below 85% at Sites SW9 and SW10.</p>	No further requirement for assessment of Performance Measure.	Continue monitoring.

The above results were consistent with previous year's monitoring results. The Duralie Coal EIS 1996 indicated that water quality in Mammy Johnsons River was variable, but was generally good. It was also found that the salinity of the stream was higher during periods of low flow and generally showed a relative reduction in EC during higher flow periods (Gilbert, 2010). The current monitoring results are consistent with these observations.

Historical monitoring data presented in the DCM Environmental Assessment, Surface Water Assessment (Gilbert, 2010) show that Coal Shaft Creek is generally more saline than Mammy Johnsons River and the Karuah River. Results during the reporting period concur with these observations. It is considered that Coal Shaft Creek is generally more saline due to its ephemeral nature and the outcropping/sub-cropping of coal seams within the catchment.

In general, surface water monitoring results were consistent with predictions made in the Environmental Assessment (2010).

7.2.2.2 Review of Mine Water Monitoring Results

Mine water comprises water that is generated within the mine workings, waste rock emplacements (prior to reshaping and topsoiling), storage areas for such water and runoff from areas where coal is handled. Mine water is generally characterised by elevated EC, elevated sulphate concentrations and low turbidity/TSS.

The three principal mine water storage areas are the Main Water Dam (sampling location SW3 major), Auxiliary Dam 1 (AD1) and Auxiliary Dam 2 (AD2). Monitoring of mine water quality is also conducted within the Weismantel pit (sampling location SW4) and the Clareval pit (sampling location Clareval).

Monitoring for SW3 (major) during the reporting period indicated, on average, a moderate EC (3084 uS/cm), slightly alkaline pH (8.0) and low miscellaneous metals concentration. Reference should be made to **Table 33** and the water monitoring results in **Appendix 4**.

Table 33: Summary of Mine Water Monitoring Results – pH, EC and TSS

Site	pH		EC (µS/cm)		TSS (mg/L)	
	Range	Average	Range	Average	Range	Average
SW3 (major)	7.1-8.6	8.0	2041-3540	3084	5-23	10
AD1	7.1-8.5	8.1	2129-3140	2817	*	*
AD2	6.8-8.6	8.1	2158-3210	2832	*	*
Clareval	4.4-8.0	7.4	3010-5030	4056	14-544	84
SW4	3.9-7.7	5.4	4080-4700	4348	10-252	99

Note * = TSS not monitored at AD1 and AD2

The simulated water quality for the Main Water Dam was prepared for the Environmental Assessment (2010) including a salinity balance and an assessment of the suitability for irrigation water (Gilberts, 2010). Mine water pH has remained generally near neutral or slightly alkaline for the life of the project. The Mine Water Dam EC trend has been generally consistent with the simulated EC showing a slightly increasing trend up to 2015 and then decreasing towards 2017, however the average EC (3084 uS/cm) in 2017 has remained higher than the predicted EC of 2140 uS/cm. This is predominantly due to the higher EC water from the Clareval pit. SW4 was only monitored on four occasions during the reporting period due to no safe access into the pit; however monitoring was conducted within the Clareval pit.

The electrical conductivity (EC) performance indicator in Table 7 of the Surface Water Management Plan (SWMP) was exceeded during the reporting period in the MWD. As a requirement of the SWMP, the increasing salinity triggered an assessment of performance measure. Hollingsworth (2014) concluded that there has been no significant detrimental effect on soil properties, or suitability of soil in irrigated areas for future agricultural use.

An assessment of the irrigation water quality was undertaken in the 2017 Irrigation Area Monitoring Report (Horizon Environmental, 2017) and is included in Section 7.4.1. Irrigation and soil monitoring in

2017 concluded that there has been no significant detrimental effect on soil properties, or suitability of soil in irrigated areas for current or future agricultural use.

7.2.3 Biological Monitoring

As part of Duralie Coal's environmental monitoring program, Invertebrate Identification Australasia was commissioned to conduct biological (aquatic ecology – macroinvertebrates) monitoring of the streams near the DCM.

Biological monitoring has been conducted each year since the start of mining operations.

Monitoring during this reporting period was conducted during September 2016 and February 2017 and involved sampling from seven sites. The September survey identified a total of 54 families of aquatic invertebrates which represents an increase in number of families. For the February survey a total of 42 families of aquatic macroinvertebrates were recorded representing a substantial decrease in number of families. The report summaries are provided below.

The September 2016 report concluded that;

"the ecosystem condition along the Mammy Johnsons River has either remained stable or increased across the sites, including the tributary site M8, compared with the same period in previous years. These results suggest there have been stable environmental conditions due to a sufficient number of rainfall events and overall rainfall volume despite the overall continuance of the dry weather conditions during the late autumn and winter months. There is no evidence of any adverse effects downstream of the mining operations on the aquatic macroinvertebrate community over the last six months. Any changes in the riverine aquatic community such as changes in species composition or taxa numbers were the result of increased flow conditions over the mid-winter period prior to the survey as the trends were consistent across all sites. Therefore, there appears to have been no adverse effects on the aquatic ecosystem as a result of the mine's operations." (Invertebrate Identification Australasia 2016)."

The February 2017 report concluded that;

"the ecosystem condition along the Mammy Johnsons River has generally decreased across all of the Mammy Johnsons sites compared with the same period in previous years, excluding the tributary site, Site M8 which was dry. These results suggest there have been a gradual decline in environmental conditions due to low number of rainfall events and lack of overland flow as a result of the continuance of the dry weather conditions and increased temperatures during the late spring and summer months. There is no evidence of any adverse effects downstream of the mining operations on the aquatic macroinvertebrate community over the last six months as the decline in condition has occurred along the length of the river system. Therefore, there appears to have been no additional adverse effects on the aquatic ecosystem as a result of the mine's operations." (Invertebrate Identification Australasia 2017)."

Biodiversity values have been generally similar to those noted from prior reporting periods. Biological monitoring reports to date have not indicated any significant adverse effects on the aquatic ecosystem as a result of the mine's operations as per predictions made in the environmental assessments.

The full September 2016 and February 2017 Macroinvertebrate Survey reports can be made available on request.

7.2.4 Riparian Vegetation Monitoring

The Riparian Vegetation “Health” Monitoring program is conducted in accordance with the Duralie Coal Mine SWMP. Visual monitoring and photography is conducted in order to detect any potential change in the quality and quantity of riparian vegetation. The unnamed Tributary, Coal Shaft Creek and Mammy Johnsons River are monitored on an annual basis in conjunction with the biological monitoring for signs of leaf scorching, desiccation and dieback. Riparian health monitoring includes the development of a photographic database of riparian vegetation at fixed photo points.

Riparian vegetation health monitoring was conducted in September 2016. Results for the reporting period are generally similar to results from last year with some minor changes. Monitoring continues to demonstrate negligible impact related to mining operations on riparian vegetation. Seasonal changes generally reflect climatic conditions. The photographic database is maintained at the DCM.

7.2.5 Ecotoxicity Testing Program

In accordance with the Surface Water Management Plan and Condition 29(b) of Project Approval (08_0203), DCM have undertaken ecotoxicity testing of samples taken from selected water monitoring sites in Mammy Johnsons River, Coal Shaft Creek and DCM Main Water Dam since 2013. The ecotoxicity testing programme was initially required to be undertaken quarterly and then revised following analysis of the monitoring results. The ecotoxicity tests were undertaken by Ecotox Services Australasia during 2013 to 2015. A review of the ecotoxicity monitoring data was undertaken by the University of Queensland Centre for Mined Land Rehabilitation in May 2014 and again in October 2015. A review of the monitoring data collected during up to 2015 concluded the following;

“The results for aquatic testing of five aquatic species of Coal Shaft Creek, Mammy Johnsons River at four sampling times during 2014 -2015 show that there was no evidence for any significant toxicity and no connection with any effects from mining. The Main Water Dam at Duralie Coal Mine showed that sporadic effects to some test species, but not all. This is considered to indicate the potential for minor effects to occur on an on-going basis but does not show affects from the offsite natural waters. If the Main Water Dam water is discharged, it should be tested for aquatic toxicity.

Based on the evidence for some aquatic testing in the Main Water Dam it is recommended that the Ecotoxicity Testing Program be reduced to yearly sampling corresponding to the commencement of summer using sampling at the same four sites for a further two years. If any water release is undertaken from Duralie Mine site, the mine site and downstream waters should be tested before and after release.”

In accordance with the recommendation above ecotoxicity monitoring was undertaken in December 2016. An interpretation of the ecotoxicity results will be undertaken following the next round of sampling scheduled in December 2017.

7.3 GROUNDWATER

7.3.1 Groundwater Management

Groundwater monitoring is conducted in accordance with the DCM Water Management Plan (WMP) Appendix 3 Groundwater Management Plan (GWMP).

DCM monitors groundwater quality on and surrounding the mine site by sampling from a series of selected locations (bores). The location of these bores is shown in **Figure 2 (Appendix 1)**.

Collected waters are analysed for a suite of physical and chemical parameters. Results are evaluated for observable trending.

7.3.2 Groundwater Monitoring Results

A summary of groundwater monitoring results for the reporting period can be found in **Table 34** and **Appendix 4**. Comments on analysed parameters for monitoring conducted during the reporting period are as follows:

- Depth to groundwater was comparable with recent historical data for most monitored wells.
- pH is comparable with historical data with fluctuations apparent. pH in the reporting period varied from a slightly acidic 5.4 (DB10W in February 2017) to a neutral 7.4 (DB11W in May 2017);
- Electrical conductivity generally showed a high degree of variability across many of the wells as has historically been the case. This would appear to reflect the cycle of dry and wet conditions. Shallow wells intercept generally low conductivity alluvial aquifers, whilst deep wells associated with coal measures generally have higher conductivity;
- Calcium and magnesium concentrations across all wells tended to fluctuate within reasonably tight ranges;
- Sulphate concentrations varied across wells. SI2W exhibited the widest range of any bore spanning over 255mg/l;
- Aluminium concentrations are quite low (often being close to the limit of analytical detection) in all the deeper wells but comparatively higher in the shallower wells. The highest concentration recorded was 84 mg/l (BH4BW in September 2016);
- Iron concentrations showed no common trend with rises and falls across wells generally. Concentrations showed a wide range from a low of <0.05 mg/l (SI1W) to a high of 174.0 mg/l (BH4BW in September 2016);
- Manganese concentrations across all wells were not high with the highest being 3.38 mg/l within SI3W in September 2016; and
- Zinc concentrations were essentially low and consistent with available historical data.

Table 34: Summary of Groundwater Monitoring Results – Average depth, pH and EC.

Site	Depth (m)	pH	EC (µS/cm)
DB1W	15.8	5.9	4143
DB2W	13.6	6.3	1405
DB3W	3.1	6.4	134
DB4W	6.2	6.5	3578
DB5W	11.5	5.8	2197
DB6W	21.3	6.6	5678
DB7W	10.7	6.8	2725
DB8W	20.7	*	*
DB9W	20.7	7.0	3030
DB10W	16.7	5.7	3878
DB11W	10.7	6.8	3300
BH4BW	4.8	6.1	294
SI1W	9.6	7.0	2673
SI2W	18.4	7.1	2769
SI3W	27.8	6.9	5493
WR1	10.2	6.4	2005
WR2	60.5	6.9	4983

Note * = Depth only monitored at DB8W

It should be noted that the EA (2010) described groundwater in the Project area as being characterised by the following parameters/ranges:

- pH – 6.0 to 8.0
- Electrical conductivity – 100 to 7600 uS/cm

Groundwater monitoring results are assessed against Performance Indicators and Measures as described Section 7.1 and Table 6 of the GWMP. Monitoring data for the reporting period was in accordance with the performance measures which indicate:

- No more than a negligible impact on stream baseflow as a result of the Duralie Project;
- No more than a negligible impact on water levels in groundwater production bores on private land.

Refer **Table 35** below.

Table 35: Groundwater Monitoring Performance Outcomes – 2016-17 Reporting Period

Performance Measure	Performance Indicators	Assessment of Performance Indicators	Assessment of Performance Measure
No more than negligible impact on stream baseflow and/or natural river leakage of Mammy Johnsons River to the deeper groundwater system as a result of the Duralie Extension Project (incorporating the Open Pit Modification).	Groundwater inflows to open pits are consistent with Duralie Open Pit Modification Environmental Assessment (EA) predictions.	Data analysis indicates groundwater inflows to open pits are consistent with Duralie Open Pit Modification Environmental Assessment (EA) predictions. Refer to water balance review.	No further requirement for assessment of Performance Measure.
	Groundwater levels in alluvium bores are consistent with Duralie Open Pit Modification EA predictions (accounting for temporal changes in rainfall recharge).	Data analysis indicates groundwater levels in alluvium bores are consistent with Duralie Open Pit Modification EA predictions (accounting for temporal changes in rainfall recharge). Refer to groundwater monitoring data.	No further requirement for assessment of Performance Measure.
No more than negligible impact on water levels in groundwater production bores on privately-owned land as a result of the Duralie Extension Project (incorporating the Open Pit Modification).	No groundwater related complaints received	No groundwater related complaints were received.	No further requirement for assessment of Performance Measure.

Groundwater quality results for the reporting period indicate results consistent with EA predictions and historical groundwater data trends. For this reporting period, the groundwater pH range for bores likely to be influenced by the coal measures was between 5.4 and 7.4. This is a generally similar range to that noted in the EA. Similarly, the electrical conductivity range for the bores was 96 to 5940 uS/cm. These results are generally similar to and within the range noted in the EA.

Irrigation bores (SI Series) indicate no obvious signs of deep drainage generated from irrigation activities.

No indication of an increase in connectivity between alluvial bores and the deeper groundwater system has been observed based on monitoring results for water quality and groundwater table level.

The waste emplacements bores (WR Series) now in the fourth year of monitoring indicate signs of recharging of the backfilled void, particularly at WR1. This is consistent with the numerical modelling of the post-mining groundwater levels (EA 2010) which shows slow but complete recovery of the groundwater system over many decades and that the Clareval void, once filled with water, would act as a sink, while the Weismantel void lake would act as a flow-through lake system. Additional detail is available within the EA for the DEP Modification 2 approved in December 2014.

7.3.3 Groundwater Depressurisation

Depth to water information from piezometer monitoring indicate that bore water levels are generally consistent between bores and are generally consistent with EA (2010) predictions.

The four bores to the west of the open cut pit (SI1W, SI2W, SI3W & DB6W) are all above or close to maximum predicted levels.

No depressurisation has been observed to date at Bore DB11W, located north of operations.

Results for the reporting period are provided in **Appendix 4**. In summary, hydrographic plots (Graph 1, Graph 2 and Graph 3), indicate that groundwater monitoring results for the period are generally consistent with predicted outcomes as assessed in the EA (2010). Further review occurred in line with the GWMP where inflows to pits and water levels within bores were consistent with modelled predictions and indicators as per the GWMP. No trigger levels or exceedance of performance measures were identified during the reporting period. No complaints related to groundwater were received during the reporting period.

The Interface Investigation Program – Waste Emplacement and Alluvium prepared by Hydro Simulations (2015) in accordance with Condition 29 (c) of the DEP Project Approval has been completed and is appended to the GWMP. DCPL intended to implement the alluvial aquifers interface monitoring program during the next reporting period.

Water monitoring data continues to be provided quarterly to the CCC and is also made available in the EPL11701 monitoring data spreadsheet on the Duralie Coal website.

7.4 IRRIGATION

The Duralie Coal Mine operates under a continual stored water surplus. The Project Approval conditions precludes the disposal of mine water from the approved project approval boundary and Duralie is managed as a zero discharge site.

Irrigation at the DCM is managed in accordance with the WMP, specifically Appendix 2 Surface Water Management Plan Attachment 1 Irrigation Management Plan (IMP). Irrigation consists of a substantial network of fixed sprays in the Type I, II and IV irrigation areas supported by evaporative fans in the Type I and Type V irrigation areas (waste rock emplacement) only. During the reporting period the fixed spray system was removed from the Type IV area (rehabilitated waste emplacement). The evaporative sprays were also removed from the Type V waste rock emplacement area. No irrigation

currently occurs within Type III irrigation areas located in the catchment of Coal Shaft Creek above Dam 3.

The irrigation system management controls were maintained during the reporting period. An overview of the site irrigation system including the fixed sprays and areas are outlined in the WMP which is available on the Duralie Coal website.

During the 2016 calendar year a total of 536ML of mine water was irrigated within Type I, II, IV & V areas (compared with 1031 ML 2015 calendar year). The reduced volume was predominantly due to reduced number of evaporative sprays.

Monitoring of irrigation water quality from the Main Water Dam ("SW3") was undertaken on a monthly basis during the review period. Analytical results are available on the Duralie Coal website under monitoring results and also in **Appendix 4**. Results for the MWD irrigation water quality was assessed against the relevant performance measures from the WMP by Horizon Environmental Soil Survey (refer extract within 7.4.1 below).

7.4.1 Irrigation Area Soil and Vegetation Monitoring

Irrigation area monitoring is conducted in accordance with the DCM Water Management Plan (WMP) which incorporates the Irrigation Management Plan (IMP) as an attachment of the Surface Water Management Plan (SWMP). The annual irrigation area monitoring includes an assessment of soil characteristics and vegetation condition with consideration to the irrigation water quality applied.

The irrigation area performance indicators in Table 6 of SWMP Section 9 relate to pH in the **MWD** being maintained between 6.0 and 8.5; SAR greater than 6 and EC greater than 2500 $\mu\text{S}/\text{cm}$ (2.5 dS/m). If a performance indicator is exceeded an assessment of the performance measure is also included in the irrigation monitoring report.

The sodicity and salinity performance indicators for irrigation water in the MWD were exceeded between 2016 and 2017, while MWD pH was within the acceptable range. The EC at the MWD ranged between 3.1 dS/m and 3.4 dS/m, while the mean was 3.2 dS/m in 2016-2017.

The 2017 Irrigation Area Monitoring Report (Horizon Environmental, 2017) concluded that there has been no significant detrimental effect on soil properties, or suitability of soil in irrigated areas for future agricultural use, i.e. grazing on native pasture. Irrigation area monitoring was undertaken during April 2017 and a summary from the 2017 irrigation area monitoring report is provided below:

"Slight increase in irrigation water quality salinity during the reporting period (2016-17) was associated with a higher sodicity. However, the predominance of sulfate over chloride in the composition of irrigation water mitigates the potential adverse effects sodicity can have on soil structure, and vegetation growth, composition and grazing value. The risks from land application of water from the MWD to soil and pasture quality appear to be low.

We found no detectable adverse impact from irrigation management on pasture cover or composition. Complete ground cover is being maintained on the irrigated pasture. Soil salinity in irrigation areas were similar to respective reference sites. The surface soils have low levels of major nutrients (extractable phosphorus and potassium) that will limit productivity. Also, micronutrients including Cu and Zn appear to be deficient in pasture soils.

Since the previous annual report for 2015-16 (Hollingsworth 2016), there has been no significant detrimental effect of irrigation on soil properties or its suitability to serve grazed pasture. There may be a general lack of soil porosity to depth that may promote waterlogging. The lack of soil porosity at depth may be due to over-clearing for pasture.

Pasture growth depends on a range of factors including grazing pressure, seasonal rainfall variation, as well as local soil conditions. There does not appear to be a detrimental effect on ground cover or pasture composition in the irrigated pastures compared with the dryland, reference sites. Annual monitoring has provided a relative assessment of pasture condition over time."

Recommendations arising from the monitoring include;

- 1. Salinity and sodicity in the MWD supply continues to trigger SWMP performance measures for irrigated land disposal of mine water and its impact needs to be assessed,*
- 2. Assess soil fertility (particularly salinity and sodicity) and pasture condition with respect to irrigation water quality and water quality trends in the mine water storages in 2018 using a method consistent with the current monitoring regime,*
- 3. Review irrigation area management if irrigation water salinities increase above 9 dS/m.*

8. REHABILITATION

Rehabilitation of disturbed land at DCM is undertaken in accordance with the Mining Operations Plan (MOP) and Rehabilitation Management Plan (RMP). Following submission of the 2016 Annual Review DRG advised that the MOP now satisfies the requirement for a Rehabilitation Management Plan (RMP) in accordance with Project Approval PA08_0203 Condition 57. A MOP Amendment was prepared during the reporting period to merge the MOP with the previous RMP and also include the addition of a mine closure planning program. The MOP term covers mining operations and rehabilitation activities up to the end of 2019. The MOP is available on the Duralie Coal website.

The primary objectives of the rehabilitation program are provided in **Table 36** below.

Table 36: Rehabilitation Objectives

Feature	Objective
Mine site (as a whole of the disturbed land and water)	Safe, stable and non-polluting, fit for the purpose of the intended post-mining land use(s).
Surface infrastructure	To be decommissioned and removed, unless the Secretary agrees otherwise.
Coal Shaft Creek Diversion	Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than prior to mining.
Landforms	Final landforms sustain the intended land use for the post-mining domain(s). Final landforms are consistent with and compliment the topography of the surrounding region to minimise the visual prominence of the final landforms in the post-mining landscape. Final landforms incorporate design relief patterns and principles consistent with natural drainage.
Other land affected by the project	Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprising: <ul style="list-style-type: none"> • local native plant species; and • a landform consistent with the surrounding environment
Water Quality	Water retained on site is fit for the intended land use(s) for the post-mining domain(s). Water discharged from site is consistent with the baseline ecological, hydrological and geomorphic conditions of the creeks prior to mining disturbance. Water management is consistent with the regional catchment management strategy.
Native flora and fauna habitat and corridors	Size, locations and species of native tree lots and corridors are established to sustain biodiversity habitats. Species are selected that re-establishes and complements regional and local biodiversity.
Final void	Safe, stable and non-polluting.
Post-mining agricultural pursuits	The land capability classification for the relevant nominated agricultural pursuit for each domain is established and self-sustaining within 5 years of land use establishment (first planting of vegetation).
Community	Minimise the adverse socio-economic effects associated with mine closure.

8.1 BUILDINGS & INFRASTRUCTURE

No buildings or infrastructure were constructed, demolished or renovated during the reporting period. No decommissioning of infrastructure is scheduled during the next reporting period. This will be further addressed during the mine closure planning process.

8.2 REHABILITATION OF DISTURBED LAND

Rehabilitation of disturbed areas is undertaken progressively and concurrently with ongoing mining operations. Rehabilitation planning, management and implementation is described in the MOP. The overburden dump is rehabilitated in progressive increments to the final landform so the area of

disturbed land is minimised and contaminated water catchment areas are reduced. Stage plans for the Duralie rehabilitation are provided in the MOP.

Vegetation is cleared ahead of mine progression. Details are included in the Annual Biodiversity Report included in **Appendix 8**. During 2016/17 approximately 2 hectares of vegetation and topsoil was cleared from the northern extent of the Weismantel pit in advance of mining operations.

Topsoil is removed ahead of the advancing pit or overburden dump. All suitable and accessible topsoil material is removed. The topsoil is pushed into piles by dozers and loaded into trucks by excavator. The topsoil is either immediately respread onto re-contoured areas or is stockpiled for later re-use. Topsoil, previously stripped from the site, is respread to a nominal thickness of 100mm and revegetated. Direct placement of freshly stripped topsoil on areas under rehabilitation is undertaken wherever possible.

Following the bulk shaping, drainage works and topsoil placement, site preparation involves chisel ploughing on level ground or ripping (300-400mm) on slopes as required.

Areas to be rehabilitated will comprise a combination of native forest/woodland and pasture with scattered trees. Trees are planted to achieve maximum aesthetic and screening effects as well as providing windbreaks, woodlots, stock shelter and habitat enhancement. As per Table 10 in the MOP, local endemic native species (particularly trees identified in the EIS) will be used wherever possible based on trialling of various species in the initial rehabilitation areas and the species pallets from the biodiversity offset areas. Pasture seed utilised will consist of a mix based on previous sowings, seasonal availability and external advice.

At the end of the reporting period an estimated 228,000 cubic metres of topsoil was held in various stockpiles. This would provide for rehabilitation of 228 hectares to the nominal topsoil depth of 100mm. The current area of disturbance which will require topsoil (i.e. not including final void of 78ha) is 198 hectares, therefore sufficient topsoil resources are available to complete rehabilitation of the operation.

Topsoil stripping has now been completed up to the northern extent of both the Clareval pit and the Weismantel pit.

The DCM rehabilitation progress is generally in accordance with the planned activities described in the MOP Plan 3C (i.e. Mining and Rehabilitation - 2017), which shows the rehabilitation status at end of 2017. The revised MOP makes provision for 138 hectares of rehabilitated area by the end of 2017.

This has included:

- General areas including shoulders of the site access road, clean water diversion drains (i.e. MWD, AD1, AD2, Eastern Drain and Clareval Drain), rail siding embankments, dam embankments and the Coal Shaft Creek diversion;
- The southern waste emplacement;
- Eastern batter running parallel to the tombstone ridgeline incorporating the noise bund; and
- Two plug areas on the western side of the Clareval pit.

No new rehabilitation was undertaken during the reporting period.

Maintenance on previously rehabilitated areas with erosion or poor establishment identified in the 2016 rehabilitation monitoring report was undertaken in January 2017. This included approximately 2 hectares on the southern waste emplacement which was ripped, re-topsoiled and seeded. Maintenance activities also included slashing and clearing of access tracks and weeds spraying.

Table 37 presents a summary of the rehabilitation undertaken at the Duralie mine site up to the current reporting period. The current mining areas and rehabilitation as of 30 June 2017 are shown in **Figure 3**, provided in **Appendix 1**.

Table 37 – Rehabilitation status

Mine area type	Previous RP (actual hectares)	This RP (actual hectares)	Next RP (forecast hectares)
Total Mining Lease	947.9	942.8	942.8
Total mine footprint	387	403	403
Total active disturbance	299	299	253
Land being prepared for rehab (Landform Establishment)	0	5	51
Land under active rehabilitation (Growth Medium Development)	0	0	0
Completed rehabilitation (Ecosystem Establishment & Sustainability)	99	99	99

Note: ML area corrected based registered title areas.

8.3 REHABILITATION MONITORING

In accordance with the DCM Mining Operations Plan (MOP) and Rehabilitation Management Plan (RMP) monitoring of rehabilitation areas at the Duralie mine site, using Landscape Function Analysis (LFA) and vegetation dynamics was conducted during May 2017. A copy of the full report is available from the Duralie Coal Environmental Department. A summary of the findings follows;

“The survey of the Duralie Coal Mine Rehabilitation areas conducted in July 2017 was the fourth survey in accordance with the Duralie Coal Mine Rehabilitation Management Plan (RMP) to assess the rehabilitation progress against the project specific performance and completion criteria. Using Landscape Functional Analysis (LFA) and vegetation dynamics the survey provides indicators of rehabilitation success and assessment of landscape processes obtained from measurements at ten 25m transects representing the various ages of rehabilitation, slope and aspect. The 2017 survey utilised a different set of six established transects with an additional four new transects – two transects in recently (2016) rehabilitated areas of the spoil emplacement, one transect in 2013 rehabilitation and one transect in an area of 2008 rehabilitation that had not been previously surveyed.

Processes associated with the soil surface are reported as three main indices;

- Stability Index - measures the ability of the soil to resist erosion and to reform after disturbances;*
- Infiltration Index - measures how the soil partitions rainfall into soil-water that is plant available and runoff that is lost from the local system and may also remove nutrients and other materials; and,*
- Nutrient Cycling Index - how efficiently organic matter is cycled back into the soil.*

The development of the woody vegetation is tracked by measuring the number of plants per hectare and calculating the volume of canopy for each distinct layer of vegetation. This is presented as Vegetation Structure.

The results for the above indices from this year's survey were compared to the average index scores from a subset of six analogue transects established in remnant woodland vegetation communities of the Duralie Biodiversity Offset area and surveyed in January 2017.

By index:

- Stability Index - all rehabilitation ages with the exception of 2016 rehabilitation have achieved the Stability Index target, indicating that the soil surface is stable and not being eroded;*
- Infiltration Index – the 2008 rehabilitation has achieved Analogue Index target, with all other ages of rehabilitation improving from the 2016 survey, but still requiring time for development; and*

- *Nutrient Cycling Index – 2008 and 2012 rehabilitation areas achieved the target value, again with the remaining rehabilitation ages requiring some time to develop. The 2012 rehabilitation result is somewhat surprising, but may be due to a high incidence of mammal activity on the surveyed transects.*

Overall the spoil emplacement continues to achieve or progress towards analogue site values. No areas of concern were encountered during the LFA surveys, with all transects having index scores and coverage appropriate for their stage of rehabilitation.

The vegetation structure on the spoil emplacement is still at a relatively early stage of development when compared to remnant vegetation found on the analogue sites. Canopy volumes have continued to increase as the vegetation matures, as expected. Whereas last year's survey reported that the 2008 rehabilitation area stem densities had stabilised, this year's survey reports an increase due to natural recruitment of Eucalypt seedlings and saplings, a good result in terms of self-sustaining ecosystem establishment. Stem densities are still very high in the remaining rehabilitation areas and are predicted to remain so for a number of years. The 2016 rehabilitation areas have stem densities below the analogue values, but this is not concerning at this stage of the revegetation effort.

Given the overall progress of the rehabilitation on the spoil emplacement, recommendations were limited to changes in collection of vegetation structure and canopy volume data to ensure that the data is useful and necessary for reporting requirements."

In addition to the monitoring above a walkover style survey was conducted between the 11th and 18th July 2017. The walkover focused on factors that will impact on the achievement of the rehabilitation objectives. These include erosion (stability), weeds and native vegetation (self-sustaining ecosystems), bush fire risk, habitat enhancement features/structures and feral pest control. A summary of the findings is provided below:

- *The rehabilitation and revegetation of the DCM spoil emplacement is progressing satisfactorily;*
- *DCM staff having undertaken considerable remediation work since the 2016 survey;*
- *Observations of erosion were limited to the powerline corridor and the 2016 rehabilitation area to the north of the corridor;*
- *Areas of soil crusting and topsoil removal affecting vegetation establishment were observed in the 2011, 2013 and 2016 rehabilitation areas. Recommendations made here to revegetate these areas using suitable machinery if possible;*
- *Revegetation has progressed with a dramatic increase in floral biodiversity this survey. An additional 26 native species were recorded, with an estimated 18 being species new to the emplacement;*
- *Seedling and sapling recruitment of Eucalypts and Acacias was observed, with a total of 19 species of plants observed to be in flower and/or fruit;*
- *Weeds are becoming an issue, especially in the older 2008 rehabilitation areas where the structure is beginning to open;*
- *Other observations noted the widespread appearance of mycorrhizal fungi, important for nutrient cycling, and small mammal activity indicating habitat development;*
- *Bush fire risk was still considered to be relatively high given the dense vegetation and the amount of litter, but has decreased due to the reduction in the biomass of grasses.*

8.4 REHABILITATION TRIALS AND RESEARCH

Rehabilitation trials are currently being implemented in the biodiversity offset area in accordance with the Biodiversity Management Plan. The program has trialled several methods for ground preparation, seeding and planting to determine the most suitable and cost effective methods for completing the remaining offset revegetation and mine site rehabilitation. The techniques include both direct seeding and tube stock with inoculated and un-inoculated seed. Refer to Section 6.5 of this report and the Duralie Coal Mine Annual Biodiversity Report (DCPL, 2017) for a summary of works undertaken during the reporting period.

8.5 DEVELOPMENT OF THE FINAL REHABILITATION PLAN

8.5.1 Mine Closure Planning

DCPL representatives met with DRG on 24 May 2017 to discuss the DCM Mining Operations Plan and mine closure planning for the Duralie operation.

A MOP Amendment (Amendment B) was prepared following the issue of a notice under section 240(1)(C) of the *Mining Act 1992* by the Department of Planning and Environment (DP&E). In accordance with the notice, the MOP Amendment included the addition of a mine closure planning program, which includes a schedule of all technical and/or environmental assessments that will be required to undertake final rehabilitation following the cessation of open-cut mining at the DCM. Additionally, the MOP Amendment was prepared to address comments from the DRG regarding the inclusion of additional detail on a strategy for designing the Coal Shaft Creek alignment, rehabilitation indicators and completion criteria and the development and inclusion of additional rehabilitation monitoring. The MOP Amendment was submitted to DRG on 31 August 2017.

The MOP Section 10 details the mine closure planning program. The planning program is designed to inform the preparation of a detailed Mine Closure Plan, which is required to be prepared and submitted to the DRG prior to the expiry of the MOP term (i.e. prior to 31 December 2019). The Mine Closure Plan would include final rehabilitation measures for all areas including infrastructure areas, water management areas, waste emplacements, final voids and biodiversity offsets.

8.5.2 Final Void Management

Under the Project Approval, at the cessation of mining, the northern extents of the currently approved DEP include final voids in the Clareval pit and Weismantel pit. A final void water balance was undertaken for the DEP EA 2010 and was revised for the Open Pit Modification EA 2014. Further details associated with the final void will be addressed as part of detailed mine closure planning.

8.5.3 Re-Establishment of Coal Shaft Creek

Re-construction of Coal Shaft Creek is required following the completion mining activities. The Coal Shaft Creek Reconstruction conceptual design is included in the DCM Water Management Plan. The final Coal Shaft Creek design will be included in the mine closure planning process.

A MOP Amendment was prepared during the reporting period which included the addition of a mine closure planning program. The MOP Amendment included additional detail on a strategy for designing the Coal Shaft Creek alignment. The final Coal Shaft Creek Reconstruction Plan will be required to be prepared prior to the end of the MOP term (i.e. end 2019).

A photographic surveillance record of key structures along the existing Coal Shaft Creek diversion is undertaken annually and was conducted during February 2017. Regular inspections of the CSC Diversion are also undertaken and in general the diversion is stable and no signs of erosion or sedimentation have been identified. Maintenance activities including weed spraying and vegetation control was undertaken during the reporting period.

8.6 REHABILITATION TARGETS

The DCM MOP Plan 3C - Mining and Rehabilitation 2016 rehabilitation target for end of 2016 calendar year is a cumulative total of 138 hectares of rehabilitation. To date 99 hectares of rehabilitation has been completed. Bulk shaping works (Landform Establishment phase) of approximately 40 hectares of waste emplacement is scheduled to commence in November 2017 in accordance with the MOP.

The DCM MOP Plan 3D - Mining and Rehabilitation 2017 rehabilitation target is a cumulative total of 138 hectares of rehabilitation. DCPL propose to progress 40 hectares of waste emplacement to Growth Medium Development phase during 2018.

9. **COMMUNITY RELATIONS**

9.1 **COMMUNITY ENGAGEMENT ACTIVITIES**

Yancoal Australia Ltd is committed to making a positive contribution in the areas in which it operates. To help facilitate this commitment Stratford Coal Pty Ltd and Duralie Coal Pty Ltd have established the Community Support Program to provide assistance to local initiatives within the local area in which they operate. The aim of the Community Support Program is to help benefit a diverse range of community needs such as education, environment, health, infrastructure projects, arts, leisure and cultural heritage.

The Stratford Coal Community Support Program has granted over \$500,000 since commencing in 2010 and during 2017 a total of \$63,000 in grants was distributed between 21 community organisations for a diverse range of community projects and initiatives.

The community groups to receive grants in 2017 were:

Community Organisation	Project
Stroud Show Association Inc.	Stroud Show -2017
Gloucester Thunderbolts Swimming Club Inc.	Annual Picnic Carnival
Clontarf Foundation - Chatham Academy	Academy facilities: Air conditioning, blinds, printer and enclosed trailer.
Gloucester Country Club	Stratford Coal Super Sevens - Golf Competition
Rotary Club of Gloucester	Gloucester Outdoor Fitness Trail - Inclusion of Wheelchair exercise station
Stroud Community Lodge	Stroud Community Services – Home Care
Gloucester Chamber of Commerce	Chill Out Festival 2017
MidCoast Science and Engineering Challenge	MidCoast Science and Engineering Challenge and Discovery Day 2017
Worimi First People Aboriginal Corporation	NAIDOC Day 2017
Gloucester Mountain Man Triathlon Inc.	Gloucester Mountain Man Tri Challenge
Stroud & District Men's Shed Inc	Air conditioning & Structural Changes for disability access
Gloucester High School P & C Ass. Inc.	Concrete Wash Bay for Cattle, Ag Farm.
Gloucester Working Dog Club Inc.	Gloucester Dogs, Boots & Bulls 2017
Stroud Road Community Hall & Progress Assoc.	Stroud Road Spring "Bash 'n Bang" 2017
Gloucester Little Athletics Centre	Long Jump Overhaul
Stroud & District Historical Society Assoc.	Karuah Valley Heritage brochure and app.
Wildlife In Need Of Care	Support for orphaned wildlife: Humidicrib.
Gloucester Public School P & C Assoc.	MiniLit Literacy Program
Stroud Rodeo Association	2017 Stroud Rodeo and Campdraft
Bucketts Way Neighbourhood Group Inc	Domestic violence program

Stratford Coal Pty Ltd and Duralie Coal Pty Ltd have also continued their commitment to education and training in the Gloucester region through Stratford Coal's Education Support Program, providing much needed funding for the next generation of young students. In 2017, \$31,400 has been allocated in funding to help support local students and businesses.

Since the commencement of mining in 1995, Stratford Coal has contributed more than \$681,000 to locally based community and training initiatives via the Education Support Program.

9.2 COMMUNITY CONSULTATIVE COMMITTEE

The Duralie Community Consultative Committee (CCC) was established in 2003 and operates under the guidance of the NSW Department of Planning & Environment. Meetings are held quarterly and provide a forum for open discussion between the community, Council, the Company and other stakeholders on issues relating to the mine's operations, environmental performance and community engagement.

The Community Consultative Committee (CCC) for the Duralie Coal Mine is currently comprised of:

- An independent Chairperson;
- Five (5) local community representatives;
- Two (2) local government representatives (MidCoast Council); and
- Two (2) DCPL representatives.

The CCC was formed in accordance with Schedule 5, Condition 5 of the Project Approval for the Duralie Extension Project. The Committee operates in such a manner as to generally satisfy the *Community Consultative Committees Guidelines for State Significant Projects* (Department of Planning, 2016) and to the satisfaction of the Secretary of the Department of Planning & Environment.

Items raised and/or discussed during the four (4) quarterly CCC meetings held during the reporting period include but are not limited to:

- Environmental monitoring, including air quality, surface water and groundwater;
- Irrigation activities including evaporative spray operation;
- Biodiversity offset works, including flora, fauna, weeds and pest management;
- Bushfire management;
- Blasting activities;
- Community complaints;
- Community engagement and Council contributions;
- Post-mining land use planning;
- Rehabilitation and mine closure planning; and
- Management of Yancoal owned lands.

Site inspections have also been undertaken during the CCC meetings and have included the active operations, rehabilitation areas and biodiversity offsets. The CCC meeting agendas, presentations and minutes are available on the Duralie Coal website (www.duraliecoal.com.au).

9.3 ENVIRONMENTAL COMPLAINTS

Complaints (by category) received by Duralie Coal Pty Ltd over the last 6 reporting years are as follows:

Complaint Category	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Noise	28	25	26	39	10	3
Blasting	16	1	12	13	3	0
Air Quality	0	4	4	1	1	14
Water	1	0	0	0	0	0
Lighting	0	1	0	0	0	0
Visual	0	1	1	0	0	0
Train	0	0	0	3	0	0
Other	0	0	1	0	0	0
Total* (by Category)	43	46	42	56	14	17

Summary comments:

- The total number of complaints received during the reporting period was 17 with the total number of complainants being 9.
- Air quality (including odour) complaints constituted the most populous category of complaints received (14). 13 of the 14 air quality complaints related to odours from the mine site. Noise complaints made up the remainder of the complaints (3).
- Overall the total number of complaints received by category during 2016/2017 was slightly higher than the previous reporting period predominately due to the increase in odour complaints. Noise complaints significantly reduced.
- The reduced noise complaint's potentially reflects the reduced production, current location of operations and improved management practices.
- Duralie Coal's Environment Protection Licence (EPL) 11701 applies to the area over which the NSW Department of Trade & Investment, Regional Infrastructure and Services (DTIRIS) Mining Leases 1427 and 1646 are issued. A requirement of the EPL is to record pollution complaints regarding complaints stemming from operations within the nominated Lease areas. Complaints relating to coal trains despite operating off the mining lease are included in the total complaints as they relate to the project. No complaints relating to trains were received during the reporting period.

A full complaints listing is provided in **Appendix 7** and includes details on DCPL's responses to complaints. A summary of complaints by category is provided in the relevant sections of the report.

9.3.1 Liaison and Complaint Resolution

DCPL operates a system to receive, handle, respond to and record complaints or information requests relating to operation of the Duralie Coal Mine which is described in the Environmental Management Strategy. DCPL operates dedicated 24 hour hotline (1300 658 239). The number is advertised within the *Sensis White Pages Directory (Newcastle)*, a local telephone directory (*Pink Pages*) and in the local newspapers (*Gloucester Advocate and Dungog Chronicle*) on a six monthly basis.

Designated Duralie staff, when notified of a complaint, determine an appropriate response on the basis of the nature of the complaint during business hours. This may involve a site visit/inspection, liaison with personnel on site by telephone or other appropriate action. After business hours, all complaints and operations are reviewed as soon as practicable by the open cut examiner and responded to by DCPL staff during business hours.

All complaints received and responses taken in relation to each complaint are recorded in a Complaints Register which is tabled at each Community Consultative Committee meeting for the period covered since the last Committee meeting and is included in **Appendix 7** for the reporting year. The complaints register is also made available on the Duralie Coal website.

9.4 EMPLOYMENT STATUS AND DEMOGRAPHY

As at 30 June 2017, the employment status at the mine site was as follows:

DURALIE	FULL-TIME
Total FTEs	75
Environment & Community (included in total)	1
Total	75

In addition to direct permanent employment at the mine, on the basis of a conservative employment multiplier of one mine site job generating one job within the general community, up to 85 (full time

equivalent) jobs are expected to have been provided in supporting services. On the basis of a review of employees' living location, 60% of mine employees resided within the greater local area (defined as being bounded by Stroud, Gloucester and Dungog).

9.5 EMPLOYEE ENVIRONMENTAL AWARENESS TRAINING

Contractors and new employees working at site are provided with information on environmental issues as part of induction training which is updated periodically. This includes elements such as the Pollution Incident Response Management Plan and reporting obligations of personnel and the management of environmental incidents such as oil or fuel spills. Ongoing environmental awareness training is also undertaken with staff and employees periodically.

Training during the reporting period included a presentation on general environmental awareness and mining in new areas with all staff and employees in March 2016, this included information on the DCM Pollution Incident Response Management Plan and incident reporting. Additionally, a training package on Prescribed Dam Visual Inspections was undertaken with relevant personnel in May 2016. A training package regarding environmental requirements for the Duralie shuttle train operations is proposed to be rolled out in September 2017.

10. INDEPENDENT ENVIRONMENTAL AUDIT

No Independent Environmental Audit of the DCM was scheduled during the reporting period.

An Independent Environmental Audit of the DCM was conducted by Trevor Brown and Associates during November 2014. The audit conclusions indicated a generally high standard of compliance of the DCM activities with the conditions of approval granted to the project under the Project Approval 08_0203, Environmental Protection Licence 11701 and Mining Leases 1427 and 1646.

The IEA 2014 report and DCPL's response to the recommendations were provided to DP&E in February 2015. On 27 August 2016 DP&E provided confirmation of acceptance of the IEA 2014 Report. DP&E have requested an update on the IEA Responses to Recommendations to be included in this Annual Review. Accordingly the status of actions against each audit recommendations are include in **Appendix 10**.

The full audit report and responses to the recommendations are available on the Duralie Coal website at <http://www.duraliecoal.com.au/environment/environmental-audit.php>.

The next Independent Environmental Audit of the Duralie Coal Mine is scheduled to be undertaken prior to the end of 2017.

On the 30 August 2016 an interagency (Environment Protection Authority (EPA), Department of Planning and Environment (DPE) and Department of Industry - Resources Regulator (DIRR)), compliance audit was undertaken of the Duralie Coal Mine Dams. The audit was part of an interagency compliance audit focussing on the management of tailings, wastewater holding and sedimentation dams (including prescribed dams) across NSW. Audit reports were provided by each agency along with actions and recommendations. Further, DPE's letter dated 28 March 2017 provided the final accepted audit actions and requested an update on the status of the Dams Audit actions and responses to be included in this Annual review. Accordingly the status of actions against each audit recommendation are included in **Appendix 10**.

11. INCIDENTS AND NON-COMPLIANCE

A protocol for managing incidents and non-compliances is included in the DCM Environmental Management Strategy. A statement of compliance is included in Section 1. During the reporting period there have been three incidents or non-compliances at the Duralie Coal Mine. The non-compliances related to odours, dust emissions and air quality monitoring results. These non-compliances have also been discussed within the relevant sections in this report

No further action was taken by neither DPE nor EPA in relation to the non-compliances.

12. ACTIVITIES PROPOSED IN THE NEXT AR PERIOD

The following environmental targets have been set for the next 12 months:

- Progress rehabilitation works to satisfy DEP EA and MOP nominated rehabilitation targets;
- Progress biodiversity offset works in accordance with the BMP including full implementation of the revegetation works;
- Maintain low level of complaints reported to the mine including complaints specifically relating to noise;
- Continuing developing the Mine Closure Plan for the Duralie Coal Mine which is to be included in a future revision of the Mining Operations Plan.

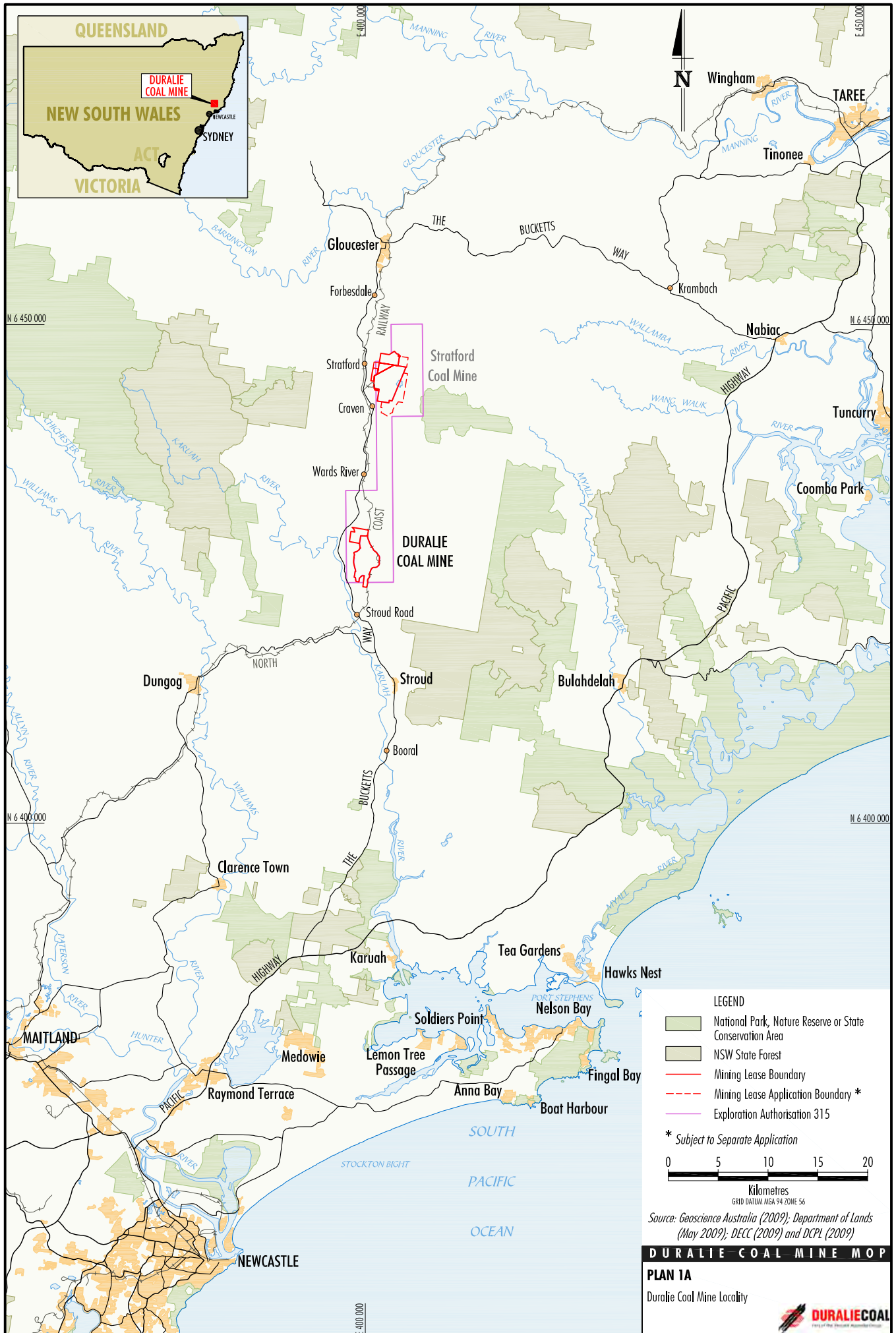
13. **REFERENCES**

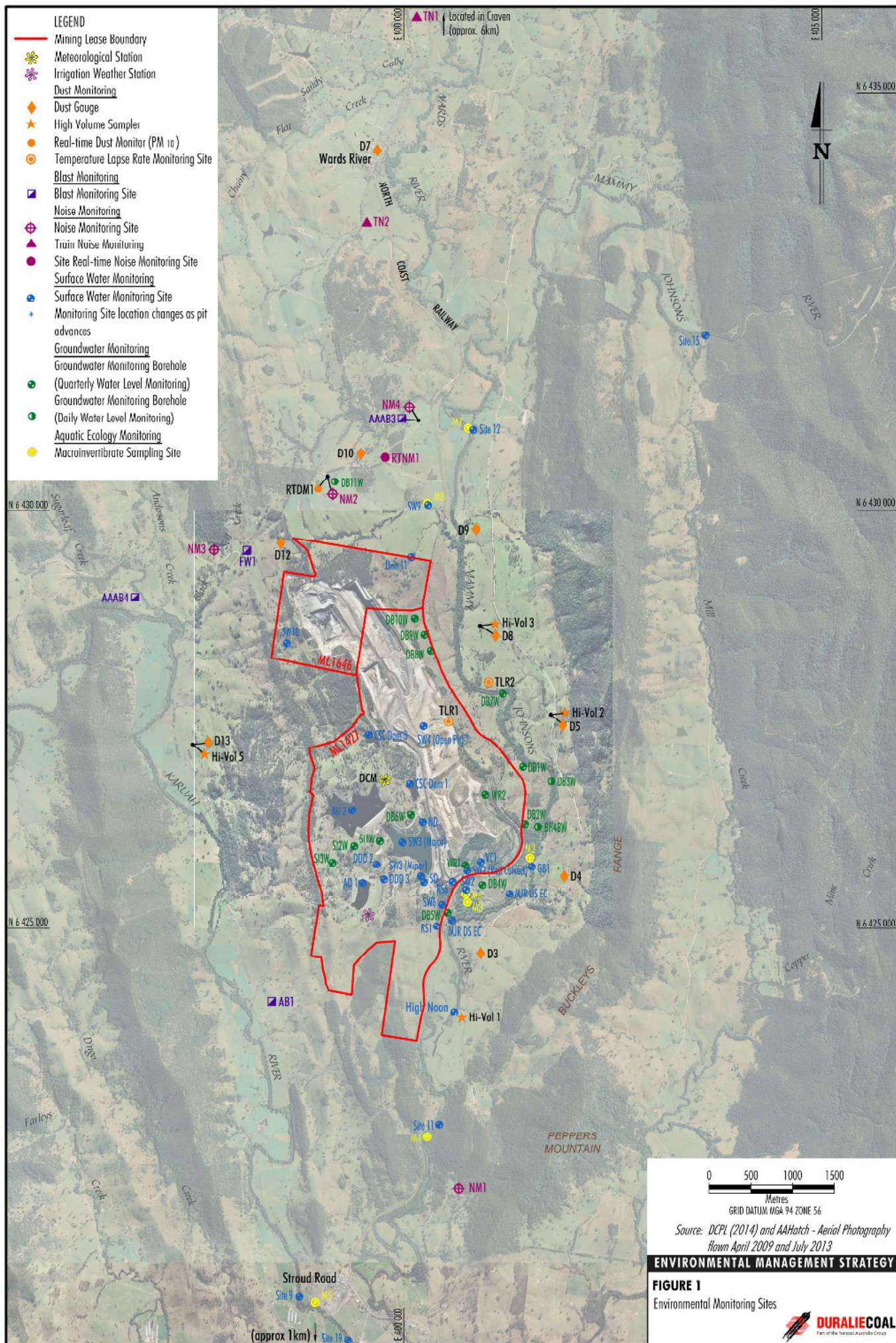
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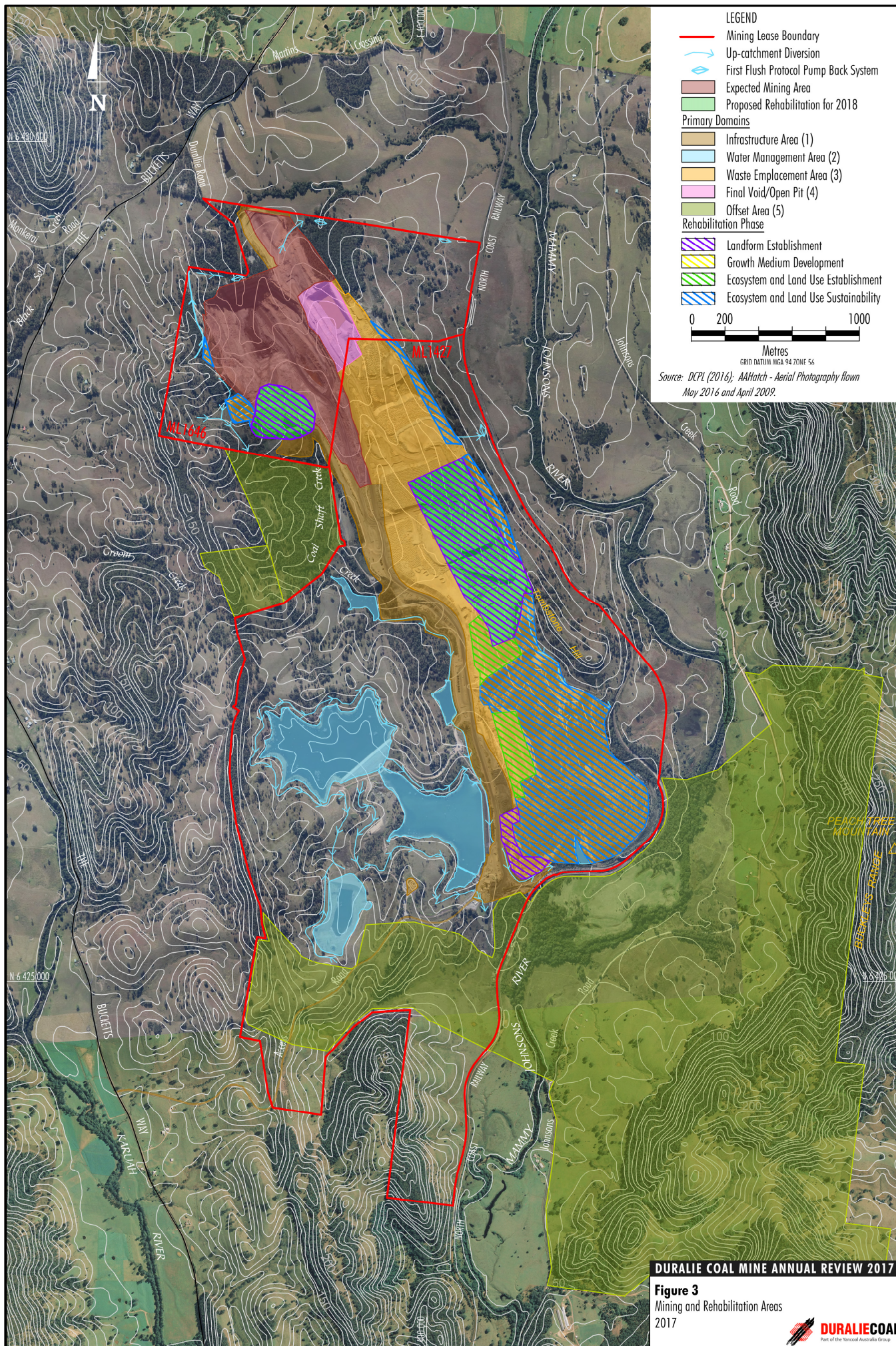
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Appendix 1:

- **Site Locality Plan**
- **Monitoring Locations**
- **Disturbed and Rehabilitated Land Plan.**







Appendix 2:

Meteorological Monitoring

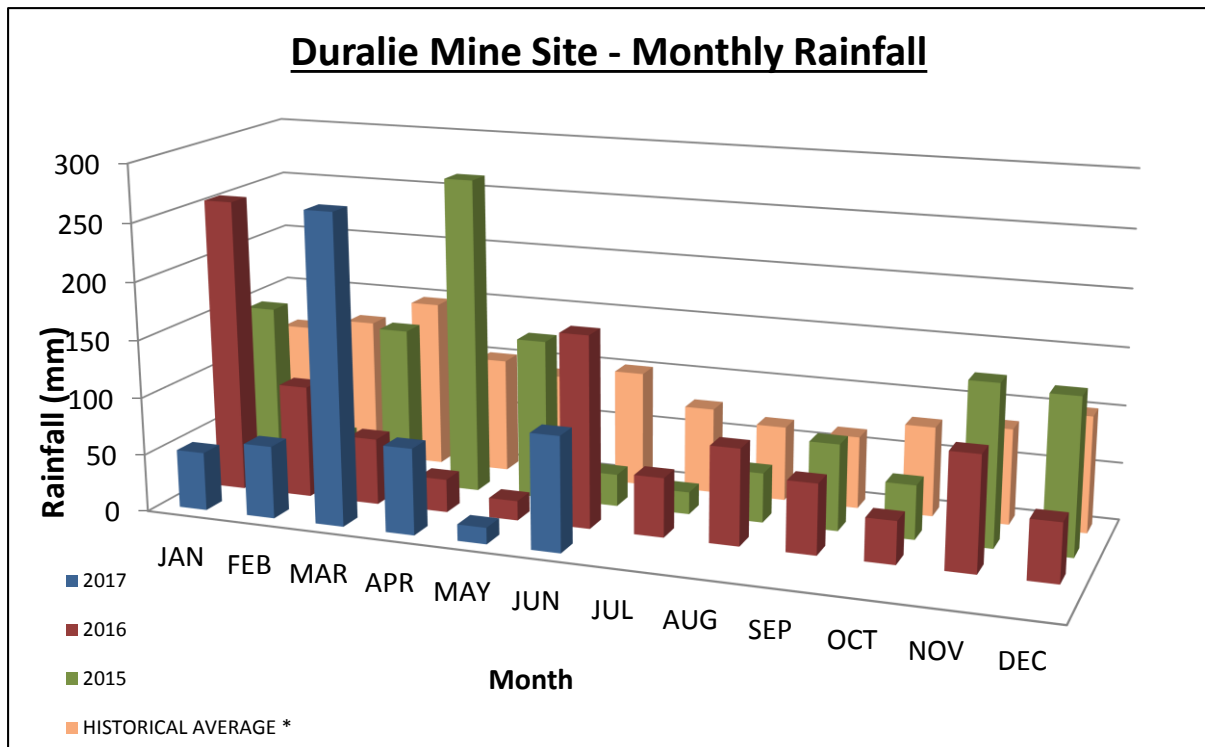


Figure 2-1: Monthly Rainfall for 2016 to 2017 and Historical Averages

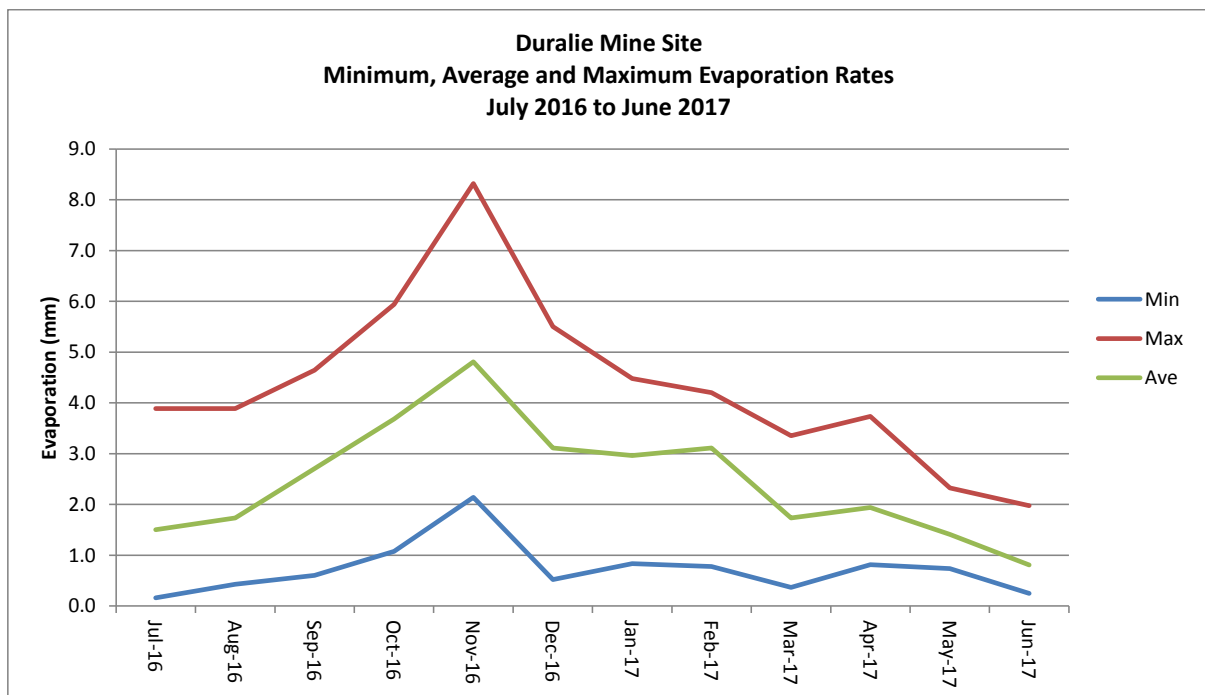
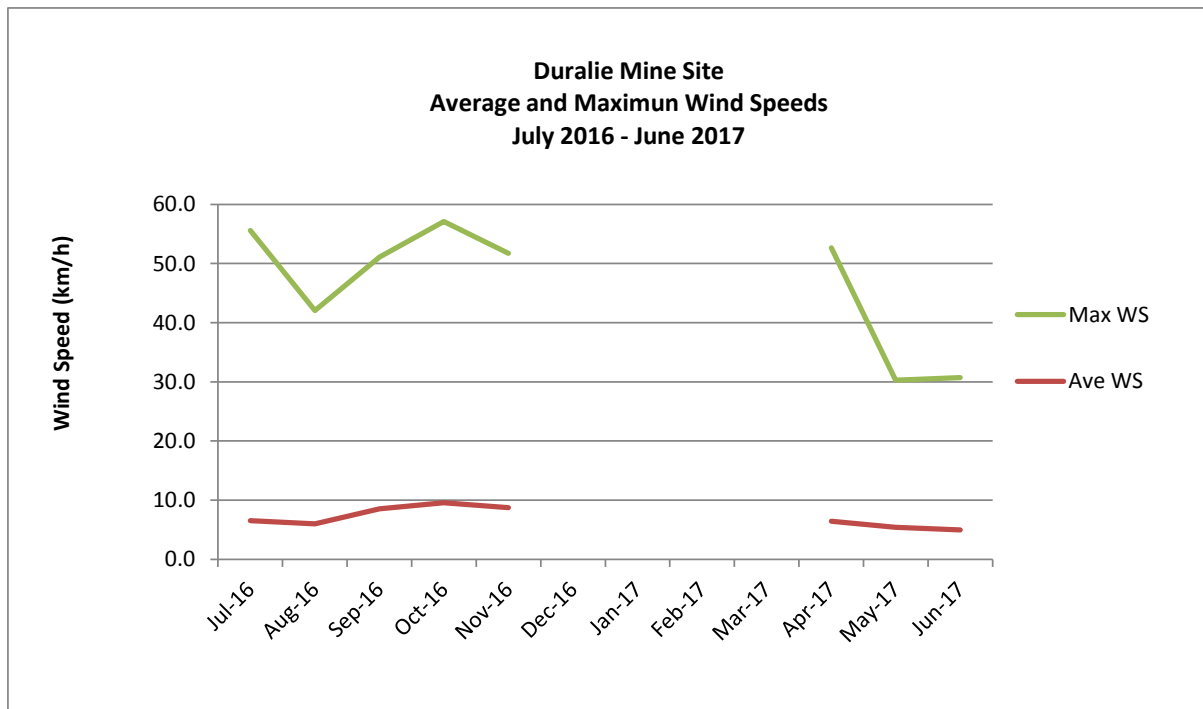


Figure 2-2: Minimum, Maximum and Average Evaporation Rates During the Reporting Period



Note: No wind data December 2016 to March 2017 due to lightning damage to wind sensor

Figure 2-3: Maximum and Average Wind Speeds During the Reporting Period

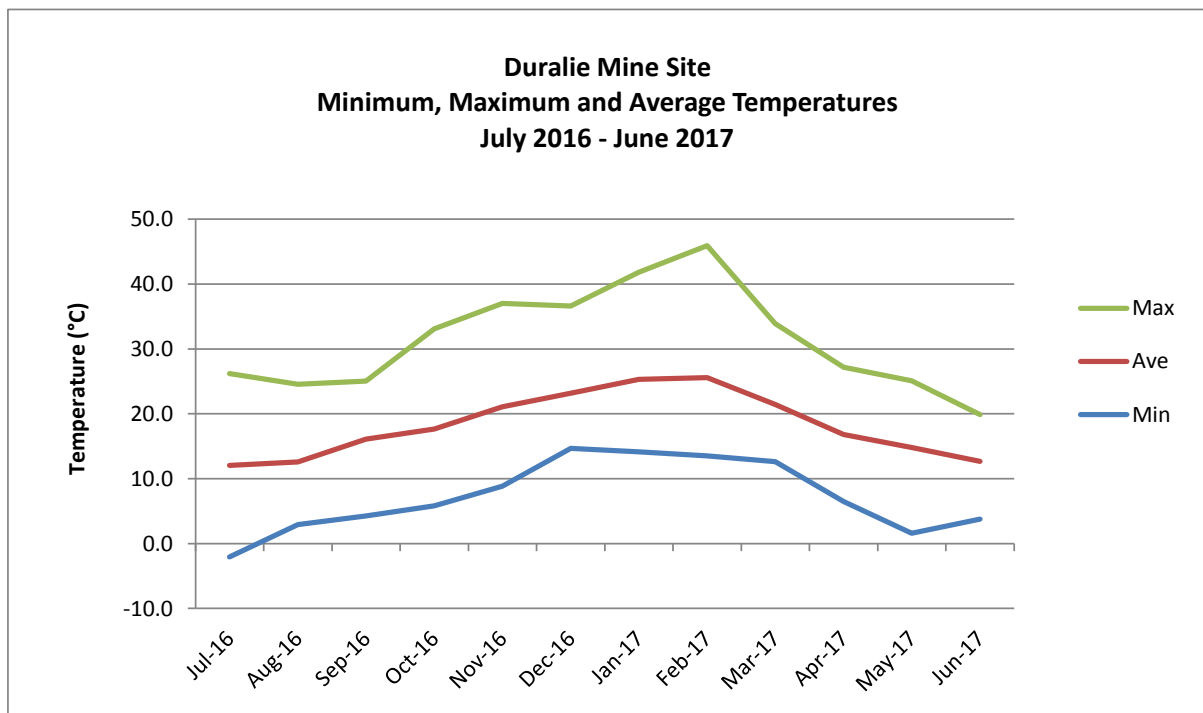
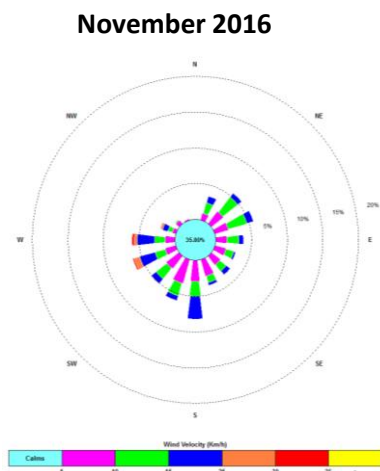
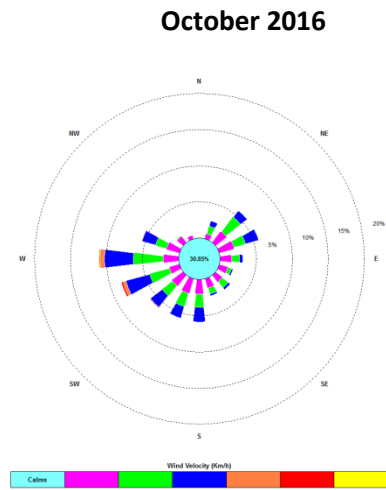
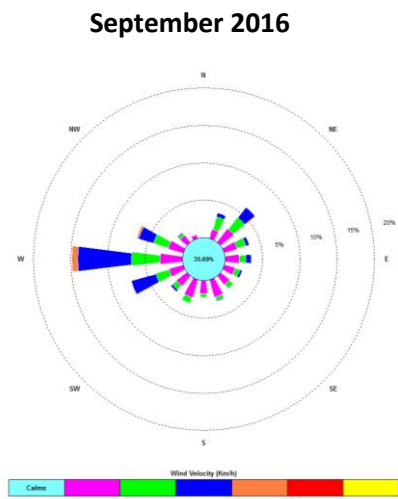
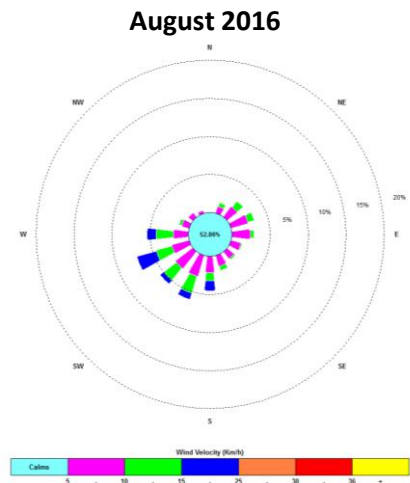
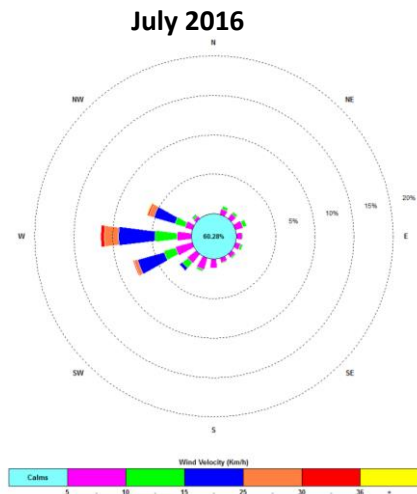


Figure 2-4: Minimum, Maximum and Average Temperatures During the Reporting Period



December 2016

No data – lightning damage

Figure 2-5: Monthly Windroses showing wind direction, speed and frequencies

January 2017

February 2017

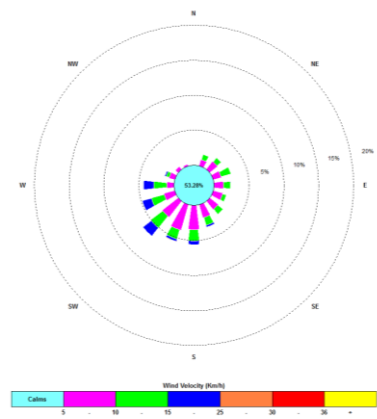
No data – lightning damage

No data – lightning damage

March 2017

April 2017

No data – lightning damage



May 2017

June 2017

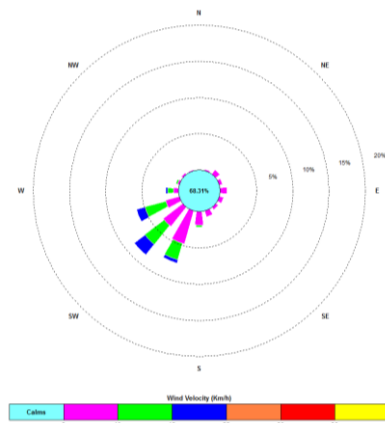
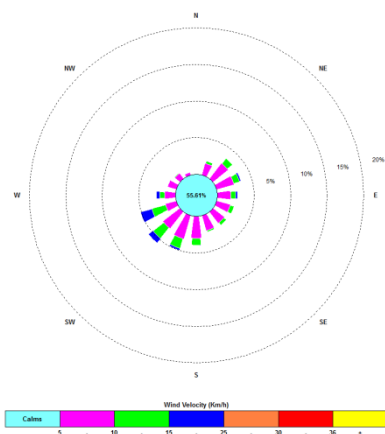


Figure 2-5 (continued): Monthly Windroses showing wind direction, speed and frequencies

Appendix 3:

Air Quality Monitoring Results

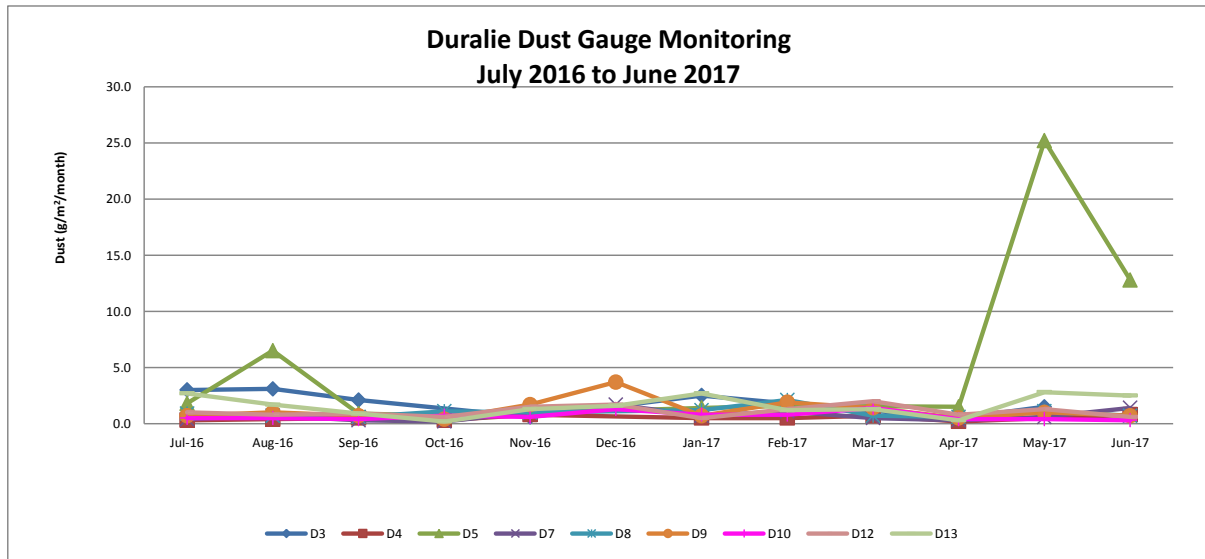


Figure 3-1: Monthly Depositional Dust Monitoring Results (minus contaminated results) during the Reporting Period

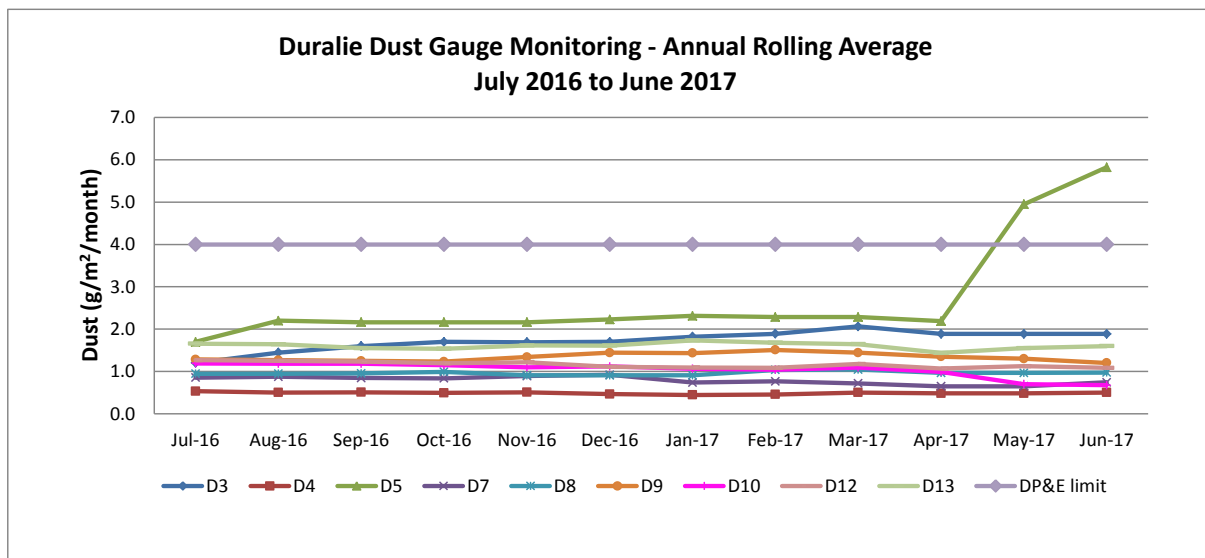


Figure 3-2: Rolling Annual Average Depositional Dust Monitoring Results (minus contaminated results) during the Reporting Period

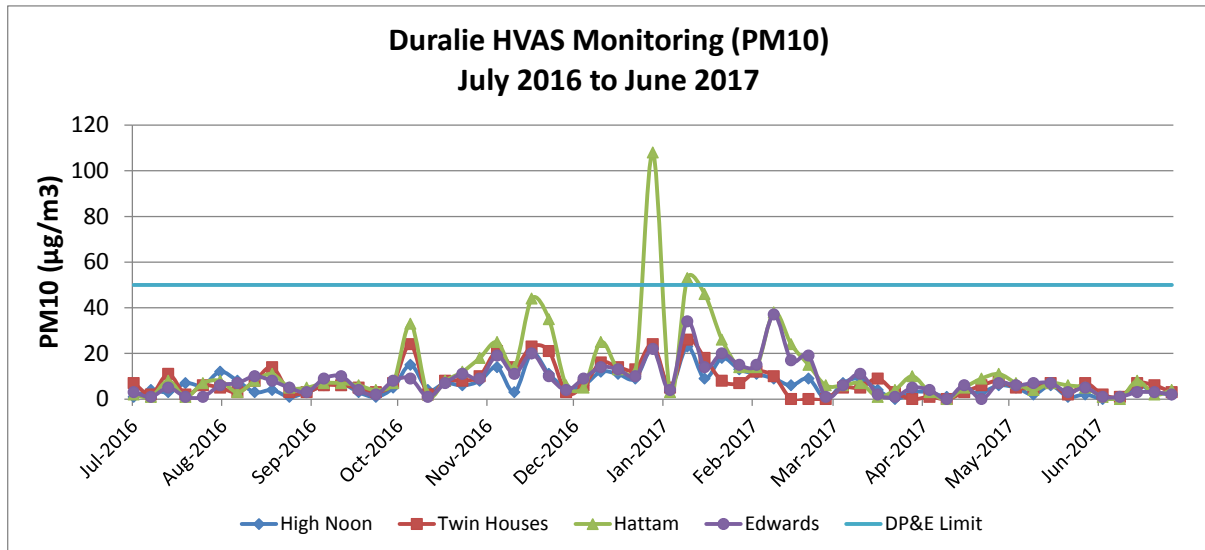


Figure 3-3: High Volume Air Sampling (PM₁₀) Results during the Reporting Period

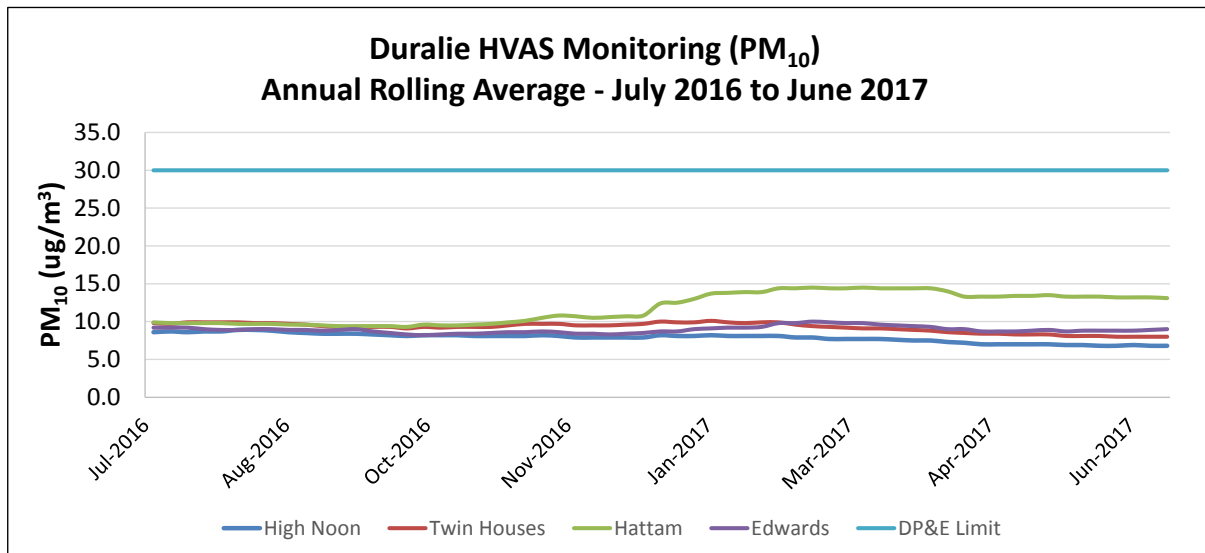


Figure 3-4: Rolling Annual Average HVAS (PM₁₀) Results during the Reporting Period

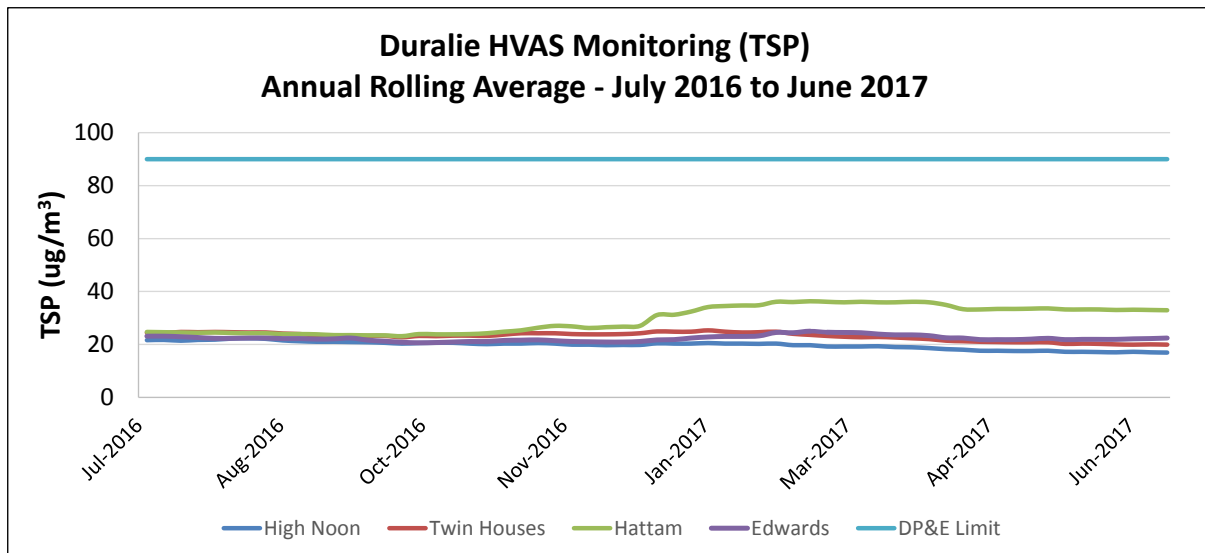


Figure 3-5: Rolling Annual Average HVAS (TSP) Results during the Reporting Period

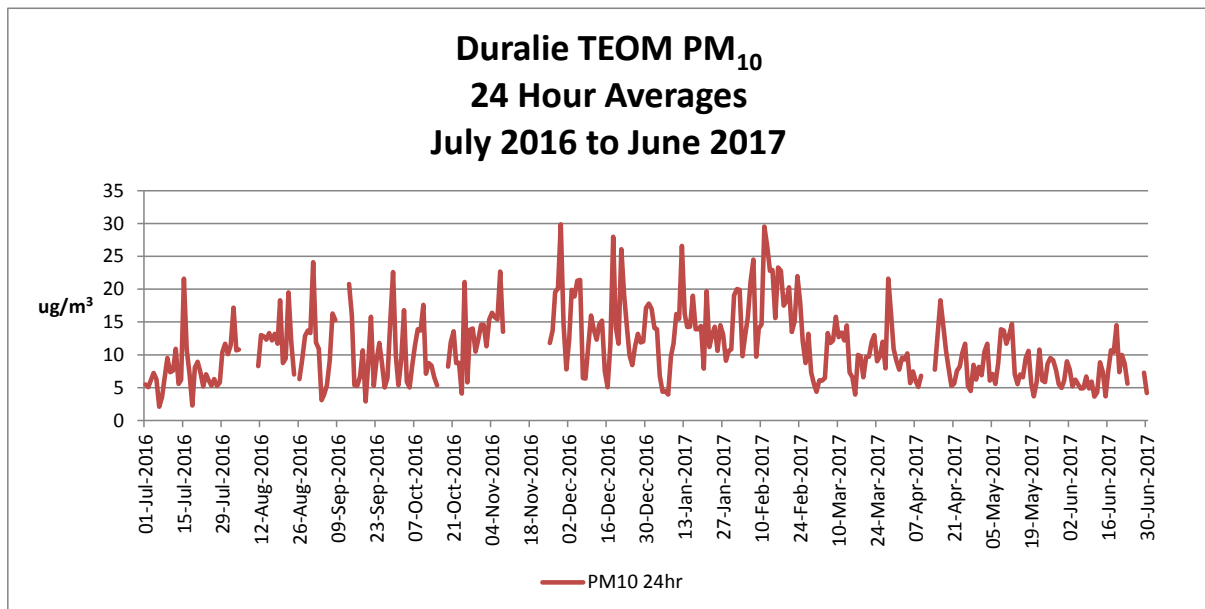


Figure 3-6: Real Time Dust Monitoring (PM₁₀) Results during the Reporting Period

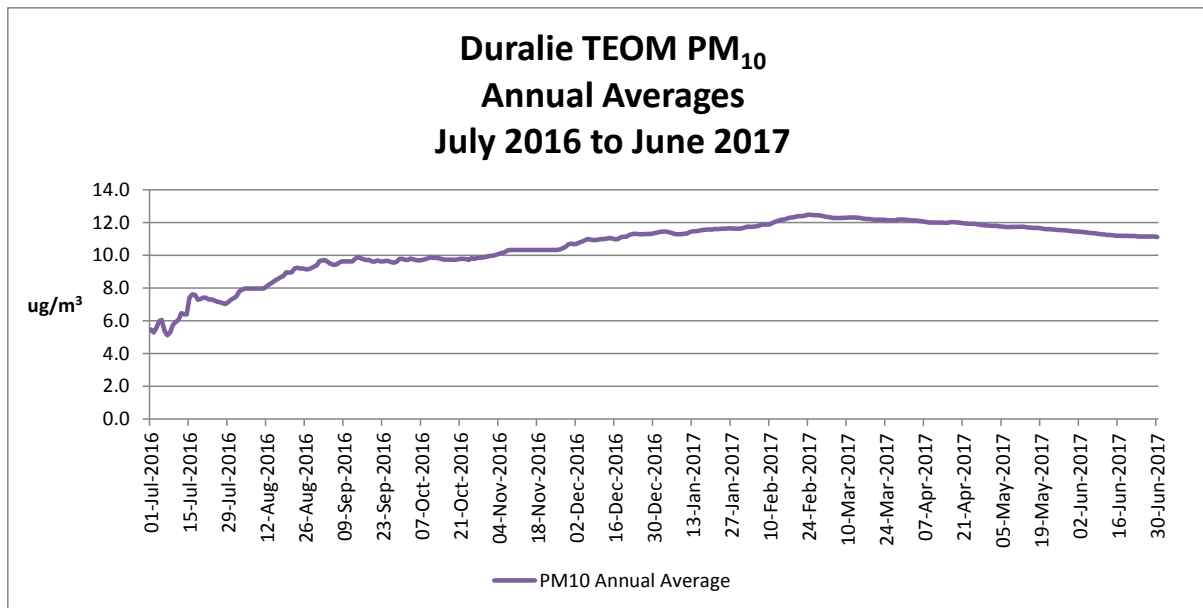


Figure 3-7: Rolling Annual Average TEOM (PM₁₀) Results during the Reporting Period

Real Time Dust Monitoring (PM₁₀) Results during the Reporting Period

	PM10 24hr	PM10 Annual Average		PM10 24hr	PM10 Annual Average		PM10 24hr	PM10 Annual Average		PM10 24hr	PM10 Annual Average		PM10 24hr	PM10 Annual Average		PM10 24hr	PM10 Annual Average
1/07/2016	5.5	5.5	1/09/2016	11.9	9.7	1/11/2016	14.6	10.0	1/01/2017	17.0	11.4	1/03/2017	5.5	12.4	1/05/2017	6.9	11.8
2/07/2016	5.1	5.3	2/09/2016	10.9	9.7	2/11/2016	11.3	10.0	2/01/2017	14.1	11.4	2/03/2017	4.4	12.4	2/05/2017	10.5	11.8
3/07/2016	6.1	5.6	3/09/2016	3.1	9.6	3/11/2016	15.4	10.0	3/01/2017	13.9	11.5	3/03/2017	6.1	12.3	3/05/2017	11.7	11.8
4/07/2016	7.2	6.0	4/09/2016	3.9	9.5	4/11/2016	16.4	10.1	4/01/2017	6.8	11.4	4/03/2017	6.1	12.3	4/05/2017	6.1	11.8
5/07/2016	6.3	6.0	5/09/2016	5.4	9.4	5/11/2016	15.7	10.1	5/01/2017	4.4	11.4	5/03/2017	6.5	12.3	5/05/2017	7.1	11.8
6/07/2016	2.1	5.4	6/09/2016	9.1	9.4	6/11/2016	15.4	10.2	6/01/2017	4.5	11.3	6/03/2017	13.3	12.3	6/05/2017	5.6	11.7
7/07/2016	3.6	5.1	7/09/2016	16.3	9.5	7/11/2016	22.7	10.3	7/01/2017	3.9	11.3	7/03/2017	11.8	12.3	7/05/2017	8.7	11.7
8/07/2016	6.4	5.3	8/09/2016	15.3	9.6	8/11/2016	13.5	10.3	8/01/2017	9.8	11.3	8/03/2017	12.2	12.3	8/05/2017	13.9	11.7
9/07/2016	9.5	5.8	9/09/2016	no data	9.6	9/11/2016	no data	10.3	9/01/2017	11.7	11.3	9/03/2017	15.8	12.3	9/05/2017	13.7	11.7
10/07/2016	7.4	5.9	10/09/2016	9.6	9.6	10/11/2016	no data	10.3	10/01/2017	16.2	11.3	10/03/2017	12.7	12.3	10/05/2017	11.7	11.7
11/07/2016	7.6	6.1	11/09/2016	no data	9.6	11/11/2016	no data	10.3	11/01/2017	15.5	11.3	11/03/2017	13.4	12.3	11/05/2017	13.0	11.7
12/07/2016	10.9	6.5	12/09/2016	no data	9.6	12/11/2016	no data	10.3	12/01/2017	26.6	11.4	12/03/2017	12.2	12.3	12/05/2017	14.7	11.8
13/07/2016	5.6	6.4	13/09/2016	20.8	9.8	13/11/2016	no data	10.3	13/01/2017	16.2	11.5	13/03/2017	14.5	12.3	13/05/2017	7.1	11.7
14/07/2016	6.2	6.4	14/09/2016	16.0	9.9	14/11/2016	no data	10.3	14/01/2017	14.2	11.5	14/03/2017	7.3	12.3	14/05/2017	5.5	11.7
15/07/2016	21.6	7.4	15/09/2016	5.4	9.8	15/11/2016	no data	10.3	15/01/2017	14.3	11.5	15/03/2017	6.6	12.3	15/05/2017	7.0	11.7
16/07/2016	10.8	7.6	16/09/2016	5.3	9.8	16/11/2016	no data	10.3	16/01/2017	19.0	11.5	16/03/2017	3.9	12.3	16/05/2017	6.6	11.7
17/07/2016	7.1	7.6	17/09/2016	6.7	9.7	17/11/2016	no data	10.3	17/01/2017	13.9	11.5	17/03/2017	10.0	12.2	17/05/2017	9.5	11.7
18/07/2016	2.3	7.3	18/09/2016	10.7	9.7	18/11/2016	no data	10.3	18/01/2017	13.9	11.6	18/03/2017	9.8	12.2	18/05/2017	10.6	11.7
19/07/2016	8.1	7.3	19/09/2016	2.9	9.6	19/11/2016	no data	10.3	19/01/2017	14.4	11.6	19/03/2017	6.6	12.2	19/05/2017	5.6	11.6
20/07/2016	8.9	7.4	20/09/2016	8.4	9.6	20/11/2016	no data	10.3	20/01/2017	7.9	11.6	20/03/2017	9.7	12.2	20/05/2017	3.7	11.6
21/07/2016	7.3	7.4	21/09/2016	15.8	9.7	21/11/2016	no data	10.3	21/01/2017	19.7	11.6	21/03/2017	9.7	12.2	21/05/2017	5.9	11.6
22/07/2016	5.2	7.3	22/09/2016	5.3	9.6	22/11/2016	no data	10.3	22/01/2017	11.2	11.6	22/03/2017	12.0	12.2	22/05/2017	10.8	11.6
23/07/2016	7.0	7.3	23/09/2016	9.1	9.6	23/11/2016	no data	10.3	23/01/2017	13.1	11.6	23/03/2017	13.0	12.2	23/05/2017	6.1	11.6
24/07/2016	6.2	7.2	24/09/2016	11.8	9.7	24/11/2016	no data	10.3	24/01/2017	14.3	11.6	24/03/2017	9.0	12.2	24/05/2017	5.9	11.6
25/07/2016	5.3	7.2	25/09/2016	8.8	9.6	25/11/2016	11.8	10.3	25/01/2017	10.6	11.6	25/03/2017	9.8	12.1	25/05/2017	8.6	11.5
26/07/2016	6.3	7.1	26/09/2016	5.1	9.6	26/11/2016	13.7	10.4	26/01/2017	14.5	11.6	26/03/2017	12.0	12.1	26/05/2017	9.5	11.5
27/07/2016	5.3	7.1	27/09/2016	6.5	9.5	27/11/2016	19.6	10.4	27/01/2017	13.1	11.6	27/03/2017	7.9	12.1	27/05/2017	9.2	11.5
28/07/2016	5.8	7.0	28/09/2016	15.1	9.6	28/11/2016	20.1	10.5	28/01/2017	9.1	11.6	28/03/2017	21.6	12.2	28/05/2017	7.7	11.5
29/07/2016	10.4	7.1	29/09/2016	22.6	9.8	29/11/2016	29.9	10.7	29/01/2017	10.6	11.6	29/03/2017	16.7	12.2	29/05/2017	5.5	11.5
30/07/2016	11.7	7.3	30/09/2016	9.8	9.8	30/11/2016	14.6	10.7	30/01/2017	10.8	11.6	30/03/2017	10.9	12.2	30/05/2017	5.0	11.5
31/07/2016	10.1	7.4	1/10/2016	5.4	9.7	1/12/2016	7.8	10.7	31/01/2017	19.0	11.7	31/03/2017	9.1	12.2	31/05/2017	6.1	11.5
1/08/2016	11.5	7.5	2/10/2016	9.2	9.7	2/12/2016	12.3	10.7	1/02/2017	20.0	11.7	1/04/2017	7.7	12.1	1/06/2017	9.0	11.5
2/08/2016	17.2	7.8	3/10/2016	16.8	9.8	3/12/2016	19.9	10.8	2/02/2017	19.9	11.7	2/04/2017	9.6	12.1	2/06/2017	7.8	11.4
3/08/2016	10.7	7.9	4/10/2016	5.9	9.8	4/12/2016	18.9	10.8	3/02/2017	9.8	11.7	3/04/2017	9.3	12.1	3/06/2017	5.2	11.4
4/08/2016	10.8	8.0	5/10/2016	5.1	9.7	5/12/2016	21.3	10.9	4/02/2017	12.8	11.7	4/04/2017	10.2	12.1	4/06/2017	6.2	11.4
5/08/2016	no data	8.0	6/10/2016	8.3	9.7	6/12/2016	21.4	11.0	5/02/2017	15.7	11.8	5/04/2017	5.7	12.1	5/06/2017	5.6	11.4
6/08/2016	no data	8.0	7/10/2016	11.4	9.7	7/12/2016	6.5	11.0	6/02/2017	21.2	11.8	6/04/2017	7.5	12.1	6/06/2017	4.9	11.4
7/08/2016	no data	8.0	8/10/2016	13.9	9.8	8/12/2016	6.4	10.9	7/02/2017	24.5	11.9	7/04/2017	6.0	12.0	7/06/2017	4.9	11.3
8/08/2016	no data	8.0	9/10/2016	13.7	9.8	9/12/2016	11.3	10.9	8/02/2017	9.7	11.9	8/04/2017	5.1	12.0	8/06/2017	6.7	11.3
9/08/2016	no data	8.0	10/10/2016	17.6	9.9	10/12/2016	16.0	11.0	9/02/2017	14.0	11.9	9/04/2017	6.8	12.0	9/06/2017	4.9	11.3
10/08/2016	no data	8.0	11/10/2016	7.1	9.9	11/12/2016	13.8	11.0	10/02/2017	14.6	11.9	10/04/2017	no data	12.0	10/06/2017	5.9	11.3
11/08/2016	8.3	8.0	12/10/2016	8.7	9.8	12/12/2016	12.3	11.0	11/02/2017	29.5	12.0	11/04/2017	no data	12.0	11/06/2017	3.7	11.3
12/08/2016	13.0	8.1	13/10/2016	8.4	9.8	13/12/2016	14.6	11.0	12/02/2017	26.6	12.1	12/04/2017	no data	12.0	12/06/2017	4.3	11.2
13/08/2016	12.8	8.2	14/10/2016	6.6	9.8	14/12/2016	15.2	11.1	13/02/2017	22.8	12.1	13/04/2017	no data	12.0	13/06/2017	8.9	11.2
14/08/2016	12.3	8.3	15/10/2016	5.3	9.7	15/12/2016	7.5	11.0	14/02/2017	22.9	12.2	14/04/2017	7.7	12.0	14/06/2017	7.5	11.2
15/08/2016	13.3	8.5	16/10/2016	no data	9.7	16/12/2016	5.1	11.0	15/02/2017	15.6	12.2	15/04/2017	13.1	12.0	15/06/2017	3.7	11.2
16/08/2016	12.2	8.6	17/10/2016	no data	9.7	17/12/2016	11.6	11.0	16/02/2017	23.3	12.2	16/04/2017	18.3	12.0	16/06/2017	7.4	11.2
17/08/2016	13.2	8.7	18/10/2016	no data	9.7	18/12/2016	28.0	11.1	17/02/2017	22.8	12.3	17/04/2017	14.5	12.0	17/06/2017	10.7	11.2
18/08/2016	11.7	8.7	19/10/2016	8.2	9.7	19/12/2016	14.3	11.1	18/02/2017	17.5	12.3	18/04/2017	10.6	12.0	18/06/2017	10.4	11.2
19/08/2016	18.3	9.0	20/10/2016	12.0	9.8	20/12/2016	11.7	11.1	19/02/2017	18.2	12.3	19/04/2017	8.0	12.0	19/06/2017	14.5	11.2
20/08/2016	8.8	9.0	21/10/2016	13.6	9.8	21/12/2016	26.1	11.2	20/02/2017	20.3	12.4	20/04/2017	5.3	12.0	20/06/2017	7.4	11.2
21/08/2016	9.5	9.0	22/10/2016	8.7	9.8	22/12/2016	19.1	11.3	21/02/2017	13.5	12.4	21/04/2017	5.6	12.0	21/06/2017	10.0	11.2
22/08/2016	19.5	9.2	23/10/2016	8.8	9.8	23/12/2016	14.2	11.3	22/02/2017	15.1	12.4	22/04/2017	7.6	11.9	22/06/2017	8.7	11.2
23/08/2016	11.9	9.2	24/10/2016	4.1	9.7	24/12/2016	10.0	11.3	23/02/2017	22.0	12.4	23/04/2017	8.2	11.9	23/06/2017	5.6	11.2
24/08/2016	7.0	9.2	25/10/2016	21.1	9.8	25/12/2016	8.5	11.3	24/02/2017	17.9	12.5	24/04/2017	10.3	11.9	24/06/2017	no data	11.2
25/08/2016	no data	9.2	26/10/2016	5.8	9.8	26/12/2016	11.3	11.3	25/02/2017	12.0	12.5	25/04/2017	11.7	11.9	25/06/2017	no data	11.2
26/08/2016	6.3	9.1	27/10/2016	13.8	9.8	27/12/2016	13.2	11.3	26/02/2017	8.8	12.5	26/04/2017	5.3	11.9	26/06/2017	no data	11.2
27/08/2016	9.3	9.1	28/10/2016	14.0	9.9	28/12/2016	11.9	11.3	27/02/2017	13.2	12.5	27/04/2017	4.5	11.9	27/06/2017	no data	11.2
28/08/2016	12.9	9.2	29/10/2016	10.5	9.9	29/12/2016	12.0	11.3	28/02/2017	7.3	12.4	28/04/2017	8.5	11.8	28/06/2017	no data	11.2
29/08/2016	13.7	9.3	30/10/2016	12.4	9.9	30/12/2016	17.2	11.3				29/04/2017	6.2	11.8	29/06/2017	7.3	11.1
30/08/2016	13.3	9.4	31/10/2016	14.6	9.9	31/12/2016	17.8	11.4				30/04/2017	8.2	11.8	30/06/2017	4.2	11.1
31/08/2016	24.1	9.6															

No data - power outages

Appendix 4:

Surface Water and Groundwater Monitoring

Surface Water

SW2 - Coal Shaft Creek

EPL 11701 Point 30

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	DO %	TSS mg/l	Alkalinity (as CaCO ₃) mg/l	Acidity (as CaCO ₃) mg/l	SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	Cu mg/l
9-Jul-16	Discharge Event	Low flow	7.1	370	17	46	7	71	5	52	42	16	14	0.58	0.048	0.016	0.72	<0.001
21-Jul-16	Discharge	Mod flow	7.4	419	7		<5											
22-Jul-16	Discharge	Low flow	8.0	446	4.7		<5											
3-Aug-16	Discharge Event	High flow	8.1	430	14.7	49	12	82	3	57	40	21	18	0.47	0.048	0.016	0.68	0.001
4-Aug-16	Discharge	Mod flow	8.2	431	23.0		14											
5-Aug-16	Discharge	Steady flow, brown	7.4	196	34.9		8											
6-Aug-16	Discharge	Steady flow, lt brown	7.7	264	34.5		8											
7-Aug-16	Discharge	Steady flow, lt brown	7.2	243	35.3		<5											
28-Sep-16	Monthly	Low flow	8.2	460	4.1	47	<5	86	7	57	52	23	18	0.1	0.208	0.008	1.15	<0.001
27-Oct-16	Monthly	Low flow	7.4	509	49.0	40	14	112	9	42	60	24	21	0.05	0.364	0.008	1.22	<0.001
10-Nov-16	Discharge Event	Low flow	7.1	397	16.2	51	6	69	6	49	48	15	13	0.61	0.163	0.01	1.11	0.001
13-Nov-16	Discharge	Mod flow	7.1	470	31.9		14											
15-Nov-16	Discharge	Mod flow	6.9	484	27.8		12											
5-Dec-16	Ecotox	Trickle, clear	7.9	550	3.0		<5	112	8	56	62	20	19	0.07	0.565	<0.005	1.09	<0.001
29-Dec-16	Monthly	Trickle	7.2	585	8.9	2	<5	160	12	24	72	26	21	0.02	1.000	<0.005	0.42	<0.001
30-Jan-17	Monthly	Nil flow																
27-Feb-17	Monthly	Nil flow																
17-Mar-17	Discharge Event	Mod flow	6.9	561	14.0	37	11	24	5	156	44	27	19	0.61	0.073	0.027	0.6	0.001
18-Mar-17	Discharge	Very high, brown, turbid	6.1	96	56.0		8											
19-Mar-17	Discharge	High flow	7.5	506	35.0		16											
20-Mar-17	Discharge	Backed up from river	8.0	526	19.0		<5											
21-Mar-17	Discharge	Low flow	7.0	491	15.9		<5											
22-Mar-17	Discharge	Clear	6.8	470	17.5		5											
23-Mar-17	Discharge	Moderate flow, clear	8.0	401	17.0		12											
24-Mar-17	Discharge	Low flow, light brown	7.2	477	16.0		<1											
31-Mar-17	Discharge	Low flow, light brown	7.5	421	29.0		20											
4-Apr-17	Discharge	Low flow, clear	8.0	501	10.0		18											
5-Apr-17	Discharge	Low flow, light brown	7.0	471	13.0		8											
12-Apr-17	Discharge Event	brown	7.7	412	12.0	62	9	82	3	54	43	12	16	0.44	0.032	<0.005	0.77	<0.001
13-Apr-17	Discharge	Moderate flow, clear	7.1	459	10.0		16											
30-May-17	Monthly	Very low flow, Clear.	7.3	576	7.0	10	<5	129	7	37	73	20	19	0.01	0.633	<0.005	1.63	<0.001
9-Jun-17	Discharge Event	Moderate flow, Brown.	7.4	361	179.0	60	95	50	3	47	42	15	12	4.81	0.115	0.018	4.02	0.002
10-Jun-17	Discharge	Mod flow, light brown	7.4	340	36.0		8											
13-Jun-17	Discharge	Mod flow, light brown	7.5	496	25.0		4											
19-Jun-17	Discharge	Mod flow, brown	7.9	326	64.0		27											
20-Jun-17	Discharge	Discharge	7.9	535	20.0		8											
Min			6.1	96	3.0		4	24	3	24	40	12	12	0.01	0.032	0.008	0.42	0.001
Avg			7.4	432	26.7		15	89	6	57	53	20	17	0.71	0.295	0.015	1.22	0.001
Max			8.2	585	179.0		95	160	12	156	73	27	21	4.81	1.000	0.027	4.02	0.002
Var			0.2	11901	938.5		318	1428	8	###	151	24	10	1.92	0.099	0.000	0.98	0.000
SD			0.5	109	30.6		18	38	3	34	12	5	3	1.38	0.314	0.007	0.99	0.001
*Water Quality Trigger			7.1 - 7.9	544	119	85 - 110%	80							3.02		0.064		0.003

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000). "Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

SW2 RC - Coal Shaft Creek at Rail Siding Culvert (Entrance)

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	DO %	TDS mg/l	TSS mg/l	Hardness mg/l	Alkalinity CaCO ₃ mg/l	Acidity CaCO ₃ mg/l	SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	CO ₃ CaCO ₃ mg/l	Bicarb (as CaCO ₃) mg/l	BOD mg/l	Na mg/l
9-Jul-16	Discharge Event	Low flow	8.0	507	152	40	262	45	130	72	2	111	43	24	17	3.62	0.028	0.032	1.95	<1	72	<2	44
3-Aug-16	Discharge Event	High flow	8.1	459	14	42	237	10	129	82	2	59	44	22	18	0.4	0.052	0.012	0.64	<1	82	<2	46
28-Sep-16	Monthly	Low flow	7.3	490	4.2	47	254	<5	129	82	2	65	46	22	18	0.12	0.025	0.012	0.23	<1	82	<2	44
27-Oct-16	Monthly	Low flow	8.0	490	2.4	46	254	<5	150	107	3	43	54	24	22	0.07	0.026	0.019	0.23	<1	107	<2	59
10-Nov-16	Discharge Event	Low flow	7.9	420	161	59	217	61	126	68	3	81	43	24	16	4.85	0.094	0.043	4.2	<1	68	<2	44
29-Dec-16	Monthly	Dry																					
30-Jan-17	Monthly	Dry																					
27-Feb-17	Monthly	Dry																					
17-Mar-17	Discharge Event	Mod flow	7.1	762	6	40	399	9	224	21	3	242	64	42	29	0.35	0.016	0.043	0.37	<1	21	<2	76
12-Apr-17	Discharge Event	Low flow	7.7	504	11	64	261	<5	126	86	2	75	46	16	21	0.26	0.008	0.007	0.3	<1	86	<2	56
30-May-17	Monthly	Very low flow, Clear.	8.2	564	6	76	292	11	146	111	2	57	62	22	22	0.05	0.041	0.007	1.63	<1	111	<2	60
9-Jun-17	Discharge Event	Mod flow, light brown	7.5	689	114	52	358	76	189	28	2	202	43	36	24	3.27	0.032	0.034	2.45	<1	28	<2	71
Min			7.1	420	2.4	40.0	217	9	126	21	2	43	43	16	16	0.05	0.008	0.007	0.23	<1	21	<2	44
Avg			7.8	543	52.3	51.8	282	35	150	73	2	104	49	26	21	1.44	0.036	0.023	1.33	<1	73	3	56
Max			8.2	762	161.0	76.0	399	76	224	111	3	242	64	42	29	4.85	0.094	0.043	4.20	<1	111	0	76
Var			0.1	12542	4728.3	152.2	3528	867	1181	961	0	4843	71	64	17	3.62	0.001	0.000	1.86		961		148
SD			0.4	112	68.8	12.3	59	29	34	31	1	70	8	8	4	1.90	0.025	0.015	1.36		31		12
*Water Quality Trigger			7.1 - 7.9	544	119	85 - 110%		80								3.02		0.064					

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000). "Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

SW2 RC - Coal Shaft Creek at Rail Siding Culvert (Entrance)

Date	As mg/l	Ba mg/l	Cd mg/l	Cr mg/l	Cu mg/l	Pb mg/l	Mo mg/l	Ni mg/l	Se mg/l	Ag mg/l	U mg/l	B mg/l	Hg mg/l	F mg/l	NH3 (as N) mg/l	NO2 (as N) mg/l	NO3 (as N) mg/l	N mg/l	P mg/l
9-Jul-16	<0.001	0.047	<0.0001	0.001	0.002	0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.05	0.4	<0.01
3-Aug-16	<0.001	0.018	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.02	0.6	0.02
28-Sep-16	<0.001	0.023	<0.0001	<0.001	<0.001	<0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	<0.01	0.5	<0.01
27-Oct-06	<0.001	0.021	<0.0001	<0.001	0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	<0.01	0.6	0.02
10-Nov-16	<0.001	0.054	<0.0001	0.002	0.003	0.002	<0.001	0.003	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.08	0.7	0.03
17-Mar-17	<0.001	0.058	<0.0001	<0.001	0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.11	0.4	<0.01
12-Apr-17	<0.001	0.021	<0.0001	<0.001	<0.001	<0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.07	0.5	<0.01
30-May-17	<0.001	0.018	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.03	0.3	<0.01
9-Jun-17	<0.001	0.052	<0.0001	0.001	0.002	<0.001	<0.001	0.003	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.1	0.7	0.02
Min	<0.001	0.018		<0.001	<0.001	<0.001		<0.001						<0.1	<0.01		<0.01	0.3	<0.01
Avg		0.035		0.001	0.002	0.002		0.002							0.03			0.07	0.5
Max	0.003	0.058		0.002	0.003	0.002		0.003						0.1	0.03		0.11	0.7	0.03
Var		0.000		0.000	0.000	0.000		0.000							0.00		0.00	0.0	0.00
SD		0.017		0.001	0.001	0.001		0.001							0.01		0.03	0.1	0.01
*Water Quality Trigger					0.003										0.05			1.2	0.08

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

"Gilberts & Associstes 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

SW6

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	DO %	TSS mg/l	Alkalinity (as CaCO ₃) mg/l	Acidity (as CaCO ₃) mg/l	SO4 mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	Cu mg/l
9-Jul-16	Discharge Event	Nil flow																
3-Aug-16	Discharge Event	Mod flow	7.4	476	46	50	12	35	3	110	41	22	15	1.52	0.015	0.007	1.46	0.002
28-Sep-16	Monthly	No flow																
27-Oct-16	Monthly	Nil flow																
10-Nov-16	Discharge Event	Very Low flow	7.0	804	44	50	104	36	8	288	55	45	32	1.04	0.034	0.009	0.89	0.002
29-Dec-16	Monthly	Dry																
30-Jan-17	Monthly	Dry																
27-Feb-17	Monthly	Dry																
17-Mar-17	Discharge Event	Low flow	6.5	611	26	32	22	47	22	166	38	31	21	1.33	0.123	0.021	1.14	0.002
12-Apr-17	Discharge Event	Low flow	7.4	760	51	79	76	65	4	187	54	32	25	1.31	0.028	<0.005	1.32	<0.001
30-May-17	Monthly	Dry																
9-Jun-17	Discharge Event	Low flow	7.2	914	74	62	12	118	5	1200	219	240	101	0.02	0.632	<0.005	0.12	<0.001
Min			6.5	476	26	32	12	35	3	110	38	22	15	0.02	0.015	0.007	0.12	0.002
Avg			7.1	713	48	55	45	60	8	390	81	74	39	1.04	0.166	0.012	0.99	0.002
Max			7.4	914	74	79	104	118	22	1200	219	240	101	1.52	0.632	0.021	1.46	0.002
Var			0.1	29366	297	301	1787	1190	61	209072	5974	8679	1247	0.36	0.070	0.000	0.28	0.000
SD			0.4	171	17	17	42	34	8	457	77	93	35	0.60	0.264	0.008	0.53	0.000
*Water Quality Trigger			7.1 - 7.9	544	119	85 - 110%	80								3.02	0.064		0.003

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

"Gilberts & Associstes 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

SW9 - Un-named Tributary (Fisher-Webster)

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	DO %	TDS mg/l	TSS mg/l	Hardness mg/l	Alkalinity (as CaCO ₃) mg/l	Acidity (as CaCO ₃) mg/l	SO4 mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	CO3 (as CaCO ₃) mg/l	Bicarb (as CaCO ₃) mg/l	BOD mg/l	Na mg/l
9-Jul-16	Discharge Event	Low flow	7.0	233	44	39	1915	18	31	21	6	5	43	6	4	0.67	0.043	0.014	1.5	<1	21	<2	23
21-Jul-16	Non routine	Low flow	7.9	204	43.1			21															
3-Aug-16	Discharge Event	High flow	6.9	140	60	49	71	130	22	11	6	18	28	4	3	1.4	0.045	0.013	1.65	<1	11	5	15
28-Sep-16	Monthly	Pooled/ Nil flow																					
27-Oct-16	Monthly	Dry/No flow																					
10-Nov-16	Discharge Event	Dry/No flow																					
29-Dec-16	Monthly	Dry/No flow																					
30-Jan-17	Monthly	Dry																					
27-Feb-17	Monthly	Dry																					
17-Mar-17	Discharge Event	Low flow	6.0	190	114	29	97	21	22	15	4	<1	22	4	3	1.03	0.028	<0.005	0.85	<1	15	<2	13
12-Apr-17	Discharge Event	Moderate flow	7.8	138	24	77	70	<5	29	27	<1	1	22	5	4	0.21	0.01	<0.005	0.4	<1	27	<2	17
30-May-17	Monthly	No flow, Pools																					
9-Jun-17	Discharge Event	No flow, Pools																					
Min			6.0	139	24	29	70	18	22	11	4	1	22	4	3	0.21	0.010	0.013	0.40		11	5	13
Avg			7.1	181	57	49	538	48	26	19	5	8	29	5	4	0.83	0.032	0.014	1.10		19	5	17
Max			7.9	233	114	77	1915	130	31	27	6	18	43	6	4	1.40	0.045	0.014	1.65		27	5	23
Var			0.6	1690	1177	428	842574	3027	22	49	1	79	98	1	0	0.26	0.000	0.000	0.34		49		19
SD			0.8	41	34	21	918	55	5	7	1	9	10	1	1	0.51	0.016	0.001	0.58		7		4
*Water Quality Trigger			6.4 - 7.1	461	94	85 - 110%	57									2.96	0.024						

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

"Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

SW9 - Un-named Tributary (Fisher-Webster)

Date	As	Ba	Cd	Cr	Cu	Pb	Mo	Ni	Se	Ag	U	B	Hg	F	NH3 (as N)	NO2 (as N)	NO3 (as N)	N	P
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
9-Jul-16	0.002	0.046	<0.0001	<0.001	0.003	<0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.33	1.9	0.52
21-Jul-16																			
3-Aug-16	0.001	0.042	<0.0001	<0.001	0.003	0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.06	<0.01	0.71	2.9	0.63
28-Sep-16																			
27-Oct-16																			
10-Nov-16																			
29-Dec-16																			
30-Jan-17																			
27-Feb-17																			
17-Mar-17	<0.001	0.023	<0.0001	<0.001	0.002	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.38	1.1	0.04
12-Apr-17	<0.001	0.014	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.07	0.3	0.02
30-May-17																			
9-Jun-17																			
Min	0.001	0.014		0.000	0.002	0.001		0.001						<0.1	0.01		0.07	0.3	0.02
Avg	0.002	0.031		#DIV/0!	0.003	0.001		0.002						0.02	0.02		0.37	1.6	0.30
Max	0.002	0.046		0.000	0.003	0.001		0.002						0.0	0.06		0.71	2.9	0.63
Var	0.000	0.000		#DIV/0!	0.000	#DIV/0!		0.000							0.00		0.07	1.2	0.10
SD	0.001	0.015		#DIV/0!	0.001	#DIV/0!		0.001							0.03		0.26	1.1	0.32
*Water Quality Trigger				0.002	0.0040										0.13			2.6	0.68

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

*Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

SW10 - Coal Shaft Creek (Holmes Upstream)

Date	Category	Comment	ph	EC	Turbidity	DO	TDS	TSS	Hardness	Alkalinity (as CaCO ₃)	Acidity (as CaCO ₃)	SO4	Cl	Ca	Mg	Al	Mn	Zn	Fe	CO3 (as CaCO ₃)	Bicarb (as CaCO ₃)	Na	BOD
				uS/cm	NTU	%	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
9-Jul-16	Discharge Event	Very low flow	7.0	79	69	47	40	17	21	6	8	<1	15	5	2	3.43	0.031	0.012	3.46	<1	6	8	<2
9-Aug-16	Discharge Event	Low flow	6.9	110	76	61	56	19	23	9	6	22	16	6	2	3.52	0.025	0.009	3.01	<1	9	14	3
28-Sep-16	Monthly	No flow																					
27-Oct-16	Monthly	No flow																					
10-Nov-16	Discharge Event	Low flow	6.9	101	140	52	51	19	16	7	8	16	14	3	2	7.98	0.122	0.015	4.89	<1	7	13	4
29-Dec-16	Monthly	Dry																					
30-Jan-17	Monthly	Dry																					
27-Feb-17	Monthly	Dry																					
17-Mar-17	Discharge Event	Low flow	5.9	319	24	41	164	16	87	7	32	100	28	25	6	2.24	0.181	0.018	2.51	<1	7	29	<2
12-Apr-17	Discharge Event	Low flow	6.1	96	159	69	49	36	26	23	3	2	12	4	4	6.88	0.077	0.017	7.07	<1	23	12	5
30-May-17	Monthly	No flow																					
9-Jun-17	Discharge Event	Moderate flow, light brown	7.8	61	117	59	31	24	18	10	4	2	8	4	2	6.88	0.032	0.023	6.15	<1	10	8	<2
Min			5.9	61	24	41	31	16	16	6	3	2	8	3	2	2.2	0.025	0.009	2.5		6	8	
Avg			7.3	128	98	55	65	22	32	10	10	28	16	8	3	5.2	0.078	0.016	4.5		10	14	
Max			8.1	319	159	69	164	36	87	23	32	100	28	25	6	8.0	0.181	0.023	7.1		23	29	
Var			0.7	9089	2529	103	2423	56	743	41	119	1679	46	72	3	5.6	0.004	0.000	3.3		41	60	
SD			0.8	95	50	10	49	7	27	6	11	41	7	8	2	2.4	0.063	0.005	1.8		6	8	
*Water Quality Trigger			7.1 - 7.9	544	119	85 - 110%		80								3.02		0.064					

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SW16 - Coal Shaft Creek (Holmes Upstream)

Date	As	Ba	Cd	Cr	Cu	Pb	Mo	Ni	Se	Ag	U	B	Hg	F	NH3 (as N)	NO2 (as N)	NO3 (as N)	N	P
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
9-Jul-16	<0.001	0.013	<0.0001	0.003	0.006	<0.001	<0.001	0.003	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.02	0.9	0.04
3-Aug-16	<0.001	0.019	<0.0001	0.002	0.003	<0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	<0.01	1.2	0.09
28-Sep-16																			
27-Oct-16																			
10-Nov-16	0.001	0.04	<0.0001	0.004	0.005	0.003	<0.001	0.003	<0.01	<0.001	<0.001	0.06	<0.0001	<0.1	0.04	<0.01	0.03	3	0.21
29-Dec-16																			
30-Jan-17																			
27-Feb-17																			
17-Mar-17	<0.001	0.04	<0.0001	0.002	0.011	<0.001	<0.001	0.007	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.03	1.7	0.11
12-Apr-17	<0.001	0.028	<0.0001	0.004	0.006	<0.001	<0.001	0.004	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.04	<0.01	<0.01	1.7	0.14
30-May-17																			
9-Jun-17	<0.001	0.015	<0.0001	0.004	0.006	<0.001	<0.001	0.006	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.02	1.9	0.11
		0.013		<0.001	0.003			0.002							0.020		0.020	0.900	0.040
		0.026		0.003	0.006			0.004							0.030		0.025	1.733	0.117
		0.040		0.004	0.011			0.007							0.040		0.030	3.000	0.210
		0.000		0.000	0.000			0.000							0.000		0.000	0.523	0.003
		0.012		0.001	0.003			0.002							0.012		0.006	0.723	0.056
*Water Quality Trigger					0.003										0.05			1.2	0.08

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

*Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

Date	Category	Comment	pH	EC uS/cm	Turbidity NTU	DO %	TDS mg/l	TSS mg/l	Hardness mg/l	Alkalinity (as CaCO ₃) mg/l	Acidity (as CaCO ₃) mg/l	SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	CO ₃ (as CaCO ₃) mg/l	Bicarb (as CaCO ₃) mg/l	BOD mg/l	Na mg/l
9-Jul-16	Discharge Event	Low flow	7.22	241	24	63	123	16	47	40	4	9	45	9	6	0.89	0.039	0.007	1.23	<1	40	<2	27
21-Jul-16	Discharge	Mod flow	7.96	264	34			27															
22-Jul-16	Discharge	Mod flow	7.97	213	17			7															
3-Aug-16	Discharge Event	High flow	7.42	146	126	57	74	126	25	20	4	3	29	5	3	2.77	0.129	0.014	3.02	<1	20	2	18
4-Aug-16	Discharge	High flow	7.94	110	65			14															
5-Aug-16	Discharge	Steady flow, brown	6.84	103	47																		
6-Aug-16	Discharge	Steady flow, lt brown	6.69	127	42			<5															
7-Aug-16	Discharge	Steady flow, lt brown	7.22	108	37			<5															
28-Sep-16	Monthly	Low flow	7.38	334	2	51	172	<5	68	63	4	8	50	14	8	0.12	0.033	<0.005	0.72	<1	63	3	34
27-Oct-16	Monthly	Low flow	7.62	370	1	54	190	<5	97	88	5	5	61	19	12	0.06	0.079	<0.005	0.81	<1	88	<2	50
10-Nov-16	Discharge Event	Low flow	7.59	230	5	66	117	8	81	82	6	4	64	16	10	0.15	0.232	<0.005	0.85	<1	82	<2	43
13-Nov-16	Discharge	Mod flow	7.27	334	9			7															
15-Nov-16	Discharge	Low flow	6.83	367	11			6															
5-Dec-16	Ecotox	Low flow, clear	8.5	385	1		198	<5	79	76	6	2	59	15	10	0.18	0.609	<0.005	1.23	<1	76	4	43
29-Dec-16	Monthly	Trickle clear	7.18	377	5	2	194	<5	89	91	8	<1	57	19	10	0.05	1.820	<0.005	2.03	<1	91	3	42
30-Jan-17	Monthly	Very low clear	7.26	370	15	14	190	6	86	96	6	<1	61	18	10	0.24	1.520	<0.005	3.47	<1	96	<2	43
27-Feb-17	Monthly	Low flow	7.36	329	9	29	169	<5	77	77	6	<1	49	16	9	0.06	0.919	<0.005	3.59	<1	77	2	40
17-Mar-17	Discharge Event	High flow	6.74	151	30	64	77	19	25	14	5	10	33	5	3	1.14	0.034	<0.005	0.94	<1	14	<2	19
18-Mar-17	Discharge	high flow, brown, ts	6.73	109	79			78															
19-Mar-17	Discharge	High flow	6.67	104	33			29															
20-Mar-17	Discharge	Very high flow	7.9	115	24			7															
21-Mar-17	Discharge	High flow, clear	6.52	158	9			8															
22-Mar-17	Discharge	Clear	7.13	164	14			<5															
23-Mar-17	Discharge	Moderate flow, clear	6.54	191	9			7															
24-Mar-17	Discharge	Low flow, clear	6.41	175	7			<1															
31-Mar-17	Discharge	erate flow, light brn	7.47	163	29			39															
4-Apr-17	Discharge	Low flow, clear	7.79	159	8			7															
5-Apr-17	Discharge	ow flow, light brown	7.16	164	12			8															
12-Apr-17	Discharge Event	Moderate flow, clear	7.42	179	13	84	91	8	31	24	4	5	35	6	4	0.51	0.028	<0.005	1.02	<1	24	<2	26
13-Apr-17	Discharge	Moderate flow, clear	7.3	191	7			9															
30-May-17	Monthly	Moderate flow, clear	7.57	315	3	56	162	<5	68	55	2	7	55	14	8	0.08	0.047	<0.005	0.94	<1	55	3	38
9-Jun-17	Discharge Event	Mod flow, light brown	7.59	216	46	71	110	30	47	35	2	5	36	9	6	1.73	0.047	<0.005	1.94	<1	35	<2	27
10-Jun-17	Discharge	Mod flow, light brown	7.6	229	40			14															
13-Jun-17	Discharge	Mod flow, light brown	7.8	190	29			13															
19-Jun-17	Discharge	igh flow, light brown	6.89	194	42			15															
20-Jun-17	Discharge	Mod flow, light brown	7.99	154	30			12															
Min			6.4	103	1	2	74	6	25	14	2	2	29	5	3	0.05	0.028	0.007	0.72		14	<2	18
Avg			7.3	215	25	51	144	21	63	59	5	6	49	13	8	0.61	0.426	0.011	1.68		59		35
Max			8.5	385	126	84	198	126	97	96	8	10	64	19	12	2.77	1.820	0.014	3.59		96	4	50
Var			0.2	8269	644	577	2159	695	634	843	3	7	146	27	9	0.68	0.381	0.000	1.10		843		104
SD			0.5	91	25	24	46	26	25	29	2	3	12	5	3	0.83	0.617	0.005	1.05		29		10
*Water Quality Trigger			7.1 - 7.6	370	24	85 - 110%	15									1.24	0.011						

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GB1 - Mammy Johnsons River

Date	As mg/l	Ba mg/l	Cd mg/l	Cr mg/l	Cu mg/l	Pb mg/l	Mo mg/l	Ni mg/l	Se mg/l	Ag mg/l	U mg/l	B mg/l	Hg mg/l	F mg/l	NH3 (as N) mg/l	NO2 (as N) mg/l	NO3 (as N) mg/l	N mg/l	P mg/l
9-Jul-16	<0.001	0.04	0.0001	<0.001	0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.09	0.4	0.11
21-Jul-16																			
22-Jul-16																			
3-Aug-16	0.001	0.06	<0.0001	0.001	0.003	0.002	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.06	<0.01	0.19	1.7	0.25
4-Aug-16																			
5-Aug-16																			
6-Aug-16																			
7-Aug-16																			
28-Sep-16	<0.001	0.04	<0.0001	<0.001	<0.001	<0.001	<0.001	0.004	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.02	0.4	0.02
27-Oct-16	<0.001	0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.06	<0.01	0.01	2	0.04
10-Nov-16	<0.001	0.06	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.02	0.5	0.05
13-Nov-16																			
15-Nov-16																			
5-Dec-16	0.001	0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.07	0.9	0.10
29-Dec-16	0.002	0.08	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.12	<0.01	<0.01	0.8	0.12
30-Jan-17	0.003	0.10	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.12	<0.01	0.06	1	0.18
27-Feb-17	0.003	0.07	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.26	<0.01	0.04	0.8	0.20
17-Mar-17	<0.001	0.04	<0.0001	<0.001	0.002	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.43	1.1	0.04
18-Mar-17																			
19-Mar-17																			
20-Mar-17																			
21-Mar-17																			
22-Mar-17																			
23-Mar-17																			
24-Mar-17																			
31-Mar-17																			
4-Apr-17																			
5-Apr-17																			
12-Apr-17	<0.001	0.03	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.06	0.7	0.06
13-Apr-17																			
30-May-17	<0.001	0.04	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.06	<0.01	0.06	0.4	0.02
9-Jun-17	<0.001	0.04	<0.0001	<0.001	<0.001	<0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.11	1	0.09
Min	0.001	0.030		<0.001	0.001	0.002		<0.001							0.020		0.01	0.4	0.02
Avg	0.002	0.054			0.002	0.002									0.079		0.10	0.9	0.10
Max	0.003	0.100		0.001	0.003	0.002		0.004							0.260		0.43	2.0	0.25
Var	0.000	0.000			0.000	#DIV/0!									0.005		0.01	0.2	0.01
SD	0.001	0.020			0.001	#DIV/0!									0.073		0.12	0.5	0.07
*Water Quality Trigger				0.001	0.0020										0.06			0.8	0.12

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	DO %	TDS mg/l	TSS mg/l	Hardness mg/l	Alkalinity (as CaCO ₃) mg/l	Acidity (as CaCO ₃) mg/l	SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	CO ₃ (as CaCO ₃) mg/l	Bicarb (as CaCO ₃) mg/l	BOD mg/l	Na mg/l
9-Jul-16	Discharge Event	Mod flow	7.16	260	22	59	133	14	50	49	4	11	44	10	6	0.91	0.045	0.008	1.33	<1	49	<2	29
21-Jul-16	Discharge	Mod flow	8.1	230	42			22															
22-Jul-16	Discharge	Low flow	8.16	249	20			8															
3-Aug-16	Discharge Event	High flow	7.62	153	110	59	78	90	25	16	4	7	28	5	3	2.46	0.092	0.015	2.45	<1	16	2	17
4-Aug-16	Discharge	High flow	8.12	112	42			26															
5-Aug-16	Discharge	Steady flow, brown	6.84	122	111			90															
6-Aug-16	Discharge	Steady flow, it brown	6.69	139	42			<5															
7-Aug-16	Discharge	Steady flow, it brown	7.09	131	40			<5															
28-Sep-16	Monthly	Low flow	7.4	329	2	49	169	<5	72	63	5	9	51	14	9	0.14	0.048	<0.005	0.82	<1	63	<2	35
27-Oct-16	Monthly	Low flow	7.56	371	2	55	191	<5	92	83	4	7	64	17	12	0.06	0.078	<0.005	0.63	<1	83	<2	51
10-Nov-16	Discharge Event	Low flow	7.14	371	6	69	191	6	76	75	4	7	59	14	10	0.25	0.095	<0.005	0.76	<1	75	<2	42
13-Nov-16	Discharge	Mod flow	7.51	319	21			18															
15-Nov-16	Discharge	Low flow	7.26	345	12			11															
28-Dec-16	Monthly	Slow flow	7.52	419	2	5	216	<5	97	81	4	7	68	19	12	0.03	0.139	<0.005	0.44	<1	81	4	51
30-Jan-17	Monthly	Low flow clear	7.41	460	2	39	238	<5	99	102	5	3	81	20	12	0.03	0.229	<0.005	0.64	<1	102	<2	62
27-Feb-17	Monthly	Low flow	7.7	440	4	42	227	<5	103	94	7	1	70	20	13	0.03	0.639	<0.005	1.58	<1	94	<2	54
17-Mar-17	Discharge Event	High flow	6.79	159	33	62	81	19	27	13	5	10	32	6	3	1.83	0.042	0.022	1.37	<1	13	<2	18
18-Mar-17	Discharge	Very high flow, brown, turb	6.77	121	114			86															
19-Mar-17	Discharge	High flow	6.91	116	34			34															
20-Mar-17	Discharge	Very high flow	7.9	120	24			8															
21-Mar-17	Discharge	Moderate flow, clear	6.77	148	11			<5															
22-Mar-17	Discharge	Clear	7.23	174	16			10															
23-Mar-17	Discharge	Moderate flow, clear	6.49	227	9			3															
24-Mar-17	Discharge	Low flow, light brown	6.46	191	7			2															
31-Mar-17	Discharge	Moderate flow, light brown	7.67	179	31			34															
4-Apr-17	Discharge	Low flow, clear	8.1	171	7			8															
5-Apr-17	Discharge	Low flow, light brown	7.29	160	10			6															
12-Apr-17	Discharge Event	Low flow, light brown	7.4	201	17	86	102	<5	36	29	2	8	37	6	5	0.79	0.035	<0.005	1.18	<1	29	3	28
13-Apr-17	Discharge	Moderate flow, light brown	7.26	196	9			14															
30-May-17	Monthly	Low flow clear	7.18	322	2	46	164	<5	72	57	3	8	56	14	9	0.08	0.072	<0.005	0.98	<1	57	<2	38
9-Jun-17	Discharge Event	Mod flow, brown	7.47	274	61	69	140	40	63	48	2	12	42	12	8	2.37	0.049	0.006	2.52	<1	48	<2	34
10-Jun-17	Discharge	Mod, light brown	7.51	296	49			17															
13-Jun-17	Discharge	Mod, light brown	7.67	201	26			12															
15-Jun-17	Discharge	Mod, light brown	6.96	206	47			30															
20-Jun-17	Discharge	Mod, light brown	8.13	162	29			9															
Mn			8.5	112	2	5	78	<5	25	13	<1	<1	28	5	3	0.03	0.035	<0.005	0.44		13		17
Avg			7.3	231	29	53	161	25	68	59	4	8	53	13	9	0.75	0.130	0.013	1.23		59		38
Max			8.2	460	114	86	238	90	103	102	7	12	81	20	13	2.46	0.639	0.022	2.52		102		62
Var			0.2	10043	912	404	3016	685	782	863	2	10	272	30	13	0.89	0.029	0.000	0.46		863		203
SD			0.5	100	30	20	55	26	28	29	1	3	16	5	4	0.95	0.169	0.007	0.68		29		14
*Water Quality Trigger			7.1 - 7.6	370	24	85 - 110%	15									1.24		0.011					

*Water Quality Trigger

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

*Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

Highnoon - Mammy Johnsons River

Date	As mg/l	Ba mg/l	Cd mg/l	Cr mg/l	Cu mg/l	Pb mg/l	Mo mg/l	Ni mg/l	Se mg/l	Ag mg/l	U mg/l	B mg/l	Hg mg/l	F mg/l	NH3 (as N) mg/l	NO2 (as N) mg/l	NO3 (as N) mg/l	N mg/l	P mg/l
9-Jul-16	<0.001	0.04	0.0002	<0.001	0.002	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.10	0.6	<0.01
21-Jul-16																			
22-Jul-16																			
3-Aug-16	<0.001	0.05	<0.0001	0.001	0.003	0.002	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.09	<0.01	0.29	1.8	0.29
4-Aug-16																			
5-Aug-16																			
6-Aug-16																			
7-Aug-16																			
28-Sep-16	<0.001	0.04	<0.0001	<0.001	<0.001	<0.001	<0.001	0.003	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.02	0.3	0.02
27-Oct-16	<0.001	0.04	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	<0.01	0.4	0.02
10-Nov-16	<0.001	0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	<0.01	0.07	0.03
13-Nov-16																			
15-Nov-16																			
29-Dec-16	0.001	0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.01	0.6	0.03
30-Jan-17	0.001	0.05	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.04	<0.01	0.03	0.6	0.04
27-Feb-17	0.002	0.13	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	<0.01	0.6	0.04
17-Mar-17	<0.001	0.05	<0.0001	<0.001	0.003	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.42	1.1	0.04
18-Mar-17																			
19-Mar-17																			
20-Mar-17																			
21-Mar-17																			
22-Mar-17																			
23-Mar-17																			
24-Mar-17																			
31-Mar-17																			
4-Apr-17																			
5-Apr-17																			
12-Apr-17	<0.001	0.03	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.07	0.6	0.04
13-Apr-17																			
30-May-17	<0.001	0.04	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.06	0.5	0.04
9-Jun-17	<0.001	0.04	<0.0001	0.002	0.001	<0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.10	0.8	0.05
Mn	<0.001	0.03		<0.001	<0.001	<0.001		<0.001							<0.01		0.0	0.3	<0.01
Avg	0.001	0.05													0.04		0.1	0.7	0.1
Max	0.002	0.13		0.002	0.003	0.002		0.003							0.09		0.4	1.8	0.3
Var	0.000	0.00													0.00		0.0	0.2	0.0
SD	0.001	0.03													0.03		0.1	0.4	0.1
*Water Quality Trigger				0.001	0.0020										0.06			0.8	0.15

Site 9 - Karuah River (Near Stroud Road Village)

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	DO %	TDS mg/l	TSS mg/l	Hardness mg/l	Alkalinity (as CaCO ₃) mg/l	Acidity (as CaCO ₃) mg/l	SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	CO ₃ (as CaCO ₃) mg/l	Bicarb (as CaCO ₃) mg/l	BOD mg/l	Na mg/l
9-Jul-16	Discharge Event	Mod flow	6.9	179	14	69	91	9	43	50	3	5	27	9	5	0.55	0.016	0.006	0.78	<1	50	<2	17
3-Aug-16	Discharge Event	High flow	7.9	161	109	54	82	124	34	32	4	2	26	7	4	3.40	0.149	0.015	3.60	<1	32	2	17
28-Sep-16	Monthly	Low flow	7.6	202	3	64	103	<5	27	48	3	4	30	11	6	0.12	0.009	<0.005	0.38	<1	48		20
27-Oct-16	Monthly	Low flow	7.7	194	3	67	99	<5	55	53	3	3	30	12	6	0.11	0.012	<0.005	0.36	<1	53	<2	22
10-Nov-16	Discharge Event	Mod flow	7.6	219	3	77	112	<5	54	54	4	3	33	10	7	0.13	0.033	<0.005	0.46	<1	54	<2	22
29-Dec-16	Monthly	Slow flow	7.6	258	2	5	132	7	73	64	4	2	37	16	8	0.02	0.068	<0.005	0.52	<1	64	<2	24
30-Jan-17	Monthly	Low flow clear	7.3	270	20	42	138	<5	70	74	4	<1	38	15	8	0.04	0.076	<0.005	0.56	<1	74	<2	25
27-Feb-17	Monthly	Low	7.1	293	2	50	150	<5	84	73	6	1	40	17	10	0.02	0.084	<0.005	0.52	<1	73	<2	28
17-Mar-17	Discharge Event	High flow	7.0	112	26	66	57	42	29	6	12	30	33	5	4	5.56	0.100	0.022	3.56	<1	6	<2	23
12-Apr-17	Discharge Event	High flow	7.3	140	7	91	71	<5	26	21	4	<1	21	4	4	0.46	0.074	0.023	2.11	<1	21	2	19
30-May-17	Monthly	mod flow clear	7.2	149	2	90	76	6	36	37	2	2	24	8	4	0.07	0.008	0.007	0.28	<1	37	3	16
9-Jun-17	Discharge Event	Mod flow, light brown	7.6	171	20	80	87	12	43	44	2	4	24	9	5	0.62	0.025	<0.005	0.87	<1	44	<2	20
Mn			6.9	112	2	5	57	6	26	6	2	<1	21	4	4	0.02	0.008	0.006	0.28		6	<2	16
Avg			7.4	196	18	63	100	33	48	46	4	6	30	10	6	0.93	0.055	0.015	1.17		46	2	21
Max			7.9	293	109	91	150	124	84	74	12	30	40	17	10	5.56	0.149	0.023	3.60		74	3	28
Var			0.1	3076	903	556	815	2157	379	407	7	75	37	17	4	3.01	0.002	0.000	1.50		407	0	13
SD			0.3	55	30	24	29	46	19	20	3	9	6	4	2	1.74	0.044	0.008	1.23		20	1	4
*Water Quality Trigger			N/A	N/A	N/A											N/A		N/A					

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).
 *Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

Site 9 - Karuah River (Near Stroud Road Village)

Date	As mg/l	Ba mg/l	Cd mg/l	Cr mg/l	Cu mg/l	Pb mg/l	Mo mg/l	Ni mg/l	Se mg/l	Ag mg/l	U mg/l	B mg/l	Hg mg/l	F mg/l	NH ₃ (as N) mg/l	NO ₂ (as N) mg/l	NO ₃ (as N) mg/l	N mg/l	P mg/l
9-Jul-16	0.001	0.019	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.05	0.2	0.03
3-Aug-16	<0.001	0.044	<0.0001	0.002	0.004	0.002	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.14	1.5	0.25
28-Sep-16	<0.001	0.021	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.1	<0.01	<0.01	0.21	0.5	0.02
27-Oct-16	<0.001	0.019	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.14	<0.01	0.02	0.4	0.09
10-Nov-16	<0.001	0.025	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.04	0.02	0.06	0.6	0.04
29-Dec-16	0.001	0.025	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.06	<0.01	0.09	0.6	0.06
30-Jan-17	0.001	0.025	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.05	<0.01	0.08	0.6	0.06
27-Feb-17	0.001	0.029	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.1	0.22	<0.01	0.07	0.9	0.1
17-Mar-17	0.002	0.052	<0.0001	0.004	0.004	0.002	<0.001	0.004	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.06	1.3	0.14
12-Apr-17	0.002	0.036	<0.0001	<0.001	0.002	<0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.02	2.4	0.52
30-May-17	<0.001	0.014	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.08	0.4	0.03
9-Jun-17	<0.001	0.016	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.09	0.4	0.04
Mn		0.014		<0.001	<0.001										<0.01		0.02	<0.1	0.02
Avg		0.027													0.07		0.08	0.8	0.12
Max		0.052		0.004	0.004										0.22		0.21	2.4	0.52
Var		0.000													0.00		0.00	0.4	0.02
SD		0.012													0.07		0.05	0.6	0.14

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).
 *Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

Site 11 - Mammy Johnsons - Downstream of High Noon

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	DO %	TDS mg/l	TSS mg/l	Hardness mg/l	Alkalinity (as CaCO ₃) mg/l	Acidity (as CaCO ₃) mg/l	SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	CO ₃ (as CaCO ₃) mg/l	Bicarb (as CaCO ₃) mg/l	BOD mg/l	Na mg/l
09-Jul-16	Discharge Event	Nil RL Low flow	7.01	240	30	60	123	20	63	58	4	12	49	12	8	1.13	0.046	<0.005	1.53	<1	58	<2	63
03-Aug-16	Discharge Event	RL 01 High flow	7.76	170	74	60	86	74	31	24	4	7	32	6	4	2.46	0.102	0.008	2.58	<1	24	2	21
28-Sep-16	Monthly	NA	7.46	312	6	59	160	7	72	62	4	9	52	14	9	0.16	0.037	<0.005	0.85	<1	62	3	37
27-Oct-16	Monthly	NA Low flow	7.5	379	4	59	195	<5	94	87	5	6	324	18	12	0.08	0.065	0.013	0.74	<1	87	<2	49
10-Nov-16	Discharge Event	Low flow	7.01	419	9	70	216	<5	89	82	5	7	69	16	12	0.18	0.106	0.01	0.72	<1	82	2	46
08-Dec-16	Ecotox	Low flow, clear	7.7	440	2		227	<5	92	81	5	6	70	17	12	0.5	1.510	0.015	2.38	<1	81	4	48
29-Dec-16	Monthly	Trickle	7.57	490	2	4	254	<5	115	98	6	<1	76	23	14	0.01	0.759	0.009	0.78	<1	98	4	54
30-Jan-17	Monthly	Very Low clear	7.4	660	4	30	343	8	144	128	7	1	132	28	18	0.03	1.220	<0.005	1.14	<1	128	<2	73
27-Feb-17	Monthly	Nil Flow																					
17-Mar-17	Discharge Event	High flow	6.72	154	32	64	78	25	27	13	5	11	32	6	3	1.55	0.045	0.01	1.27	<1	13	<2	19
12-Apr-17	Discharge Event	Moderate flow	7.39	204	16	84	104	9	36	27	2	8	37	6	5	0.77	0.030	<0.005	1.17	<1	27	<2	28
30-May-17	Monthly	Mod flow clear	7.06	321	3	76	165	<5	72	54	2	8	58	14	9	0.08	0.049	<0.005	1.04	<1	54	<2	38
09-Jun-17	Discharge Event	High flow, light brown	7.4	316	74	73	162	30	76	54	3	13	48	14	10	2.69	0.062	0.007	2.86	<1	54	<2	38
Mn			6.7	154	2	4	78	<5	27	13	<1	1	32	6	3	0.01	0.030	<0.005	0.72		13	<2	19
Avg			7.3	342	21	58	176	25	76	64	4	8	82	15	10	0.80	0.336	0.010	1.42		64	4	43
Max			7.8	660	74	84	343	74	144	128	7	13	324	28	18	2.69	1.510	0.015	2.86		128	4	73
Var			0.1	21484	712	511	5891	553	1193	1109	2	11	6560	45	19	0.92	0.275	0.000	0.58		1109	0	16
SD			0.3	147	27	23	77	24	35	33	1	3	81	7	4	0.96	0.525	0.003	0.76		33		
*Water Quality Trigger			7.1 - 7.6	370	24	85 - 110%	15									1.24		0.011					

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).
 *Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

Site 11 - Mammy Johnsons - Downstream of High Noon

Date	As	Ba	Cd	Cr	Cu	Pb	Mo	Ni	Se	Ag	U	B	Hg	F	NH3 (as N)	NO2 (as N)	NO3 (as N)	N	P
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
9-Jul-16	0.001	0.042	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.06	0.3	0.03
3-Aug-16	<0.001	0.045	<0.0001	0.001	0.002	0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.2	1.3	0.14
28-Sep-16	<0.001	0.043	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.01	0.4	0.06
27-Oct-16	<0.001	0.043	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.02	0.8	0.02
10-Nov-16	<0.001	0.051	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.08	0.7	0.03
5-Dec-16	0.002	0.07	<0.0001	<0.001	<0.001	<0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.21	2.1	0.14
29-Dec-16	0.002	0.058	<0.0001	<0.001	<0.001	<0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.1	<0.01	0.03	0.6	0.04
30-Jan-17	0.002	0.083	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.06	<0.01	0.04	0.6	0.05
17-Mar-17	<0.001	0.045	<0.0001	<0.001	0.003	<0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.43	1.2	0.05
12-Apr-17	<0.001	0.032	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.08	0.5	0.05
30-May-17	<0.001	0.038	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.09	0.4	0.02
9-Jun-17	<0.001	0.044	<0.0001	<0.001	0.001	<0.001	<0.001	0.003	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.12	0.8	0.08
Min	<0.001	0.032		<0.001	0.001	0.001		<0.001							0.02		0.01	0.3	0.02
Avg		0.050			0.002	0.001									0.04		0.11	0.8	0.06
Max	0.002	0.083		0.001	0.003	0.001		0.003							0.10		0.43	2.1	0.14
Var		0.000			0.000	#DIV/0!									0.00		0.01	0.3	0.00
SD		0.014			0.001	#DIV/0!									0.03		0.12	0.5	0.04
*Water Quality Trigger				0.001	0.0020										0.06			0.8	0.15

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

"Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

Site 12 - Mammy Johnsons - Relton Property

Date	Category	Comment	ph	EC	Turbidity	DO	TDS	TSS	Hardness	Alkalinity (as CaCO ₃)	Acidity (as CaCO ₃)	SO4	Cl	Ca	Mg	Al	Mn	Zn	Fe	CO3 (as CaCO ₃)	Bicarb (as CaCO ₃)	BOD	Na
				uS/cm	NTU	%	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
9-Jul-16	Discharge Event	Low flow	7.24	234	32.0	61	120	14	50	53	3	8	38	10	6	1.03	0.035	0.007	1.56	<1	53	<2	26
3-Aug-16	Discharge Event	High flow	7.37	150	269.0	49	76	318	31	26	5	3	27	6	4	5.88	0.32	0.022	7.45	<1	26	2	19
28-Sep-16	Monthly	Low flow	7.37	307	2.9	60	158	<5	68	57	4	7	46	14	8	0.14	0.03	<0.005	0.76	<1	57	<2	32
27-Oct-16	Monthly	Low flow	7.69	341	2.9	57	175	<5	81	73	5	5	58	16	10	0.12	0.039	<0.005	0.71	<1	73	<2	45
10-Nov-16	Discharge Event	low flow	7.66	237	1.2	69	121	15	63	58	6	5	67	12	8	0.68	0.204	<0.005	1.20	<1	58	<2	44
29-Dec-16	Monthly	Trickle	6.85	380	4.2	3	196	8	109	107	12	<1	53	24	12	0.62	2.86	0.029	1.43	<1	107	<2	40
30-Jan-17	Monthly	Very low clear	7.09	451	3.0	26	233	9	113	133	9	3	67	24	13	0.03	3.17	<0.005	1.64	<1	133	<2	46
27-Feb-17	Monthly	Low	7.4	397	12.0	26	205	11	95	103	6	<1	44	20	11	0.17	1.2	<0.005	2.17	<1	103	<2	36
17-Mar-17	Discharge Event	High flow	6.81	147	28.0	65	75	14	25	14	4	14	32	5	3	1.51	0.032	0.008	1.06	<1	14	<2	19
12-Apr-17	Discharge Event	Moderate flow	7.51	194	10.0	86	99	<5	31	24	2	6	37	6	4	0.39	0.021	<0.005	0.82	<1	24	<2	27
30-May-17	Monthly	Mod flow clear	7.77	290	2.0	69	149	<5	64	54	2	6	48	14	7	0.06	0.027	0.006	0.84	<1	54	2	33
9-Jun-17	Discharge Event	mod flow, light brown	7.51	304	36.0	64	156	20	65	44	2	9	49	12	8	1.13	0.062	<0.005	1.82	<1	44	<2	38
Min			6.8	147	1	3	75	5	25	14	2	<1	27	5	3	0.02	0.02	<0.005	0.71		14	<2	19
Avg			7.4	286	34	53	147	51	66	62	5	7	47	14	8	0.93	0.67	0.014	1.79		62	2	34
Max			7.8	451	269	86	233	318	113	133	12	14	67	24	13	5.88	3.17	0.029	7.45		133	2	46
Var			0.1	9416	5655	543	2553	####	866	1311	9	10	162	43	11	2.68	1.32	0.000	3.39		1311	0	90
SD			0.3	97	75	23	51	108	29	36	3	3	13	7	3	1.64	1.15	0.010	1.84		36	0	9
*Water Quality Trigger			7.1 - 7.6	370	24	85 - 110%	15									1.24		0.011					

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

"Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

Site 12 - Mammy Johnsons - Relton Property

Date	As	Ba	Cd	Cr	Cu	Pb	Mo	Ni	Se	Ag	U	B	Hg	F	NH3 (as N)	NO2 (as N)	NO3 (as N)	N	P
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
9-Jul-16	<0.001	0.042	<0.0001	<0.001	0.008	<0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.06	0.4	0.02
3-Aug-16	0.002	0.098	<0.0001	0.004	0.004	0.004	<0.001	0.003	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.16	2	0.27
28-Sep-16	<0.001	0.042	<0.0001	<0.001	<0.001	<0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.02	0.4	0.02
27-Oct-16	<0.001	0.044	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	0.01	0.01	0.8	0.03
10-Nov-16	<0.001	0.062	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.04	0.6	0.05
29-Dec-16	0.004	0.104	<0.0001	<0.001	<0.001	<0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.05	<0.01	0.01	0.7	0.09
30-Jan-17	0.002	0.110	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.10	0.06	<0.01	0.02	0.7	0.11
27-Feb-17	0.003	0.070	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.07	<0.01	<0.01	1	0.12
17-Mar-17	<0.001	0.044	<0.0001	<0.001	0.002	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.45	1.2	0.04
12-Apr-17	<0.001	0.033	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	0.0001	<0.1	<0.01	<0.01	0.03	0.3	0.02
30-May-17	<0.001	0.038	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.07	0.4	0.02
9-Jun-17	<0.001	0.049	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.07	0.6	0.03
Min	0.002	0.033		<0.001	<0.001	<0.001		<0.001						<0.01	0.010		0.01	0.3	0.02
Avg	0.003	0.061													0.042		0.09	0.8	0.07
Max	0.004	0.110		0.004	0.008	0.004		0.003							0.070		0.45	2.0	0.27
Var	0.000	0.001													0.000		0.02	0.2	0.01
SD	0.001	0.028													0.022		0.13	0.5	0.07
*Water Quality Trigger				0.001	0.0020										0.06			0.8	0.15

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

"Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

Site 15 - Mammy Johnsons - Tereel

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	DO %	TDS mg/l	TSS mg/l	Hardness mg/l	Alkalinity (as CaCO ₃) mg/l	Acidity (as CaCO ₃) mg/l	SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	CO ₃ (as CaCO ₃) mg/l	Bicarb (as CaCO ₃) mg/l	BOD mg/l	Na mg/l
9-Jul-16	Discharge Event	Mod flow	7.5	179	23	76	91	12	34	29	3	7	34	7	4	1.02	0.020	0.006	1.29	<1	29	<2	19
3-Aug-16	Discharge Event	High flow	7.5	144	74	66	73	68	27	21	3	5	29	6	3	2.13	0.087	0.007	2.24	<1	21	<2	17
28-Sep-16	Monthly	Mod flow	7.4	239	3	71	122	<5	47	34	3	6	39	9	6	0.18	0.014	<0.005	0.55	<1	34	<2	22
27-Oct-16	Monthly	Low flow	8.0	227	2	60	116	<5	52	39	3	4	42	11	6	0.06	0.014	<0.005	0.37	<1	39	<2	28
10-Nov-16	Discharge Event	Low flow	7.2	244	6	62	125	10	47	36	3	4	42	9	6	0.17	0.035	<0.005	0.50	<1	36	<2	24
29-Dec-16	Monthly	Dry																					
30-Jan-17	Monthly	Verylow flow clear	7.3	430	21	13	222	11	129	111	5	<1	68	27	15	40	0.762	<0.005	4.10	<1	111	<2	40
27-Feb-17	Monthly	Dry																					
17-Mar-17	Discharge Event	High flow	6.9	144	21	70	73	9	25	12	3	9	34	5	3	1.21	0.018	<0.005	0.70	<1	12	<2	19
12-Apr-17	Discharge Event	High flow	7.6	169	6	90	86	<5	29	16	2	6	36	5	4	0.3	0.015	<0.005	0.53	<1	16	<2	24
30-May-17	Monthly	Mod flow clear	7.7	214	2	84	109	<5	50	29	2	6	43	10	6	0.07	0.013	0.015	0.62	<1	29	6	50
9-Jun-17	Discharge Event	Mod flow, clear	7.5	202	19	90	103	13	40	22	2	6	38	8	5	0.53	0.012	<0.005	1.25	<1	22	<2	25
Min			6.9	144	2	13	73	<5	25	12	<1	4	29	5	3	0.06	0.012	<0.005	0.37				17
Avg			7.5	219	18	68	112	21	48	35	3	6	41	10	6	4.57	0.099		1.22		35		27
Max			8.0	430	74	90	222	68	129	111	5	9	68	27	15	40.00	0.762	0.015	4.10		111	6	50
Var			0.1	6808	467	492	1848	544	908	791	1	2	112	41	12	155.43	0.055		1.35		791		108
SD			0.3	83	22	43	23	30	30	28	1	2	11	6	3	12.47	0.234		1.16		28		10
*Water Quality Trigger			7.1 - 7.6	370	24	85 - 110%		15								1.24	0.011						

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).
Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project.

Site 15 - Mammy Johnsons - Tereel

Date	As mg/l	Ba mg/l	Cd mg/l	Cr mg/l	Cu mg/l	Pb mg/l	Mo mg/l	Ni mg/l	Se mg/l	Ag mg/l	U mg/l	B mg/l	Hg mg/l	F mg/l	NH ₃ (as N) mg/l	NO ₂ (as N) mg/l	NO ₃ (as N) mg/l	N mg/l	P mg/l
9-Jul-16	<0.001	0.037	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.07	0.3	<0.01
3-Aug-16	<0.001	0.048	<0.0001	<0.001	0.001	0.002	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.12	0.9	0.09
28-Sep-16	<0.001	0.048	<0.0001	<0.001	<0.001	<0.001	<0.001	0.003	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.01	0.2	<0.01
27-Oct-16	<0.001	0.035	<0.0001	<0.001	0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.01	0.5	0.01
10-Nov-16	<0.001	0.038	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.2	0.6	0.02
29-Dec-16																			
30-Jan-17	0.006	0.089	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.10	0.16	<0.01	0.04	0.9	0.08
17-Mar-17	<0.001	0.038	<0.0001	<0.001	0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.58	1.2	0.02
12-Apr-17	<0.001	0.026	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.03	0.2	0.01
30-May-17	<0.001	0.029	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.04	0.3	<0.01
9-Jun-17	<0.001	0.035	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.06	0.3	<0.01
Min		0.026			<0.001	<0.001									0.01		0.01	0.2	<0.01
Avg		0.042													0.04		0.12	0.5	0.04
Max		0.089			0.001	0.002									0.16		0.58	1.2	0.09
Var		0.000													0.00		0.03	0.1	0.00
SD		0.018													0.07		0.17	0.4	0.04
*Water Quality Trigger				0.001	0.0020										0.06			0.8	0.15

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).
Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project.

Site 19 - Karuah River (Washpool Turnoff)

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	DO %	TDS mg/l	TSS mg/l	Hardness mg/l	Alkalinity (as CaCO ₃) mg/l	Acidity (as CaCO ₃) mg/l	SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	CO ₃ (as CaCO ₃) mg/l	Bicarb (as CaCO ₃) mg/l	BOD mg/l	Na mg/l
9-Jul-16	Discharge Event	High flow	6.59	267	27	64	137	22	59	54	4	10	41	12	7	1.04	0.026	0.010	1.29	<1	54	<2	24
3-Aug-16	Discharge Event	High flow	7.96	216	64	59	110	55	40	31	5	5	33	8	5	2.17	0.070	0.034	2.35	<1	31	2	21
28-Sep-16	Monthly	Mod flow	7.7	290	3	61	149	<5	32	57	3	4	39	13	8	0.19	0.016	<0.005	0.57	<1	27		28
27-Oct-16	Monthly	Low flow	7.66	230	6	70	117	<5	65	63	3	4	36	13	8	0.11	0.021	<0.005	0.35	<1	63	3	26
10-Nov-16	Discharge Event	Mod flow	7.91	290	4	79	149	8	60	62	4	5	41	11	8	0.08	0.049	<0.005	0.36	<1	62	3	27
29-Dec-16	Monthly	Slow flow	7.98	297	3	7	152	<5	77	66	3	3	40	16	9	0.04	0.053	0.006	0.40	<1	66	4	28
30-Jan-17	Monthly	Mod flow clear	7.56	294	4	76	151	<5	77	76	3	2	41	16	9	0.05	0.063	<0.005	0.42	<1	76	<2	28
27-Feb-17	Monthly	Low	7.32	296	4	59	152	<5	84	82	4	2	39	17	10	0.06	0.099	<0.005	0.38	<1	82	<2	31
17-Mar-17	Discharge Event	High flow	7.16	174	43	71	88	32	25	15	5	8	28	5	3	1.82	0.045	0.010	1.54	<1	15	<2	17
12-Apr-17	Discharge Event	High flow	7.39	219	12	87	112	<5	42	30	2	5	35	7	6	0.32	0.030	<0.005	0.93	<1	30	<2	27
30-May-17	Monthly	Mod flow clear	6.83	269	3	63	138	6	50	44	2	1	34	10	6	0.11	0.022	0.006	0.52	<1	44	<2	24
9-Jun-17	Discharge Event	Mod flow, light brow	6.76	590	54	79	306	47	153	102	4	11	115	30	19	1.36	0.138	0.005	2.80	<1	102	<2	61
Min			6.6	174	3	7	88	<5	25	15	<1	<1	28	5	3	0.04	0.016	<0.005	0.35		15	<2	17
Avg			7.4	286	19	65	147	28	64	57	4	5	44	13	8	0.61	0.053	0.012	0.99		57		29
Max			8.0	590	64	87	306	55	153	102	5	11	115	30	19	2.17	0.138	0.034	2.80		102	4	61
Var			0.2	10768	505	410	2955	405	1136	591	1	10	523	42	15	0.60	0.001	0.000	0.71		591		118
SD			0.5	104	22	20	54	20	34	24	1	3	23	6	4	0.78	0.036	0.011	0.84		24		11
*Water Quality Trigger			7.1 - 7.6	370	24	85 - 110%		15								1.24	0.011						

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).
Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project.

Site 19 - Karuah River (Washpool Turnoff)

Date	As	Ba	Cd	Cr	Cu	Pb	Mo	Ni	Se	Ag	U	B	Hg	F	NH3 (as N)	NO2 (as N)	NO3 (as N)	N	P
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
09-Jul-16	<0.001	0.029	<0.0001	<0.001	0.003	<0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.18	0.6	0.06
03-Aug-16	<0.001	0.037	<0.0001	0.001	0.004	0.002	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	0.1	0.31	<0.01	0.44	2.6	0.60
28-Sep-16	<0.001	0.028	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.1	<0.01	<0.01	0.21	0.5	0.02
27-Oct-16	<0.001	0.023	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.03	<0.01	0.02	0.6	0.03
10-Nov-16	0.001	0.029	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.05	0.6	0.03
29-Dec-16	0.001	0.027	<0.0001	<0.001	<0.001	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.1	0.03	<0.01	0.02	0.5	0.04
30-Jan-17	0.001	0.028	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.1	0.02	<0.01	0.04	0.5	0.04
27-Feb-17	0.001	0.034	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.1	<0.01	<0.01	<0.01	0.5	0.03
17-Mar-17	0.001	0.038	<0.0001	<0.001	0.002	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.04	<0.01	0.42	1.4	0.07
12-Apr-17	<0.001	0.024	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.05	<0.01	0.05	0.6	0.07
30-May-17	<0.001	0.021	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.10	0.4	0.02
09-Jun-17	0.001	0.050	<0.0001	<0.001	<0.001	<0.001	<0.001	0.004	<0.01	<0.001	<0.001	<0.05	<0.0001	0.2	0.06	<0.01	0.22	1.2	0.14
Min	<0.001	0.021		<0.001	<0.001	<0.001		<0.001			<0.001			0.1	0.01		0.02	0.4	<0.01
Avg		0.031												0.1	0.06		0.16	0.8	0.10
Max	0.001	0.050		0.001	0.004	0.002		0.004			0.000			0.2	0.31		0.44	2.6	0.60
Var		0.000												0.0	0.01		0.02	0.4	0.03
SD		0.008												0.0	0.09		0.15	0.6	0.16
*Water Quality Trigger				0.001	0.0020										0.06			0.8	0.15

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

"Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

SW3 - Main Water Dam (Major) EPL11701 Point 3

Date	Category	Storage RL	pH	EC uS/cm	Turbidity NTU	TDS mg/l	TSS mg/l	Hardness mg/l	Alkalinity (as CaCO ₃)	Acidity (as CaCO ₃)	SO ₄ mg/l	Cl mg/l	Ca mg/l	Mg mg/l	Al mg/l	Mn mg/l	Zn mg/l	Fe mg/l	CO ₃ (as CaCO ₃) mg/l	Bicarb (as CaCO ₃) mg/l	BOD mg/l	Na mg/l
6-Jul-16	Weekly	RL 71.026	8.2	3280	8.1																	
9-Jul-16	Discharge Event	NA	7.8	3420	2.0	1937	9		188	6	1340	232	277	102	0.03	0.16	<0.005	0.06	<1	188	<2	419
13-Jul-16	Weekly	RL 71.066	7.7	3450	2.0																	
19-Jul-16	Weekly	RL 71.089	8.1	2680	2.6																	
29-Jul-16	Weekly	RL 71.008	8.3	3540	1.2																	
3-Aug-16	Discharge Event	RL 71.094	8.1	3350	4.0	1875	<5		149	6	1260	248	288	108	0.03	0.05	0.01	0.06	<1	149	2	409
10-Aug-16	Weekly	RL 71.082	8.0	2670	2.0																	
16-Aug-16	Weekly	RL 71.033	8.0	3220	1.7																	
25-Aug-16	Weekly	RL 71.012	7.6	2069	5.2																	
29-Aug-16	Weekly	RL 71.007	8.2	2290	2.9																	
7-Sep-16	Weekly	70.992	8.4	3100	1.9																	
12-Sep-16	Weekly	71.054	8.4	3160	1.9																	
21-Sep-16	Weekly	70.994	8.3	3160	4.1																	
28-Sep-16	Monthly	70.947	8.5	3070	6.3	1714	<5		121	2	1380	239	252	99	<0.01	0.10	<0.005	<0.05	<1	121	<2	389
4-Oct-16	Weekly	70.979	8.2	3060	1.0																	
13-Oct-16	Weekly	70.047	8.4	3110	2.9																	
18-Oct-16	Weekly	71.026	8.3	3140	1.2																	
27-Oct-16	Monthly	71.007	8.4	3210	1.3	254	<5		94	<1	970	262	243	117	0.02	0.10	<0.005	0.05	11	84	<2	414
2-Nov-16	Weekly	70.997	8.2	3260	3.9																	
9-Nov-16	Weekly	71.024	8.4	3300	1.9																	
10-Nov-16	Discharge Event	71.091	8.4	3300	1.9	1846	8		75	3	1340	241	217	103	0.02	0.08	<0.005	<0.05	<1	75	<2	353
16-Nov-16	Weekly	71.106	7.7	3053	4																	
23-Nov-16	Weekly	71.026	8.3	3140	11																	
29-Nov-16	Weekly		8.4	3070	3																	
5-Dec-16	Ecotox	RL 71.0	7.9	3340	1	1869	5		59	4	1470	268	208	93	0.02	0.06	<0.005	0.06	<1	59	2	363
7-Dec-16	Weekly	RL 71.037	7.9	3140	4																	
14-Dec-16	Weekly	RL 70.975	8.2	3210	1																	
21-Dec-16	Weekly	RL 70.912	8.6	3170	2																	
29-Dec-16	Monthly	RL 70.874	7.6	3300	2	1846	5		65	3	1300	270	239	114	<0.1	0.14	<0.005	<0.05	<1	65	<2	415
5-Jan-17	Weekly	RL 70.930	8.3	3270	1																	
13-Jan-17	Weekly	RL 71.017	8.2	3220	2																	
18-Jan-17	Weekly	RL 70.949	7.9	3310	2																	
23-Jan-17	Weekly	RL 90.196	8.2	3340	2																	
30-Jan-17	Monthly	RL 70.970	8.4	3280	2	168	<5		84	3	1290	287	219	122	0.03	0.06	<0.005	0.07	<1	84	<2	418
7-Feb-17	Weekly	RL 71.004	8.2	3250	2																	
14-Feb-17	Weekly	RL 70.991	8.1	2940	1																	
24-Feb-17	Weekly	RL 70.993	8.0	3290	6																	
27-Feb-17	Monthly	RL 71.019	7.7	3210	2	1743	6		96	5	1200	262	227	118	<0.01	0.10	<0.005	<0.05	<1	96	<2	456
9-Mar-17	Weekly	RL 70.670	8.2	3100	3																	
14-Mar-17	Weekly	RL 70.984	7.1	3120	3																	
17-Mar-17	Discharge Event	RL 71.032	7.9	3120	2	1743	23		111	7	1260	267	214	109	<0.01	0.21	<0.005	0.08	<1	111	<2	367
23-Mar-17	Weekly	RL 71.034	8.0	3070	2																	
28-Mar-17	Weekly	RL 71.016	8.2	3090	2																	
4-Apr-17	Weekly	RL 71.022	7.2	3160	3																	
10-Apr-17	Weekly	NA	7.5	3110	3																	
12-Apr-17	Discharge Event						14	877	96	5	1210	224	183	102	0.02	0.79	0.02	0.16	<1	96	<2	361
21-Apr-17	Weekly	RL 71.001	8.2	2350	6																	
26-Apr-17	Weekly	RL 71.031	8.1	2880	4																	
1-May-17	Weekly	RL 70.996	7.3	3070	4																	
9-May-17	Weekly	RL 70.969	7.5	3160	3																	
16-May-17	Weekly	RL 70.982	7.8	2041	5																	
23-May-17	Weekly	RL 70.996	7.1	3050	3																	
30-May-17	Monthly	RL 70.955	7.9	3160	1	1766	6	1040	120	4	1470	254	239	108	0.03	0.68	0.01	0.11	<1	120	4	377
8-Jun-17	Discharge Event	RL 71.028	7.7	2900	3	12	1020		118	5	1200	219	240	101	0.02	0.63	<0.005	0.12	<1	118	<2	324
13-Jun-17	Weekly	RL 71.04	7.5	2960	7																	
19-Jun-17	Weekly	RL 71.079	7.5	2940	6																	
28-Jun-17	Weekly		8.0	3050	3																	
	Min		7.1	2041	1	168	<5		59	<1	970	219	183	93	0.02	0.05	<0.005	<0.05		59	<2	324
	Avg		8.0	3084	3	1524	10		106	4	1284	252	234	107	0.02	0.24	0.09			105		390
	Max		8.6	3540	11	1937	23		188	7	1470	287	288	122	0.03	0.79	0.16			188	4	456
	Var		0.1	90067	4	426238	34		1237	2	17026	401	791	72	0.00	0.07	0.00			1264		1295
	SD		0.4	300	2	653	6		35	2	130	20	28	8	0.01	0.27	0.04			36		36

*Water Quality Trigger

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project.

SW3 - Main Water Dam (Major)

Date	As mg/l	Ba mg/l	Cd mg/l	Cr mg/l	Cu mg/l	Pb mg/l	Mo mg/l	Ni mg/l	Se mg/l	Ag mg/l	U mg/l	B mg/l	Hg mg/l	F mg/l	NH3 (as N) mg/l	NO2 (as N) mg/l	NO3 (as N) mg/l	N mg/l	P mg/l
9-Jul-16	<0.001	0.033	<0.0001	<0.001	<0.001	<0.001	0.011	0.009	<0.01	<0.001	0.001	0.06	<0.0001	0.3	0.19	0.02	0.77	1.3	<0.01
3-Aug-16	<0.001	0.034	<0.0001	<0.001	<0.001	<0.001	0.011	0.007	<0.01	<0.001	0.001	0.06	<0.0001	0.2	0.11	0.02	0.75	1.3	0.01
28-Sep-16	<0.001	0.028	<0.0001	<0.001	<0.001	<0.001	0.011	0.007	<0.01	<0.001	<0.001	0.06	<0.0001	0.3	<0.01	0.01	0.23	0.4	<0.01
27-Oct-16	0.02	0.024	<0.0001	<0.001	<0.001	<0.001	0.011	0.003	<0.01	<0.001	<0.001	<0.005	<0.0001	0.2	0.03	<0.01	0.04	0.6	0.01
10-Nov-16	<0.001	0.025	<0.0001	<0.001	<0.001	<0.001	0.011	0.002	<0.01	<0.001	<0.001	<0.005	<0.0001	0.2	0.04	0.01	0.26	0.6	<0.01
5-Dec-16	<0.001	0.024	<0.0001	<0.001	<0.001	<0.001	0.009	0.004	<0.01	<0.001	<0.001	0.06	<0.0001	0.2	0.07	0.02	1.26	1.9	<0.01
29-Dec-16	<0.001	0.029	<0.0001	<0.001	<0.001	<0.001	0.01	0.004	<0.01	<0.001	<0.001	0.06	<0.0001	0.3	0.05	0.02	0.41	0.8	<0.01
30-Jan-17	0.001	0.032	<0.0001	<0.001	<0.001	<0.001	0.009	0.003	<0.01	<0.001	<0.001	0.05	<0.0001	0.3	0.05	<0.01	0.13	0.5	0.01
27-Feb-17	<0.001	0.033	<0.0001	0.001	<0.001	<0.001	0.01	0.003	<0.01	<0.001	<0.001	0.07	<0.0001	0.2	0.07	<0.01	0.03	0.3	<0.01
17-Mar-17	<0.001	0.037	<0.0001	0.001	<0.001	<0.001	0.01	0.005	<0.01	<0.001	<0.001	<0.05	<0.0001	0.3	0.11	<0.01	0.15	0.6	<0.01
12-Apr-17	<0.001	0.03	<0.0001	<0.001	<0.001	<0.001	0.007	0.02	<0.01	<0.001	<0.001	0.05	<0.0001	0.2	0.28	0.02	0.72	1.2	<0.01
30-May-17	0.001	0.034	<0.0001	<0.001	<0.001	<0.001	0.006	0.009	<0.01	<0.001	<0.001	0.05	<0.0001	0.3	0.25	0.01	0.35	1	0.02
8-Jun-17	<0.001	0.034	<0.0001	<0.001	<0.001	<0.001	0.006	0.01	<0.01	<0.001	<0.001	0.06	<0.0001	0.3	0.36	0.04	0.4	1	<0.01
Min	0.001	0.024					0.006	0.002			<0.001	0.05	<0.0001	0.2	0.03	0.01	0.03	0.3	<0.01
Avg	0.007	0.031					0.009	0.007			0.001	0.06		0.3	0.13	0.02	0.42	0.9	
Max	0.020	0.037					0.011	0.020			0.001	0.07		0.3	0.36	0.04	1.26	1.9	0.02
Var	0.000	0.000					0.000	0.000			0.000	0.00		0.0	0.01	0.00	0.13	0.2	
SD	0.011	0.004					0.002	0.005			0.000	0.01		0.1	0.11	0.01	0.36	0.5	

Site - Northern Arm of MWD Diversion Drain

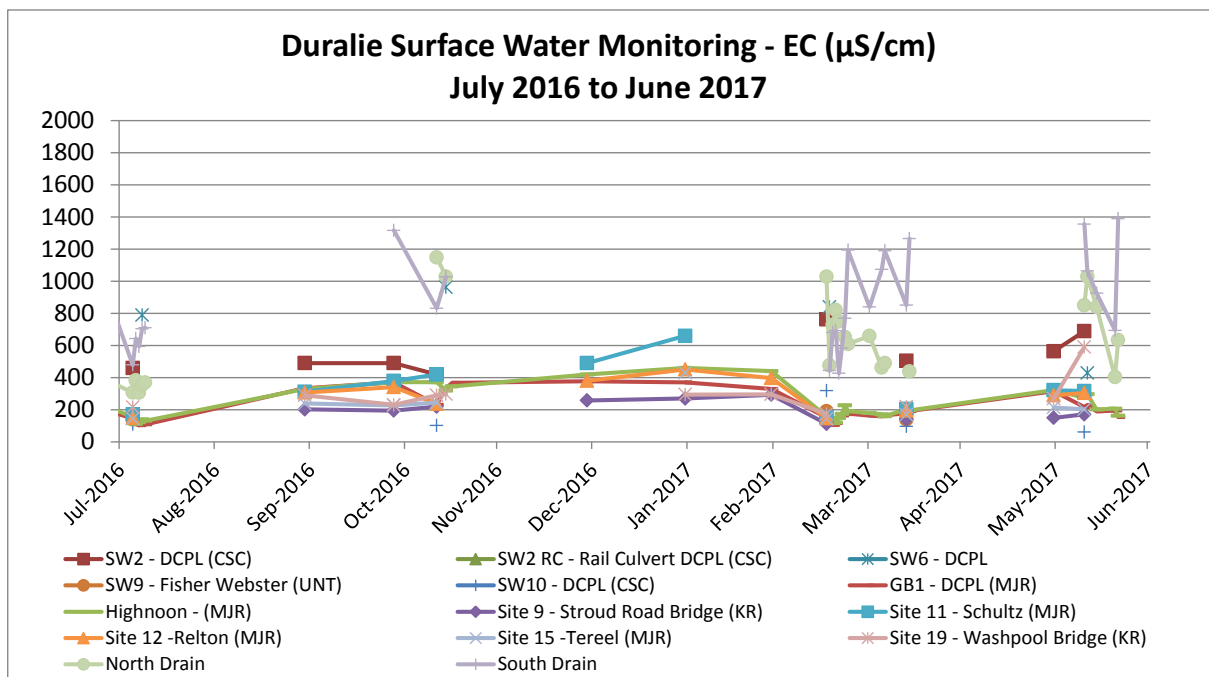
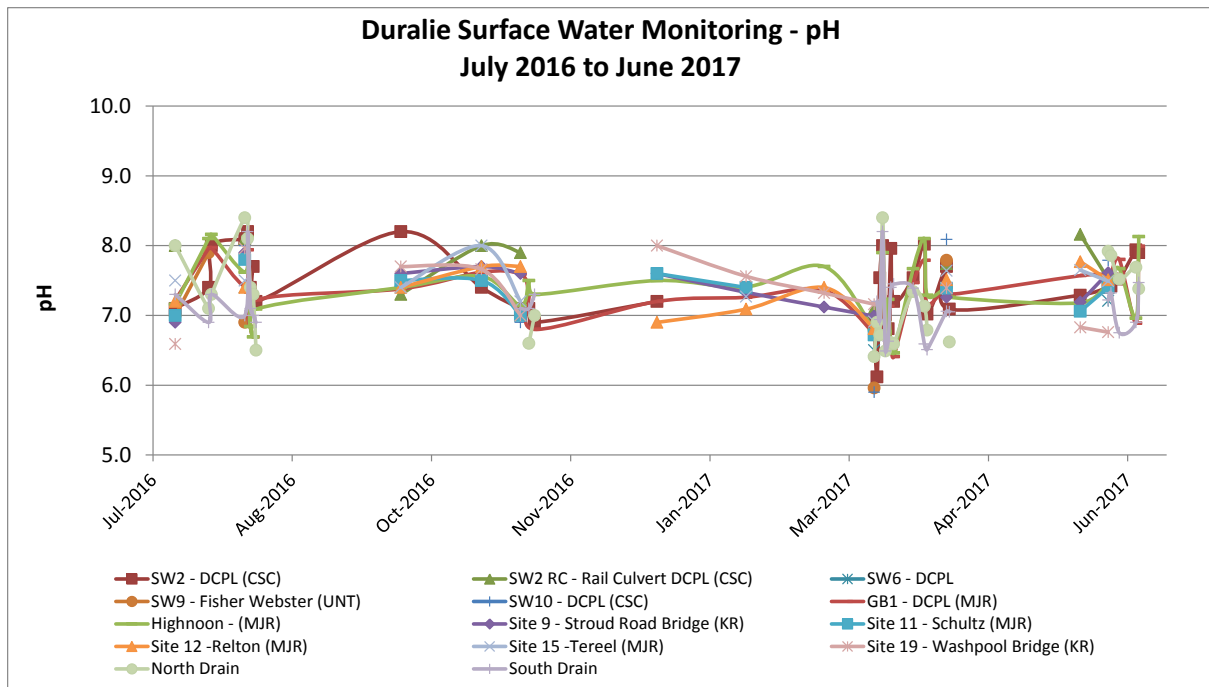
Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	TSS mg/l	Acidity (as mg/l CaCO ₃)	Alkalinity (as mg/l CaCO ₃)	SO ₄ mg/l	Mn mg/l	Fe (dis) mg/l	Zn mg/l	Al mg/l	Ca mg/l	Mg mg/l	Cl mg/l
9-Jul-16	Discharge Event	Low flow	8.0	210	60	25										
21-Jul-16	Discharge	Low flow	7.1	420	44	13										
22-Jul-16	Discharge	Low flow	7.3	417	34	6										
3-Aug-16	Discharge Event	Mod flow	8.4	307	44	5										
4-Aug-16	Discharge	Low flow	8.1	384	22	7										
5-Aug-16	Discharge	Steady flow	7.4	306	47.1	7										
6-Aug-16	Discharge	Low flow	7.3	354	35.6	<5										
7-Aug-16	Discharge	Low flow	6.5	370	30.8	<5										
28-Sep-16	Monthly	No flow														
27-Oct-16	Monthly	No flow														
10-Nov-16	Discharge Event	No flow														
13-Nov-16	Discharge	Low flow	6.6	1149	7.8	6										
15-Nov-16	Discharge	Low flow trickle	7.0	1029	15.6	10										
29-Dec-16	Monthly	Nil flow														
30-Jan-17	Monthly	Nil flow														
27-Feb-17	Monthly	Nil flow														
17-Mar-17	Discharge Event	Low flow	6.4	1029	7	8										
18-Mar-17	Discharge	Very high flow, clear	6.9	477	32	<5										
19-Mar-17	Discharge	Moderate flow	6.7	729	14	10										
20-Mar-17	Discharge	Low flow	8.1	822	5	<5										
21-Mar-17	Discharge	Low flow, clear	6.5	750	4.13	8										
22-Mar-17		nil flow														
23-Mar-17	Discharge	Very low flow, clear	6.6	652	3	19										
24-Mar-17	Discharge	Very low flow, clear	6.6	609	4	9										
31-Mar-17	Discharge	Moderate flow, clear	7.3	659	30	10										
4-Apr-17	Discharge	Low flow, clear	7.1	462	6	7										
5-Apr-17	Discharge	Low flow, clear	6.8	491	7	6										
12-Apr-17	Discharge Event	nil flow														
13-Apr-17	Discharge	Low flow, clear	6.6	439	17	11										
30-May-17	Monthly	Nil flow														
9-Jun-17	Discharge Event	Low flow, clear	7.9	850	36	14										
10-Jun-17	Discharge	Moderate flow, clear	7.9	1029	23	8										
13-Jun-17	Discharge	Low flow, clear	7.5	840	21	11										
19-Jun-17	Discharge	Mod flow, clear - 55mm (low)	7.7	403	57	13										
20-Jun-17	Discharge	Low flow, clear	7.4	635	34	9										
Min			6.4	210	3	5										
Avg			7.2	609	25	10										
Max			8.4	1149	60	25										
Var			0.3	69151	293	22										
SD			0.6	263	17	5										
*Water Quality Trigger			7.1 - 7.9	544	119	80							3.02		0.064	

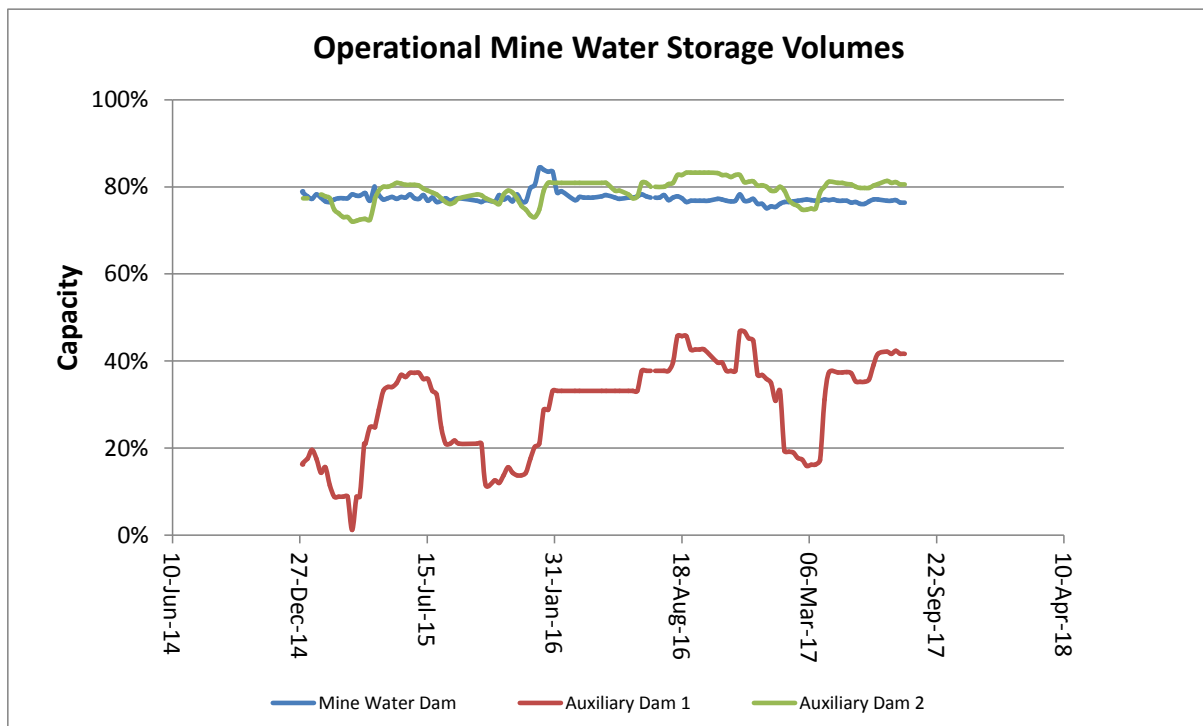
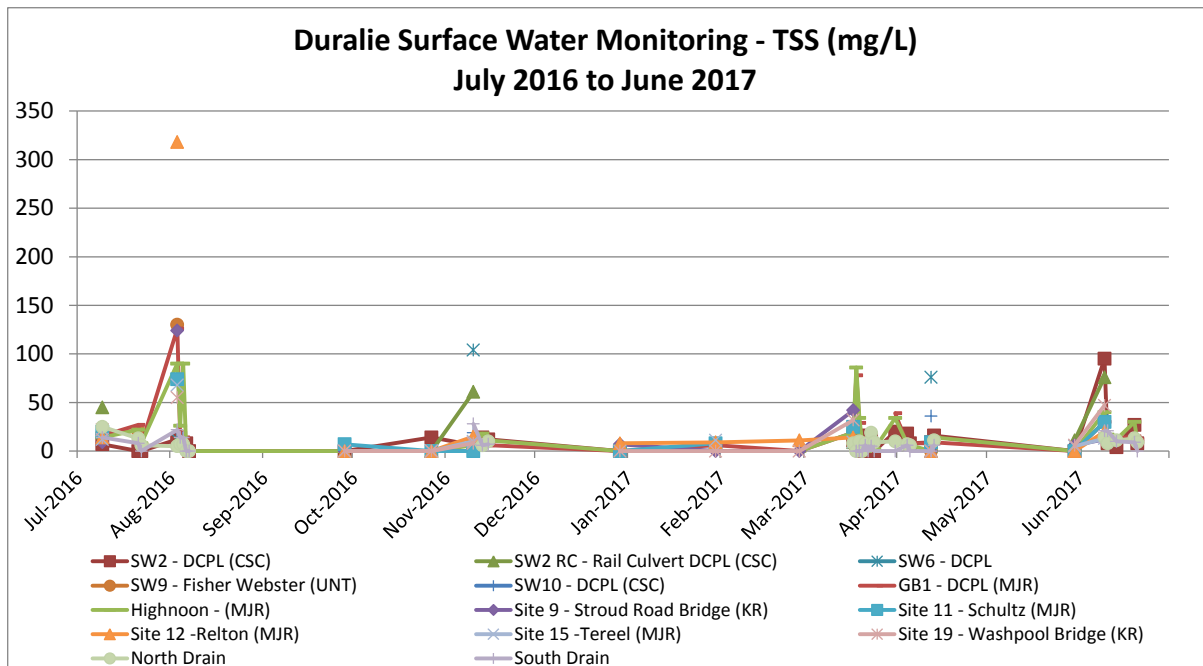
*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).
 Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project.

Site - Southern Arm of MWD Diversion Drain

Date	Category	Comment	ph	EC uS/cm	Turbidity NTU	TSS mg/l	Acidity (as mg/l CaCO ₃)	Alkalinity (as mg/l CaCO ₃)	SO ₄ mg/l	Mn mg/l	Fe mg/l	Zn mg/l	Al mg/l	Ca mg/l	Mg mg/l	Cl mg/l
9-Jul-16	Discharge Event	Nil flow (sbr)	7.3	1460	7.4	14										
21-Jul-16	Discharge	Low flow	6.9	880	21	8										
22-Jul-16	Discharge	Low flow	7.3	1126	13	<5										
3-Aug-16	Discharge Event	High flow	7.0	479	39	22										
4-Aug-16	Discharge	High flow	8.2	643	34	14										
5-Aug-16	Discharge	Steady flow	7.1	594	37.7	14										
6-Aug-16	Discharge	Low flow	7.0	703	32.1	<5										
7-Aug-16	Discharge	Low flow	6.9	711	21.2	<5										
28-Sep-16	Monthly	No flow														
27-Oct-16	Monthly	No flow														
10-Nov-16	Discharge Event	Nil flow (sbr)	7.1	1317	36	28										
13-Nov-16	Discharge	Low flow	7.1	832	9.5	6										
15-Nov-16	Discharge	Low flow trickle	7.3	1027	10	7										
29-Dec-16	Monthly	Nil flow														
30-Jan-17	Monthly	Nil flow														
27-Feb-17	Monthly	Nil flow														
17-Mar-17	Discharge Event	Nil flow														
18-Mar-17	Discharge	Low flow, clear @ 08:10	7.2	444	26	<5										
18-Mar-17	Discharge	Low flow, clear @ 09:30		432												
18-Mar-17	Discharge	Low flow, clear @ 11:50		507												
19-Mar-17	Discharge	Moderate flow	6.9	681	19	<5										
20-Mar-17	Discharge	High-Moderate flow	8.2	692	10	<5										
21-Mar-17	Discharge	High flow, clear	6.5	427	21	6										
22-Mar-17	Discharge	Clear	6.6	583	13.32	<5										
23-Mar-17	Discharge	Moderate flow, clear	7.4	769	4	5										
24-Mar-17	Discharge	Low flow, clear	7.5	1194	3	<1										
31-Mar-17	Discharge	Moderate flow, clear	7.4	840	21	<5										
4-Apr-17	Discharge	Low flow, clear	6.6	1074	10	6										
5-Apr-17	Discharge	Low flow, clear	6.5	1190	3	<5										
12-Apr-17	Discharge	Moderate flow, clear	7.1	852	24	<5										
13-Apr-17	Discharge	Low flow, clear	7.1	1265	6	6										
30-May-17	Monthly	Nil flow														
9-Jun-17	Discharge Event	Nil flow (SBR)	7.2	1356	36	21										
10-Jun-17	Discharge	Mod flow, clear	7.3	1064	33	21										
13-Jun-17	Discharge	Low flow, clear	6.8	926	47	10										
19-Jun-17	Discharge	Mod flow, clear - 123mm (mod)	6.9	694	27	9										
20-Jun-17	Discharge	Sample from sump	7.5	1390	12	<5										
Min			6.5	427	3	5										
Avg			7.1	872	21	12										
Max			8.2	1460	47	28										
Var			0.2	97214	159	52										
SD			0.4	312	13	7										
*Water Quality Trigger			7.1 - 7.9	544	119	80							3.02		0.064	

*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).
 Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project.





Groundwater

DB1W

Parameter	Units	13-Sep-16	15-Nov-16	9-Feb-17	17-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	15.69	15.75	16.20	15.73	15.7	15.84	16.20	0.06	0.24
pH		5.9	6.0	5.7	6.1	5.7	5.9	6.1	0.03	0.17
Conductivity @ 25°C	(µS/cm)	3910	4440	4120	4100	3910	4143	4440	48292	220
ORP	(mV)	79	0	10	42	0	33	79	1272	36
Dissolved Oxygen	(%)	27	26	29	12	12	24	29	60	8
TDS	(mg/L)	2680	3550	3200	2720	2680	3038	3550	172558	415
Alkalinity as CaCO3	(mg/L)	120	133	117	96	96	117	133	235	15
Acidity as CaCO3	(mg/L)	156	144	123	118	118	135	156	318	18
Sulphate	(mg/L)	368	339	329	316	316	338	368	489	22
Chloride	(mg/L)	1000	1110	1060	1040	1000	1053	1110	2092	46
Calcium	(mg/L)	245	328	251	238	238	266	328	1764	42
Magnesium	(mg/L)	58	71	62	63	58	64	71	30	5
Sodium	(mg/L)	456	522	464	478	456	480	522	867	29
Aluminium	(mg/L)	0.58	3.12	1.14	0.55	0.55	1.35	3.12	1.47	1.21
Manganese	(mg/L)	1.0	0.9	1.0	0.9	0.9	1.0	1.0	0.01	0.07
Zinc	(mg/L)	0.07	0.04	0.05	0.11	0.04	0.07	0.11	0.00	0.03
Iron	(mg/L)	32.0	33.1	36.5	39.8	32.0	35.4	39.8	12.47	3.53

DB2W

Parameter	Units	13-Sep-16	15-Nov-16	9-Feb-17	17-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	13.93	13.40	13.54	13.36	13.36	13.56	13.93	0.07	0.26
pH		6.27	6.21	6.14	6.70	6.1	6.3	6.7	0.06	0.25
Conductivity @ 25°C	(µS/cm)	1335	1355	1470	1460	1335	1405	1470	4883.33	69.88
ORP	(mV)	-14	14	-22	-16	-22	-10	14	257.00	16.03
Dissolved Oxygen	(%)	26	33	36	8	8	26	36	152.89	12.36
TDS	(mg/L)	890	812	960	848	812	878	960	4041.00	63.57
Alkalinity as CaCO3	(mg/L)	182	165	188	159	159	174	188	188.33	13.72
Acidity as CaCO3	(mg/L)	92	84	73	61	61	78	92	181.67	13.48
Sulphate	(mg/L)	152	153	155	169	152	157	169	62.92	7.93
Chloride	(mg/L)	228	241	259	250	228	245	259	175.00	13.23
Calcium	(mg/L)	93	99	101	100	93	98	101	12.92	3.59
Magnesium	(mg/L)	23	26	26	24	23	25	26	2.25	1.50
Sodium	(mg/L)	135	146	157	144	135	146	157	81.67	9.04
Aluminium	(mg/L)	<0.01	<0.01	<0.01	0.02	0.02	0.02	0.02		
Manganese	(mg/L)	0.83	0.79	0.89	0.84	0.79	0.84	0.89	0.00	0.04
Zinc	(mg/L)	<0.005	<0.005	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Iron	(mg/L)	13.2	14.4	13.8	16.6	13.2	14.5	16.6	2.20	1.48

DB3W

Parameter	Units	13-Sep-16	15-Nov-16	9-Feb-17	17-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	2.93	3.04		3.20	2.93	3.06	3.20	0.02	0.14
pH		6.3	6.3	6.0	6.7	6.0	6.4	6.7	0.08	0.28
Conductivity @ 25°C	(µS/cm)	96	105	130	206	96	134	206	2494.92	49.95
ORP	(mV)	20	29	-21	47	-21	19	47	828.25	28.78
Dissolved Oxygen	(%)	29	37	30	22	22	29	37	0.00	0.00
TDS	(mg/L)	210	214	310	163	163	224	310	0.00	0.00
Alkalinity as CaCO3	(mg/L)	38	35	43	39	35	39	43	10.92	3.30
Acidity as CaCO3	(mg/L)	18	18	24	14	14	19	24	17.00	4.12
Sulphate	(mg/L)	3	3	2	3	2	3	3	0.25	0.50
Chloride	(mg/L)	10	11	11	9	9	10	11	0.92	0.96
Calcium	(mg/L)	1	1	4	2	1	1	1	0.00	0.00
Magnesium	(mg/L)	1	1	2	2	1	1	1	0.00	0.00
Sodium	(mg/L)	17	22	26	19	17	21	26	15.33	3.92
Aluminium	(mg/L)	5	3	36	0	0	11	36	282.00	16.79
Manganese	(mg/L)	0.06	0.03	0.22	0.04	0.03	0.09	0.22	0.01	0.09
Zinc	(mg/L)	0.02	0.01	0.17	0.01	0.01	0.05	0.17	0.01	0.08
Iron	(mg/L)	4.9	3.2	56.6	3.5	3.2	17.1	56.6	695.75	26.38

DB4W

Parameter	Units	13-Sep-16	15-Nov-16	9-Feb-17	17-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	6.60	6.04	6.25	6.10	6.04	6.25	6.60	0.06	0.25
pH		6.3	6.5	6.3	6.9	6.3	6.5	6.9	0.08	0.29
Conductivity @ 25°C	(µS/cm)	3900	3900	3870	2640	2640	3578	3900	390825.00	625.16
ORP	(mV)	4	-97	-29	-96	-97	-55	4	2533.67	50.34
Dissolved Oxygen	(%)	29	31	29	8	8	24	31	119.34	10.92
TDS	(mg/L)	2020	2670	2860	2250	2020	2450	2860	147133.33	383.58
Alkalinity as CaCO3	(mg/L)	268	237	248	279	237	258	279	360.67	18.99
Acidity as CaCO3	(mg/L)	73	55	34	31	31	48	73	386.25	19.65
Sulphate	(mg/L)	178	166	173	85	85	151	178	1931.00	43.94
Chloride	(mg/L)	993	1010	1030	945	945	995	1030	1317.67	36.30
Calcium	(mg/L)	172	175	170	145	145	166	175	191.00	13.82
Magnesium	(mg/L)	87	86	93	66	66	83	93	138.00	11.75
Sodium	(mg/L)	456	525	511	477	456	492	525	990.25	31.47
Aluminium	(mg/L)	<0.01	0.02	0.01	<0.01	0.01	0.02	0.02	0.00	0.01
Manganese	(mg/L)	1.7	1.5	1.6	1.2	1.2	1.5	1.7	0.05	0.22
Zinc	(mg/L)	<0.005	<0.005	<0.005	<0.005					
Iron	(mg/L)	3.1	2.8	1.8	0.5	0.5	2.1	3.1	1.38	1.17

DB5W

Parameter	Units	13-Sep-16	15-Nov-16	9-Feb-17	17-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	11.41	11.64	11.20	11.60	11.20	11.46	11.64	0.04	0.20
pH		5.6	5.9	5.8	5.8	5.6	5.8	5.9	0.01	0.12
Conductivity @ 25°C	(µS/cm)	2220	2010	2196	2360	2010	2197	2360	20689.00	143.84
ORP	(mV)	17	-21	-6	-41	-41	-13	17	598.92	24.47
Dissolved Oxygen	(%)	31	26	33	8	8	25	33	129.67	11.39
TDS	(mg/L)	1300	1360	1400	1400	1300	1365	1400	2233.33	47.26
Alkalinity as CaCO3	(mg/L)	55	45	32	39	32	43	55	94.92	9.74
Acidity as CaCO3	(mg/L)	170	150	124	146	124	148	170	355.67	18.86
Sulphate	(mg/L)	175	149	160	195	149	170	195	396.92	19.92
Chloride	(mg/L)	564	536	557	594	536	563	594	575.58	23.99
Calcium	(mg/L)	34	32	36	33	32	34	36	2.92	1.71
Magnesium	(mg/L)	38	36	36	36	36	37	38	1.00	1.00
Sodium	(mg/L)	301	311	316	317	301	311	317	53.58	7.32
Aluminium	(mg/L)	0.02	<0.01	<0.01	<0.01	0.02	0.02	0.02		
Manganese	(mg/L)	1.2	1.0	1.1	1.2	1.00	1.14	1.22	0.01	0.10
Zinc	(mg/L)	0.023	0.012	0.023	0.057	0.01	0.03	0.06	0.00	0.02
Iron	(mg/L)	50.5	48.6	50.4	63.3	48.6	53.2	63.3	46.10	6.79

DB6W

Parameter	Units	14-Sep-16	16-Nov-16	10-Feb-17	18-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	21.41	21.37	21.20	21.20	21.20	21.30	21.41	0.01	0.11
pH		6.7	6.3	6.6	6.6	6.3	6.6	6.7	0.03	0.18
Conductivity @ 25°C	(µS/cm)	5610	5720	5640	5740	5610	5678	5740	3891.67	62.38
ORP	(mV)	-3	-4	170	-12	-12	38	170	7789.58	88.26
Dissolved Oxygen	(%)	39	40	32	9	9	30	40	208.67	14.45
TDS	(mg/L)	3310	3250	4200	3780	3250	3635	4200	198033.33	445.01
Alkalinity as CaCO3	(mg/L)	659	626	663	599	599	637	663	908.25	30.14
Acidity as CaCO3	(mg/L)	116	120	85	79	79	100	120	440.67	20.99
Sulphate	(mg/L)	80	74	75	80	74	77	80	10.25	3.20
Chloride	(mg/L)	1440	1440	1460	1500	1440	1460	1500	800.00	28.28
Calcium	(mg/L)	305	328	310	283	283	307	328	343.00	18.52
Magnesium	(mg/L)	202	192	198	185	185	194	202	54.92	7.41
Sodium	(mg/L)	600	637	663	615	600	629	663	752.25	27.43
Aluminium	(mg/L)	0.1	0.06	0.24	0.03	0.03	0.11	0.24	0.01	0.09
Manganese	(mg/L)	0.329	0.277	0.315	0.288	0.277	0.302	0.329	0.001	0.024
Zinc	(mg/L)	0.007	<0.005	0.023	0.024	0.007	0.018	0.024	0.000	0.010
Iron	(mg/L)	3.9	4.7	4.2	4.5	3.9	4.3	4.7	0.12	0.35

DB7W

Parameter	Units	13-Sep-16	15-Nov-16	9-Feb-17	17-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)		10.63	10.94	10.46	10.46	10.68	10.94	0.06	0.24
pH		6.7	6.8	6.6	7.0	6.6	6.8	7.0	0.03	0.16
Conductivity @ 25°C	(µS/cm)	2730	2730	2710	2730	2710	2725	2730	100.00	10.00
ORP	(mV)	119	-90	-77	-74	-90	-31	119	9981.67	99.91
Dissolved Oxygen	(%)	36	30	26	9	9	25	36	133.17	11.54
TDS	(mg/L)	1630	1770	1740	1630	1630	1693	1770	5358.33	73.20
Alkalinity as CaCO3	(mg/L)	426	372	392	388	372	395	426	515.67	22.71
Acidity as CaCO3	(mg/L)	48	42	27	28	27	36	48	108.25	10.40
Sulphate	(mg/L)	88	80	75	67	67	78	88	77.67	8.81
Chloride	(mg/L)	630	640	645	622	622	634	645	105.58	10.28
Calcium	(mg/L)	151	151	140	138	138	145	151	48.67	6.98
Magnesium	(mg/L)	54	60	52	52	52	55	60	14.33	3.79
Sodium	(mg/L)	340	371	347	349	340	352	371	179.58	13.40
Aluminium	(mg/L)	0.5	0.3	0.1	0.0	0.0	0.2	0.5	0.05	0.22
Manganese	(mg/L)	0.666	0.620	0.642	0.604	0.604	0.633	0.666	0.00	0.03
Zinc	(mg/L)	0.012	<0.005	<0.005	<0.005	0.012	0.012	0.012		
Iron	(mg/L)	0.59	0.46	0.33	0.2	0.20	0.40	0.59	0.03	0.17

DB8W

Parameter	Units	14-Sep-16	16-Nov-16	9-Feb-17	18-May-17	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	20.8	20.6	20.49	20.79	20.67	20.80	0.02	0.15

DB9W

Parameter	Units	14-Sep-16	16-Nov-16	9-Feb-17	18-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	20.7	20.79	20.75	20.6	20.60	20.71	20.79	0.01	0.08
pH		7.04	6.88	7.21	6.74	6.7	7.0	7.2	0.04	0.20
Conductivity @ 25°C	(µS/cm)	3010	3100	2890	3120	2890	3030	3120	11000.00	104.88
ORP	(mV)	-6	-12	21	-69	-69	-17	21	1431.00	37.83
Dissolved Oxygen	(%)	33	35	28	11	11	27	35	116.83	10.81
TDS	(mg/L)	1710	1660	1900	1820	1660	1773	1900	11691.67	108.13
Alkalinity as CaCO3	(mg/L)	129	138	122	139	122	132	139	64.67	8.04
Acidity as CaCO3	(mg/L)	11	10	6	7	6	9	11	5.67	2.38
Sulphate	(mg/L)	202	200	197	202	197	200	202	5.58	2.36
Chloride	(mg/L)	758	773	764	768	758	766	773	40.25	6.34
Calcium	(mg/L)	145	149	134	142	134	143	149	40.33	6.35
Magnesium	(mg/L)	13	15	12	14	12	14	15	1.67	1.29
Sodium	(mg/L)	429	492	458	488	429	467	492	863.58	29.39
Aluminium	(mg/L)	0.24	0.02	0.26	0.04	0.0	0.1	0.3	0.02	0.13
Manganese	(mg/L)	0.281	0.149	0.315	0.252	0.149	0.249	0.315	0.01	0.07
Zinc	(mg/L)	0.029	0.006	0.012	0.01	0.006	0.014	0.029	0.00	0.01
Iron	(mg/L)	0.61	0.67	1.9	1.07	0.61	1.06	1.90	0.35	0.59

DB10W

Parameter	Units	14-Sep-16	16-Nov-16	9-Feb-17	18-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	21.07	21.18	12.2	12.17	12.17	16.66	21.18	26.64	5.16
pH		6.07	5.7	5.39	5.56	5.4	5.7	6.1	0.08	0.29
Conductivity @ 25°C	(µS/cm)	3800	3900	3910	3900	3800	3878	3910	2691.67	51.88
ORP	(mV)	-141	15	19	72	-141	-9	72	8448.25	91.91
Dissolved Oxygen	(%)	26	29	24	13	13	23	29	51.37	7.17
TDS	(mg/L)	2280	2240	2460	2460	2240	2360	2460	13600.00	116.62
Alkalinity as CaCO3	(mg/L)	59	62	37	37	37	49	62	185.58	13.62
Acidity as CaCO3	(mg/L)	115	118	66	71	66	93	118	773.67	27.81
Sulphate	(mg/L)	362	377	382	376	362	374	382	73.58	8.58
Chloride	(mg/L)	956	966	968	963	956	963	968	27.58	5.25
Calcium	(mg/L)	81	97	84	80	80	86	97	61.67	7.85
Magnesium	(mg/L)	75	84	82	73	73	79	84	28.33	5.32
Sodium	(mg/L)	569	612	618	574	569	593	618	640.92	25.32
Aluminium	(mg/L)	0.41	11.2	0.08	0.05	0.1	2.9	11.2	30.39	5.51
Manganese	(mg/L)	0.881	0.963	0.916	0.891	0.881	0.913	0.963	0.00	0.04
Zinc	(mg/L)	0.043	0.053	0.088	0.122	0.043	0.077	0.122	0.00	0.04
Iron	(mg/L)	17.2	28.6	14.6	16.1	14.60	19.13	28.60	41.04	6.41

DB11W

Note: Installed 3-Sep-13. E - 399100, N - 6430300

Parameter	Units	13-Sep-16	15-Nov-16	9-Feb-17	17-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL (TOC)	(m)	10.65	10.79	10.83	10.40	10.4	10.67	10.83	0.04	0.19
pH		6.36	6.75	6.62	7.41	6.4	6.79	7.41	0.20	0.45
Conductivity @ 25°C	(µS/cm)	2619	3670	3450	3460	2619.0	3299.75	3670.00	216253.58	465.03
ORP	(mV)	136	-47	-56	-82	-82.0	-12.25	136.00	9988.25	99.94
Dissolved Oxygen	(%)	22	41	31	7	7.1	25.28	41.00	207.04	14.39
TDS	(mg/L)	3890	2870	2800	2300	2300.0	2965.00	3890.00	444700.00	666.86
Alkalinity as CaCO3	(mg/L)	206	244	260	255	206.0	241.25	260.00	596.92	24.43
Acidity as CaCO3	(mg/L)	110	40	25	31	25.0	51.50	110.00	1559.00	39.48
Sulphate	(mg/L)	324	201	188	188	188.0	225.25	324.00	4371.58	66.12
Chloride	(mg/L)	1710	928	905	862	862.0	1101.25	1710.00	165448.92	406.75
Calcium	(mg/L)	533	284	251	240	240.0	327.00	533.00	19210.00	138.60
Magnesium	(mg/L)	127	58	53	45	45.0	70.75	127.00	1434.92	37.88
Sodium	(mg/L)	530	413	421	367	367.0	432.75	530.00	4769.58	69.06
Aluminium	(mg/L)	0.07	<0.01	0.04	0.02	0.0	0.04	0.07	0.00	0.03
Manganese	(mg/L)	2.620	1.130	1.210	1.040	1.0	1.50	2.62	0.56	0.75
Zinc	(mg/L)	0.007	<0.005	0.009	<0.005	0.0	0.01	0.01	0.00	0.00
Iron	(mg/L)	11.6	5.82	4.98	5.08	5.0	6.87	11.60	10.08	3.18

BH4BW

Parameter	Units	13-Sep-16	15-Nov-16	9-Feb-17	17-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	4.68	4.72	5.02	4.83	4.7	4.81	5.02	0.02	0.15
pH		6.1	6.1	6.0	6.4	6.0	6.14	6.40	0.03	0.18
Conductivity @ 25°C	(µS/cm)	280	290	316	290	280.0	294.00	316.00	237.33	15.41
ORP	(mV)	39	88	2	37	2.0	41.50	88.00	1249.67	35.35
Dissolved Oxygen	(%)	20	34	17	10	10.2	20.30	34.00	100.23	10.01
TDS	(mg/L)	334	221	229	200	200.0	246.00	334.00	3591.33	59.93
Alkalinity as CaCO3	(mg/L)	59	95	110	86	59.0	87.50	110.00	459.00	21.42
Acidity as CaCO3	(mg/L)	65	53	49	58	49.0	56.25	65.00	47.58	6.90
Sulphate	(mg/L)	6	6	6	6	6.0	6.00	6.00	0.00	0.00
Chloride	(mg/L)	32	32	21	19	19.0	26.00	32.00	48.67	6.98
Calcium	(mg/L)	10	15	16	16	10.0	14.25	16.00	8.25	2.87
Magnesium	(mg/L)	7	13	13	9	7.0	10.50	13.00	9.00	3.00
Sodium	(mg/L)	25	28	31	28	25.0	28.00	31.00	6.00	2.45
Aluminium	(mg/L)	84	16	5	25	5.0	32.50	84.00	1245.67	35.29
Manganese	(mg/L)	3.3	1.3	1.4	1.5	1.3	1.88	3.30	0.91	0.95
Zinc	(mg/L)	0.4	0.1	0.1	0.2	0.1	0.18	0.45	0.03	0.19
Iron	(mg/L)	174.0	30.3	18.7	49.1	18.7	68.03	174.00	5148.33	71.75

SI1W

Parameter	Units	13-Sep-16	16-Nov-16	10-Feb-17	18-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	9.51	9.56	9.60	9.53	9.51	9.55	9.60	0.00	0.04
pH		7.1	6.7	7.0	7.1	6.7	7.0	7.1	0.04	0.19
Conductivity @ 25°C	(µS/cm)	2650	2630	2660	2750	2630	2673	2750	2825.00	53.15
ORP	(mV)	9	11	12	67	9	25	67	794.92	28.19
Dissolved Oxygen	(%)	27	36	30	46	27	35	46	66.56	8.16
TDS	(mg/L)	1920	1780	2070	2000	1780	1943	2070	15491.67	124.47
Alkalinity as CaCO ₃	(mg/L)	478	459	493	455	455	471	493	310.92	17.63
Acidity as CaCO ₃	(mg/L)	49	41	27	28	27	36	49	112.92	10.63
Sulphate	(mg/L)	616	615	651	636	615	630	651	299.00	17.29
Chloride	(mg/L)	309	322	326	311	309	317	326	68.67	8.29
Calcium	(mg/L)	178	180	173	171	171	176	180	17.67	4.20
Magnesium	(mg/L)	155	145	158	140	140	150	158	71.00	8.43
Sodium	(mg/L)	223	251	262	235	223	243	262	296.25	17.21
Aluminium	(mg/L)	0.04	<0.01	0.13	0.01	0.01	0.06	0.13	0.00	0.06
Manganese	(mg/L)	0.002	<0.001	0.006	0.002	0.0	0.00	0.01	0.00	0.00
Zinc	(mg/L)	<0.005	<0.005	0.009	<0.005	0.0	0.01	0.01		
Iron	(mg/L)	0.06	<0.05	0.20	0.24	0.06	0.17	0.24	0.01	0.09

SI2W

Parameter	Units	13-Sep-16	16-Nov-16	10-Feb-17	18-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	18.10	18.11	18.70	18.56	18.1	18.37	18.70	0.10	0.31
pH		7.3	6.9	7.2	7.2	6.9	7.14	7.25	0.03	0.18
Conductivity @ 25°C	(µS/cm)	2094	2880	3040	3060	2094	2769	3060	208689	457
ORP	(mV)	103	-8	16	60	-8	43	103	2406	49
Dissolved Oxygen	(%)	24	35	26	9	9	23	35	117	11
TDS	(mg/L)	1670	2070	2430	2310	1670	2120	2430	112400	335
Alkalinity as CaCO ₃	(mg/L)	340	332	349	317	317	335	349	184	14
Acidity as CaCO ₃	(mg/L)	26	23	16	16	16	20	26	26	5
Sulphate	(mg/L)	738	993	967	942	738	910	993	13582	117
Chloride	(mg/L)	186	254	253	249	186	236	254	1094	33
Calcium	(mg/L)	109	143	143	143	109	135	143	289	17
Magnesium	(mg/L)	120	154	168	151	120	148	168	410	20
Sodium	(mg/L)	262	353	366	312	262	323	366	2197	47
Aluminium	(mg/L)	0.17	0.03	0.03	0.01	0.01	0.06	0.17	0.01	0.07
Manganese	(mg/L)	0.014	0.012	0.015	0.017	0.012	0.015	0.017	0.000	0.002
Zinc	(mg/L)	0.012	<0.005	0.008	0.017	0.008	0.012	0.017	0.000	0.005
Iron	(mg/L)	0.24	0.11	0.16	0.13	0.11	0.16	0.24	0.00	0.06

SI3W

Parameter	Units	13-Sep-16	16-Nov-16	10-Feb-17	18-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	27.60	27.90	27.90	27.68	27.60	27.77	27.90	0.02	0.15
pH		7.0	6.8	6.9	7.0	6.8	6.9	7.0	0.01	0.10
Conductivity @ 25°C	(µS/cm)	5000	5320	5710	5940	5000	5493	5940	173291.67	416.28
ORP	(mV)	22	-59	96	51	-59	28	96	4252.33	65.21
Dissolved Oxygen	(%)	17	27	26	48	17	30	48	172.33	13.13
TDS	(mg/L)	2490	3340	4780	4190	2490	3700	4780	1000066.67	1000.03
Alkalinity as CaCO ₃	(mg/L)	414	362	379	320	320	369	414	1524.92	39.05
Acidity as CaCO ₃	(mg/L)	49	41	22	30	22	36	49	141.67	11.90
Sulphate	(mg/L)	443	478	575	603	443	525	603	5838.92	76.41
Chloride	(mg/L)	1150	1210	1400	1440	1150	1300	1440	20066.67	141.66
Calcium	(mg/L)	342	390	436	420	342	397	436	1708.00	41.33
Magnesium	(mg/L)	100	105	131	125	100	115	131	226.92	15.06
Sodium	(mg/L)	524	660	706	688	524	645	706	6811.67	82.53
Aluminium	(mg/L)	0.1	0.18	0.07	0.1	0.07	0.11	0.18	0.00	0.05
Manganese	(mg/L)	3.380	1.740	0.435	0.632	0.435	1.547	3.380	1.82	1.35
Zinc	(mg/L)	0.016	0.017	0.031	0.022	0.016	0.022	0.031	0.00	0.01
Iron	(mg/L)	0.41	0.59	0.2	0.27	0.20	0.37	0.59	0.03	0.17

WR1**Note:** Installed 3-Sep-13. E - 400776, N - 6425804

Waste Emplacement - South

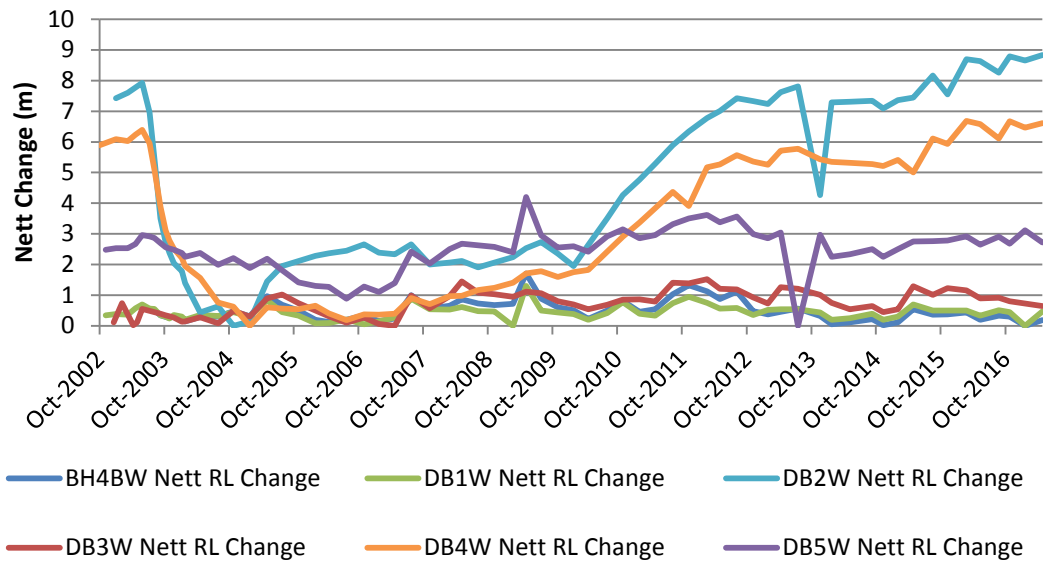
Parameter	Units	13-Sep-16	16-Nov-16	9-Feb-17	18-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL (TOC)	(m)	10.3	10.11	10.9	9.58	9.58	10.22	10.90	0.30	0.54
pH		6.49	6.52	6.02	6.59	6.0	6.4	6.6	0.07	0.26
Conductivity @ 25°C	(µS/cm)	2010	1994	2006	2010	1994	2005	2010	57.33	7.57
ORP	(mV)	70	53	29	94	29	62	94	752.33	27.43
Dissolved Oxygen	(%)	18	21	12	36	12	22	36	104.25	10.21
TDS	(mg/L)	1340	1430	1980	1360	1340	1528	1980	92491.67	304.12
Alkalinity as CaCO3	(mg/L)	275	262	271	259	259	267	275	56.25	7.50
Acidity as CaCO3	(mg/L)	67	62	47	43	43	55	67	133.58	11.56
Sulphate	(mg/L)	426	397	384	390	384	399	426	346.25	18.61
Chloride	(mg/L)	240	259	271	269	240	260	271	200.92	14.17
Calcium	(mg/L)	145	141	139	142	139	142	145	6.25	2.50
Magnesium	(mg/L)	29	30	30	29	29	30	30	0.33	0.58
Sodium	(mg/L)	250	278	301	276	250	276	301	434.92	20.85
Aluminium	(mg/L)	39.3	21.4	21.3	22.1	21.3	26.0	39.3	78.45	8.86
Manganese	(mg/L)	0.616	0.64	0.711	0.661	0.616	0.657	0.711	0.00	0.04
Zinc	(mg/L)	0.096	0.086	0.102	0.069	0.069	0.088	0.102	0.00	0.01
Iron	(mg/L)	15.20	12.60	10.50	11.10	10.50	12.35	15.20	4.39	2.10

WR2**Note:** Installed 3-Sep-13. E - 400990, N - 6426582

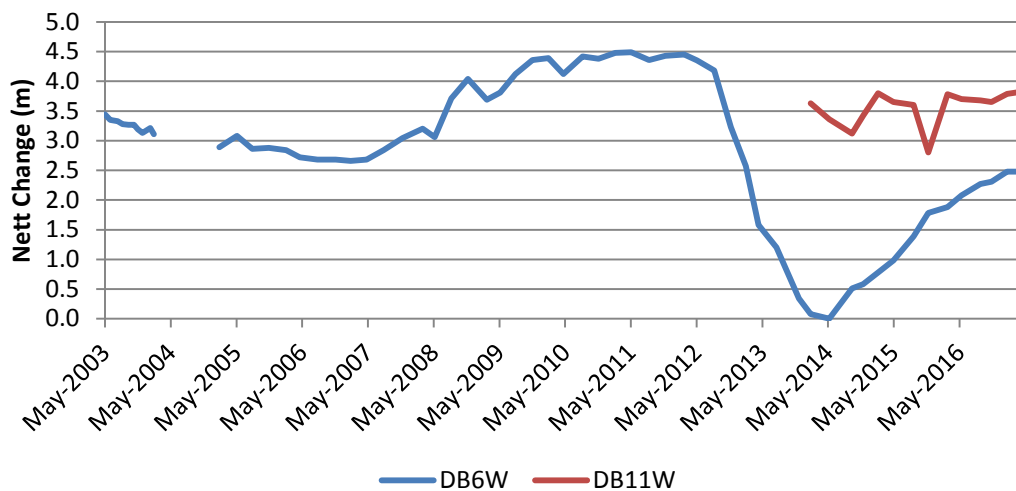
Waste Emplacement - East

Parameter	Units	14-Sep-16	16-Nov-16	9-Feb-17	18-May-17	Min	Avg	Max	Variance	Std Dev
Depth to standing WL (TOC)	(m)	58.4	59.7	61.45	62.47	58.40	60.51	62.47	3.28	1.81
pH		7.09	6.68	6.9	7.04	6.7	6.93	7.09	0.03	0.18
Conductivity @ 25°C	(µS/cm)	5060	4840	4930	5100	4840	4983	5100	14291.67	119.55
ORP	(mV)	12	-20	-40	-36	-40	-21	12	558.67	23.64
Dissolved Oxygen	(%)	19	19	17	19	17	19	19	1.04	1.02
TDS	(mg/L)	3840	5040	4820	4390	3840	4523	5040	279891.67	529.05
Alkalinity as CaCO3	(mg/L)	238	242	290	163	163	233	290	2751.58	52.46
Acidity as CaCO3	(mg/L)	39	36	25	18	18	30	39	95.00	9.75
Sulphate	(mg/L)	1020	1010	914	1040	914	996	1040	3144.00	56.07
Chloride	(mg/L)	1020	1020	1040	1110	1020	1048	1110	1825.00	42.72
Calcium	(mg/L)	914	895	848	863	848	880	914	898.00	29.97
Magnesium	(mg/L)	28	34	35	27	27	31	35	16.67	4.08
Sodium	(mg/L)	302	309	301	308	301	305	309	16.67	4.08
Aluminium	(mg/L)	0.43	7.51	5.29	25.3	0.43	9.63	25.30	117.84	10.86
Manganese	(mg/L)	2.17	2.5	2.58	2.4	2.17	2.41	2.58	0.03	0.18
Zinc	(mg/L)	0.03	0.163	0.077	0.458	0.030	0.182	0.458	0.04	0.19
Iron	(mg/L)	5	21.6	10.2	72.3	5.00	27.28	72.30	949.06	30.81

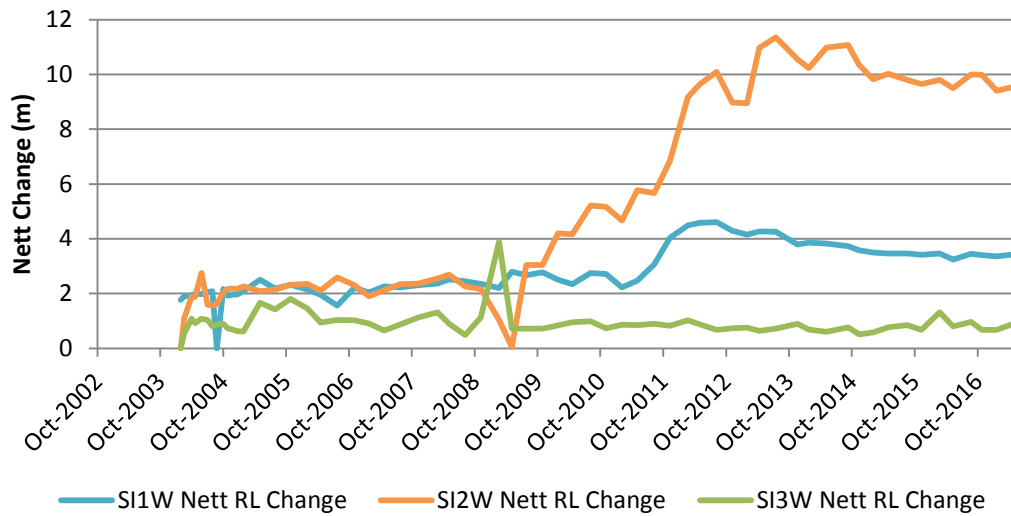
Groundwater Nett RL Change - Pit to River



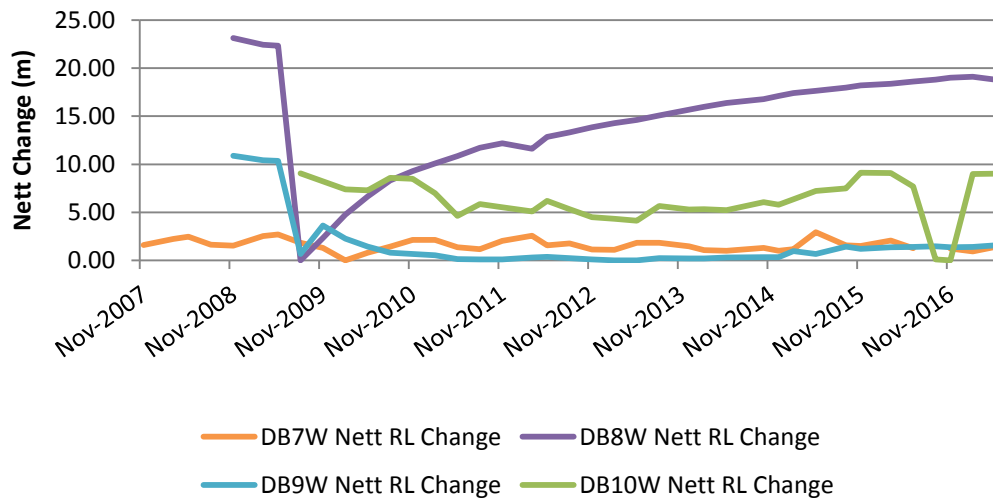
Groundwater Nett RL Change - DB6W & DB11W



Groundwater Nett RL Change - Western Irrigation Area



Groundwater Nett RL Change - Pit to River



Appendix 5:

Blast Monitoring

Duralie Coal Mine Blast Monitoring Results

Location	Date	Time	Schultz (AB1)		Fisher-Webster (AAAB3)		Moylan (AAAB4)		Weismantel Inn		Bragg (Additional)		Overpressure Site Exceedance ¹	Overpressure "Cumulative Exceedance" ¹	Ground Vibration Site Exceedance ¹	Ground Vibration "Cumulative Exceedance" ¹	Monitored Blasts ¹	Fume Rating
		24hr	mm/s	dBL	mm/s	dBL	mm/s	dBL	mm/s	dBL	mm/s	dBL	%		%			
Clareval Block 6	05-Jul-16	12:37:00	<0.22	<110.0	0.32	109.1	0.49	111.9	1.4	115.4	0.73	108.9	0.0%	0	0.0%	0	1	1A
Clareval Block 6	08-Jul-16	12:36:00	<0.22	<110.0	0.25	91.9	<0.22	<110.0	<0.22	<110.0	0.22	85.0	0.0%	0	0.0%	0	2	Nil
Clareval Block 6	13-Jul-16	12:49:00	<0.22	<110.0	0.31	107.7	0.64	106.8	1.63	112.7	0.56	107.0	0.0%	0	0.0%	0	3	Nil
Weismantel Strip 16	15-Jul-16	16:33:00	<0.22	<110.0	0.27	112.6	<0.22	<110.0	1.00	116.5	0.28	101.9	0.0%	0	0.0%	0	4	Nil
Clareval Block 6	25-Jul-16	11:30:00	0.26	88.9	0.39	107.5	0.58	105.3	1.28	113.1	0.95	103.7	0.0%	0	0.0%	0	5	Nil
Weismantel Strip 16	28-Jul-16	12:45:00	<0.22	<110.0	0.49	109.1	0.44	105.5	1.41	110.8	0.42	98.3	0.0%	0	0.0%	0	6	Nil
Clareval Block 6	05-Aug-16	12:33:00	<0.22	<110.0	0.53	111.6	0.53	107.4	0.99	114.9	0.57	104.0	0.0%	0	0.0%	0	7	Nil
Weismantel Strip 16	06-Aug-16	12:38:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.34	103.1	<0.22	<110.0	0.0%	0	0.0%	0	8	Nil
Weismantel Strip 16	10-Aug-16	12:38:00	<0.22	<110.0	0.63	106.8	0.52	106.8	1.45	113.9	0.41	101.4	0.0%	0	0.0%	0	9	Nil
Clareval Block 7	16-Aug-16	12:39:00	<0.22	<110.0	0.47	107.9	0.43	107.2	0.96	110.8	0.34	107.5	0.0%	0	0.0%	0	10	Nil
Weismantel Strip 16	19-Aug-16	14:12:00	<0.22	<110.0	0.26	101.8	<0.22	<110.0	1.06	112.9	0.23	103.7	0.0%	0	0.0%	0	11	Nil
Clareval Block 7	24-Aug-16	16:41:00	<0.22	<110.0	0.27	107.5	0.4	108.8	0.77	111.6	0.27	103.4	0.0%	0	0.0%	0	12	Nil
Weismantel Strip 16	26-Aug-16	12:40:00	<0.22	<110.0	0.42	102.9	<0.22	<110.0	0.31	108.0	0.26	98.3	0.0%	0	0.0%	0	13	Nil
Clareval Block 7	08-Sep-16	16:47:00	<0.22	<110.0	0.311	100.6	0.45	105.5	1.08	109.1	0.547	103.0	0.0%	0	0.0%	0	14	Nil
Clareval Block 7	10-Sep-16	12:51:00	<0.22	<110.0	0.25	99.1	<0.22	<110.0	0.61	102.3	0.42	96.2	0.0%	0	0.0%	0	15	Nil
Clareval Block 6	13-Sep-16	12:35:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.36	108.4	<0.22	<110.0	0.0%	0	0.0%	0	16	Nil
Clareval Block 2	16-Sep-16	12:31:00	<0.22	<110.0	0.3	105.4	0.44	104.6	0.82	107.8	0.75	99.5	0.0%	0	0.0%	0	17	Nil
Clareval Block 7	21-Sep-16	12:46:00	<0.22	<110.0	<0.22	<110.0	0.37	100.8	0.48	105.7	0.48	98.9	0.0%	0	0.0%	0	18	Nil
Clareval Block 7	28-Sep-16	11:36:00	<0.22	<110.0	0.59	106.4	0.39	107.2	1.23	109.1	0.57	104.0	0.0%	0	0.0%	0	19	Nil
Clareval Block 7	06-Oct-16	15:25:00	<0.22	<110.0	0.4	106.6	0.46	108.1	1.29	110.1	0.45	100.5	0.0%	0	0.0%	0	20	Nil
Clareval Block 7	07-Oct-16	11:01:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.37	96.7	0.24	100.0	0.0%	0	0.0%	0	21	1B
Clareval Block 7	15-Oct-16	11:20:00	0.22	88.9	0.28	103.3	0.54	104.6	0.68	108.2	0.71	104.0	0.0%	0	0.0%	0	22	Nil
Clareval Block 7	20-Oct-16	11:11:00	<0.22	<110.0	0.45	103.6	0.51	107.2	0.93	111.5	0.56	105.5	0.0%	0	0.0%	0	23	2A
Clareval Block 7	25-Oct-16	11:06:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.25	103.1	<0.22	<110.0	0.0%	0	0.0%	0	24	Nil
Clareval Block 7	28-Oct-16	10:56:00	<0.22	<110.0	0.46	105.1	0.56	104.6	0.95	109.3	0.56	100.5	0.0%	0	0.0%	0	25	2A
Clareval Block 7	31-Oct-16	14:35:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.24	101.1	<0.22	<110.0	0.0%	0	0.0%	0	26	Nil
Clareval Block 7	04-Nov-16	14:37:00	<0.22	<110.0	0.46	108.1	0.38	107.7	1.19	111.8	0.35	104.0	0.0%	0	0.0%	0	27	Nil
Weismantel Strip 16	03-Dec-16	11:17:00	<0.22	<110.0	0.57	111.9	<0.22	<110.0	0.63	124.4	Monitor removed		0.0%	0	0.0%	0	28	Nil

Duralie Coal Mine Blast Monitoring Results

Location	Date	Time	Schultz (AB1)		Fisher-Webster (AAAB3)		Moylan (AAAB4)		Weismantel Inn		Bragg (Additional)		Overpressure Site Exceedance ¹	Overpressure "Cumulative Exceedance" ¹	Ground Vibration Site Exceedance ¹	Ground Vibration "Cumulative Exceedance" ¹	Monitored Blasts ¹	Fume Rating
		24hr	mm/s	dBL	mm/s	dBL	mm/s	dBL	mm/s	dBL	mm/s	dBL	%		%			
Weismantel Strip 16	14-Dec-16	14:36:00	<0.22	<110.0	0.45	108.8	0.41	97.5	0.53	107.0	Monitor removed		0.0%	0	0.0%	0	29	Nil
Weismantel Strip 16	16-Dec-16	11:12:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.32	111.4			0.0%	0	0.0%	0	30	Nil
Clareval Block 7	21-Dec-16	11:09:00	<0.22	<110.0	0.35	102.1	0.54	102.4	1.36	108.8			0.0%	0	0.0%	0	31	Nil
Clareval Block 7	06-Jan-17	12:12:00	<0.22	<110.0	0.33	104.6	0.42	104.2	0.92	108.1			0.0%	0	0.0%	0	32	Nil
Clareval Block 7	12-Jan-17	12:05:00	<0.22	<110.0	0.302	102.7	0.49	102.8	0.74	109.8			0.0%	0	0.0%	0	33	Nil
Weismantel Strip 16	19-Jan-17	11:37:00	<0.22	<110.0	0.25	104.9	<0.22	<110.0	0.35	109.2			0.0%	0	0.0%	0	34	Nil
Weismantel Strip 16	25-Jan-17	9:09:00	<0.22	<110.0	0.65	105.5	0.37	106.3	0.84	113.5			0.0%	0	0.0%	0	35	1A
Clareval Block 7	02-Feb-17	11:46:00	<0.22	<110.0	0.55	103.0	0.38	102.0	1.03	106.5			0.0%	0	0.0%	0	36	Nil
Weismantel Strip 16	10-Feb-17	10:36:00	<0.22	<110.0	<0.22	<110.0	0.27	111.8	0.84	121.4			0.0%	0	0.0%	0	37	Nil
Clareval Block 7	17-Feb-17	11:30:00	<0.22	<110.0	0.32	99.1	0.32	104.2	0.68	109.8			0.0%	0	0.0%	0	38	Nil
Weismantel Strip 16	24-Feb-17	14:53:00	<0.22	<110.0	0.65	107.1	0.32	109.6	0.75	115.4			0.0%	0	0.0%	0	39	Nil
Weismantel Strip 16	03-Mar-17	15:22:00	<0.22	<110.0	0.65	105.1	0.38	104.6	1.00	114.2			0.0%	0	0.0%	0	40	Nil
Weismantel Strip 16	08-Mar-17	11:42:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.36	112.5			0.0%	0	0.0%	0	41	Nil
Weismantel Strip 16	14-Mar-17	15:02:00	<0.22	<110.0	0.51	106.6	0.31	117 ²	1.15	123.9			2.4%	1	0.0%	0	42	Nil
Weismantel Strip 16	22-Mar-17	15:00:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.32	103.8			2.3%	1	0.0%	0	43	2A
Weismantel Strip 16	29-Mar-17	15:09:00	<0.22	<110.0	0.67	103.3	0.27	106.0	1.14	114.7			2.3%	1	0.0%	0	44	Nil
Clareval Block 7	05-Apr-17	11:37:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.63	104.2			2.2%	1	0.0%	0	45	Nil
Weismantel Strip 16	13-Apr-17	11:37:00	<0.22	<110.0	0.49	106.2	0.26	106.0	0.86	114.7			2.2%	1	0.0%	0	46	3A
Clareval Block 7	20-Apr-17	11:30:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0			2.1%	1	0.0%	0	47	Nil
Weismantel Strip 16	24-Apr-17	15:10:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0			2.1%	1	0.0%	0	48	Nil
Weismantel Strip 16	02-May-17	11:39:00	<0.22	<110.0	0.33	103.3	0.24	106.8	0.57	112.5			2.0%	1	0.0%	0	49	Nil
Clareval Block 7	05-May-17	14:59:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.41	105.6			2.0%	1	0.0%	0	50	Nil
Clareval Block 7	12-May-17	11:35:00	<0.22	<110.0	<0.22	<110.0	0.31	100.5	0.9	107.8			2.0%	1	0.0%	0	51	Nil
Weismantel Strip 16	24-May-17	11:28:00	<0.22	<110.0	0.33	98.6	<0.22	<110.0	0.61	115.4			1.9%	1	0.0%	0	52	Nil
Clareval Block 7	01-Jun-17	13:30:00	<0.22	<110.0	0.33	102.1	0.47	97.5	0.89	104.9			1.9%	1	0.0%	0	53	Nil
Clareval Block 7	07-Jun-17	11:41:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.49	104.5			1.9%	1	0.0%	0	54	Nil
Clareval Block 7	09-Jun-17	12:29:00	<0.22	<110.0	<0.22	<110.0	0.38	103.5	0.8	114.2			1.8%	1	0.0%	0	55	Nil
Clareval Block 7	16-Jun-17	13:22:00	<0.22	<110.0	<0.22	<110.0	0.41	109.9	0.65	116.7			1.8%	1	0.0%	0	56	Nil
Clareval Block 7	23-Jun-17	12:12:00	<0.22	<110.0	<0.22	<110.0	0.25	98.9	0.56	105.2			1.8%	1	0.0%	0	57	Nil

Note 1 Site exceedance, monitored blasts & cumulative exceedances reference blasts between 4/9/16 and most recent blast.

Note 2 Blast exceedance of 115dBL or 5mm/s.

Note 3 Blast exceedance of 120dBL or 10mm/s

*Note: Blast compliance,

- No more than 5% of total blasts for annual monitoring period to exceed an overpressure of 115dBL(L) or ground vibration of 5mm/s.
- No blast is to exceed an overpressure of 120dBL(L) or ground vibration of 10mm/s.
- Weismantel's Inn – No blast is to exceed 10 mm/s ground vibration. No limit on overpressure.
- Mammy Johnson's Grave - No blast is to exceed 5 mm/s ground vibration. No limit on overpressure.

Appendix 6:

Real Time Noise Results

DCPL Real-time Noise Monitoring Response Register

*Note: Commencement Date December 2013

Alarm Date/Time	Review of Meteorological Data (Does the noise criteria apply)	Review of real-time audio to determine mine contribution	Identified source of noise emissions	Management Measures Taken	Review of real-time data to determine whether the management strategy has resulted in a discernible noise reduction.
30/07/2016 2:30	Yes	Review of real-time noise indicates potentially false alarm.	No significant mine contribution on audio.	N/A	N/A
1/08/2016 1:15	Yes	N/A	Monday morning, no operations commenced.	N/A	N/A
14/08/2016 0:15	Yes	N/A	Monday morning, no operations commenced.	N/A	N/A
18/01/2017 21:45	Yes. Moderate south winds.	RTN levels between 39-42dBL between 21:00 to 22:30. Reduce to <35dBL after 22:45 for remainder of night period.		One digger fleet operating.	RTN levels had reduced after 22:45.
18/01/2017 22:30	Yes	RTN levels between 39-42dBL between 21:00 to 22:30. Reduce to <35dBL after 22:45 for remainder of night period.		One digger fleet operating.	RTN levels had reduced after 22:45.
7/02/2017 20:30	Yes	RTN level briefly above alarm level at 8pm and reduced by 8:30pm. Elevated level due to moderate south wind.	N/A	N/A	N/A
18/02/2017 21:30	Yes	Thunder storms	N/A	N/A	N/A
20/02/2017 2:00	Yes	Thunder storms	N/A	N/A	N/A
21/02/2017 7:30					
23/02/2017 23:15					
1/03/2017 7:45	Yes	Rain, Wind	N/A	N/A	N/A
3/03/2017 7:15	Yes	Rain, Wind	N/A	N/A	N/A
7/03/2017 0:30	Yes	Southerly winds and showers.	N/A	N/A	N/A
13/06/2017 0:00	N/A	Low battery voltage due to prolonged cloudy weather.	N/A	N/A	N/A
13/06/2017 20:30	Yes	Cloudy and showers.	Fluctuating noise levels since reconnecting power. Requires inspection.	N/A	N/A
16/06/2017 0:00	Multiple alarms over previous days.	Yes. There appears to be issues with the noise readings. Review of audio contains static noise. No audible mine noise contribution.	Advise novecom of faults. Service and repair undertaken by Novecom. Issues with solar charging from prolonged cloudy weather.	N/A	N/A

Appendix 7:

Complaints

Duralie Complaint Summary

Period: 12 Months to June 2017

Total No. of Complaints: 17 (3 noise, 0 blasting, 14 air quality (inc. odour), 0 other)

Total No. of Complainants: 9

Date/Time of Complaint	Complainant Location	Method of Complaint	Nature of Complaint	Investigation/Outcome
29/07/2016 9:50hrs	Gloucester	Community hotline	Odour from mine	Complaint: "Strong sulphur smell is coming from the mine" DCPL Response Comments: <ul style="list-style-type: none"> The complaint was referred directly to the operations manager for immediate investigation. Two areas of spontaneous combustion were identified potentially contributing to the odour. A risk assessment was undertaken to access the areas and measures taken to manage the spontaneous combustion and generation of odours/gases. This includes removal of material and capping to reduce air flow. Some additional follow-up work was undertaken on the PAF dump. Outcome: <ul style="list-style-type: none"> Incident reported to EPA and DP&E. Monitoring for spon comm will continue. DCPL called complainant on 1-8-2016 and provided response. No further information was requested.
29/07/2016 14:00hrs	4km North of mine	Community hotline	Odour from mine	Complaint: "This morning a very strong smell hurt throat and caused headache" DCPL Response Comments: <ul style="list-style-type: none"> As per details above. Outcome: <ul style="list-style-type: none"> DCPL called complainant on 1-8-2016, no answer. Called back on 2-Aug-2016 - DCPL provided information regarding spontaneous combustion and general information regarding the Duralie operations. The complainant stated they had smelt the odours for a couple of weeks, particularly morning and evening. The complainant thanked DCPL for the information and follow-up. Monitoring for spontaneous combustion and odour will continue.
29/07/2016 14:00hrs	Approx. 1.5km NNE of operation.	Email	Odour from mine	Complaint: "There has for some weeks now been very bad odours emanating from your Duralie operation" DCPL Response Comments: <ul style="list-style-type: none"> As per details above. Outcome: <ul style="list-style-type: none"> MP emailed complainant on 1-8-2016 and provided response. Complainant requested further information on 2-August-2016. DCPL conducted additional inspections and gas monitoring and provided a response to the complainant. Spontaneous combustion is management in accordance with the Spontaneous Combustion Management Procedure. Monitoring for spontaneous combustion and odour will continue. Gas monitoring is also undertaken as required.
05/08/2016 12:07hrs	4km North of mine	Community hotline	Odour from mine	Complaint: "Bad Smell" DCPL called the complainant who advised the smell had been bad between 6am-8am. <ul style="list-style-type: none"> An inspection of the area was undertaken immediately (i.e.12:15pm), however the odour was not present at this time. Monitoring has been undertaken for the past 4 days. Further monitoring will be undertaken during the early morning as anecdotal comments indicate this is when the odour is most noticeable as discussed with complainant.
06/08/2016 12:28hrs	Approx. 1.5km NNE of operation.	Community hotline and email.	Odour from mine	Complaint: "Ongoing odour from mine". The complainant provided an email requesting a response to several concerns. <ul style="list-style-type: none"> DCPL called the complainant on 8-Aug-2016 at 9:00am to acknowledge receipt of complaint. DCPL advised they had been addressing the issue with odours over the weekend and would provide further response to the complaint. DCPL provided a letter response to the complaint with details regarding odour issues, compliance conditions, monitoring, ongoing management measures and reporting. The complainant still had concerns following this response and DCPL proposed to arrange a meeting with the complainant to discuss the matter further.

23/08/2016 9:27hrs	4km North of mine	Community hotline	Odour from mine	<p>Complaint: "Bad Smell from mine again"</p> <p>DCPL called the complainant back at 9:37hrs. The complainant advised the smell was bad again this morning. Inspections by Duralie Coal staff also identified odour near Duralie Rd.</p> <ul style="list-style-type: none"> • The complaint asked questions about the odour and what actions the mine was taking. The odour had passed at the time of the call. • DCPL provided information on the ongoing management of PAF material and odours. Progress had been made although further work was still required. Monitoring has continued to ensure no levels above health guideline. DCPL recognise the odour can be offensive and work is schedule to continue to resolve the issue as a matter of priority.
24/08/2016 9:20hrs	Approx. 1.5km NNE of operation.	Email	Odour from mine	<p>Complaint: "The caller reported air pollution coming from EPL11701 . The caller described the odour as an acrid smell causing hard of breathing. The odour is ongoing."</p> <ul style="list-style-type: none"> • DCPL had previously provided a report to EPA following the first incident on 29 July 2016. • DCPL prepared a further report with additional details on the management measures which had been taken to resolve the odour issues, DCPL are treating the matter as a priority and had received independent advice on the measures which should be taken going forward. • Monitoring will continue during this process. • No further action has been requested from the EPA at this point. DCPL are continuing to manage self heating and odours.
1/11/2016 9:00hrs	5.5km NE of mine.	Mobile	Odour from mine	<p>Complaint: "Strong odour from mine site."</p> <ul style="list-style-type: none"> • DCPL staff inspected the area along Terreel Rd at 10am however the odour had passed. DCPL arranged to meet with the complainant to further discuss the matter and other general progress at Duralie. • No further action has been requested at this point.
1/11/2016 8:15hrs	Approx. 3.4km NNE of mine	Community hotline	Odour from mine	<p>Complaint: "Gas smell". DCPL returned phone call at 1:30pm, no answer. Called again on 2/11/16 at 9:40am, no answer.</p> <ul style="list-style-type: none"> • DCPL returned call again on 2/11/16 at 1:45pm. Complainant advised this was the first time they had smelt the odour and were not sure what it was coming from. • DCPL provided information on spon com and self-heating issues and the measures being taken by Duralie to manage the issue. DCPL staff offered to meet with the landholder if the issue continued. • No further response required at this time.
1/11/2016 8:30hrs	6.0km NE of mine	Community hotline	Odour from mine	<p>Complaint: "Awful smell of sulphur, don't normally smell it". DCPL returned phone call at 1:30pm, no answer.</p> <ul style="list-style-type: none"> • DCPL returned call again on 2/11/16 at 9:30am. Complainant advised they had only smelt the odour a few times however it was the worst yesterday morning. • DCPL provided information on spon com and self-heating issues and the measures being taken by Duralie to manage the issue. DCPL staff offered to meet with the landholder if the issue continued. • No further response required at this time.
5/12/2016 9:00hrs	Approx. 3.4km NNE of mine	EPA hotline	Odour from mine	<p>EPA Hotline Incident Description: <i>Strong coal smell coming from Duralie Coal Mine Bucketts Way Stroud Road.</i> DCPL provided a response to the EPA on 5 December 2016. No further information has been request. DCPL continue to manage any odours from the mine site.</p>
21/12/2016 12:11hrs	Approx. 1.5km NNW of operation.	Email	Odour from mine	<p>Complaint: "Odours worse than ever, it's been 5hrs of hell. When are these poisonous emissions going to stop? What are you doing about it?"</p> <ul style="list-style-type: none"> • The Ops Manager and OCE were immediately notified of complaint. An inspection of Martins Crossing Rd and Duralie Rd was undertaken and no smell was noticeable at 12:30pm. The OCE advised there had been no increased level of odours noticeable during the morning. • DCPL called a nearby neighbour to follow-up on odours. They advised the odours had improved although they could still smell them occasionally in the early morning and evening and it was noticeable this morning. • Weather observations: There was a southerly change at around 6am on 21/12 which coincides with the time of the complaint. • Phone call to complainant on 22/12/2016 to discuss odours and management measures undertaken by DCPL.

21/12/2016 20:00hrs	Approx. 1.5km W of mining operation	Community hotline	Noise	<p>Complaint: "Noise and explosions. I am an asthmatic."</p> <ul style="list-style-type: none"> • DCPL called the complainant on 23/12/2016. The complaint advised they thought the explosion and noise came from the mine direction. DCPL advised there had been no blasting at this time. The complainant advised it was not normal mine operation noise. They also stated there was an odour present. They did not want any further information or follow-up. • The complaint was reported to the operations manager. The source of the explosion noise is unknown and possibly not related to the mine. Management of odours from the PAF waste emplacement is ongoing.
18/01/2017	No details	Community hotline	Visible dust	<p>Complaint: "Fair bit of dust laying on the road". Declined to leave details or a name. Location not identified.</p> <ul style="list-style-type: none"> • Weather Conditions: Very hot day with NW winds. A strong southerly change arrived at 4:00pm. Conditions in the valley were generally hazy with visible dust not specifically related to mining. • No further action required.
7/02/2017 9:00hrs	4km North of Mine	Community hotline	Odour from mine	<p>Complaint: "Bad sulphur smell early this morning". The complainant declined a return call.</p> <ul style="list-style-type: none"> • The OCE was advised of the complaint. Heating had been present on the PAF dump on 6/2/2017 however the odours had not been strong. Gas monitoring had been undertaken directly on the PAF dump with no high levels recorded. • There were bushfires on the afternoon of 6/2/2017 and the presence of smoke had been noted. • Weather: There was a southerly change at 11pm on 6/2/2017 which may have contributed to some odours at the residence. DCPL continue to monitor heating and odours on the PAF emplacement area.
28/04/2017 22:30hrs	Wards River Village	Community Hotline	Mine Noise	<p>Complaint: Noise complaint.</p> <ul style="list-style-type: none"> • DCPL called the complainant at 9:30am on 1/5/2017. The complainant stated the mine noise had been bad for a few weeks and was particularly loud on Friday night. • DCPL representative advise the operations ceased at 11pm and no operations occur on weekends. One digger and truck fleet is currently working in the north end of Weismantel. • Quarterly noise monitoring in Wards River has continued and was undertaken during the week. The operations were not audible during the monitoring. The real-time noise monitoring profiles indicate no elevated noise levels over the previous nights. • The complainant indicated noise was still an issue for many residents however they have stopped complaining as nothing was being done. DCPL advised they would encourage any concerned residents to continue notifying DCPL so they could continue to engage with neighbours and improve performance.
9/05/2017 22:30hrs	Wards River Village	EPA hotline	Mine Noise	<p>Complaint: Received by EPA - Excessive noise from truck movement at Duralie Coal Mine Bucketts Way, Stroud. Caller advised noise ongoing all day. Started getting excessive approx. 30 minutes ago.</p> <ul style="list-style-type: none"> • The EPA requested information from DCPL regarding the complaint. • DCPL provided information to the EPA including real-time noise monitoring results, operations, actions undertaken. • Real-time noise levels were below the investigation levels during this period. • No further action requested.

Appendix 8:

Duralie Coal Mine Annual Biodiversity Report 2017



Duralie Coal Mine – Annual Biodiversity Report 2017

FOR THE YEAR ENDING 30 JUNE 2017

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1 INTRODUCTION

The Duralie Coal Mine (DCM) Annual Biodiversity Report contains a review of Duralie Coal Pty Ltd.'s (DCPL's) environmental performance and progress against the requirements of the DCM Biodiversity Management Plan (BMP) covering the mining lease area and biodiversity offset areas in accordance with Section 7.2 of the BMP.

This Annual Biodiversity Report is included as an Appendix of the DCM Annual Review which will be made publicly available on the Duralie Coal website, www.duraliecoal.com.au.

During the reporting period a revised BMP was submitted to the NSW Department of Planning and Environment (D&PE) on 3 August 2016 and is yet to be approved. The revisions predominantly related to bushfire management and weeds management measures.

2 STATUS OF BMP PERFORMANCE CRITERIA

The performance criteria for the DCM mining lease and offset areas are presented in Tables 12 to 19 and 21 of the BMP (the same numbering is used in this report for consistency). The performance criteria have been developed to meet the objectives for the areas described in Section 2 of the BMP. All performance criteria are linked to the management specifications listed in the BMP Section 6, and monitoring/reporting specifications in the BMP Section 7. The status of BMP performance criteria is provided in the subsequent sections of this report.

Legend	Not commenced	In progress	Completed
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3 VEGETATION CLEARANCE REPORT

Vegetation clearance for the period July 2016 to June 2017 was undertaken in accordance with the BMP Section 5.4 Vegetation Clearance Plan. Prior to any clearance operations a Clearing Plan Checklist was completed and vegetation pre-clearance surveys were undertaken. During 2016/17 approximately 2 hectares of vegetation was cleared from the northern extent of the Weismantel pit in advance of mining operations. Appendix 1 contains a summary of the habitat features cleared and any fauna observed (species, number and condition) during clearance operations in 2016/17. This information is used to determine the requirements for nest box replacement in the biodiversity offset areas (refer Section 8).

Vegetation has now been cleared up to the northern boundary for the approved project. During the vegetation clearance operations for the reporting period no threatened species were observed or encountered. At the end of the reporting period a total of 2 tree hollows from two trees had been removed (Appendix 1).

4 SALVAGED AND REUSED MATERIAL FOR HABITAT ENHANCEMENT

The BMP requires salvaged material from vegetation clearance activities to be used for habitat enhancement within the revegetation areas.

During the reporting period cleared vegetation was managed as follows:

- Suitable trees and stumps salvaged and stockpiled for reuse. This includes vegetation cleared from Strip 16.
- No new vegetation was mulched, however mulch in stockpiles was used on the rehabilitation and incorporated into topsoil.
- Six stag trees were installed in the rehabilitation area.

5 NEST BOX PROGRAMME

BMP Table 12
Nest Box Program Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Year 1 (2013) PC Restoration Preparation Phase	Year 2 (2014) PC Preliminary Restoration Phase	Year 3 (2015) PC VMU Installation Establishment	Annually from Year 3 onwards (2016 onwards) PC Maintenance Phase	CC
Nest box strategy including target species, habitat trees/feature, nest box designs maintenance and monitoring	Nest box plan developed following habitat assessment and pre-clearance surveys (Section 5.4).				
Nest box installation includes installation of 18 Squirrel Glider boxes, however may be expanded as required.	Hollow bearing habitat features (nest boxes) installed (Section 6.4).				Nest boxes installed.

Maintenance and monitoring of installed net boxes. Including monitoring for European Bee invasion and repair/replacement		Monitoring in autumn and spring completed. Maintenance undertaken where required (Sections 6.4 and 7.1).	Annual nest box monitoring and maintenance (Sections 6.4 and 7.1).	Annual nest box monitoring and maintenance (Sections 6.4 and 7.1).	Nest boxes monitored and maintained, being replaced where required.
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AMBS Ecology & Heritage (AMBS) was commissioned to implement the nest box programme as described in the BMP Section 5.4.2 and Section 6.4. The nest box programme consists of two main components:

- Replacing 18 boxes specifically targeting the Squirrel Glider; and
- Replacing boxes on a like for like basis for any hollow bearing trees cleared during vegetation clearance operations (refer Section 3).

Implementation of the nest box programme requires installation of the boxes described above followed by monitoring and maintenance of the nest boxes. The installation of nest boxes has occurred over four periods with the final installation in September 2016. An annual nest box monitoring report was completed by AMBS following the fourth annual monitoring in September 2016 (full text available on request), the executive summary from the report is reproduced below. No further nest box installations are required during the next reporting period. Monitoring is scheduled for September 2017.

The programme currently involves:

- 18 nest boxes targeting the Squirrel Glider (*Petaurus norfolcensis*), installed between 4 February 2013 and 8 February 2013;
- 106 nest boxes targeting a variety of hollow-dependent species, installed between 21 August 2013 and 30 August 2013;
- 45 nest boxes targeting a variety of hollow-dependent species, installed between 9 September 2014 and 12 September 2014; and
- 42 nest boxes targeting a variety of hollow-dependent species, installed between 19 September 2016 and 23 September 2016.

This report summarises the work undertaken in relation to the Nest Box Programme for the Duralie Offset Area between April 2015 and September 2016, in accordance with the Duralie Coal Mine Biodiversity Management Plan (BMP). Works undertaken and other milestones that took place during this period included yearly monitoring of 18 Squirrel Glider and 106 additional nest boxes (Variation 1) in September 2015 and 2016. Monthly monitoring of 45 additional nest boxes (Variation 2) was undertaken from April to September 2015, with annual monitoring in September 2016. During September 2016, an additional 42 nest boxes (Variation 3) were installed in the offset areas.

*During the monitoring of the Squirrel Glider nest boxes, the target species was recorded within one nest box. Other vertebrate species recorded included the Sugar Glider (*Petaurus breviceps*) and Brown Antechinus (*Antechinus stuartii*). All 18 Squirrel Glider nest boxes have been occupied or showed signs of previous occupancy at some stage since their installation. Management of European Bees (*Apis mellifera*) which had occupied a nest box in March 2015 was successful, with no live bees observed during April 2015. Four additional nest boxes had signs of previous occupation by bees. A dead Sugar Glider was recorded for the first time in two separate nest boxes, once during September 2015, and again in September 2016.*

*Seventy-nine of the 106 nest boxes installed during August 2013 were occupied or shown signs of occupation at some stage since their installation. This is an occupancy rate of approximately 75%, 36 months after installation. Twelve species were recorded in the nest boxes or shown signs of previous occupation, during the period relevant to this report. Five of these species have not previously been recorded during the Nest Box Programme, including the Gould's Long-eared Bat (*Nyctophilus gouldi*), Lesser Long-eared Bat (*Nyctophilus geoffroyi*), White-throated Treecreeper (*Cormobates leucophaea*), Common Tree Snake (*Dendrelaphis punctulatus*) and the Bush Rat (*Rattus fuscipes*; probable).*

Thirty-nine of the 45 additional nest boxes installed in September 2014 were occupied or shown signs of occupation at some stage since their installation. This is an occupancy rate of approximately 87%, 24 months after installation. Ten species were recorded in the nest boxes or shown signs of previous occupation, during the period relevant to this report. Two species, the Bush Rat (*Rattus fuscipes*; probable) and Carpet or Diamond Python (*Morelia* sp.), have not previously been recorded within the nest boxes during the Nest Box Programme. A small amount of bees wax was recorded in one nest box, but no bees were present.

Twenty vertebrate species have now been recorded within nest boxes during the Nest Box Programme. This includes eleven species of mammal (Brown Antechinus, Bush Rat [probable], Brush-tailed Phascogale, Common Brushtail Possum, Common Ringtail Possum, Feathertail Glider, Gould's Wattled Bat, Lesser Long-eared Bat, Gould's Long-eared Bat, Sugar Glider and Squirrel Glider), five species of bird (Australian King-Parrot, Eastern Rosella, Australian Owlet-nightjar, Australian Wood Duck and White-throated Treecreeper), one frog species (Peron's Tree Frog) and three species of reptile (Lace Monitor, Common Tree Snake and Diamond/Carpet Python). The majority of nest boxes were in good condition, with little maintenance required. One Phascogale nest box required replacement due to significant degradation. The metal strap for one Feathertail Glider nest box detached and required fixing, and a large branch had broken off a nearby tree and hit two nest boxes which required repositioning. The two nest boxes at B17 were relocated to a different tree due to concerns regarding the safety of the original tree. Signs of bees were recorded at five nest boxes, but no bees were present at the time of the survey. Future monitoring will be important to ensure bees do not establish within nest boxes in the offset areas.



Plate 1 - Sugar Gliders (*Petaurus breviceps*)



Plate 2 - Common Tree Snake (*Dendrelaphis punctulatus*)

6 WEED CONTROL AND MONITORING

BMP Table 13
Weed Control Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Year 1 (2013) PC Restoration Preparation Phase	Year 2 (2014) PC Preliminary Restoration Phase	Year 3 onwards (2015) PC VMU Installation Establishment	Annually from Year 3 onwards (2016 onwards) PC Maintenance Phase	CC
Permit to clear woody weeds along the Mammy Johnsons River (If Required)	Permit obtained from the relevant CMA. Permit covers duration of activities (If required).				Permit to clear woody weeds along Mammy Johnsons River obtained for life of activities.

Weed Control/treatment program in remnant enhancement and regrowth management VMUs	Primary woody weed control undertaken using methods specified in Appendix E (Sections 5.9 and 6.5). Primary control of priority target weeds described in Sections 5.9 and 6.5 commenced, using method described in Appendix E.	Follow-up woody and priority weed control undertaken as per Appendix E and Sections 5.9 and 6.5.	Follow-up woody and priority weed control undertaken as per Appendix E and Sections 5.9 and 6.5. Target/ priority weed coverage in Offset reduced by 90% (Section 6.7).	Follow-up woody and priority weed control undertaken as per Appendix E and Sections 5.9 and 6.5. Target/ priority weed coverage in Offset reduced by 90% (Section 6.7).	Target/priority weed coverage within offset VMUs reduced by 90%.
Weed control/ management in Installation (revegetation) VMUs	Pre-cultivation spraying in all installation VMUs undertaken including control of exotic Sporobolus and fireweed (Figure 7 and Section 6.11).	Second cultivation spray in all installation VMUs undertaken including control of exotic Sporobolus and fireweed where necessary (Section 6.11). Control of competitive plants within revegetation areas as detailed in Section 6.11.	Additional pre-planting weed treatment in all installation VMUs undertaken if required (Section 6.11). Control of competitive plants within revegetation areas as detailed in Section 6.11.	Additional pre-planting weed treatment in all installation VMUs undertaken if required (Section 6.11). Control of competitive plants within revegetation areas as detailed in Section 6.11.	Control of competitive plants within revegetation areas until maintenance phase (detailed in Section 6.11) is complete i.e. 90% of canopy and shrub species have survived 12 months after planting including replanting of lost species.
Monitoring and reporting		Monitoring and documentation of weed species, occurrence and densities as per Section 7.1.	Monitoring and documentation of weed species, occurrence and densities as per Section 7.1.	Monitoring and documentation of weed species, occurrence and densities as per Section 7.1.	Annual monitoring and reporting undertaken.

Greening Australia were contracted to undertake an initial weed assessment of the offset area. The aim of the weed assessment was to assist in setting priorities and developing on-ground actions for weed control and is presented in the form of a mapping survey. The mapping survey provides reference to individual weed infestations within each vegetation management unit (VMU) for the biodiversity offset area. Each weed occurrence was allocated a priority ranking based on the species status i.e. noxious or agricultural, and the size and density of the infestation. The survey information contributed to the development of a strategic approach to the control of priority weeds and allow contractors to locate infestations using the mapping files. Additionally, it will continue to assist in tracking weeds to gauge the effectiveness of control measures and the potential spread and future distribution.

Follow-up weed treatment of all remnant enhancement and regrowth management VMUs recommenced in October 2016 and continued through to April 2017. Additional weed management activities within the Mining Lease areas recommenced in September 2016. The key species targeted include blackberry, lantana and Giant Parramatta grass. This is the fourth round of weed control activities in the offset areas. Revegetation works continued during autumn 2017 and pre-cultivation spraying was undertaken in preparation for the revegetation works.

In April 2015 DCPL arranged a meeting with Great Lakes Council (GLC) weeds officer to discuss weeds management activities and in particular the management of woody weeds within the riparian zone of Mammy Johnsons River located in the Duralie Offset Area. Advice has been provided with regard to necessary permits, target species, methodologies (i.e. chemical or mechanical) and suitable chemicals for use in riparian zones. During 2016/17 the removal of privet adjacent to Mammy Johnsons River in the offset areas continued using mechanical removal and chemical spraying.

During 2016 DCPL engaged DPI to conduct a GPG fungus trial program on Yancoal properties. The trial commenced during October 2016 and plots have been established by a DPI officer with support from DCPL and a local community member on

Yancoal property north of Wards River. A follow-up inspection was undertaken by DPI in May 2017. An update on any further progress will be provided in the 2018 report.

Success of weed management has been monitored and documented in the *DCM Biodiversity Offset Monitoring of Landscape Function and Vegetation Structure 2017* (available in the DCM environment office). Monitoring of the VMUs including the effectiveness of weed control will continue to be undertaken annually in conjunction with the Landscape Function Analysis (LFA) and vegetation monitoring. The monitoring report indicate:

The number and density of weed species was generally very low with only Lantana camara (Lantana) being wide spread within the VMUs themselves. Ligustrum sinense (Small-leaved Privet) was recorded in VMUs B and E. Other weeds observed along access tracks included Ageratina adenophora (Crofton Weed), Andropogon virginicus (Whisky Grass) and Sporobolus fertilis (Giant Parramatta Grass).

7 FERAL ANIMAL CONTROL AND MONITORING

AMC was commissioned to undertake the initial invasive animal survey, in accordance with Section 5.10 of the BMP. The objectives of the study was to determine the range of invasive animals that occur or are likely to occur within the DCM and offset areas and provide recommendations for invasive animal control.

During the reporting period DCPL engaged MDP Vertebrate Pest Management to implement a wild dog and fox control program. The program was undertaken during October to December 2016 and covered the Biodiversity Offset area, the Duralie and Stratford Mining Leases and surrounding Yancoal owned property. The program involved a combination of trapping and shooting. A total of 24 dogs and foxes were caught during the program.

A second trapping program was undertaken during April 2017 and a further 17 dogs and foxes were caught across the offset and Mining Lease areas.



Plate 3 - Wild Dog Trapping

In accordance with the BMP Section 5.10 a follow-up feral animal survey was undertaken by AMBS Ecology & Heritage (AMBS) during April 2017 to monitor the success of control programs and determine priorities for ongoing control measures. A summary of the survey results is included below (full report available on request):

The results of the current invasive animal survey were similar to those from the initial invasive animal survey in 2013. A total of 14 invasive species have been recorded in the study area in the past or during recent surveys or are considered to have potential to occur. Eleven of these species were either not recorded or were recorded in very low numbers during the current surveys and are of little concern at the current time. These include the Common Starling, House Sparrow, Mallard, Rock Dove, Spotted Turtle-Dove, House Mouse, Black Rat, Brown Hare and Deer. In accordance with the BMP the abundance of these species should be monitored every two years to determine if future controls are necessary.

Four species of invasive animal were repeatedly recorded in the study area and are a potential threat to native biodiversity. These are the Fox, Feral Cat, Rabbit and the Common Myna. Wild Dogs were also recorded in the study area. Wild Dogs are mostly seen as an agricultural threat, preying on sheep, calves and other livestock (Fleming et al. 2001). They are not generally considered to have severe negative impacts on biodiversity, although this topic has not been well studied.

Wild Dogs and the Rabbit are declared pest species in NSW and Pest Control Orders have been issued under the LLS Act. Under the LLS Act private landowners are obligated to eradicate these species on their land by any lawful method. Although no legal obligation exists for landowners to control Foxes, Feral Cats or the Common Myna, from an ecological perspective control of these three species would potentially benefit native biodiversity in the area (and control of Foxes and Feral Cats is strongly recommended if control measures for Wild Dogs and European Rabbits are implemented). Foxes and Feral Cats are likely to exert considerable predation pressure on the native small to medium-sized fauna species. Their numbers are likely to increase in response to the control of the Wild Dog and they are likely to prey-switch to native species if Rabbits are controlled.

In summary:

- Foxes and Feral Cats may represent a threat to biodiversity within the study area;
- Wild Dogs are present in the study area, and while they may or may not be a threat to biodiversity, are currently a declared pest species;
- The European Rabbit is present at low densities, but its abundance can increase rapidly, particularly if dog, fox and cat numbers decrease, and it is also a declared pest species;
- The abundances of all of the above species within the study area are likely to be inter-related.

It is therefore recommended that if control measures for Wild Dogs and/or European Rabbits are implemented in order to comply with the Pest Control Order, that any such control measures should be implemented together with control measures for Foxes and Feral Cats, in a co-ordinated manner, and the impacts monitored. For Wild Dogs a combination of 1080 baiting and trapping are the recommended methods. It is recommended to integrate the control of Foxes with the Wild Dog control program. For the control of Feral Cats trapping is recommended. To control rabbits nationwide, a new strain of the RHD virus has been released in March 2017. However, knockdown rates are expected to be low and control through the virus should not be relied upon. The recommended method for Rabbit control at the DCM is 1080 baiting followed by warren destruction.

The control of the Common Myna is recommended and the patchy distribution of the Myna throughout the study area may assist in control efforts. The recommended method for the Myna is selective trapping at points of high activity.

Pest control in the study area should be considered in the context that the study area represents a small part of a much broader region. Pest control in the study area alone is likely to be of only temporary and limited benefit, unless carried out in a broader area in conjunction with other landholders, and carried out over the medium to long term.

In addition to the above the following is recommended:

- Monitoring of invasive animal species at least every two years to determine changes in abundance or species which have recently moved into the study area;
- Post-control monitoring for all species due to small size of study area and high re-colonisation potential for all invasive species; and
- Initiate or encourage and support initiatives for larger-scale control of invasive species throughout the Gloucester Valley to improve the likelihood of long-term success.

8 CONTROLLING ACCESS AND MANAGING GRAZING

BMP Table 14
Managing Grazing and Agriculture Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Year 1 (2013) PC Restoration Preparation Phase	Year 2 (2014) PC Preliminary Restoration Phase	Year 3 onwards (2015) PC VMU Installation Establishment	Annually from Year 3 onwards (2016 onwards) PC Maintenance Phase	CC
Managing grazing and agriculture	Livestock excluded from the Offset through installation of gates and fencing illustrated in Figure 9 (Section 6.7).				Livestock excluded from the offset.
Monitoring and maintenance of fencing and gate infrastructure		Monitoring of gates and fencing to exclude livestock. Where required, maintenance undertaken and documented (Section 7.1).	Monitoring of gates and fencing to exclude livestock. Where required, maintenance undertaken and documented (Section 7.1).	Monitoring of gates and fencing to exclude livestock. Where required, maintenance undertaken and documented (Section 7.1).	Gates and fencing monitored and maintained.

BMP Table 15
Controlling Access Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Year 1 (2013) PC Restoration Preparation Phase	Year 2 (2014) PC Preliminary Restoration Phase	Year 3 onwards (2015) PC VMU Installation Establishment	Annually from Year 3 onwards (2016 onwards) PC Maintenance Phase	CC
Operational Review to facilitate site access for offset management activities including installation, inspection and bushfire management	Operational Review developed. Review includes road, fire trail and culvert construction and requirements for fencing and revegetation cultivation/site preparation ² . Maintenance activities, particularly track maintenance and slashing have been considered (Section 6.7, plus related Sections 6.9 and 6.5)				Operational Review undertaken and outcomes implemented.
Community and stakeholder engagement	Assessment of surrounding landholders and the local community to evaluate opportunities for participation in implementation of this Biodiversity Management Plan undertaken. Local council consultation has commenced regarding placement of signage on the Johnson's Creek Road bisect area of the Offset (See Figure 9 for location) (Section 6.7).	Signage has been installed on the Johnson's Creek Road bisect area of the Offset to alert drivers of potential fauna on the roads.			Opportunities for landholder and community participation in the BMP identified. Local council consulting regarding signage. Signage installed on Johnsons Creek Road
Infrastructure including access tracks, fencing, fire trails and culverts	Access tracks, fire trails, firebreaks, fencing and culverts have been completed as per Figure 9 and the Operational Review ² (Section 6.7).				Access related infrastructure identified in the Operational Review
Monitoring and maintenance of infrastructure including tracks, fire trails, culverts and fences.		Monitoring and maintenance of all access tracks and fire trails has been undertaken ² (Sections 6.7, 6.9 and 7.1).	Monitoring and maintenance of all access tracks and fire trails has been undertaken ² (Sections 6.7, 6.9 and 7.1).	Monitoring and maintenance of all access tracks and fire trails has been undertaken ² (Sections 6.7, 6.9 and 7.1).	Regular monitoring and maintenance program for roads, tracks, fire trails, fences and culverts.

Installation works to control access and manage grazing in the offset areas was completed in 2014. During the reporting period contractors were engaged to undertake maintenance activities on access tracks, culverts, gates and fences. All livestock have continued to be excluded from the offset area with the exception of use for 'crash grazing' in preparation for revegetation activities following a field assessment by a qualified consultant.

During 2014 DCPL installed wildlife warning signage in accordance with advice from Great Lakes Council and with regard to Australian Standard AS1742.2. Further correspondence was held with GLC Ecologist in 2015 regarding future requirements for traffic controls within the offset areas. This has been completed with reassessment in a further three years (2018).

9 BUSHFIRE MANAGEMENT

BMP Table 17
Bushfire Management Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Year 1 (2013) PC Restoration Preparation Phase	Year 2 (2014) PC Preliminary Restoration Phase	Year 3 onwards (2015) PC VMU Installation Establishment	Annually from Year 3 onwards (2016 onwards) PC Maintenance Phase	CC
Operational Review to facilitate site access for offset management activities including installation, inspection and bushfire management.	Operational Review completed ² . Areas addressed within the review include road, fire trail and culvert construction along with maintenance activities, particularly track slashing (Sections 5.12 and 6.7)				
Fire excluded from the offset for initial 3 years (2012 – 2015)	Fire excluded from offset prior to 2015 (Section 6.9).	Fire excluded from offset prior to 2015.	Fire excluded from offset prior to 2015.		Fire excluded from offset prior to 2015
Bushfire Management activities through hazard reduction actions installation and maintenance of relevant access infrastructure.	Access tracks, fire trails, firebreaks, fencing and culverts have been completed as per Figure 9 and the Operational Review ² (Sections 6.7 and 6.9).	Fire management activities have been undertaken as required, including yearly access trail inspection, maintenance and repair of inaccessible tracks within one month of identification ² (Sections 5.12, 6.7 and 6.9).	Fire management activities have been undertaken as required, including yearly access trail inspection, maintenance and repair of inaccessible tracks within one month of identification ² (Sections 5.12, 6.7 and 6.9).	Fire management activities have been undertaken as required, including yearly access trail inspection, maintenance and repair of inaccessible tracks within one month of identification ² (Sections 5.12, 6.7 and 6.9).	Regular bushfire management measures in place
Monitoring and maintenance		Fuel loads monitored and documented (Sections 6.9 and 7.1). Identified issues incorporated into future management planning	Fuel loads monitored and documented (Sections 6.9 and 7.1). Identified issues incorporated into future management planning.	Fuel loads monitored and documented (Sections 6.9 and 7.1). Identified issues incorporated into future management planning.	Fuel loads monitored and maintained. Risks identified and managed as part of part of hazard reduction actions.

Where possible fire was be excluded from the offset area during the first three years (i.e. up to 2015) of management and revegetation. To assist with bushfire management access tracks have been constructed in the offset area as shown in the BMP Figure 9. During the reporting period access tracks have also been maintained to assist with bushfire management.

DCPL engaged the RFS in August 2015 to assist in the development of a burn plan for hazard reduction burning in select areas of the biodiversity offset and surrounding Yancoal owned properties. The burn plan considered areas where fire was to be excluded for bush regeneration in the offset and areas where burning was required for hazard reduction prior to revegetation activities. Hazard reduction burning activities were planned for spring 2015, however due to the lack of suitable windows for undertaking burning and limited availability of the RFS, no activities were undertaken. Hazard reduction burning activities were again planned for winter/spring 2016, however further delays have resulted in no burning to date. Continued discussions have been held with the RFS to conduct fire management activities and any such activities will be assessed and implemented to ensure the most appropriate period for ecological burn activities whilst also giving due consideration to personnel and asset safety.

Due to the delays with burning DCPL have undertaken bushfire hazard reduction through slashing of areas along Johnson's creek road, in the biodiversity offset area and surrounding the Duralie Mining lease in autumn 2017.

10 SEED COLLECTION AND PROPOGATION

BMP Table 18
Seed Collection and Tubestock Supply Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Year 1 (2013) PC Restoration Preparation Phase	Year 2 (2014) PC Preliminary Restoration Phase	Year 3 (2015) PC VMU Installation Establishment	Annually from Year 3 onwards (2016 onwards) PC Maintenance Phase	CC
Collecting and propagating seed	Seed collection (of required species as specified in Section 6.10 and Appendix F) has commenced during vegetation clearance or an alternate seed source has been obtained. (Sections 5.7 and 6.10).	Seed collection from cleared vegetation finalised (Section 5.7). Seed collection to obtain required quantities and species for future revegetation continued (Section 6.10, Appendix F).	Seed collections to obtain required quantities and species for future revegetation continued (Section 6.10, Appendix F).		Seed collection necessary to obtain required quantities and species for future revegetation completed.
Plant propagation/ tubestock supply		Propagation of species required for revegetation work in Offsets commenced. Species and quantity as per guidelines in Sections 5.7 and 6.10 and Appendix F.	Propagation of species required for revegetation work in Offsets undertaken. Species and quantity as per guidelines in Section 5.7, 6.10 and Appendix F or adjusted based on additional literature/field trial results.	Propagation of species required for revegetation/supplementary infill planting work in Offsets undertaken as per guidelines in Sections 5.7 and 6.10 and Appendix F.	Plant propagation necessary to obtain quantities and species required for revegetation completed.

Where possible all seed required for revegetation activities has been collected from within the biodiversity offset area and surrounds. Specific tree and shrub species which have not been available for collection have now been sourced through other suppliers. Further seed collection may be undertaken if found necessary to meet the completion criteria of the BMP offset revegetation and mine site rehabilitation.



Plate 4 - Native tree seed from Duralie Offset Area

11 REVEGETATION MANAGEMENT

BMP Table 19
Revegetation Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Year 1 (2013) PC Restoration Preparation Phase	Year 2 (2014) PC Preliminary Restoration Phase	Year 3 (2015) PC VMU Installation Establishment	Annually from Year 3 onwards (2016 onwards) PC Maintenance Phase	CC
Operational Review	Operational review including access, tracks and cultivation requirements for implementing revegetation completed (Section 6.7).				Operational Review completed and implemented.
Implementing Revegetation - Weed management and maintenance	Pre-cultivation spraying in all installation VMUs including control of exotic Sporobolus and fireweed undertaken (Sections 6.5 and 6.11).	Second cultivation spray in all installation VMUs undertaken including control of exotic Sporobolus and fireweed where necessary (Section 6.5 and 6.11).	Pre-plant weed treatment in all installation VMUs as per Figure 7 undertaken as required (Sections 6.5 and 6.11). Control of competitive plants within revegetation areas as detailed in Section 6.11. Maintenance including watering and herbivory controls, undertaken as required (Section 6.11).	Pre-plant weed treatment in all installation VMUs as per Figure 7 undertaken as required (Sections 6.5 and 6.11). Control of competitive plants within revegetation areas as detailed in Section 6.11. Maintenance including watering and herbivory controls, undertaken as required (Section 6.11).	Pre-planting weed control undertaken, including control of threatening weeds Sporobolus and Fireweed. Competitive plants controlled during revegetation establishment.
Implementing revegetation		Initial cultivation of all proposed trial installation VMUs commenced (Vegetation Management Units I, S, U and AB.) according to guidelines in Section 6.11.	Propagation of species required for revegetation work in Offsets commenced. Species and quantity as per guidelines in Sections 5.7 and 6.10 and Appendix F.	Revegetation planting finalised. All plants prescribed in Appendix F have been installed. (Section 6.11).	Species type and quantities planted according to threshold guidelines in the species palette or as guided by on site trials. 90% survival of shrub-layer plants 12 months after installation,

Management Action	Year 1 (2013) PC Restoration Preparation Phase	Year 2 (2014) PC Preliminary Restoration Phase	Year 3 (2015) PC VMU Installation Establishment	Annually from Year 3 onwards (2016 onwards) PC Maintenance Phase	CC
					replacement of lost plants to above threshold levels.
Implementing revegetation (Cont.)			Trial revegetation for VMUs I, S, U and AB completed. .Key treatments to trial may include gapped mounding in floodplain areas, performance of proposed species and direct seeding methods. Results from this trial should be to guide the installation area using the adaptive management process (Section 6.11). Plant palettes adjusted where field trails or research demonstrate alternative species/density (Section 6.10).	Based on learnings from the revegetation trials, planting of tubestock/direct seeding in installation VMUs according to species palette and quantity guidelines in Appendix F and Section 6.1 has been completed	90% survival of canopy-layer plants 12 months after installation, including replacement of lost plants to above threshold levels. Revegetation areas have met Assessment Criteria and Completion criteria described in Table 14, Section 8 (e.g. 90% of all initial canopy species rates are present within VMUs).
Monitoring and reporting			Monitoring and reporting of trial revegetation results, changes to plant palette, plant health, establishment success and maintenance activities. (Section 7.1).	Monitoring and reporting of trial revegetation results, changes to plant palette, plant health, establishment success and maintenance activities. (Section 7.1).	Annual Monitoring and reporting completed.

Pre-cultivation spraying was undertaken in summer to autumn 2016 in preparation for the trial revegetation works. Initial revegetation works for VMUs I, S and U commenced in autumn of 2016. Preparation works were completed including seed collection, inoculation, growing of tube-stock and ground preparations including weed spraying. The trial revegetation program included methods involving both tube-stocking, and direct seeding. Ground preparation was site specific and included weed spraying, crash grazing and back burning.

Revegetation works in VMUs AF, AE, AA and Z were undertaken during December 2016 and included ground preparation and direct seeding. Due to the inability to undertake controlled burning, slashing was undertaken as an alternative option prior to direct seeding



Plate 5 - Loading seed for revegetation works.



Plate 6 - Spreading native tree and shrub seed.

Tubestock was propagated during summer 2017 in preparation for autumn planting. VMUs Y, AD and S which are located on alluvial flats near Mammy Johnsons River were prepared for planting by slashing, spraying for weeds and ripping. This was followed by the planting of tubestock.



Photo: Tube-stock pallets being prepared for the biodiversity offset.

Following the trial revegetation works the annual vegetation monitoring including LFA and vegetation dynamics was undertaken in January 2017. The results from the biodiversity offset monitoring are shown in Section 12. Recommendations from the report will be used to continue developing the revegetation program and maintenance activities.

12 BIODIVERSITY OFFSET MONITORING AND REPORTING

BMP Table 21
Monitoring and Reporting Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Year 1 (2013) PC Restoration Preparation Phase	Year 2 (2014) PC Preliminary Restoration Phase	Year 3 (2015) PC VMU Installation Establishment	Annually from Year 3 onwards (2016 onwards) PC Maintenance Phase	CC
Monitoring and reporting	Baseline Landscape Function Analysis Report has been undertaken for the Offset area (Section 7.1). Monitoring and reporting has been undertaken ³ as per requirements in Sections 7.1 and 7.2.	Monitoring and reporting has been undertaken ³ as per requirements in Sections 7.1 and 7.2)	Monitoring and reporting has been undertaken ³ as per requirements in Sections 7.1 and 7.2. Independent Environmental Audit has been supplied to the NSW Secretary of the DP&E for review.	Monitoring and reporting has been undertaken ³ as per requirements in Sections 7.1 and 7.2.	Monitoring requirements completed when all completion criteria are achieved in accordance with Section 8 (e.g. 357.5 ha of revegetated woodland/open woodland habitat areas and 36 ha of revegetated forest habitat areas are a self-sustaining ecosystem).

As described in the Section 7 of the BMP an annual report reviewing DCPL's environmental performance and progress against the requirements of the BMP including monitoring and reporting is prepared annually and appended to the *Duralie Coal Mine Annual Review*. This document reports on monitoring for:

- Effectiveness of revegetation in the offset area VMU's;
- Usage of the offset by fauna;
- Effectiveness of weed control;
- Effectiveness of feral animal control;
- Nest box monitoring program.

To monitor the effectiveness of revegetation in the offset areas Green Australia was commissioned to undertake the baseline monitoring of Landscape Function Analysis (LFA) and vegetation structure in the offset area in February 2013. The baseline monitoring provides information to track the progression towards meeting the completion criteria of the BMP.

The annual vegetation and landscape function monitoring was repeated in January 2017 and the results are provided in the *DCM Biodiversity Offset Monitoring of Landscape Function and Vegetation Structure 2017* (available in the DCM environment office). The executive summary is reproduced below.

Kleinfelder Australia was engaged to conduct Landscape Function Analysis (LFA) and Vegetation Structure Dynamics in the Duralie Coal Mine (DCM) Biodiversity Offset Areas as required by the Biodiversity Management Plan (2016). Monitoring is required to demonstrate the effectiveness of revegetation in the Offset Areas and progression towards achieving the BMP completion criteria. A subset of six Vegetation Management Units (VMUs) were selected representing various vegetation communities and their relative LFA index scores from the 2013 survey recorded in the Offsets Areas. This survey was conducted to provide recent baseline data for comparison to woodland/forest revegetation in the offset areas and rehabilitation areas on the Duralie Coal Mine waste emplacement. The surveys were undertaken during January 2017.

For the LFA, three indices and two patch dynamics characteristics were assessed. The average Stability Index recorded a non-significant increase from the 2014 survey, with individual VMUs recording considerably greater variation. VMU E recorded a significant increase, but the result was regarded as anomalous given that the 2014 result was below the theoretical limits as stated in LFA

literature. Other VMUs recorded non-significant increases and decreases in this index. Average Infiltration and Nutrient Cycling Indices recorded substantial increases from the previous survey, with all individual VMUs also increasing. These changes were attributed to a recovery after fire in three of the VMUs (VMU, K, P and R) with the remaining VMUs being regarded as more mature vegetation communities that have not been greatly affected by disturbance.

Patch dynamics included for the assessment were the number of patches per 10m and the Average distance between patches. Both are used to indicate the propensity of the system to accumulate or shed water and nutrients. All areas were assessed to be "all patch", with only the patch type changing down transects. The average number of patches per 10m recorded a non-significant decrease from the 2014 survey, while average distance between patches reduced to 0. Both these changes were attributed to increases in litter accumulation and/or ground and shrub cover and recovery from a major fire in 2012 that affected three of the VMUs.

Vegetation Structure data suffered from inconsistent application of the methods resulting in data that was inconsistent across the three surveys with only cautious interpretations of any changes or trends offered. This included the interpretation that VMU AG represented a mature or non-disturbed example of the Spotted-Gum – Grey Ironbark Forest (Ironbark Variant) vegetation community (the most common community in the Offsets Areas) with little midstorey and an increasing shrub layer, while VMUs K and R were examples of advanced re-growth with a considerable portion of vegetation structure contained in the midstorey. This is expected to trend towards the structure found in VMU AG over time. VMUs B and E, while different vegetation communities had a similar structure that has not changed significantly over the course of the surveys indicating a stable structure indicative of communities found on the alluvial flats and along water courses in the Offsets Areas.

Observations of weeds, erosion and other factors affecting the successful revegetation/ regrowth of the Offsets areas were made transiting the Offsets Areas and in the immediate area of transects. Evidence of "feral" cattle observed in VMU K included tracks, damage to vegetation and scats. The number of weed species was generally very low with only Lantana camara (Lantana) being wide spread within the VMUs themselves, and formed dense thickets in some areas. Ligustrum sinense (Small-leaved Privet) was recorded in VMUs B and E. Other weeds observed along access tracks included Ageratina adenophora (Crofton Weed), Andropogon virginicus (Whisky Grass) and Sporobolus fertilis (Giant Parramatta Grass). Erosion was confined to the steeper access tracks servicing the offsets areas with the track on the north-west slope of VMU R requiring repair work, which at the time of writing was being undertaken. The fuel load was considered to be high in several of the VMUs with thick native grasses and/or dense shrub and midstorey species regenerating after the last fire event and the removal of the majority of the cattle.

Overall the remnant and regrowth VMU areas are showing good signs of natural recruitment and enhanced biodiversity. Management recommendations include:

- regular slashing of tracks to slow the spread of exotic grasses,
- continued weed control of Lantana;
- instigation of further monitoring to ascertain the extent and location of lantana infestations possibly through the use of drones;
- inclusion of infra-red camera on the drone to locate cattle and any other feral animals; and,
- a professional bush fire assessor to determine the bushfire risk and determine if and where controlled burns could be used for weed control and risk mitigation.

Furthermore, future monitoring should focus on consistent application of the methodology and improved marking of transects to ensure more reliable data is collected to provide accurate results.

13 MAMMY JOHNSONS RIVER STABILISATION

In accordance with Section 6.8 of the BMP a detailed design for the in-stream rehabilitation of a severely eroded section of Mammy Johnsons River has been prepared by Alluvium (*Mammy Johnson's River –Bank Stabilisation Detailed Design*

2013 electronic files available in DCM environment office). No works on the MJR bank stabilisation have commenced during the reporting period.

BMP Table 16
Mammy Johnsons River Bank Stabilisation Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Year 1 (January to December 2013) PC Restoration Preparation Phase	Year 2 (January to December 2014) PC Preliminary Restoration Phase	Year 3 onwards (January to December 2015) PC VMU Installation Establishment	Annually from Year 3 onwards (January 2016 onwards) PC Maintenance Phase	CC
River bank stabilisation design	Design for the in-stream rehabilitation of a severely eroded section of Mammy Johnsons River has been prepared. Office of Water engaged regarding plan approval ¹ (Section 6.8).				Design of stabilisation plan completed and approved by the Office of Water
River bank in-stream rehabilitation			In-stream rehabilitation works undertaken ¹ (Section 6.8).	In-stream rehabilitation been completed ¹ (Section 6.8).	Rehabilitation of severely eroded section of Mammy Johnsons River completed.

14 LONG TERM SECURITY AND CONSERVATION BOND

Long-term Security

The Public Positive Covenants and Restrictions on the Use of Land for the Duralie Offsets have been registered on title with NSW Land and Property Information (LPI) in May 2015

Conservation Bond

The terms of the conservation bond in the form of a bank guarantee were approved by DP&E on 12 December 2013 and the bank guarantee has been subsequently provided to DP&E. There have been no changes to the conservation bond during the reporting period with the exception of the transition to a new financier.

15 COMMONWEALTH APPROVAL COMPLIANCE REPORTS

In accordance with the Commonwealth Approval [EPBC 2010/5396] during the reporting period DCPL have submitted to DoE the following compliance reports:

- *DCM Implementation of the Giant Barred Frog Management Plan Annual Report 2016, submitted on 3 August 2016 (Condition 10);*
- *DCM Implementation of the Biodiversity Management Plan Annual Report 2017 on 12 January 2016 (Condition 14(i));*
- *Duralie Coal Extension Project Annual Compliance Report 2017, submitted on 11 April 2017 (Condition 20).*

These reports will continue to be submitted annually for the first five years following the commencement of the operation.

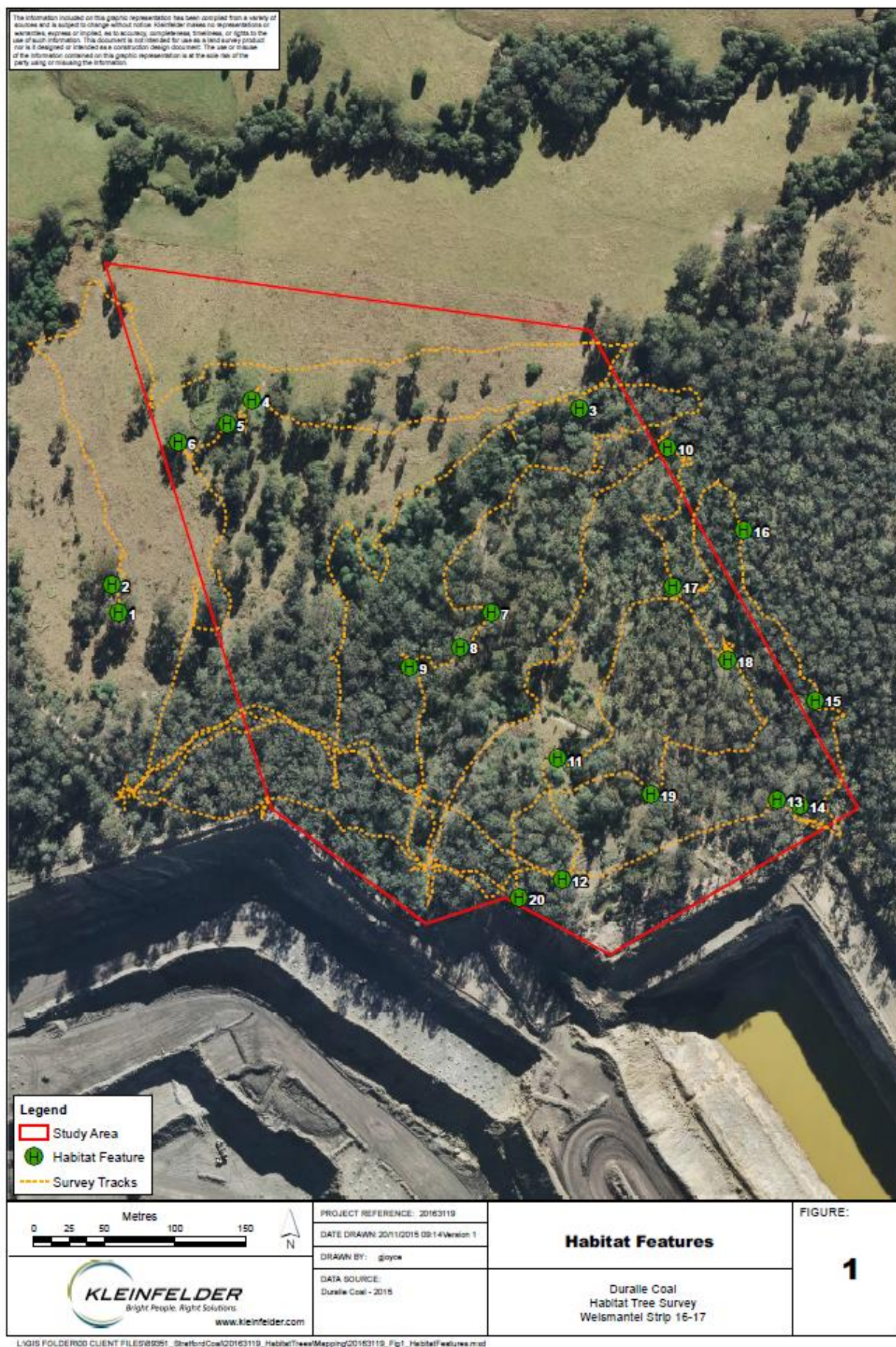
Appendix 1:

Duralie Coal Mine - Nest Box Replacement Requirements

*Note: Accounts for vegetation clearance post approval of the amended NSW Project Approval 08_0203. i.e. 10 November 2011

*Note: Jul 2016 to Jun 2017

Area Cleared	Date cleared	Tree #	Location		Total #	Habitat Features			Fauna Observed	
			Easting	Northing		Feature	Feature Height	Dimensions Width (mm)	Species	Comments
Weismantel Strip 16 & 17	01/08/2016	3	6429494	399259	1	Pipe	20	>20	No sign of use	
	01/08/2016	13	6429217	399399	1	Pipe	20	>20	No sign of use	
	01/08/2016	17	6429368	399325	1	Termite Nest	15	5 - 20	No sign of use	
	01/08/2016	14	6429213	399415	0	log pile	on ground	na	No sign of use	
	01/08/2016	18	6429315	399364	1	log	on ground	5 - 20	No sign of use	
Total					2	(Red indicates non-tree hollow feature, i.e. nest or log pile)				



Appendix 9:

Shuttle Train Performance Summary

Duralie Coal Mine Shuttle Train Performance Summary

Notes:

1. The number of trains is considered to be a full circuit to and from the site.
2. Includes the date/time of each train received between 10pm and midnight.
3. Includes instances when the shuttle train is operated between midnight and 1 am in exceptional circumstances.

Day / Date	Number of Trains	Trains Received after 10pm	Trains between 12 and 1am
Friday, 1 July 2016	0		
Saturday, 2 July 2016	0		
Sunday, 3 July 2016	0		
Monday, 4 July 2016	4		
Tuesday, 5 July 2016	3		
Wednesday, 6 July 2016	4	11:40:00 PM	
Thursday, 7 July 2016	2		
Friday, 8 July 2016	2		
Saturday, 9 July 2016	0		
Sunday, 10 July 2016	0		
Monday, 11 July 2016	4		
Tuesday, 12 July 2016	4		
Wednesday, 13 July 2016	4	10:05:00 PM	
Thursday, 14 July 2016	4	10:10:00 PM	
Friday, 15 July 2016	4		
Saturday, 16 July 2016	0		
Sunday, 17 July 2016	0		
Monday, 18 July 2016	4		
Tuesday, 19 July 2016	2		
Wednesday, 20 July 2016	1	11:30:00 PM	
Thursday, 21 July 2016	3	11:35:00 PM	
Friday, 22 July 2016	1	11:00:00 PM	
Saturday, 23 July 2016	0		
Sunday, 24 July 2016	0		
Monday, 25 July 2016	3		
Tuesday, 26 July 2016	4	11:30:00 PM	
Wednesday, 27 July 2016	3	10:50:00 PM	
Thursday, 28 July 2016	3	10:30:00 PM	
Friday, 29 July 2016	3	10:35:00 PM	
Saturday, 30 July 2016	0		
Sunday, 31 July 2016	0		
Monday, 1 August 2016	3	10:40:00 PM	
Tuesday, 2 August 2016	1		
Wednesday, 3 August 2016	0		
Thursday, 4 August 2016	0		
Friday, 5 August 2016	0		
Saturday, 6 August 2016	0		
Sunday, 7 August 2016	0		
Monday, 8 August 2016	2		

Tuesday, 9 August 2016	1		
Wednesday, 10 August 2016	2		
Thursday, 11 August 2016	2		
Friday, 12 August 2016	3		
Saturday, 13 August 2016	0		
Sunday, 14 August 2016	0		
Monday, 15 August 2016	0		
Tuesday, 16 August 2016	4	11:00:00 PM	
Wednesday, 17 August 2016	4		12:03:00 AM
Thursday, 18 August 2016	3	10:08:00 PM	
Friday, 19 August 2016	4		
Saturday, 20 August 2016	2		
Sunday, 21 August 2016	0		
Monday, 22 August 2016	2	11:15:00 PM	
Tuesday, 23 August 2016	4	11:30:00 PM	
Wednesday, 24 August 2016	3	10:10:00 PM	
Thursday, 25 August 2016	2		
Friday, 26 August 2016	3		
Saturday, 27 August 2016	0		
Sunday, 28 August 2016	0		
Monday, 29 August 2016	2		12:05:00 AM
Tuesday, 30 August 2016	3		
Wednesday, 31 August 2016	4	11:05:00 PM	
Thursday, 1 September 2016	3	11:25:00 PM	
Friday, 2 September 2016	1		
Saturday, 3 September 2016	0		
Sunday, 4 September 2016	0		
Monday, 5 September 2016	1	10:50:00 PM	
Tuesday, 6 September 2016	4	11:25:00 PM	
Wednesday, 7 September 2016	3		
Thursday, 8 September 2016	3		
Friday, 9 September 2016	2		
Saturday, 10 September 2016	0		
Sunday, 11 September 2016	0		
Monday, 12 September 2016	3	10:10:00 PM	
Tuesday, 13 September 2016	3		
Wednesday, 14 September 2016	3		
Thursday, 15 September 2016	1		
Friday, 16 September 2016	0		
Saturday, 17 September 2016	0		
Sunday, 18 September 2016	0		
Monday, 19 September 2016	0		
Tuesday, 20 September 2016	0		
Wednesday, 21 September 2016	0		
Thursday, 22 September 2016	0		
Friday, 23 September 2016	2		
Saturday, 24 September 2016	0		
Sunday, 25 September 2016	0		
Monday, 26 September 2016	1		
Tuesday, 27 September 2016	0		

Wednesday, 28 September 2016	0		
Thursday, 29 September 2016	3		
Friday, 30 September 2016	0		
Saturday, 1 October 2016	0		
Sunday, 2 October 2016	0		
Monday, 3 October 2016	0		
Tuesday, 4 October 2016	2		
Wednesday, 5 October 2016	0		
Thursday, 6 October 2016	2		
Friday, 7 October 2016	1		
Saturday, 8 October 2016	0		
Sunday, 9 October 2016	0		
Monday, 10 October 2016	0		
Tuesday, 11 October 2016	0		
Wednesday, 12 October 2016	0		
Thursday, 13 October 2016	2		
Friday, 14 October 2016	0		
Saturday, 15 October 2016	0		
Sunday, 16 October 2016	0		
Monday, 17 October 2016	0		
Tuesday, 18 October 2016	1		
Wednesday, 19 October 2016	2		
Thursday, 20 October 2016	3		
Friday, 21 October 2016	3		
Saturday, 22 October 2016	0		
Sunday, 23 October 2016	0		
Monday, 24 October 2016	2		
Tuesday, 25 October 2016	0		
Wednesday, 26 October 2016	3		
Thursday, 27 October 2016	3		
Friday, 28 October 2016	3		
Saturday, 29 October 2016	0		
Sunday, 30 October 2016	0		
Monday, 31 October 2016	1		
Tuesday, 1 November 2016	1		
Wednesday, 2 November 2016	2		
Thursday, 3 November 2016	3		
Friday, 4 November 2016	3		
Saturday, 5 November 2016	0		
Sunday, 6 November 2016	0		
Monday, 7 November 2016	0		
Tuesday, 8 November 2016	0		
Wednesday, 9 November 2016	0		
Thursday, 10 November 2016	0		
Friday, 11 November 2016	3		
Saturday, 12 November 2016	0		
Sunday, 13 November 2016	0		
Monday, 14 November 2016	3		
Tuesday, 15 November 2016	3		
Wednesday, 16 November 2016	1		

Thursday, 17 November 2016	3		
Friday, 18 November 2016	3		
Saturday, 19 November 2016	0		
Sunday, 20 November 2016	0		
Monday, 21 November 2016	2		
Tuesday, 22 November 2016	3		
Wednesday, 23 November 2016	3		
Thursday, 24 November 2016	3		
Friday, 25 November 2016	2		
Saturday, 26 November 2016	0		
Sunday, 27 November 2016	0		
Monday, 28 November 2016	2		
Tuesday, 29 November 2016	1		
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Appendix 10:

- **Status Update on DCM Independent Environmental Audit 2014 Responses to Recommendations**
- **Status Update on DCM Dams Compliance Audit 2016 Responses to Recommendations**

Duralie Coal Mine - Independent Environmental Audit 2014

Response to Recommendations

Recommendations				
Audit report reference	Management area	Audit Recommendation	Duralie Coal Response (Original February 2015)	Status Update January 2017
4.2.4.1	Noise management	Recommendation N1: The Vipac Quarterly Environmental Noise Survey reports do not contain assessment of low frequency noise emissions in accordance with the Industrial Noise Policy. It is recommended that low frequency noise emissions should be assessed in the quarterly reports to satisfy Condition L4.5 of EPL 11701.	Duralie Coal Mine undertakes its monitoring in accordance with the INP. The Duralie Modification Environmental Assessment included a low frequency analysis of C and A weighted intrusive noise levels in accordance with INP requirements which indicated that there is no dominant low-frequency content relating to noise emissions from Duralie Coal Mine. DCM will continue to consult with the EPA and DP&E as part of future revisions of the Noise Management Plan with consideration to low frequency assessment.	Completed. The DCM Noise Management Plan was update and approved by DP&E on 7 March 2016. The quarterly attended noise monitoring reports include an assessment of low frequency noise. A low frequency noise assessment is only undertaken when the target specific mine noise is deemed to be the dominant noise source in accordance with the INP Section 4. If the mine noise is deemed to be the dominant source an analysis of C and A weighted noise levels is undertaken to determine if the modifying factor should be applied.
4.2.4.1	Noise management	Recommendation N2: It is recommended that to incorporate the low frequency assessment into the current noise monitoring report format analysis results should be changed on the left hand side of the graphical representation to the following, in order: Total Leq dB(A) Mine contribution Leq dB(A) Mine contribution Leq dB(C) Mine dB(C) – dB(A) Mine contribution L1 (night time only).	As above.	Completed. The C and A weighted assessment is included in the noise reports if the mine contribution is deemed to be the dominant source. Noise reports are available on the Duralie Coal website.
4.2.4.2	Noise management	Recommendation N3: It is recommended that the inversion data since commissioning of the real-time capability be analysed to determine the 90th percentile site-specific inversion strength in accordance with provisions in the INP. A summary report should then be forwarded to EPA/OEH for their consideration of reviewing the applicable inversion strength in EPL 11701. Incorporation of the site-specific value in the EPL would then necessitate changes to the real-time noise management triggers.	DCPL fulfils its obligations listed under the Statement of Commitments of Direct Temperature Inversion Management within Appendix 9 of the Duralie Coal Project Approval 08_0203 and EPL11701 conditions 4.9 and M5. DCPL will continue to provide for real-time measurement of temperature lapse rate in accordance with the Industrial Noise Policy and also review inversion data to interpret the 90th percentile inversion strength in line with the INP provisions. Additionally, correlation between the measured and calculated inversion strengths will continue to be included in the noise survey reports.	Direct temperature inversion monitoring continues to be undertaken at Duralie. The inversion strength would be assessed in the quarterly noise monitoring reports where there is an exceedence of the noise criteria in accordance with the NMP Section 7.2.4 Compliance Assessment Protocol.
4.2.8	Noise management	Recommendation N4: It is recommended the unattended logger surveys (typically 72 hour) be discontinued.	Duralie Coal accepts the recommendation.	Completed. The DCM Noise Management Plan was update and approved by DP&E on 7 March 2016. Unattended logger surveys have been removed from Section 7.
4.2.8	Noise management	Recommendation N5: It is recommended to discontinue including model results in compliance reports.	Duralie Coal accepts the recommendation.	Completed. The DCM Noise Management Plan was update and approved by DP&E on 7 March 2016. Modelled results are no longer reported in the compliance reports.
4.11.8	Biodiversity	Recommendation B1: It is recommended that consultation between Duralie Coal Pty Ltd and the OEH should be undertaken to address the concerns expressed by OEH. The amendments to the survey design of the Giant Barred Frog Study are described in the Annual Giant Barred Frog Study Reports 2011 to 2014 prepared by Biosphere Environmental Consultants (Dr Arthur White). Any consultation with the OEH in relation to survey transects should include Dr Arthur White who was endorsed by DP&I in March 2012 as a qualified and experienced person for the preparation of the Giant Barred Frog Study and Giant Barred Frog Management Plan in accordance with Project Approval 08_0203 Schedule 3 conditions 30 and 32. The two documents, were approved in March 2012 and annual reports of the monitoring results were submitted to the OEH and DPI. The discussion with OEH related to statistical analysis and methodology of the population data should include Dr Ian Lenane to ensure clarification of issues and discussion of consistency of approach.	Duralie Coal accepts the recommendation and will consult accordingly.	DCPL prepared a revision the Giant Barred Frog Management Plan with assistance from Dr Arthur White in 2015. The revised GBFMP was approved by DP&E on 17 December 2015 and by DotE on 4 January 2016. The revised GBFMP was provided to OEH and is available on the Duralie Coal website.
4.16	Rehabilitation	Recommendation R1: It is recommended that final landform design remains generally consistent within the limitations of the maximum height of the waste overburden emplacements (i.e. 135 m AHD approved 5 December 2014) and include some visible relief (+/- 20m RL) to provide a more natural skyline on the completed rehabilitation areas. The final slope of the overburden emplacement should adopt a concave profile (rather than batters and benches) where practicable to manage surface runoff and reduce potential erosion risk on the completed areas.	DCPL have an approved Rehabilitation Management Plan which currently commits to assessing the incorporation of a concave profile where practicable. The rehabilitation approach and strategy was also assessed within the Duralie Extension Project Modification and outlines DCPL's approach to waste emplacement shaping. Assessment of visible relief options on final landforms will be undertaken in consultation with DRE and DP&E during the revision of respective documents.	The DCM Rehabilitation Management Plan was updated and accepted by DRE on 21 October 2016. The RMP was revised to ensure consistency with the Mining Operations Plan following advice from DRE. The audit recommendation is addressed in the RMP Section 5.4.
4.12.3.2	Heritage	Recommendation H1: It is recommended that the maintenance program for the former Weismantel Inn European heritage site including any special requirements of the tenancy be described in the Heritage Management Plan.	Duralie Coal accepts this recommendation.	The DCM Heritage Management Plan was revised and approved by DP&E on 23 June 2015. The HMP Section 6.2 states "Weismantel's Inn is managed under the standard agency agreement for residential properties. This includes routine inspections of roofs, gutters, building damage such as water ingress, pest inspections and any other matters. No specific tenancy requirements beyond standard NSW tenancy requirements are required for the Former Weismantels Inn."

Development Approval No 08_0203 (MOD2) - Duralie Coal Mine Dams Compliance Audit									
						Duralie Coal's response		DPE response	Completion Comments
Schedule	Condition No.	Requirement	Compliance C/NC/ANC/NA/NV	Evidence Sighted	Observations	Comment	timing		
2	13	The Proponent shall ensure that all the plant and equipment used on site, or to transport coal from the site is:							
2	13b	operated in a proper and efficient manner.	NC	Sample of Coal Shaft Creek Diversion Inspection and Monitoring Checklist and Record sighted	<p>Dams generally observed in fair to good condition during site inspection.</p> <p>Decommissioned leachate well observed full at toe of AD1. Decommission level detection system observed adjacent to leachate well.</p> <p>Leachate from AD1 observed entering southern clean water drain dam. Clean water and leachate must fill dam at toe of emplacement prior to discharging into clean water drain.</p> <p>Mobile pump observed discharging collected clean water and leachate into AD1.</p> <p>None of the Inspection and Monitoring Checklists and Records reviewed identify AD1 leachate as an issue</p>	As part of our continuous improvement program - Inspection checklist is to be revised and updated to include specific reference point of inspection for seepage at AD1. Any actions from inspections to be assigned and entered into CMO.	End of Qtr 1 2017	Accepted. DCPL to advise DPE within 4 weeks of completion.	03/05/2017. The routine visual inspection checklist has been revised to include specific comments regarding seepage. A toolbox session has been held with the relevant personnel undertaking dams inspections.
3	28b	in accordance with the irrigation system, including the irrigation management plan, in the approved Surface Water Management Plan under Condition 29 of Schedule 3.	NC	Irrigation Management Plan attached as Attachment A of approved SWMP	<p>Irrigation not being undertaken during site inspection.</p> <p>Site inspection confirmed soil moisture probes and communications systems installed in irrigation areas.</p> <p>Signal cabling associated with the moisture probes in the irrigation management system was observed in poor condition.</p> <p>Review of onsite irrigation control system monitored via iNTELiTROLL Network system confirmed the damage observed to moisture probe</p>	Work orders are generated through SAP for the inspection and maintenance of the irrigation system. The damaged moisture sensors had not been operated as no irrigation was occurring through winter. All irrigation hardware was inspected and maintained in Spring 2016 prior to recommencing irrigation activities. Records of maintenance activities will be recorded. As part of our continuous improvement program - Duralie is to conduct an additional inspection of soil moisture probes by end of Qtr 2 2017.	Qtr 2 2017	Accepted. DCPL to advise DPE within 4 weeks of completion.	03/05/2017. All irrigation hardware was inspected and maintained in Spring 2016 prior to recommencing irrigation activities. Work orders are recorded in SAP.
		• an irrigation management plan for the irrigation system under the water management system, which includes:	NC	Irrigation Management Plan attached as Attachment A of approved SWMP	While not specified in the Irrigation Management Plan the site inspection questioned the logic of the location of the moisture probes in line downslope. It was not established if the current location of the moisture probes adequately monitored the discharge from the irrigation sprinklers in the irrigation area to the southwest of MWD	The Mait automated irrigation system was installed by a third party contractor and documentation was provided. As part of our continuous improvement program - DCPL will review the location of the moisture probes to determine whether this adequately monitors the discharge from the irrigation sprinklers.	Qtr 2 2017	Accepted. DCPL to advise DPE within 4 weeks of completion.	A review of the irrigation moisture sensors was undertaken by Dr Ian Hollingsworth and an accompanying letter provided. Finding: The downslope locations of the soil water sensors in irrigation areas to the southwest of the DCM MWD were assessed to be operating the land application system effectively and in compliance with the SWMP and IMP. The logic of the downslope location of soil water sensors increases the sensitivity and reliability of the irrigation control system. (Refer to full letter).
		• a plan to respond to any exceedence of the performance criteria and mitigate and/or offset any adverse surface water impacts of the project; and	NC	Section 9 (Including Tables 6 and 7) of the SWMP outlines a plan of action if triggers in Table 6 are reached	<p>Review of monitoring results confirms the EC of the MWD is above 3,000 us/cm, Table 6 trigger is >2,500us/cm.</p> <p>Soil Survey and Evaluation report provided for 2014 but not for 2015 and 2016</p>	The assessment of EC performance criteria for the irrigation water supply in MWD was included in the Annual Irrigation Monitoring Reports 2014, 2015 and 2016. The analysis of EC in the MWD in accordance with Table 7 of the SWMP indicated whilst the performance indicator had been exceeded the performance measure had not been exceeded and hence the contingency measure was not required to be implemented. The 2016 irrigation report was provided to DP&E on 8 December 2016.		Accepted. DCPL to continue monitoring and trigger reporting as per SWMP and report in Annual Review.	28/04/2017. Annual irrigation area monitoring has been undertaken again during 2017 and will be reported in the Annual Review 2017.
5	3d	identify any trends in the monitoring data over the life of the project;	ANC	Section 7 and Appendix 4 of the 2016 Annual Review	No identification of trends over the life of the project related to dams provided in the Annual Review Report	A review of the irrigation area monitoring bores is included in the DCM Annual Reviews. DCPL will include a monitoring data trend analysis in relation to the storage dams in future Annual Reviews.		Accepted.	Include in Annual Review due 30 September 2017.

Duralie Water Management Plan - Duralie Coal Mine Dams Compliance Audit						
Dated 12 Aug 2016					Duralie Coal Response	
WMP Section	Requirement/Commitment	Compliance C/NC/ANC/NA/NV	Evidence Sighted	Observations	Comments	Timing
2.2	The release of water into the MJR catchment must only occur when Electricity Conductivity levels do not exceed 400 Micro Siemens ($\mu\text{S}/\text{cm}$) in the MJR at the "High Noon" monitoring site and 1,326 $\mu\text{S}/\text{cm}$ in the Main Water Dam diversion drain sumps; or alternate thresholds as may be advised in writing by the Department.	C	<p>Routine Work Order 40531096 for Electrical Inspection of Environmental Monitoring Equipment.</p> <p>Monitoring sheet for 3 August 2016 reviewed.</p> <p>Duralie Environmental Monitoring System, Process Description, Primatec QDA</p>	<p>Work Orders illustrate that the EC probe are regularly inspected.</p> <p>Highnoon monitoring results for sample date 3 August 2016 illustrates EC of less than 400us/cm (153us/cm) at Highnoon MJR and less than 1,326us/cm in the Main Water Dam (North Drain 307us/cm and South Drain 479us/cm).</p> <p>Environmental Monitoring System diverts to Dam at greater than 1270us/cm and MJR for less than 1250us/cm (and less than 400us for five minutes at High Noon)</p>	N/A	

Duralie Site Water Balance - Duralie Coal Mine Dams Compliance Audit								
Dated 12 Aug 2016					Duralie Coal Response		DPE Response	Completion Comments
SWB Section	Requirement/Commitment	Compliance C/NC/ANC/NA/NV	Evidence Sighted	Observations	Comments	Timing		
6.1	MWD, which is located north-west of the main infrastructure area and has a constructed capacity of up to approximately 1,405 ML to the top of the I-Beam, and approximately 1,296 ML to the invert of the spill pipe.	NV	Mine Water Dam Construction Report, Alan Watson Associates, 24 February 2005. Mine Water Dam Design Report, Alan Watson Associates September 2002	Neither document provides any "As Built" drawings or "As Built" survey to confirm the dam was constructed with these available capacities. No recent bathymetric surveys were available for review to confirm the current capacity of the MWD (Bathymetric survey accommodate accumulated sediments and provide current capacity)			DCPL to undertake bathymetric survey for MWD to confirm sizing in accordance with design criteria in SWMP by 30 June 2017 . DCPL to provide DPE with report within 4 weeks of completion of bathymetric surveys .	Bathymetric surveys of MWD, AD1 and AD2 were undertaken on 12/05/2017. A comparison to design/as-built volumes has been completed and is available on request..
6.1	Auxiliary Dam No. 1, which is located upslope of the MWD and has a constructed capacity of 462 ML (with an approved capacity up to 500 ML).	NV	AWD1 Construction Report, Alan Watson Associates, June 2012. AWD1 Design Report, Alan Watson Associates Feb 2009	Neither document provides any "As Built" drawings or "As Built" survey to confirm the dam was constructed with these available capacities. No recent bathymetric surveys were available for review to confirm the current capacity of the AWD1 (Bathymetric survey accommodate accumulated sediments and provide current capacity)			DCPL to undertake bathymetric survey for AD1 to confirm sizing in accordance with design criteria in SWMP by 30 June 2017 . DCPL to provide DPE with report within 4 weeks of completion of bathymetric surveys .	Bathymetric surveys of MWD, AD1 and AD2 were undertaken on 12/05/2017. A comparison to design/as-built volumes has been completed and is available on request..
6.1	Auxiliary Dam No. 2, which is located upslope of the MWD and has a constructed capacity of 2,724 ML (with an approved capacity up to 2,900 ML).	NV	AWD2 Construction Report, Alan Watson Associates, July 2012. AWD2 Design Report, Alan Watson Associates May 2010	Neither document provides any "As Built" drawings or "As Built" survey to confirm the dam was constructed with these available capacities. No recent bathymetric surveys were available for review to confirm the current capacity of the AWD2 (Bathymetric survey accommodate accumulated sediments and provide current capacity)			DCPL to undertake bathymetric survey for AD2 to confirm sizing in accordance with design criteria in SWMP by 30 June 2017 . DCPL to provide DPE with report within 4 weeks of completion of bathymetric surveys .	Bathymetric surveys of MWD, AD1 and AD2 were undertaken on 12/05/2017. A comparison to design/as-built volumes has been completed and is available on request..
7	Key triggers for transfer between the MWD and Auxiliary Dams - Table 3.							
	994 ML Trigger volume in MWD for pumping to AD1 or AD2	NV	Insufficient evidence provided to verify	MP's refer to ML capacities and Duralie's procedures refer to RL's			DCPL to revise procedures to include ML capacities by 30 June 2017 and advise DPE within 4 weeks of completion .	Relative levels (RLs) have been added to the DCM Surface Water Balance Section 7 Table 3 consistent with the levels referenced in the DCM Prescribed Dams Operations and Maintenance Manual Figure 10 TARP Water Levels.
	800ML Trigger volume in MWD to pump from AD1 or AD2	NV	Insufficient data provided	MP's refer to ML capacities and Duralie's procedures refer to RL's				
	69ML AD1 and 133ML AD2 minimum freeboard to pump from MWD	NV	Insufficient data provided	MP's refer to ML capacities and Duralie's procedures refer to RL's				
	Transfer rate from MWD to AD1 (10ML/day) and AD2 (27ML/day) .	NV	Pump table spreadsheet identifies DPS 250 Pump as largest on site	Review of comparable 300x200 Truflow pumpsets indicates that 250 pump would be on the maximum limit of pumping capacities at 27ML/day				
	Transfer rate to MWD to AD1 (5ML/day) and AD2 (27ML/day) .	NV	Pump table spreadsheet identifies DPS 250 Pump as largest on site	Review of comparable 300x200 Truflow pumpsets indicates that 250 pump would be on the maximum limit of pumping capacities at 27ML/day				
7	No pumping from the open pits to the MWD will occur when the volume stored in the MWD exceeds 1,200 ML.	NV	Insufficient data provided	MP's refer to ML capacities and Duralie's procedures refer to RL's				
7	A water transfer system capable of transferring 1 ML/hour (24 ML/day), and 200 millimetre diameter gravity fed transfer pipeline are installed between the MWD and Weismantel open pit.	NV	Section 7 of the Site Water Balance documents that the pump and pipeline exists. Sizing details were provided for electric and diesel pumps, however no flow rates were provided for diesel pump	While no specific pump was identified during the site inspection, review of comparable 300x200 Truflow pumpsets indicates that the largest pump on site (250 pump) would be on the maximum limit of pumping capacities at 24ML/day				

Duralie Site Water Balance - Duralie Coal Mine Dams Compliance Audit								
Dated 12 Aug 2016					Duralie Coal Response		DPE Response	Completion Comments
SWB Section	Requirement/Commitment	Compliance C/NC/ANC/NA/NV	Evidence Sighted	Observations	Comments	Timing		
9.1 and 9.2	A site water balance review will be undertaken on an annual basis to review monitoring of the status of inflows, outflows, site water inventory and consumption (irrigation, dust suppression, vehicle washdown) and to update the site water balance model predictions.	NC	2015 Annual Water Balance Review Report	While an annual water balance has been provided for 2015, Section 4.2.3 of the report highlights a significant departure in dam water volumes in MWD compared to predicted volumes	DCPL has completed the site water balance review in accordance with the conditions of approval and is therefore compliant. The water balance report indicates the departure in measured versus predicted MWD storage is assumed to be due to discrepancy in flow meter measured versus actual volumes. DCPL has undertaken servicing and verification of all flow meters on site during 2016 with the results to be used in the next water balance review.		DCPL to undertake annual calibration check of all flow meters on transfers to and from the MWD, AD1 and AD2, as per recommendation of 2015 Annual Water Balance Review Report and include in Annual Review reports.	Flow meter service and calibrations will continue to be undertaken annually.
10	Pollution Incident Response Management Plan - protocols for monitoring incidents, non compliances, exceedances and complaints	NC	PIRMP Sept 2015	Other MP's within the WMP refer to a Contingency Plan rather than the PIRMP for notification of the Department. PIRMP does not contain a requirement to contact the Department	Duralie Coal as holder of Environment Protection Licence No.11701 (EPL11701) has prepared the PIRMP in accordance with Part 5.7A of the Protection of the Environment Operations Act 1997 (POEO Act) and Part 3A of the Protection of the Environment Operations (General) Regulation 2009 (Regulation). Notification protocols are outlined in Section 4, including notification to relevant authorities. Duralie Management Plans are to be reviewed upon the next round of annual reviews to establish clear reporting obligations.	With next revision of EMP's.	Accepted. DCPL to provide DPE with indicative schedule of submissions of EMP reviews by 31 March 2017.	DCPL will revise the Environmental Management Strategy following submission of the next Annual Review in 2017 to clarify the reporting and management protocols for incidents.

Duralie Surface Water Management Plan - Duralie Coal Mine Dams Compliance Audit							
Dated 12 Aug 2016					Duralie Coal Response		DPE Response
SWMP Section	Requirement/Commitment	Compliance C/NC/ANC/NA/NV	Evidence Sighted	Observations	Comments	Timing	Completion Comments
5.2	Water Storage Capacities	NV	See SWB Tab	See SWB Tab	See SWB Tab		
7.1	Construction of sediment dams downstream of disturbed areas sized to contain runoff up to specified design criteria in Table 3.	NC	Nil	<p>Rail Siding Sediment Dams RS1 and RS6 and Waste Rock Emplacement Sediment Dam VC1 were the only sediment dams observed during the site inspection.</p> <p>While sediment control structure design criteria is provided in Section 7 of the SWMP no calculations for sizing's of sediment dams have been provided.</p> <p>No 'as built' surveys or recent bathymetric surveys were available for review to confirm the current capacity of sediment dams (Bathymetric survey accommodate accumulated sediments and provide current capacity)</p>	DCPL to undertake bathymetric surveys of sediment dams to confirm sizing in accordance with design criteria in SWMP.	Qtr 2 2017	<p>Accepted.</p> <p>Once actual capacity is established by bathymetric surveys, actual capacity to be compared against design volume calculations to confirm compliance.</p> <p>DCPL to provide DPE with report within 4 weeks of completion of bathymetric surveys.</p> <p>Calco has been engaged to undertake sediment dam surveys. The survey canoe from Abel Mine will be required for the surveys due to access limitations. Action not yet complete.</p>
7.1	Water should be treated before being released from the site to achieve criteria.	NV	Nil				DCPL to provide DPE with water quality data from last discharge to confirm compliance by 31 March 2017.
7.1	Dewatering of sediment dams (subject to water quality criteria listed above) to well-grassed areas between runoff events via grassed buffer areas to further remove entrained sediment and its migration to down-slope watercourses and in accordance with the conditions of EPL 11701.	NV	Nil				DCPL to provide DPE with water quality data from last sediment dam dewatering event to confirm compliance by 31 March 2017.
7.1	Where a suitable vegetated dewatering area is not available, dewatering of sediment dams for priority re-use, for purposes such as dust suppression and moisture conditioning of earthworks on site.	NV	Nil				
7.1	Selective use of benign flocculants, such as gypsum, to assist in the settlement of suspended	NV	Nil				DCPL to provide DPE with records of flocculant additions to sediment dams by 31 March 2017.
7.1	Sediment dams will continue to be dewatered to their normal operating level within 5 days of a runoff-generating rainfall event to re-establish the design containment capacity or within 10 days where the dam has been designed with a 125% adjustment factor.	NV	Nil	While sediment control structure design criteria is provided in Section 7 of the SWMP no calculations for sizing's of sediment dams have been provided			DCPL to undertake bathymetric surveys of sediment dams to confirm sizing in accordance with design criteria in SWMP by 30 June 2017. DCPL to provide DPE with report within 4 weeks of completion of bathymetric surveys.
7.1	Outlets of collection and diversion drains will be armoured (e.g. compacted rock or jute mesh) in order to prevent localised erosion.	NV	Nil	Outlets of sediment dams not inspected due to limited access during site inspection			DCPL to provide DPE photographs of outlets and diversion drains to confirm compliance by 31 March 2017.
7.4	The dams will provide adequate runoff detention such that peak flow rates in culverts under the North Coast Railway line will not be increased.	NC	Nil	<p>Rail Siding Sediment Dams RS1 and RS6 and Waste Rock Emplacement Sediment Dam VC1 were the only sediment dams observed during the site inspection.</p> <p>While sediment control structure design criteria is provided in Section 7 of the SWMP, no calculations for sizing of sediment dams (including this condition) have been provided</p>	As above refer to 7.1	Qtr 2 2017	<p>Accepted.</p> <p>Once actual capacity is established by bathymetric surveys, actual capacity to be compared against design volume calculations to confirm compliance.</p> <p>DCPL to provide DPE with report within 4 weeks of completion of bathymetric surveys.</p> <p>As above refer to 7.1</p>
9	Water Management and Water Resource Performance monitoring in accordance with Table 6 and Table 7.	NC	<p>Monthly Environmental Monitoring Report</p> <p>Soil Survey and Evaluation report</p>	<p>Soil Survey and Evaluation report provided for 2014 but not for 2015 and 2016.</p> <p>Significant adverse impacts observed in irrigation area as defined by Table 6. Dead trees and bushes/leaf scorching observed in the evaporator discharge area adjacent to MWD during site inspection</p>	<p>Irrigation area monitoring has been undertaken and an assessment of the performance measures and indicators has been completed in accordance with SWMP Table 6 and 7. The 2016 Irrigation Area Monitoring Report was provided to DP&E on 8 December 2016. There have been no adverse impacts - The irrigation area monitoring has demonstrated no significant impacts on soil properties or suitability of irrigated areas for future agriculture. The scorching of trees has only occurred immediately adjacent to evaporative sprays in the footprint of the Mine Water Dam.</p>		<p>Accepted.</p> <p>DCPL to continue monitoring and trigger reporting as per SWMP and report in Annual Review.</p> <p>28/04/2017. Annual irrigation area monitoring has been undertaken again during 2017 and will be reported in the Annual Review 2017.</p>