



Annual Review

2016

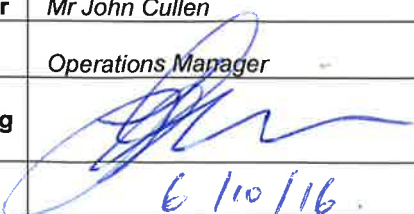


DURALIE COAL MINE

ANNUAL REVIEW

Reporting Period: 1st July 2015 to 30th June 2016

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 2015
Annual Review end date	30 th June 2016
<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
Signature of authorised reporting officer	
Date	6/10/16

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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	NO

Table 3 – Non-compliances

Relevant Approval	Condition #	Condition Description (summary)	Compliance Status	Comment	Section addressed
PA (08_0203) ML1646	Schedule 3 Condition 29b Condition 2	Water discharges – Environmental Harm	Non-Compliant	Rainfall runoff from irrigation area. Incident report submit to DP&E and EPA. No further action required.	Section 6.1
PA (08_0203) ML1646	Schedule 5 Condition 6 Condition 2	Incident Reporting – Environmental Harm	Non-Compliant	Uncontrolled Burning in biodiversity offset area. Incident report submit to DP&E and EPA. No further action requested.	Section 6.1
PA (08_0203) ML1427	Schedule 3 Condition 9 Condition 61	Blasting hours	Non-Compliant	One misfire after approved hours. Incident report submit to DP&E and EPA. No further action requested.	Section 6.1

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 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 2015.

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 2015 to 30 June 2016. 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:

Operations Manager, Stratford & Duralie Operations:
Environment & Community Superintendent:

Mr John Cullen
Mr Michael Plain

3. APPROVALS

3.1.1 Status of Leases, Licences, Permits and Approvals

The Duralie Mine has the following approvals:

- Mining Lease No. 1427 dated 6 April 1998 issued by the Minister for Minerals Resources. The lease was issued for a period of 21 years.
- Environment Protection Licence (EPL) No. 11701 issued by the Environment Protection Authority on 4 September 2002 as modified by subsequent variations (refer to EPA website).
- DLWC Bore Licence for the Duralie Open Cut (20BL168404) dated 23 September 2002. Renewed on 23 September 2012.
- DLWC Bore Licence for monitoring bores (20BL168539) dated 31 October 2002, three bores added on 2 February 2004.
- Water Supply Works Approval (20WA202053) under the NSW *Water Management Act, 2000* issued by the Department of Water and Energy (now NSW Office of Water) on 15 May 2009 for the Coal Shaft Creek diversion and various on-site water management structures. Replaced DIPNR licence - 20SL060324.
- Project Approval for the Duralie Extension Project (DEP) dated 26 November 2010 and as amended by the Land and Environment Court on 10 November 2011.
- Commonwealth Approval (EPBC 2010/5396) for the Duralie Extension Project granted 22 December 2010.
- Mining Lease 1646 issued by the Minister for Primary Industries on 4 January 2011.
- Mining Operations Plan (MOP) approved by DRE on 20 May 2011 and includes subsequent revisions. The current version expires on 31 December 2019.
- Modification to Project Approval (08_0203) for the Duralie Extension Project was granted by the Minister for Planning and Infrastructure on 1 November 2012 regarding Duralie rail hours. The expiry of this licence remains 31 December 2021.
- Modification 2 to Project Approval (08_0203) for the Duralie Extension Project was granted by the Planning Assessment Commission as delegate of the Minister for Planning on 5 December 2014 regarding an increase to the height of waste dumps, deepening of the Clareval Pit and minor additional surface development to stabilise pit walls. The expiry of this licence remains 31 December 2021.

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&I 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 7 March 2016.
- 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), January 2016.

3.1.2 Amendments to Approvals/Licences during the Reporting Period

The following approvals and amendments were granted during the reporting period;

- Variation to EPA Environment Protection Licence 11701 was received on 30 June 2015 in accordance with notice number 1531244.
- Mining Operations Plan was updated and approved by the Secretary for DRE on 18 January 2016 to incorporate a minor change to the sequencing of mine operations (i.e. mining of Weismantel pit originally planned for 2018 has been brought forward to 2016). Expires on 31 December 2019.
- Environmental Management Plans were revised and updated during the reporting period including the:
 - Biodiversity Management Plan,
 - Giant Barred Frog Management Plan,
 - Noise Management Plan,
 - Rehabilitation Management,
 - Water management Plan, and
 - Pollution Incident Response management plan.

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 provide below in **Table 5**.

Table 5 - 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	10,800,289	8,519,391	4,910,000
ROM Coal	3 million tonnes per annum	1,887,375	1,446,349	703,000
Codisposal Reject (Stratford Consent)	Approx. 12.3 million tonnes over life of project.	523,295	432,133	123,000
Saleable product (Stratford Consent)	N/A (Process limit of 5.6 million tonnes per annum)	1,638,164	1,176,916	580,000

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 2015 to June 2016 was 1.18 million tonnes comprising 0.53 million tonnes of coking coal and 0.65 million tonnes of thermal coal.

ROM production for the reporting period is listed in **Table 6** below by month.

Table 6: Monthly ROM Coal Production

MONTH	ROM PRODUCTION (tonnes)
July 2014	100,723
August 2014	136,849
September 2014	117,546
October 2014	215,447
November 2014	116,802
December 2014	121,460
January 2015	54,240
February 2015	95,562
March 2015	69,570
April 2015	84,490
May 2015	156,962
June 2015	176,698
Total	1,446,349

Coal production to date by month is shown in **Table 7**.

Table 7: Product Coal Produced by Month

MONTH	Coking Coal	Thermal Coal	Total Product Coal
July 2015	66,303	79,290	145,594
August 2015	52,427	47,892	100,318
September 2015	49,589	64,543	114,132
October 2015	83,787	76,703	160,490
November 2015	66,273	57,430	123,703
December 2015	37,048	33,816	70,863
January 2016	27,148	31,456	58,604
February 2016	39,295	53,790	93,084
March 2016	22,811	28,982	51,794
April 2016	26,287	47,343	73,630
May 2016	19,064	46,699	65,763
June 2016	39,261	79,680	118,941
Total Annual	529,293	647,624	1,176,916

4.1 EXPLORATION

No exploration activities were undertaken during the 2015-2016 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 2016-2017 reporting period.

4.1.1 Estimated Mine Life

Under the November 2011 Project Approval (DoPI 2011), mining operations are permissible until 31 December 2021. This date remains the same under the Project Modification granted on 5 December 2014.

Proven and probable reserves for the Duralie Mine as of 30th June 2016 was 11.7 million tonnes, based on depletions from the December 2015 JORC statements.

4.2 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 in the Weismantel pit recommenced in February 2016 and clearing has now been completed up to the approved northern limit. Mining in the Clareval pit during the reporting period reached the full extent of the proposed disturbance and mining is continuing within the existing footprint.

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

Surface facilities at the mine and current mine development as at 30 June 2016 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.

4.2.1 Mining Equipment and Method

The mining equipment currently in use at DCM up until the 30 June 2016 is listed in **Table 8** provided below.

Table 8: Current Mining Fleet*

Plant Item	Number
Excavators	4
Haul Trucks	15
Drills	2
Dozers	5
Water Carts	2
Graders	2
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. The distance is generally limited to 100m.
- 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.

4.3 COAL HANDLING AND BENEFICATION

4.3.1 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 management in accordance with the Stratford Mining Complex Life of Mine Reject Disposal Plan.

4.3.2 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

4.3.3 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, may be 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

4.3.4 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 1 am in accordance with Condition 8, Schedule 2 of the NSW Project Approval. This condition was not utilised during the reporting period.

1.45 million tonnes of ROM coal was transported from the Duralie Mine in the reporting period to Stratford. A total of 606 train movements (Duralie-Stratford-Duralie circuit) occurred during the July 2015 to June 2016 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**.

4.4 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.

4.4.1 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.

4.4.2 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.

4.4.3 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.

4.5 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.

4.5.1 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)

4.6 OTHER INFRASTRUCTURE MANAGEMENT

4.6.1 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 11 November 2015 that the Duralie Coal Annual Review 2015 was generally in accordance with the project approval requirements and no amendments were required.

The Department of Industry, Resources & Energy (DRE) provided "Notice of Satisfactory AEMR" which is accepted subject to action items summarised in **Table 9**.

Table 9: DRE Action Items from 2014-2015 AR Review

Issue/Observation	Action	Due Date	Comments/status
Minor housekeeping issues within the workshop area. Bins were not stored correctly on bunded area. Oil waste stored incorrectly.	Correctly store drums in workshop area. Dispose of waste oil correctly.	30 August 2016	Waste grease storage issue has been rectified with containers correctly stored in bunded areas. All waste oil and grease disposal is undertaken by the accredited contractor JR Richards.
Works are required on Coal Shaft Creek which cannot commence until mining is completed. The design and approval of these works have not been finalised.	Provide an update on how the design and approval of the works are progressing.	31 December 2016	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 which is scheduled for completion by mid-2017.
Extraction of coal is proposed to be completed within the next 5 years.	Develop and submit a closure plan to DRE for approval.	31 December 2016	Mine closure planning has commenced in mid-2016. Due to recent reforecasting for the life of mine the mine closure planning process which is now scheduled for completion by mid-2017.

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

- 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 July 2015, October 2015, January 2016 and April 2016. 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) is available on the DCPL website
- Pollution Reduction Program (PRP) requirements have been met and monitoring will continue in the coming reporting period including the exposed areas assessment.
- There were three incidents reported to the EPA during the reporting period.
 - **23 August 2015** – Regarding a rainfall runoff discharge from the irrigation area. A written report was provided to the EPA and DP&E. The EPA has confirmed no further action is required.
 - **February 2016** – Regarding an uncontrolled burn in the biodiversity offset area. A written report was provided to the EPA and DP&E. Further information has been provided following the request of DP&E.
 - **17 March 2016** – Regarding a blast after the approved time and was not monitored. A written report was provided to the EPA and DP&E and no further action has been requested.
- During the reporting period the EPA requested reports on the following complaints which were received via the EPA hotline:
 - **15 February 2016** – Information was provided regarding an air quality complaint.
 - **14 May 2016** – Information was provided regarding a noise complaint.
 - No further action has been requested from the EPA.

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 10 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 10: Duralie Mine - Monthly Rainfall Records

MONTH	YEAR				STROUD DISTRICT
	2016 (to end reporting period)		2015		AVERAGE ²
	Monthly Total (mm)	No. of Rain Days/Month ¹	Monthly Total (mm)	No. of Rain Days/Month ¹	1889-2010
January	255.6	14	147	12	115.3
February	97.8	8	37	11	125.0
March	57.8	8	138	8	147.3
April	28.8	10	275.4	12	100.9
May	17	4	139.8	14	91.5
June	166.4	8	28	10	101.1
July			19.4	6	75.1
August			43.2	2	65.3
September			75.2	15	63.1
October			47	9	78.3
November			139.8	15	83.3
December			135	12	100.8
TOTAL	623.4	52	1224.8	126	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 2015 calendar year rainfall total was higher than the long-term district average with six of the twelve months in this period exceeding their respective long term average.

The rainfall total for the reporting period (July 2015 to June 2016) was 1083.0 mm, slightly below the historical average.

6.2.2 Evaporation

Table 11 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 11: Monthly Minimum, Average and Maximum Evaporation Rates

MONTH	MINIMUM EVAPORATION RATE (mm/day)	AVERAGE EVAPORATION RATE (mm/day)	MAXIMUM EVAPORATION RATE (mm/day)
July 2015	0.5	1.4	2.7
August 2015	0.2	2.1	2.7
September 2015	0.7	2.4	4.1
October 2015	0.9	3.4	5.0
November 2015	1.1	3.4	7.7
December 2015	0.4	4.2	9.6
January 2016	0.5	3.6	6.3
February 2016	0.9	3.7	6.5
March 2016	1.2	3.2	4.4
April 2016	0.2	2.2	4.2
May 2016	0.4	4.6	12.7
June 2016	0.2	1.7	5.8

6.2.3 Wind Speed and Direction

Table 12 below indicates the monthly average and maximum wind speeds and dominant wind directions for the period July 2015 to June 2016, 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.

Table 12: 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 2015	6.6	50.0	WSW
August 2015	7.9	58.2	WSW
September 2015	9.3	57.7	N, SSW
October 2015	8.4	81.7	N
November 2015	8.9	73.4	N
December 2015	10.0	61.4	N
January 2016	9.5	79.6	N
February 2016	8.7	41.8	N, SSW
March 2016	8.7	40.8	N
April 2016	7.0	49.2	N
May 2016	6.5	51.9	N, W
June 2016	7.9	62.5	W

6.2.4 Temperature

Table 13 summarises monthly air temperatures.

Table 13: 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 2015	0.6	10.5	19.6
August 2015	0.8	12.5	27.1
September 2015	2.0	14.0	28.4
October 2015	9.5	19.6	35.3
November 2015	10.6	20.8	38.4
December 2015	10.6	21.6	37.7
January 2016	13.2	22.0	38.0
February 2016	14.5	22.8	37.6
March 2016	12.6	21.7	33.7
April 2016	10.4	18.9	33.7
May 2016	6.8	17.9	27.8
June 2016	-0.2	13.3	22.7

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; and
- Water sprays during train coal loading;
- 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 during the reporting period 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)**. 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 30µg/m³/day and a National Environmental Protection Measure (NEPM) 24-hour average limit of 50µg/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 14 shows the dust deposition results for nine (9) dust deposition gauges. Gauge D7 is located within the Village of Wards River. **Table 15** shows the annual average dust deposition results at the end of the reporting period (June 2016).

Table 14: Dust Deposition Gauge Results

	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16
D3	6.9 _{D,I,V,S}	0.4	0.4	0.6	0.7	1.6	1.4	1.2	0.5	1.9	1.5	6.4 _{D,I,V,S}
D4	0.3	0.8	0.4	0.5	0.6	1.0	0.7	0.4	0.2	0.4	0.5	0.6
D5	11.4 _{D,S}	2.5	1.2	0.7	9.3 _{D,I,V,S}	1.7	0.8	1.8	3.6 _B	4.3 _{D,I,V,S}	3.1	40.6 _{D,I,V,S}
D7	0.6	0.5	0.6	0.3	0.4	1.4	2.7	6.5 _{D,V,S}	1.1	1.1	0.6	0.3
D8	0.6	0.7	0.5	0.7	1.9	8.8 _{D,I,S}	1.2	0.7	0.6	1.5	1.1	0.6
D9	0.8	1.2	0.9	0.6	0.4	2.5	0.8	1.0	2.2	1.6	1.6	1.9
D10	0.9	0.6	0.4	1.0	1.1	4.7 _{D,S}	1.4	7.9 _{D,V,I,S}	0.8	1.6	3.9	0.6
D12	1.5	1.0	1.1	1.1	1.2	3.0	0.7	1.4	0.9	2.1	0.6	1.1
D13	12.0 _{D,I,S}	1.8	4.8 _{D,C,V,I,S}	0.3	0.7	3.9 _I	1.6	3.6 _B	3.4 _B	2.6	4.7 _{D,V,I,S}	1.9

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 charred particulates showing characteristic cellular plant structures.

B=Bird droppings: The most common contamination.

O=Other contaminants not included above.

Dust levels recorded had an average value of 1.1 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.

Table 15: Annual Average Dust Deposition Gauge Results

D3	D4	D5	D7	D8	D9	D10	D12	D13	EPA Limit
1.0	0.5	1.7	0.9	0.9	1.3	1.2	1.3	1.5	4.0

Results compared with the EPA annual average upper limit of 4 g/m²/month indicate no exceedances against criteria at the end of the reporting period. 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 16 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.

Table 16: High Volume Air Sampler (PM₁₀) Results

Date	High Noon	Twin Houses	Hattam	Edwards
04-Jul-15	4	4	7	1
10-Jul-15	2	4	4	1
16-Jul-15	<1	1	<1	<1
22-Jul-15	2	4	3	<1
28-Jul-15	2	5	5	9
03-Aug-15	4	6	12	5
09-Aug-15	5	6	7	4
15-Aug-15	9	9	8	10
21-Aug-15	16	22	17	13
27-Aug-15	<1	9	5	6
02-Sep-15	7	15	9	7
08-Sep-15	7	10	13	6
14-Sep-15	8	7	8	4
20-Sep-15	6	5	7	22
26-Sep-15	6	4	5	12
02-Oct-15	11	18	13	18
08-Oct-15	11	13	14	14
14-Oct-15	8	12	13	12
20-Oct-15	12	10	12	15
26-Oct-15	13	9	<1	6
01-Nov-15	12	13	12	8
07-Nov-15	9	8	10	10
13-Nov-15	3	1	2	<1
19-Nov-15	16	23	19	17
25-Nov-15	15	21	19	17
01-Dec-15	16	12	9	12
07-Dec-15	6	7	21	11
13-Dec-15	15	17	17	18
19-Dec-15	10	10	9	11

Date	High Noon	Twin Houses	Hattam	Edwards
25-Dec-15	9	6	5	5
31-Dec-15	8	8	7	8
06-Jan-16	<1	8	1	3
12-Jan-16	22	25	23	19
18-Jan-16	4	6	4	3
24-Jan-16	22	21	16	17
30-Jan-16	15	12	11	13
05-Feb-16	12	10	10	10
11-Feb-16	7	7	8	7
17-Feb-16	20	19	26	18
23-Feb-16	9	10	8	5
29-Feb-16	11	10	10	10
06-Mar-16	8	11	11	8
12-Mar-16	9	11	1	14
18-Mar-16	2	6	6	14
24-Mar-16	6	7	4	8
30-Mar-16	7	7	6	7
05-Apr-16	8	8	8	11
11-Apr-16	12	16	25	18
17-Apr-16	8	8	44	10
23-Apr-16	12	11	12	13
29-Apr-16	6	10	6	7
05-May-16	6	8	6	6
11-May-16	4	5	1	2
17-May-16	3	7	4	2
23-May-16	11	17	17	13
29-May-16	<1	3	4	3
04-Jun-16	3	6	3	2
10-Jun-16	2	6	5	<1
16-Jun-16	1	9	5	4
22-Jun-16	2	4	5	<1
28-Jun-16	5	5	6	3

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 8.4, “Twin Houses” was 9.7, “Hattam” was 10.0 and Edwards was 9.2 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” did not exceed the 50 ug/m³ 24 hour limit on any 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 HVASs 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 AGQQMP. 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 21.4, “Twin Houses” was 24.3, “Hattam” was 24.9 and Edwards was 23.0 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 2015 to 30 June 2016 is 11.1 ug/m³ for PM₁₀. The TEOM results are generally consistent with those measured by the HVAS units.

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.

6.3.5 Complaints

One (1) air quality related complaint was received during the reporting period. A detailed complaints list is 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.

During the reporting period testing of the soils placed in the bioremediation facility was undertaken and soils with suitably low hydrocarbon levels were removed and disposed in the pit. Any new contaminated material was placed in the active cells in the bioremediation area. The bioremediation area is planned to be relocated during the next reporting period.

6.5 BIODIVERSITY

6.5.1 MANAGEMENT OF BIODIVERSITY

The Duralie Coal Mine Annual Biodiversity Report contains a review of environmental performance and progress against the requirements of the Duralie Coal Biodiversity Management Plan (BMP). 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 order to track progression towards completion criteria, baseline monitoring was undertaken in 2013.

Annual monitoring was undertaken in May 2014 and a summary of the results were provided in the *Landscape Function and Vegetation Structure for the Duralie Biodiversity Offset Report 2014*. Following the trial revegetation works which were completed in April 2016 the LFA monitoring will be undertaken again to assess progress and provide recommendations to develop an operational plan for the full offset revegetation with works scheduled to be undertaken during spring 2016.

In accordance with the BMP, the Duralie Coal Mine Annual Biodiversity Report is included in **Appendix**

8. A brief summary of main findings and conclusions are provided below:

- **Vegetation Clearance Report**

Areas cleared of vegetation during the reporting period included Strip 16 of the Weismantel Pit. 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 eight tree hollows from nine trees had been removed.

- **Seed Collection and Propagation**

A detailed list of seed collected was shown in the *2014 Annual Biodiversity Report Appendix 2*. At the end of the 2014 seed collection of 12kg of tree and shrub seed was still remaining as certain species were not available at the time of collection. These species will continue to be collected on an opportunistic basis. Additional seed has also been collected for use in the DCM rehabilitation areas on an opportunistic basis. Further seed collection may be undertaken if found necessary to meet the completion criteria of the BMP offset revegetation and mine site rehabilitation.

- **Salvaged and Reused Material for Habitat Enhancement**

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.

- **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.

- **Weed Control and Monitoring**

Weed control activities were undertaken from September 2015 to April 2016 for the target species across all VMU's within the offset areas and mining leases. The key species targeted included blackberry, lantana and Giant Parramatta grass. This was the third round of weed control activities in the offset areas. The trial revegetation works were undertaken during autumn 2016 and pre-cultivation spraying was undertaken in preparation for the revegetation works.

- **Feral Animal Control and Monitoring**

During the reporting period DCPL has investigated opportunities to enter into a partnership with a local wild dog control organisation. This would include a control program for Yancoal properties involving trapping, baiting and shooting and also broader engagement and training with local landholders for a coordinated approach to wild dog control. Further progress will be reported in the 2017 report.

A follow-up feral animal survey is scheduled to be undertaken in 2016/17 to determine requirements for ongoing control measures.

- **Nest Box Program**

The program currently involves 18 nest boxes targeting the Squirrel Glider (*Petaurus norfolcensis*) installed during February 2013, 106 nest boxes targeting a variety of hollow-dependent species installed during August 2013 and 45 nest boxes targeting a variety of hollow dependent species installed during September 2014. Results of nest box monitoring are summarised below;

Squirrel Glider nest boxes installed during February 2013:

Compared with the results from March 2015 when the same nest boxes were monitored, fewer animals were observed within the nest boxes, but all contained signs of species in the form of leaf nests, or in one case a bark nest. The target species (Squirrel Glider) was not observed during this survey. During March 2013 honey bees were recorded for the first time in a nest box (S3). The entrance hole to the nest box was blocked to kill the hive, and was re-opened during the April 2015 nest box survey, with the hive left in-situ. During the September 2015 surveys no bees were observed, and the majority of the bee hive was no longer present, apart from small traces which remained attached to the inside of the lid (Plate 1). It is possible gliders consumed the empty hive once the entrance hole to the nest box was re-opened and bees were no longer alive. A leaf nest was still present within the nest box.

Two additional observations of changes in nest box use over time include:

- S7: during March 2015, the leaves at S7 had been broken down by caterpillars and only a remnant nest remained. During the current survey a new leaf nest was present, indicating gliders have since utilised the nest box.
- S5: the first occupant of the nest box was the Brush-tailed Phascogale which had constructed a deep bark nest, while during March 2015 the nest box contained a leaf nest on top of the bark and was inhabited by sugar gliders. During the current survey no leaves were observed, only the bark nest remained with phascogale scats in one corner.

Nest boxes installed during August 2013:

Compared with previous surveys when the same nest boxes were monitored, an additional two nest boxes contained an animal or showed signs of previous occupation. This included the Lorikeet nest box at A38 which contained a nest constructed mostly of lichen, and the Phascogale nest box at A41 which contained a leaf nest.

There were two examples of multiple species using separate nest boxes in the same tree:

- at A8 the Common Brushtail Possum was occupying the Large Owl/Cockatoo nest box while the Brown Antechinus occupied the Pardalote nest box;
- at A48 Sugar Gliders occupied the Antechinus nest box while the Common Brushtail Possum occupied a Possum nest box. This is also the first time sugar gliders have been confirmed at this tree (i.e. during March 2015 a leaf nest was recorded for the first time in the Antechinus nest box).

There were two examples of nest box occupancy changes. At A19 the Owlet-nightjar nest box was previously occupied by sugar gliders, but during the current survey contained three Peron's Tree Frogs. This is the second occasion frogs have been recorded within a nest box. During the current survey, two Peron's Tree Frogs leapt from the nest box and appeared to spread their legs, fingers and toes to glide from the nest box to the ground. Both frogs were captured and returned to the nest box. In addition, the Dollarbird nest box at A11 originally contained bird eggs during October 2013, but during the current survey was occupied by a Common Brushtail Possum.

Nest boxes installed during September 2014:

Compared with the results from July 2015 when the same nest boxes were monitored, no additional nest boxes were occupied or showed signs of occupation. There was a change in occupation recorded during the current surveys. The Owl/Cockatoo nest box at B23 has now been occupied by two different hollow nesting bird species, the Australian Wood Duck and Australian Owlet-nightjar (*Aegotheles cristatus*). During the current surveys the nest box was occupied by a female Australian Wood Duck, likely sitting on eggs. During November and December 2014 this nest box was occupied by the Australian Owlet-nightjar, which was raising a clutch of four eggs.

• **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 have commenced to date. Continued discussions have been held with the RFS to conduct fire management activities and 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.

During February 2016 weeds eradication activities were undertaken as a precursor to revegetation activities. The Contractor identified weeds and gathered and placed into stockpiles before igniting and burning them in-situ. The burning of the stockpiles spread to the surrounding exotic pasture vegetation resulting in approximately 20 hectares of exotic pasture vegetation being burnt. An incident report was submitted to the DP&E and EPA. To the best of our knowledge, no native vegetation or Endangered Ecological Communities (EEC) were burnt or disturbed as a result of the fire incident.

- **Mammy Johnsons River Stabilisation**

Section 6.8 of the BMP includes a detailed design for the in-stream rehabilitation of a severely eroded section of Mammy Johnsons River prepared by Alluvium. No works commenced during the reporting period.

6.5.2 Complaints

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

6.6 GIANT BARRED FROG REPORT

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 2010 and 2015.

During the reporting period (2015/2016), the GBFMP was revised with proposed changes to the GBF monitoring program to ensure that appropriate links were established between monitoring requirements and the implementation of additional irrigation areas that were approved under the Duralie Extension Project. The revised plan was prepared with expert technical input from Dr Arthur White, the suitably qualified and experienced person endorsed by the NSW DP&E, to prepare the GBFMP.

The revised 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. 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 DEP Project Approval and respective EPL conditions and the approved BLMP.

Blast monitors are located on the:

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

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.

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, building inspections were undertaken on two dwellings. The first was an inspection of a private residence following a request from the land owner the update a previous inspection report. The second was of the Former Weismantel's Inn which is undertaken routinely on a two yearly basis.

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 were three (3) blasts where overpressure exceeded 115 dBL during the reporting period. Two of the 115 dBL exceedances were recorded at the Fisher-Webster monitor, one on 4 February 2016 and the other on 10 June 2016. In addition, one (1) blast recorded an overpressure above 115 dBL at the Moylan monitor on 11 February 2015. The three exceedances were investigated internally and management actions implemented as required. A total of 4.3% 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 2016) 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.

6.7.3 Complaints

Three (3) 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 approved by the DP&E in March 2016 and incorporated amendments for the Project Approval Modification December 2014.

Four (4) attended noise surveys were conducted during the reporting period. These surveys were conducted during July 2015, October 2015, January 2016 and April 2016.

A Sentinex real-time noise (RTN) 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 are provided in **Tables 17 to 24**. 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 there is a written agreement between Yancoal and the landholder, i.e. Sites REF1 and NM3.

Table 17: Contributed Mine Noise (LAeq_{15 min}) During July 2015 Surveys

Monitoring	Mine Contribution	Mine Contribution	Mine Contribution	Noise Criteria (day/evening/night)	Excursion dB(A)
Location	LAeq _(15 minute) for Day 7-8/07/2015	LAeq _(15 minute) for Evening 7/07/2015	LAeq _(15 minute) for Night 7-9/07/2015	LAeq _(15 minute)	LAeq _(15 minute)
NM1 Woodley	Nil	17	Nil, 25	35/35/35	0/0/0,0
NM2 Zulumovski Nth	35	37	33, 23	35/35/35	0/2/0,0
NM3 Mahony	Nil	24	21, 20	NA	0/0/0,0
NM4 Fisher-Webster	34	34	22, 21	35/35/37	0/0/0,0
REF1 Duralie Road	48	47	44, 45	NA	0/0/0,0
Additional Monitoring Location Wards River	Nil	26	19, 17	35/35/35	0/0/0,0

NA = not applicable

Table 18: Contributed Mine Noise (LA₁, min) During July 2015 Surveys

Monitoring	Mine Contribution	Noise Criteria (night)	Excursion dB(A)
Location	LA ₁ (1 minute) for Night 7-9/07/2015	LA ₁ (1 minute)	LA ₁ (1 minute)
NM1 Woodley	Nil, 28	45	0, 0
NM2 Zulumovski Nth	37, 31	45	0, 0
NM3 Mahony	24, 25	45	0, 0
NM4 Fisher-Webster	34, 33	45	0, 0
REF1 Duralie Road	47, 49	NA	0, 0
Additional Monitoring Location Wards River	27, 30	45	0, 0

NA = not applicable

Mine operating noise emissions were within the noise criteria of at all monitoring locations for the Day, Evening, Night 1 and Night 2 survey periods during the July 2015 compliance survey with the exception of the Zulumovski monitoring location during the evening survey.

During the evening measurement at the Zulumovski monitoring location, a moderate temperature inversion with a lapse rate of 3.7degrees/100m was prevailing. Thus as outlined in section L4.8 of EPL 11701, the noise limits would not be applicable to this noise measurement and the mine is deemed compliant for this measurement. Additionally the Zulumovski is a mine owned property with monitoring conducted there to represent privately owned properties to the North of the mine.

Table 19: Contributed Mine Noise (LAeq₁₅ min) During October 2015 Surveys

Monitoring	Mine Contribution	Mine Contribution	Mine Contribution	Noise Criteria (day/evening/night)	Excursion dB(A)
Location	LAeq _(15 minute) for Day 6-8/10/2015	LAeq _(15 minute) for Evening 6/10/2015	LAeq _(15 minute) for Night 6-8/10/2015	LAeq _(15 minute)	LAeq _(15 minute)
NM1 Woodley	Nil	24	26, Nil	35/35/35	0/0/0,0
NM2 Zulumovski Nth	Nil	33	35, 35	35/35/35	0/0/0,0
NM3 Mahony	Nil	26	25, 23	NA	0/0/0,0
NM4 Fisher-Webster	Nil	28	24, 35	35/35/37	0/0/0,0
REF1 Duralie Road	46	47	41, 44	NA	0/0/0,0
Additional Monitoring Location Wards River	Nil	Nil	27, 20	35/35/35	0/0/0,0

NA = not applicable

Table 20: Contributed Mine Noise (LA₁, min) During October 2015 Surveys

Monitoring	Mine Contribution	Noise Criteria (night)	Excursion dB(A)
Location	LA ₁ _(1 minute) for Night 6-8/10/2015	LA ₁ _(1 minute)	LA ₁ _(1 minute)
NM1 Woodley	31, Nil	45	0, 0
NM2 Zulumovski Nth	41, 38	45	0, 0
NM3 Mahony	30, 30	NA	0, 0
NM4 Fisher-Webster	32, 43	45	0, 0
REF1 Duralie Road	44, 46	NA	0, 0
Additional Monitoring Location Wards River	37, 38	45	0, 0

NA = not applicable

Mine operating noise emissions were within the noise criteria at all monitoring locations for the Day, Evening, Night 1 and Night 2 survey periods during the October 2015 compliance survey.

Table 21: Contributed Mine Noise (LAeq₁₅ min) During January 2016 Surveys

Monitoring	Mine Contribution	Mine Contribution	Mine Contribution	Noise Criteria (day/evening/night)	Excursion dB(A)
Location	LAeq _(15 minute) for Day 12/01/2016	LAeq _(15 minute) for Evening 12/01/2016	LAeq _(15 minute) for Night 12-14/01/2016	LAeq _(15 minute)	LAeq _(15 minute)
NM1 Woodley	23	Nil	Nil, 25	35/35/35	0/0/0,0
NM2 Zulumovski Nth	30	Nil	29, Nil	35/35/35	0/0/0,0
NM3 Mahony	Nil	23	22, 25	NA	0/0/0,0
NM4 Fisher-Webster	Nil	20	27, Nil	35/35/37	0/0/0,0
REF1 Duralie Road	54	48	43, 45	NA	0/0/0,0
Additional Monitoring Location Wards River	Nil	Nil	Nil, Nil	35/35/35	0/0/0,0

NA = not applicable

Table 22: Contributed Mine Noise (LA₁, min) During January 2016 Surveys

Monitoring	Mine Contribution	Noise Criteria (night)	Excursion dB(A)
Location	LA ₁ (1 minute) for Night 12-14/01/2016	LA ₁ (1 minute)	LA ₁ (1 minute)
NM1 Woodley	Nil, 39	45	0, 0
NM2 Zulumovski Nth	38, Nil	45	0, 0
NM3 Mahony	31, 30	NA	0, 0
NM4 Fisher-Webster	33, Nil	45	0, 0
REF1 Duralie Road	46, 48	NA	0, 0
Additional Monitoring Location Wards River	Nil, Nil	45	0, 0

NA = not applicable

Mine operating noise emissions were within the noise criteria at all monitoring locations for the Day, Evening, Night 1 and Night 2 survey periods during the January 2016 compliance survey.

Table 23: Contributed Mine Noise (LAeq₁₅ min) During April 2016 Surveys

Monitoring	Mine Contribution	Mine Contribution	Mine Contribution	Noise Criteria (day/evening/night)	Excursion dB(A)
Location	LAeq ₁₅ (15 minute) for Day 5/04/2016	LAeq ₁₅ (15 minute) for Evening 5/04/2016	LAeq ₁₅ (15 minute) for Night 5-7/04/2016	LAeq ₁₅ (15 minute)	LAeq ₁₅ (15 minute)
NM1 Woodley	28	30	30, 27	35/35/35	0/0/0,0
NM2 Zulumovski Nth	29	29	Nil, 26	35/35/35	0/0/0,0
NM3 Mahony	29	23	25, 26	NA	0/0/0,0
NM4 Fisher-Webster	Nil	Nil	Nil, Nil	35/35/37	0/0/0,0
REF1 Duralie Road	45	47	48, 50	NA	0/0/0,0
Additional Monitoring Location Wards River	Nil	Nil	Nil, Nil	35/35/35	0/0/0,0

NA = not applicable

Table 24: Contributed Mine Noise (LA₁, min) During April 2016 Surveys

Monitoring	Mine Contribution	Noise Criteria (night)	Excursion dB(A)
Location	LA ₁ (1 minute) 5-7/04/2016	LA ₁ (1 minute)	LA ₁ (1 minute)
NM1 Woodley	38, 32	45	0, 0
NM2 Zulumovski Nth	Nil, 30	45	0, 0
NM3 Mahony	33, 35	NA	0, 0
NM4 Fisher-Webster	Nil, Nil	45	0, 0
REF1 Duralie Road	52, 53	NA	0, 0
Additional Monitoring Location Wards River	Nil, Nil	45	0, 0

NA = not applicable

Mine operating noise emissions were within the noise criteria at all monitoring locations for the Day, Evening, Night 1 and Night 2 survey periods for the April 2016 compliance survey.

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 6.9.4.

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. During the reporting period the operational fleet has been reduced from the maximum in 2015. In terms of the four monitoring locations ("Woodley", "Zulumovski", "Mahony" 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 noise monitoring was conducted during the July 2015, October 2015, January 2016 and April 2016 Noise Surveys. Rail Noise Survey results are included in the Noise Survey reports which are available at the Duralie Coal website (www.duraliecoal.com.au).

Attended measurements and unattended noise logger surveys were conducted at all three locations TN2-North (Wards River North), TN3-South (Wards River South) and TN1 (Craven) for the July 2015, October 2015, January 2016 and April 2016 noise surveys.

During the July 2015 survey, noise emanating from the Duralie Shuttle complied with the L_{Amax} and L_{Aeq} pass-by noise goals at TN2-North, TN3-South and TN1 with the rail horn excluded from the measurement for this quarter monitoring period.

During the October 2016 survey, the noise emanating from the Duralie shuttle complied with the L_{Amax} and L_{Aeq} pass-by noise goals at the TN3-South and TN1 locations with the rail horn excluded from the measurement for this quarter monitoring period. TN2-North failed to meet the L_{Aeq} noise goal exceeding the goal by a single dB. However TN2-North did comply with the L_{Amax} noise goal with the train horn excluded.

During the January 2016 survey, due to operational constraints at DCM, only a limited number of shuttle train passes between Duralie and Stratford occurred. However, noise emissions associated with the Duralie shuttle train by-pass were deemed to comply with the noise goals set out in the DCM Noise Management Plan at the TN1-Craven, TN3-South and TN2-North for the January 2016 monitoring period.

During the April 2016 survey, noise emanating from the Duralie shuttle train complied with the L_{Amax} and L_{Aeq} pass-by noise goals at the TN3-South location with the rail horn excluded from the measurement for this quarter monitoring period and complied with the L_{Amax} noise goal at TN2-North and TN1 but failed to comply with the L_{Aeq} pass-by noise goals at these locations.

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 or animal noise. Additionally, several of the alarms were received at times when no operations were occurring, i.e. Sunday nights. DCPL continue to implement the noise management measures described in the NMP.

6.8.5 Mobile Plant Noise Assessments

The DCM fleet of mobile plant including haul trucks, excavators, dozers, graders and other items are annually assessed for sound power levels (SWL). SWL's are compared to the SWL's referred to in the 2010 EA and 2014 EA and are also compared to historical results to track performance over time. Availability of mobile plant for noise testing is subject to production requirements and servicing/maintenance/breakdowns. There were several changes to the plant on site following the transition to owner operator in September 2015.

Noise assessments of mobile plant and equipment occurred in January and April 2016. In general the mobile fleet SWL's were comparable to the levels reported in the 2010 and 2014 EA's. Several mobile plant exceeded the specified A-weighted and linear target noise emission levels, typically on the trucks and dozers and were generally less than 2dB. Some points of consideration with regard to the results of the sound power survey are given below;

- Pumps were measured in-situ and reflection from nearby high-walls and other operating plant may have impacted upon the measurements.
- Five haul trucks failed to comply with the static A-weighted criteria and two failed to comply with the dynamic criteria but all exceedances were only 1dB.
- Water Cart 502 exceeded the criteria for static A-weighted operation by 4dB. This is a new piece of equipment on-site from Matilda hire and does not have any attenuation applied to it.
- Wheeled Loader Komatsu WA900 exceeded the A-weighted criteria for wheeled loaders by 8dB and the linear criteria by 5dB. Vipac points out that this criterion is for a smaller class of loader which used to operate on the DCM site. Vipac recommends that a new criterion be set for this larger class of wheeled loader now operating on site and note the loader typically operates near the load-out facility.
- Dozer 201 had a loose ripper which was rattling as the dozer travelled creating additional nuisance noise from the dozer. Ensuring dozer rippers are tightly fitted ensures the excessive noise their rattling creates is eliminated.
- Similarly Dozer 203 had a whistle from the exhaust which was causing additional noise at a distinct tone on the vehicle. Such whistling is usually attributed to a turbo issue on the vehicle or a flake of the exhaust dislodging creating a whistle as exhaust fumes blow past. Vipac recommends the turbo and exhaust be investigated during the dozers' next scheduled maintenance run.
- Dozer 201 and 202 both exceeded the A-weighted and linear criteria for 2nd gear forward and reverse dynamic operations. These exceedances were attributed to both engine noise and track slap as the dozer travels.
- Historical trending of the haul trucks and excavators show that there has been no significant increase in the noise being emitted from each of the plant items in static and dynamic modes of operation.
- All evaporative fans surveyed complied with the applicable noise criteria for this annual survey. Gen Set 5 Fan 2 was submersed in water at the time of monitoring and thus could not be measured as part of this survey.
- As no coal was being exported from DCM at the time of the mobile plant survey, the rotary breaker was not measured as part of this survey.

The results of the annual mobile plant noise assessment are utilised to provide feedback on the maintenance of the mobile plant fleet. In September 2015 the Duralie Coal Mine transitioned to an owner operator structure and at the same time much of the existing fleet was replaced including dozers, drills and loaders. Specifically resulting from the April 2016 mobile plant monitoring the

following comments and recommendations apply:

- All un-attenuated 789 haul trucks have now been removed from operation.
- Historical trending of the attenuated haul trucks shows no significant increase in sound power levels.
- The dozer fleet has been replaced and includes a wheeled dozer and sound attenuated dozer. Some maintenance works have been recommended on the dozers.
- The excavators show no significant change over time and continue to be maintained.

6.8.6 Complaints

Ten (10) noise related complaints were received during the reporting period (complaints include general mine noise and evaporative fan noise). There has been a significant reduction in noise complaints during in the reporting period when compared with the previous period (39), which coincides with the reduced operational fleet and the location of operations. 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 DP&E, 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 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 2015/16.

Table 25: Aboriginal Heritage Sites within EA Study Area

Site Code (refer EA documentation)	Site Type	Status
DM2	Isolated Artefact	Salvaged
DM3	Scarred Tree	Existing
DM4	Scarred Tree	Existing
DM5	Scarred Tree	Salvaged
DM6	Isolated Artefact	Existing
DM9	Open Artefact Scatter	Existing
DM10	Scarred Tree	Existing
DM11	Isolated Artefact	Removed
38-1-0033	Scarred Tree – Honey Tree	Existing

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

Management of spontaneous combustion generally involves reducing the interaction with water and oxygen by profiling and capping and reducing the time coal faces are exposed prior to mining.

There were no occurrences of spontaneous combustion during the current reporting period. Isolated occurrences of self-heating within the exposed faces of the waste dumps have been identified and managed during the reporting period.

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 35 head of cattle grazing within the mining lease area on either a lease or agistment basis involving two (2) separate lessees or agisters. Installation and maintenance of fencing was undertaken during the reporting period to allow access for cattle grazing on areas within the Mining Lease which had become isolated. Additionally, cattle were grazed on other mine owned lands surrounding the mining lease.

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;
- 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 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-2016) the Mine Water Dam contained 1003 ML (77.5%), Auxiliary Dam 1 contained 149 ML (37.7%) and Auxiliary Dam 2 contained 2076 ML (80.0%).

7.1.2 Site Water Balance

A review of the Main Water Dam, AD1 and AD2 balance 2015 is as follows: Figures are based on Duralie Mine Site Water Balance Review for the 2015 calendar year. The full report is available on request.

Inflows (mL/pa)

Rainfall runoff	928
Pump from open cut pits	517
Pump from other storages	15
MWD diversion seepage	152
First flush capture	18
Total Inflow	1,631

Outflows (mL/pa)

Evaporation	572
Haul Road (dust suppression)	197
Irrigation and Evaporator Fan Loss	1,031
Total Outflow	1,799
INFLOW - OUTFLOW	-168
Start of 2015 year total storage volume	3,095
End of 2015 year total storage volume	3,058
Change in Storage	-57

The above values indicate only a very small change in stored water volume on site during 2015. Note that this does not include any increase in stored water volume in the Weismantel pit and the adjacent waste rock emplacement. Although the estimated volume of water contained in the Weismantel pit itself (based on recorded water levels) does not appear to have changed since late 2014, it seems likely that at least 350 ML increase has occurred in water stored in the adjacent in-pit waste rock emplacement in this period.

The volume of groundwater estimated reporting to Clareval pit in 2015 was 18 ML. No water has been pumped from the Weismantel Pit during the reporting period and only the Clareval Pit has been dewatered.

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 26** (Volumes reported are at 30-June-2016).

Table 26: Stored Water

	Volumes Held (ML)		
	Start of Reporting Period	At end of Reporting Period	Storage Capacity
Mine Water	3229	3228	4591
Contaminated Water	0	0	0
Controlled Discharge Water	na	na	na

7.2 SURFACE WATER**7.2.1 Surface Water Management**

Surface water management is divided into the management of clean and mine water as outlined below. Section 7.2.1.1 covers management of runoff from the overburden dump and sediment and erosion control. Surface water is managed in line with the approved Water Management Plan under Condition 29, Schedule 3 of the DEP Approval.

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 Duralie Extension Project Approval, 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 practical) 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 practical) 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 sediment dam spills.

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.

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 and sediment dams including RS6.

7.2.1.2 Clean Water Management

The main objective of clean water management is the segregation of clean 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 Dirty 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 Duralie Coal Mine Water Management Plan 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
- Site 9 – Karuah River (KR)
- Site 11 – Mammy Johnsons River
- Site 12 – Mammy Johnsons River
- Site 15 – Mammy Johnsons River
- Site 19 – Karuah River

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 monitor.

Table 27: Summary of Surface Water Monitoring Results and Trigger Levels – pH, EC and TSS

Site	pH			EC		TSS	
MJR	20 th %ile	80 th %ile	Trigger	80 th %ile	Trigger	80 th %ile	Trigger
Site 11	7.3	7.6	7.1-7.6	388	370	33	15
GB1	7.2	7.6		271		24	
Site 12	7.1	7.6		348		32	
CSC							
SW2 (RC)	7.4	8.0	7.1-7.9	468	544	71	80
SW10	6.9	7.4		82		22	
UT							
SW9	7.0	7.3	6.4-7.1	208	461	221	57
SW10	6.9	7.4		82		22	

Table 28: Summary of Surface Water Monitoring Results and Trigger Levels – Copper, Turbidity, Zinc and Aluminium

Site	Copper		Turbidity		Zinc		Aluminium	
MJR	80 th %ile	Trigger	80 th %ile	Trigger	80 th %ile	Trigger	80 th %ile	Trigger
Site 11	0.002	0.002	35.3	24	0.012	0.011	2.06	1.24
GB1	0.002		36.6		0.009		1.59	
Site 12	0.001		32.6		0.007		1.66	
CSC								
SW2 (RC)	0.003	0.003	93.5	119	0.052	0.064	3.94	3.02
SW10	0.007		90.8		0.025		9.08	
UT								
SW9	0.004	0.004	266.4	94	0.030	0.024	8.14	2.96
SW10	0.007		90.8		0.025		9.08	

Assessment of the Performance Indicators and Performance outcomes are presented in **Table 29**.

Table 29: Surface Water Monitoring Performance Outcomes – 2015-16 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, 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. DO is consistently below 85% at Site 11, Site 12 and GB1.</p>	No further requirement for assessment of Performance Measure.	Continue monitoring.

Table 29 (Continued): Surface Water Monitoring Performance Outcomes – 2015-16 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 Aluminium.</p> <p>Analysis of the monitoring data shows Aluminium to be only slightly elevated at SW (RC) on 3 monitoring occasions. Aluminium was also elevated above the trigger on two occasions at SW10, occurring after rainfall. Hence similar trends observed upstream and downstream.</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 29 (Continued): Surface Water Monitoring Performance Outcomes – 2015-16 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 SW2 (RC) 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 TSS, Turbidity, Aluminium and Zinc. Analysis of the monitoring data shows TSS and Turbidity to be elevated on one occasion with all other results well below the trigger. The one outlying high result for both TSS and Turbidity occurred after rainfall.</p> <p>Analysis of the monitoring data also shows similar trends observed upstream and downstream for TSS, Turbidity Al and Zinc.</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 (3097 uS/cm), slightly alkaline pH (8.1) and low miscellaneous metals concentration. Reference should be made to the water monitoring results in **Appendix 4**.

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 2019, however the average EC (3097 uS/cm) in 2016 has remained higher than the predicted EC of 2140 uS/cm. This is predominantly due to the higher EC water from the Clareval pit. An assessment of the irrigation water quality was undertaken in the 2016 Irrigation Area Monitoring Report (Horizon Environmental, 2016) and is included in Section 7.4.1.

SW4 was not monitored 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 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. Further irrigation and soil monitoring in 2016 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 (refer section 7.4.1). Grazing continued to occur during the reporting period within the approved irrigation areas.

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 mine.

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

Monitoring during this reporting period was conducted during September 2015 and February 2016 and

involved sampling from seven sites. The September survey identified a total of 61 genera in 45 families. For the February survey the level of identification changed from genus to family level. A total of 41 families of aquatic macroinvertebrates were recorded.

Both the September 2015 and February 2016 report concluded that;

“the results from the current survey suggest that the overall; biodiversity and river environmental conditions have remained very good and that there are no apparent adverse effects on the aquatic macroinvertebrate fauna in the Mammy Johnsons River as a result of any activities arising from the operations of the Duralie Mine. The only significant impact to the river in addition to the very low flows was presence of cattle at site M1 that has impacted water quality, habitat availability and the riverbed, bank and riparian structure.” (Invertebrate Identification Australasia 2015 and 2016).”

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 September 2015 and February 2016 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 Water Management Plan. 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 2015. Results for the reporting period are generally similar to results from last year with some minor differences. Monitoring continues to demonstrate negligible impact on riparian vegetation. 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 undertook ecotoxicity testing of samples taken from selected water monitoring sites in Mammy Johnsons River, Coal Shaft Creek and Duralie Coal Mine Main Water Dam during 2013 to 2015. 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 the next monitoring round will be undertaken
December 2016

7.3 GROUNDWATER

7.3.1 Groundwater Management

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)**.

Groundwater monitoring is conducted in accordance with the Duralie Coal Mine Water Management Plan (WMP) Appendix 3 Groundwater Management Plan.

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 **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 5.6 (DB5W and DB10W in September 2015) to a neutral 7.8 (WR2 in March 2016);
- 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 457mg/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 15 mg/l (DB3W in November 2015);
- 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 (SI3W) to a high of 69.4 mg/l (DB5W in November 2015);
- Manganese concentrations across all wells were not high with the highest being 6.89 mg/l within SI3W in March 2016; and
- Zinc concentrations were essentially low and not inconsistent with available historical data.

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 7 of the Groundwater Management Plan (2016). 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.

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 5.6 and 7.6. This is a generally similar range to that noted in the EA.

Similarly, the electrical conductivity range for the bores was 84 to 5600 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 third 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 Groundwater Management Plan. DCPL intended to implement the alluvial aquifers interface monitoring program during the next reporting period.

7.3.4 Reporting

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 precludes the disposal of mine water from the approved project approval boundary.

Irrigation currently 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. No irrigation currently occurs within Type III irrigation areas located in the catchment of Coal Shaft Creek above Dam 3.

In accordance with the WMP, specifically Appendix 2 Surface Water Management Plan Attachment 1 Irrigation Management Plan, 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 2015 calendar year a total of 1031ML of mine water was irrigated within Type I, II, IV & V areas (compared with 1272 ML 2014 calendar year).

Water quality for 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 2016 Irrigation Area Monitoring Report (Horizon Environmental, 2016) 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. A summary from the 2016 irrigation area monitoring is provided below:

"Irrigation water quality salinity increased since the 2015 monitoring round. The predominance of sulfate anions over chloride mitigates salinity effects on soil structure and vegetation health. The risks from land application of water from the MWD to soil and pasture quality appear to be low.

Soil salinity in irrigation areas and the respective reference sites was similar. However, the effect of irrigation with saline water from the MWD on pasture condition needs to be monitored. 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.

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 variation, as well as local soil conditions. However, 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. Assess pasture condition with respect to irrigation water quality and water quality trends in the mine water storages in 2017 using a method consistent with the current monitoring regime.*
- 2. Irrigation area management may need to be reviewed if irrigation water salinities increase above about 9 dS/m.*

7.4.2 Re-establishment of Coal Shaft Creek

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 which is scheduled for completion by mid-2017.

A photographic surveillance record of key structures along the existing Coal Shaft Creek diversion is undertaken annually and was conducted during December 2015. Regular inspections of the CSC Diversion are 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. REHABILITATION

The primary objectives of the rehabilitation program are provided in **Table 30** below.

Table 30: 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. This will be addressed during the mine closure planning process.

8.2 REHABILITATION OF DISTURBED LAND

Rehabilitation of disturbed areas is undertaken concurrent with ongoing mining operations. Rehabilitation of land is undertaken in accordance with the Duralie Coal Mine Rehabilitation Management Plan (RMP) (Duralie Coal, 2015d) and the Duralie Coal Mine Mining Operations Plan (MOP) (DCPL, 2015). A minor amendment to this MOP was submitted in December 2015 to incorporate a minor change to the sequencing of mine operations (i.e. mining of Weismantel pit originally planned for 2018 has been brought forward to 2016).and the MOP was subsequently approved by DRE in January 2016.

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.

Topsoil is removed from 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 treed and pastured areas. Trees are planted to achieve maximum aesthetic and screening effects as well as providing windbreaks, woodlots, stock shelter and habitat enhancement. As per Table 4 in the RMP, 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 238,000 cubic metres of topsoil was held in various stockpiles. This would provide for rehabilitation of 238 hectares to the nominal topsoil depth of 100mm. The current area disturbed by operations is 275 hectares, therefore sufficient topsoil resources are available to complete rehabilitation of the operation taking in to account the final voids will not require topsoil.

Topsoil stripping has now been completed up to the northern extent of both the Clareval pit and the Weismantel pit. Topsoil stripping is still to be undertaken on a small strip of approximately 2 hectares on the eastern side of Weismantel..

Rehabilitation at June 2016 has been completed generally in accordance with Plan 3B of the MOP which shows the rehabilitation status at end of 2016. 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.

Rehabilitation completed during the reporting period included 12ha above the RL69 stockpile and on the northern side of the powerline corridor.

The Duralie Coal Mine rehabilitation progress is generally in accordance with the planned activities described in DCM Mining Operations Plan (MOP 2015) approved in January 2016 (i.e. Plan 3B – Mining and Rehabilitation - 2016). The revised MOP makes provision for 110 hectares of rehabilitated area by the end of 2016.

Table 31 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 2016 are shown in **Figure 3**, provided in **Appendix 1**.

Table 31 – Rehabilitation status

Mine area type	Previous RP (actual)	This RP (actual)	Next RP (forecast)
Total Mining Lease	947.9	947.9	947.9
Total mine footprint	363	387	391
Total active disturbance	288	299	275
Land being prepared for rehab (Landform Establishment)	0	0	28
Land under active rehabilitation (Growth Medium Development)	12	0	28
Completed rehabilitation (Ecosystem Establishment & Sustainability)	86	99	99

Maintenance activities on rehabilitated land were also undertaken during the reporting period. These included slashing and clearing of access tracks, weeds spraying and some rework of areas with poor establishment. Further maintenance activities are planned for the next reporting period following the monitoring of the rehabilitation areas which was completed in May 2016.

8.3 REHABILITATION MONITORING

In accordance with the Duralie Coal Mine Rehabilitation Management Plan (Duralie Coal, 2015d) monitoring of rehabilitation areas at the Duralie mine site, using Landscape Function Analysis (LFA) was conducted during May 2016. 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 May 2016 was the third 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) 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. 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 results from the above indices are compared to analogue transects established in remnant woodland vegetation of the Duralie Biodiversity Offset area.

Overall the spoil emplacement is progressing well with index scores comparable to, or showing improvements to be comparable to, analogue sites as the landscape matures.

The older rehabilitation areas (i.e. rehabilitated in 2008 and 2010) have returned soil surface indices that are equal to or nearing the analogue sites. Stability Index scores have been stable for the last three surveys at analogue site levels, whilst Infiltration Index scores have steadily improved to now be at analogue levels. Nutrient Cycling Index scores have shown improvement to be near the analogue scores. As the Nutrient Cycling Index is a lagging index, taking time to accumulate litter and have it incorporated in to the soil, this is wholly within expectations. Younger rehabilitation areas (i.e. rehabilitated in 2011 and 2012) are progressing towards analogues site levels, with the 2012 rehabilitation areas achieving Stability Index levels. Infiltration and Nutrient Cycling Indices are progressing towards targets.

Within the rehabilitation on the spoil emplacement two relatively small areas of concern were highlighted. These were an area of 2011 rehabilitation and an area in the 2012 rehabilitation, where topsoil has been eroded and groundcover vegetation has not established. Remediation and maintenance actions have been recommended including re-application of topsoil, installation of sediment control barriers such as brushmatting, woody debris and/or coir logs with immediate seeding of stoloniferous grasses.

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, but appears to be on trajectory to have similar characteristics to the analogue sites. The 2008 rehabilitation areas have plant numbers that appear to be stabilised, albeit slightly below the targets, but with a higher canopy volume due to the canopy being almost exclusively formed by fast growing *Acacia irrorata* and *A. mearnsii*. Younger rehabilitation areas have very high plant numbers that decrease as the system self-thins, with canopy volumes increasing as the plants mature. With maturation of the Eucalypts and natural recruitment of shrubs the structure of the vegetation will increase in complexity. Younger rehabilitation areas have had a more complex seed mix used, and it is expected this will also result in a more structurally complex system in future surveys”.

8.4 REHABILITATION TRIALS AND RESEARCH

Rehabilitation trials are currently being implemented in the biodiversity offset area in accordance with the Biodiversity Management Plan. Refer to Section 6.5 of this report and the Duralie Coal Mine Annual Biodiversity Report (DCPL, 2016) for a summary of works undertaken during the reporting period.

8.5 DEVELOPMENT OF THE FINAL REHABILITATION PLAN

8.5.1 Mine Closure Planning

The current Mining Operations Plan provides for mining operations to the end of 2019. Mine closure planning is expected to commence during the next reporting period with a plan to be prepared by mid-2017. The Mine Closure Plan would include final rehabilitation measures for areas including infrastructure areas, water management areas, waste emplacements, final voids and biodiversity offsets.

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. Further details associated with the final void will be addressed as part of detailed mine closure planning.

8.6 REHABILITATION TARGETS

The DCM MOP (Plan 3B – Mining and Rehabilitation - 2016) rehabilitation target for end of 2016 calendar year is a cumulative total of 110 hectares of rehabilitation. To date 99 hectares of rehabilitation has been completed.

The DCM MOP (Plan 3C – Mining and Rehabilitation - 2017) rehabilitation target for end of 2017 calendar year is a cumulative total of 138 hectares of rehabilitation. DCPL propose to undertake 28 hectares of progressive rehabilitation during the next reporting period which will include landform establishment and growth medium development.

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 \$450,000 since commencing in 2010 and during 2016 a total of \$50,000 in grants was distributed between 18 community organisations for a diverse range of community projects and initiatives.

The community groups to receive grants in 2016 were:

- Dymocks Children's Charities Ltd for Gloucester School Public Library Regeneration Project
- Gloucester Country Club for Stratford Coal Super Sevens Golf Competition
- Dungog Arts Society for Annual Art Exhibition major prize
- Rotary Club of Gloucester for Outdoor Fitness Trail – stage 3
- Gangat Rural Fire Brigade for purchasing training equipment
- Stroud Rodeo Association for 2016 Stroud Rodeo and campdraft
- United Wild Dog Alliance – Mid North Coast for wild dog eradication
- Dungog Agricultural and Horticultural Association for cool room in kiosk for Dungog Showground
- Gloucester RSL Sub Branch for safe seating for RSL services
- Gloucester Mountain Man Triathlon Incorporated for the Mountain Man Tri Challenge
- Worimi First People Aboriginal Corporation for NAIDOC Day 2016 and Gloucester Public School Brekkie Club
- Gloucester Chamber of Commerce for Chill Out Festival 2016
- Stroud Show Association Inc. for 2016 Stroud Show
- Gloucester Thunderbolts Swimming Club Inc. for storage reels for lane ropes
- Stroud Road Community Hall and Progress Association for Stroud Road Spring 'Bash 'n Bang'
- Gloucester District Historical Society for construction of archive and research centre – solar power system
- Rotary Club of Dungog for Dungog Pedalfest 2016
- Midcoast Science and Engineering Challenge and Discovery Day

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 2016, \$30,000 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 \$625,000 to locally based community and training initiatives via the Education Support Program. During that time, the funding has made a genuine difference to the lives of 150 tertiary students (\$285,000), 100 apprentices (\$72,000) and 50 businesses (\$190,000).

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 *Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects* (Department of Planning, 2007) 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:

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

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 (Duralie Coal) over the last 6 reporting years are as follows:

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Noise	22	28	25	26	39	10
Blasting	11	16	1	12	13	3
Air Quality	5	0	4	4	1	1
Water	2	1 ^{\$}	0	0	0	0
Lighting	1	0	1	0	0	0
Visual	0	0	1	1	0	0
Train	1	0	0	0	3	0
Notification	1	0	0	0	0	0
Other	0	0	0	1	0	0
Total* (by Category)	43	43	46	42	56	14

Comments:

- The total number of complaints received during the reporting period was 14 with the total number of complainants being 7.
- Noise complaints constituted the most populous category of complaints received (10), with blasting the second most populous (3).
- Total number of complaints received by category during 2015/2016 was significantly lower than the previous reporting periods for all categories where complaints were received.

- 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.

9.4 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 via a 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.

9.5 EMPLOYMENT STATUS AND DEMOGRAPHY

As at 30 June 2016, the employment status at the mine site was as follows:

DURALIE	FULL-TIME
Total FTEs	116
Environment & Community (included in total)	1
Total	116

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 116 (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).

9.6 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 an environment and community presentation following the transition to owner operator in September 2015. Additionally a presentation on general environmental awareness and mining in new areas was undertaken with all staff and employees in March 2016.

10. INDEPENDENT ENVIRONMENTAL AUDIT

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 audit report and DCPL's response to the recommendations were provided to DP&E in February 2015. Following further correspondence with DP&E the audit report was revised and resubmitted to DP&E on 16 July 2015. Following acceptance by DP&E the full audit report and responses to the recommendations will be made available on the Duralie Coal website at <http://www.duraliecoal.com.au/environment/environmental-audit.php>

DCPL note that a response has been received from DP&E since the end of the current reporting period and details will be included in the 2016/17 Annual Review.

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

11. INCIDENTS AND NON-COMPLIANCE

During the reporting period there have been three incidents or non-compliances at the Duralie Coal Mine.

- 23 August 2015 – Regarding a rainfall runoff discharge from the irrigation area. A written report was provided to the EPA and DP&E. The EPA has confirmed no further action is required.
- 03 February 2016 – Regarding an uncontrolled burn in the biodiversity offset area. A written report was provided to the EPA and DP&E. Further information has been provided following the request of DP&E.
- 17 March 2016 – Regarding a blast after the approved time and was not monitored. A written report was provided to the EPA and DP&E and no further action has been requested.

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 targets, including 28 hectares of landform establishment and rehabilitation;
- 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;
- Develop Mine Closure Plan for the Duralie Coal Mine.

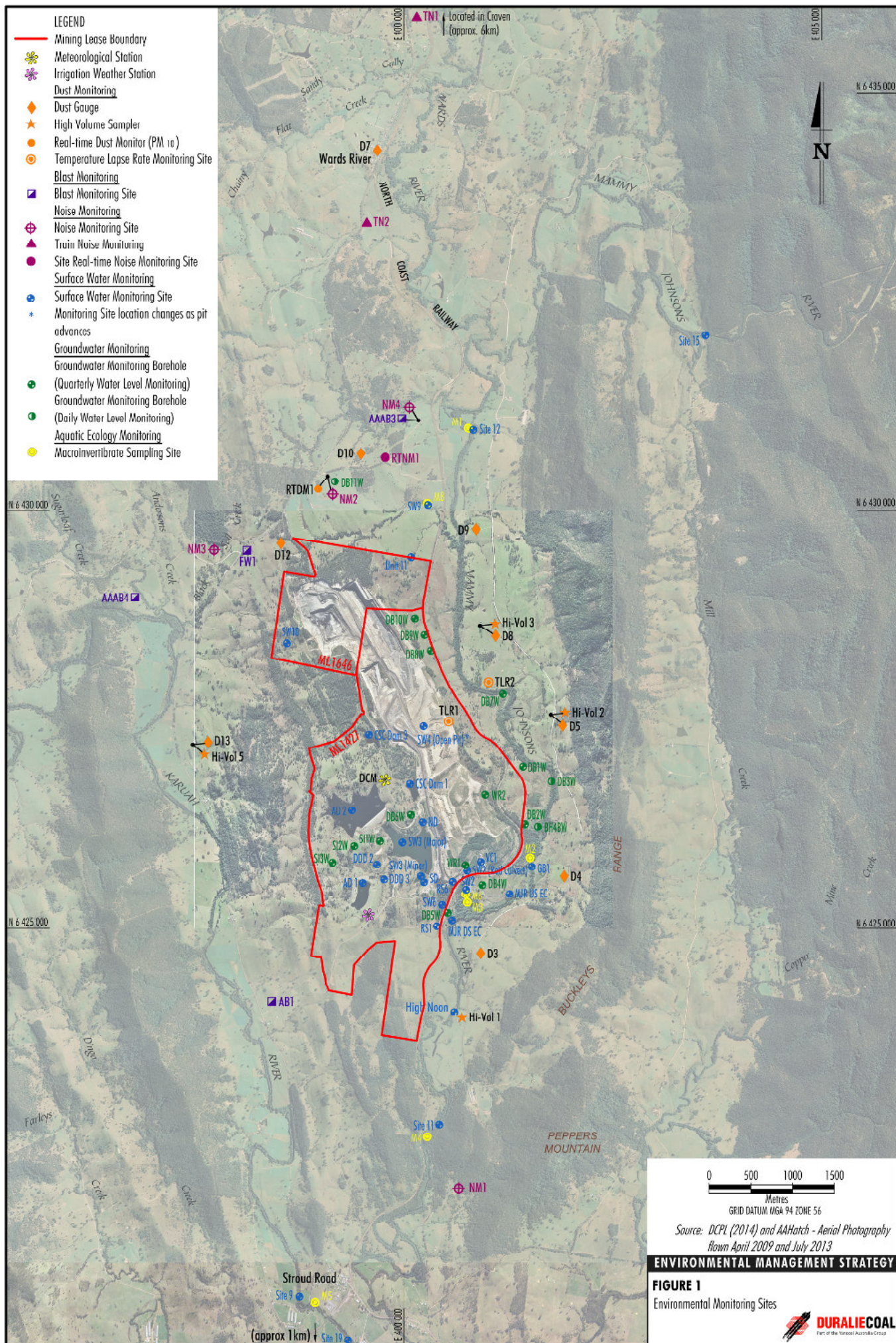
13. **REFERENCES**

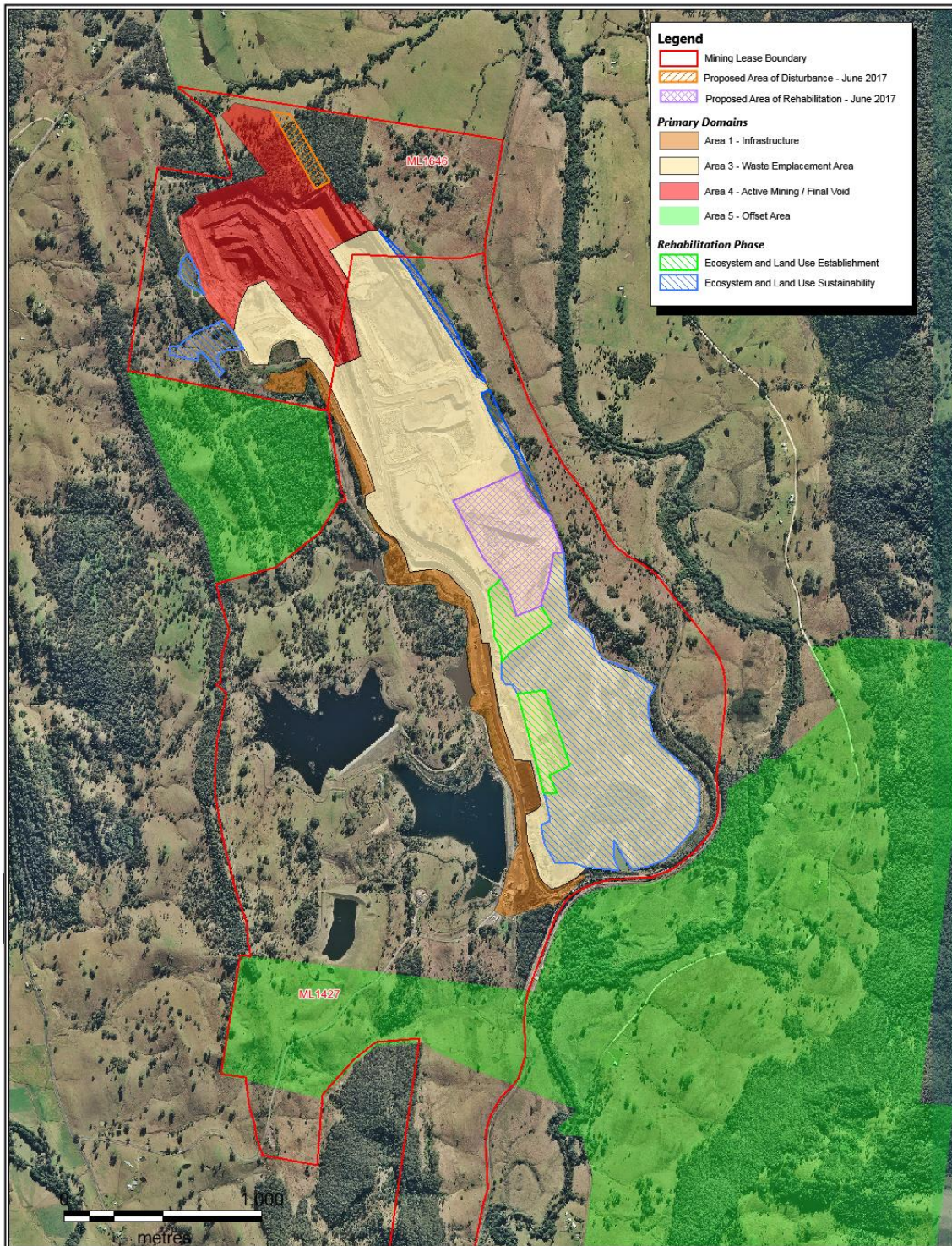
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- DCPL (2015b). *Duralie Coal Mine Heritage Management Plan*
- DCPL (2016c). *Duralie Coal Mine Noise Management Plan*
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- DCPL (2016a). *Duralie Coal Mine Water Management Plan*
- DCPL (2016b). *Duralie Coal Mine Surface Water Management Plan*
- DCPL (2016c). *Duralie Coal Mine Irrigation Management Plan*
- DCPL (2016d). *Duralie Coal Mine Groundwater Management Plan*
- DCPL (2015e). *Duralie Coal Mine Giant Barred Frog Management Plan*
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- Invertebrate Identification Australasia (2016). February 2016 Survey. *Biological Monitoring of the Streams Adjacent to the Duralie Coal Mine for Duralie Coal Pty Ltd.*
- Kleinfelder (2016). *Duralie Rehabilitation Monitoring Report 2016*

Appendix 1:

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







Appendix 2:

Meteorological Monitoring

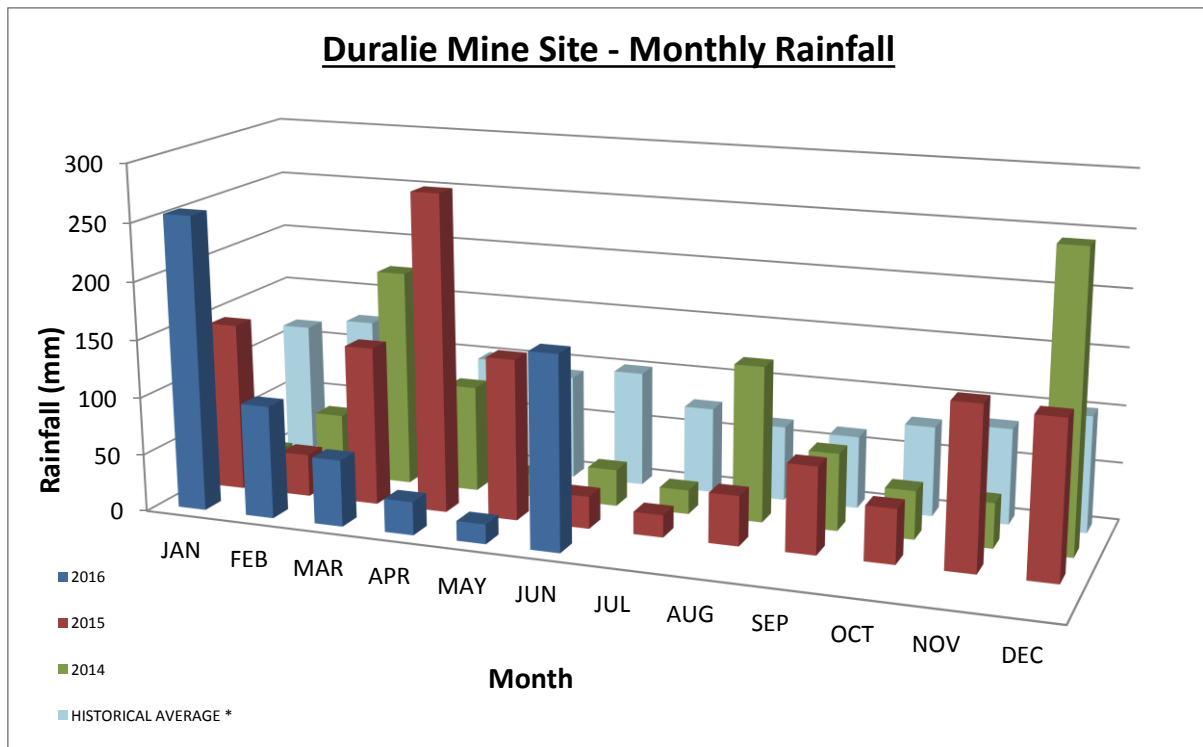


Figure 2-1: Monthly Rainfall for 2015 to 2016 and Historical Averages

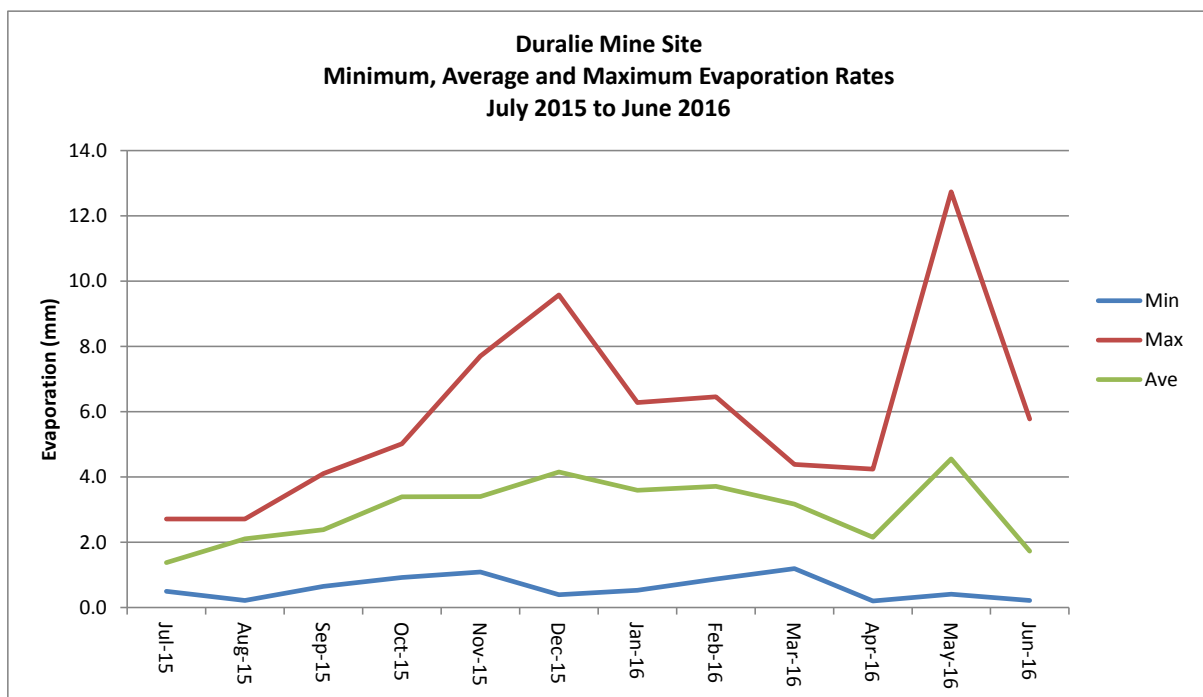


Figure 2-2: Minimum, Maximum and Average Evaporation Rates During the Reporting Period

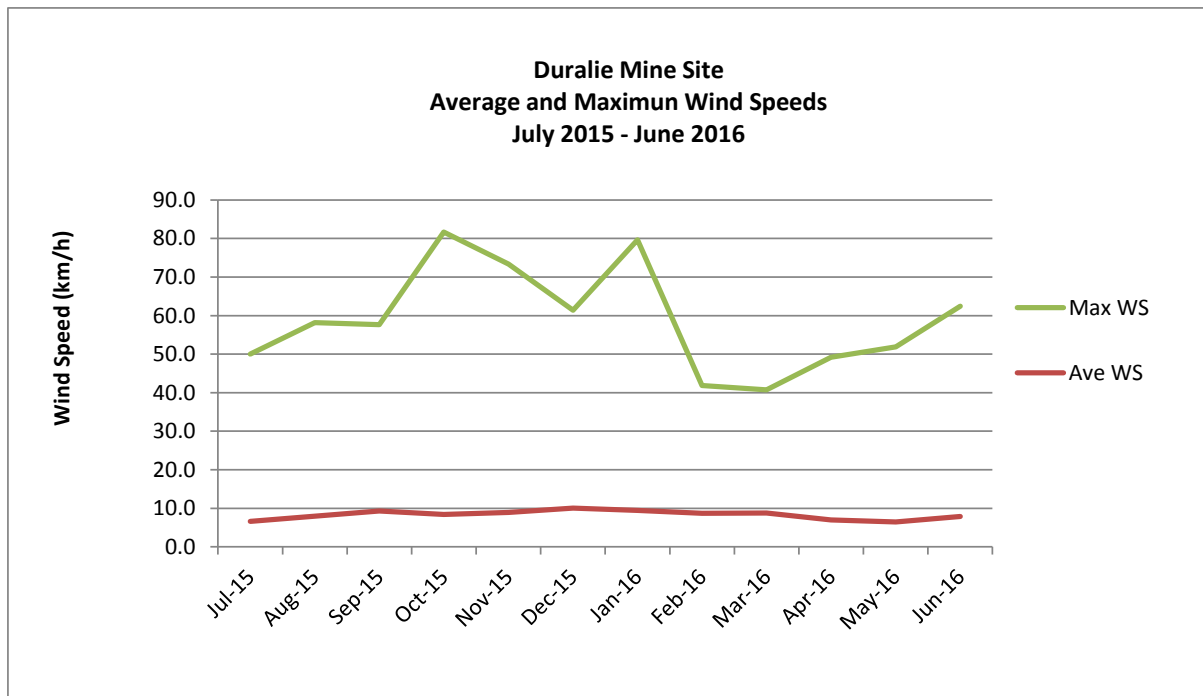


Figure 2-3: Maximum and Average Wind Speeds During the Reporting Period

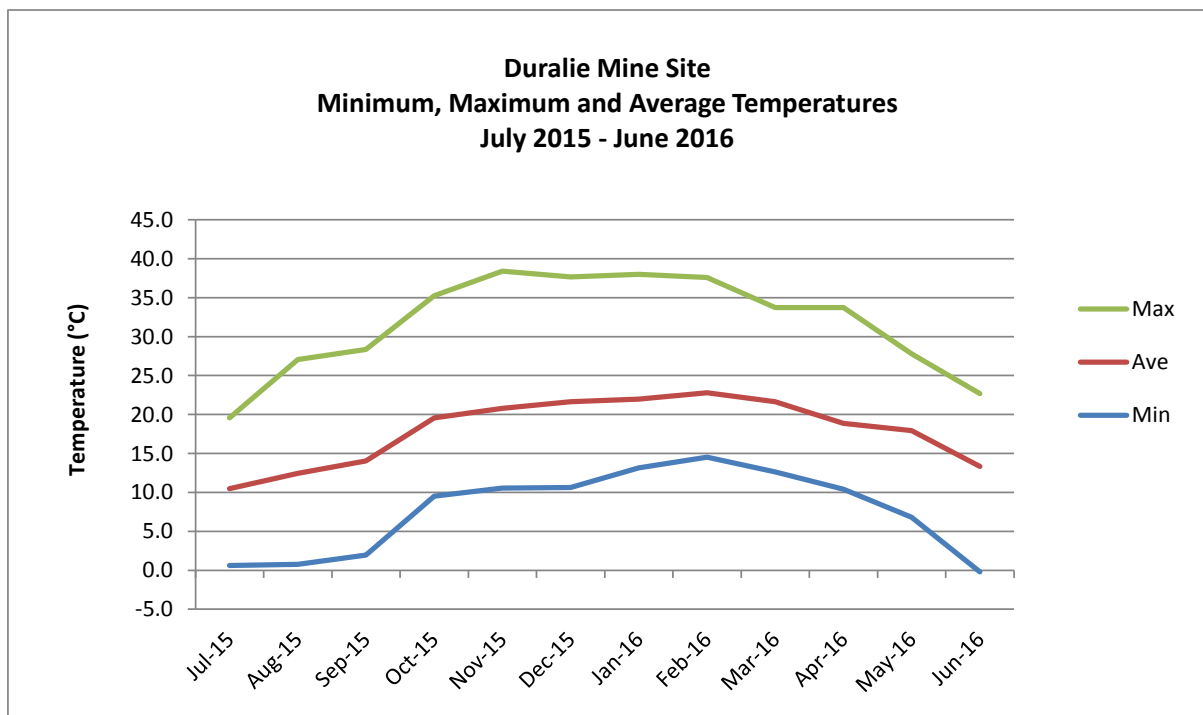
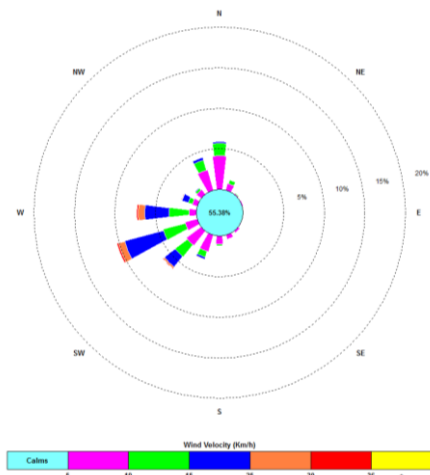
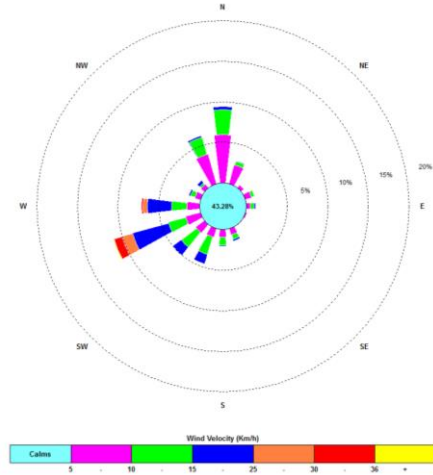


Figure 2-4: Minimum, Maximum and Average Temperatures During the Reporting Period

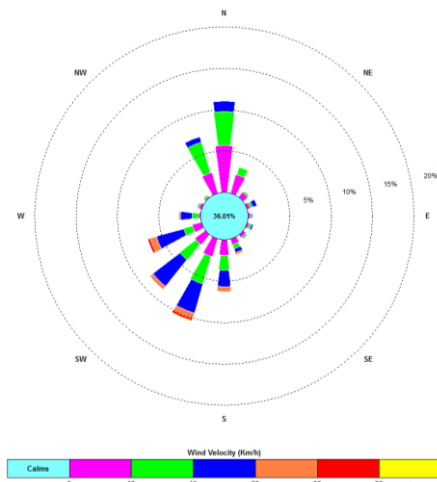
July 2015



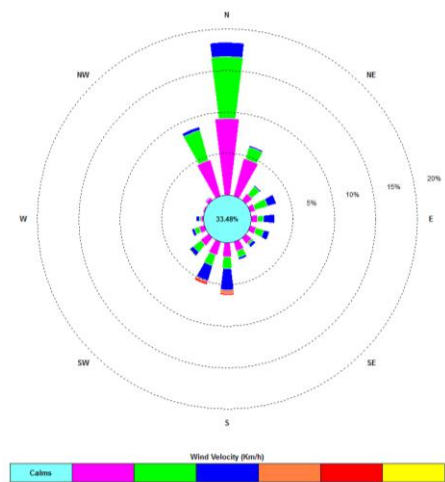
August 2015



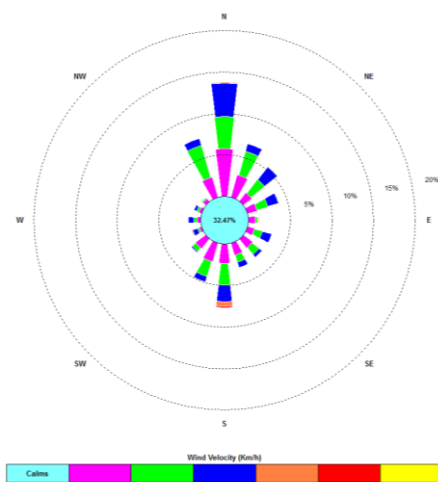
September 2015



October 2015



November 2015



December 2015

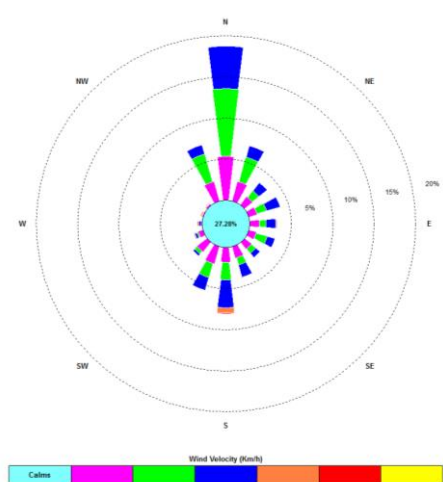
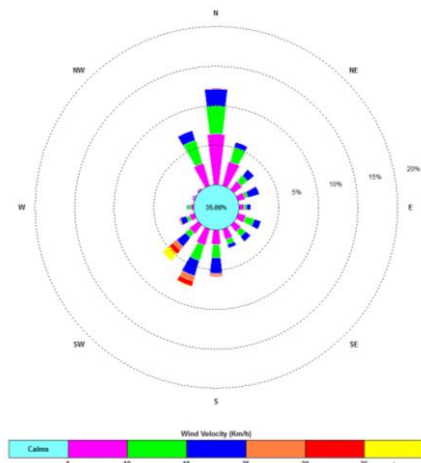
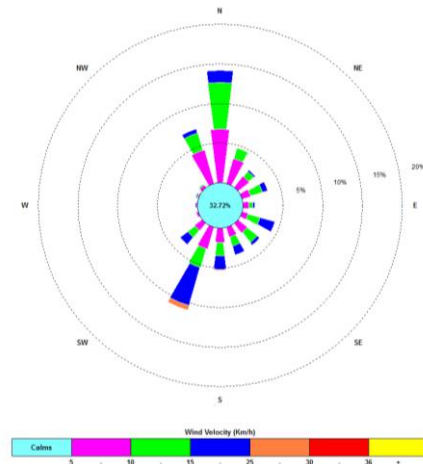


Figure 2-5: Monthly Windroses showing wind direction, speed and frequencies

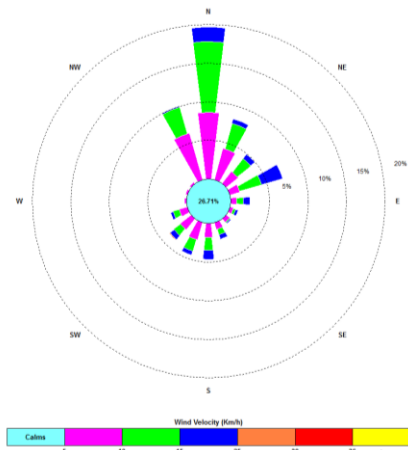
January 2016



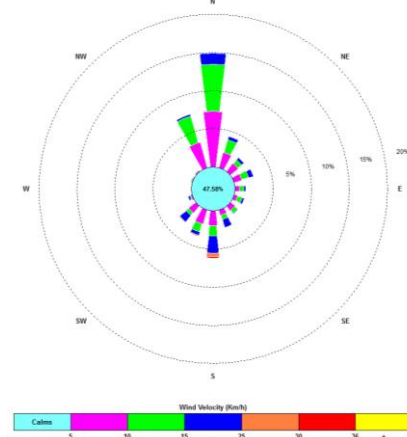
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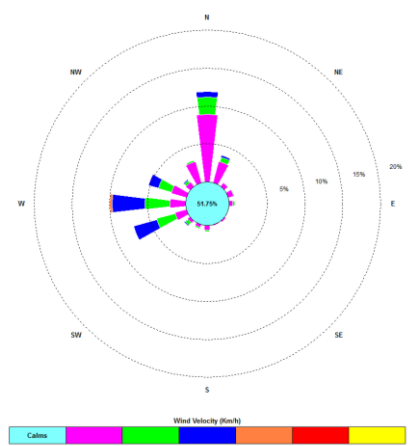
March 2016



April 2016



May 2016



June 2016

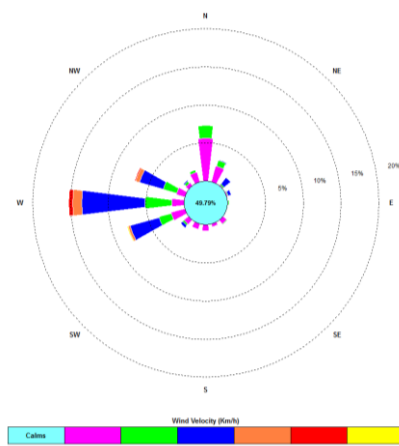


Figure 2-5 (continued): Monthly Windroses showing wind direction, speed and frequencies

Appendix 3:

Air Quality Monitoring Results

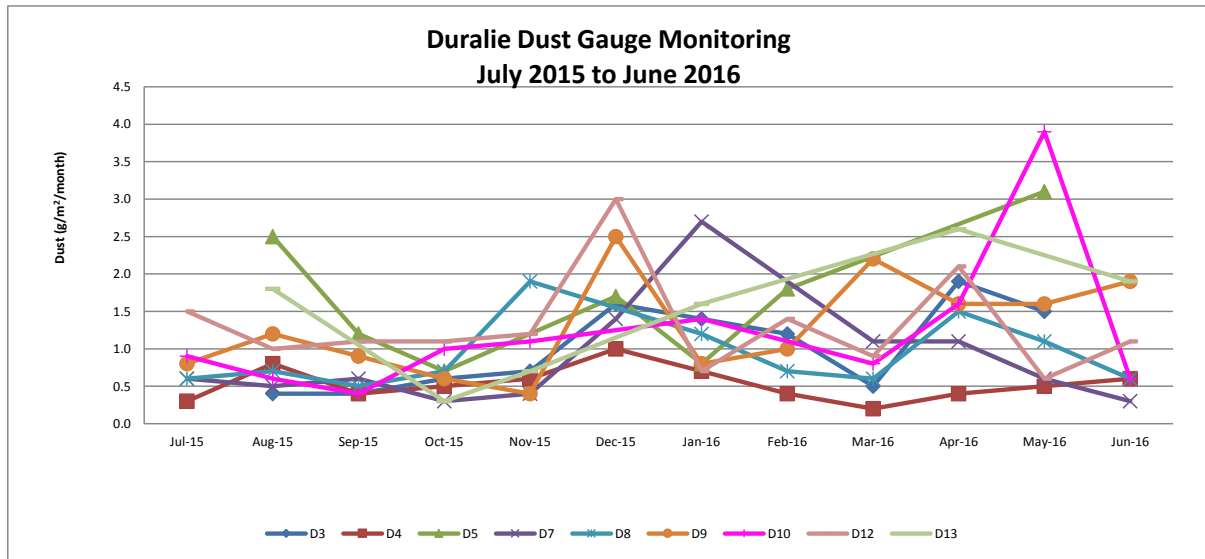


Figure 3-1: Monthly Depositional Dust Monitoring Results (minus contaminated results) during the Reporting Period

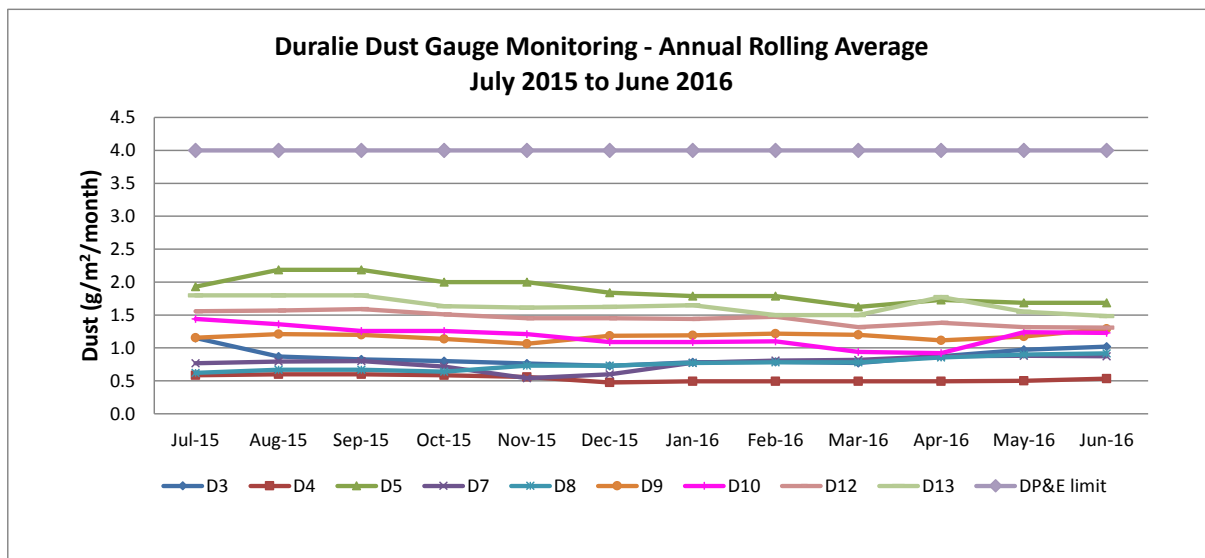


Figure 3-2: Rolling Annual Average Depositional Dust Monitoring Results (minus contaminated results) during the Reporting Period

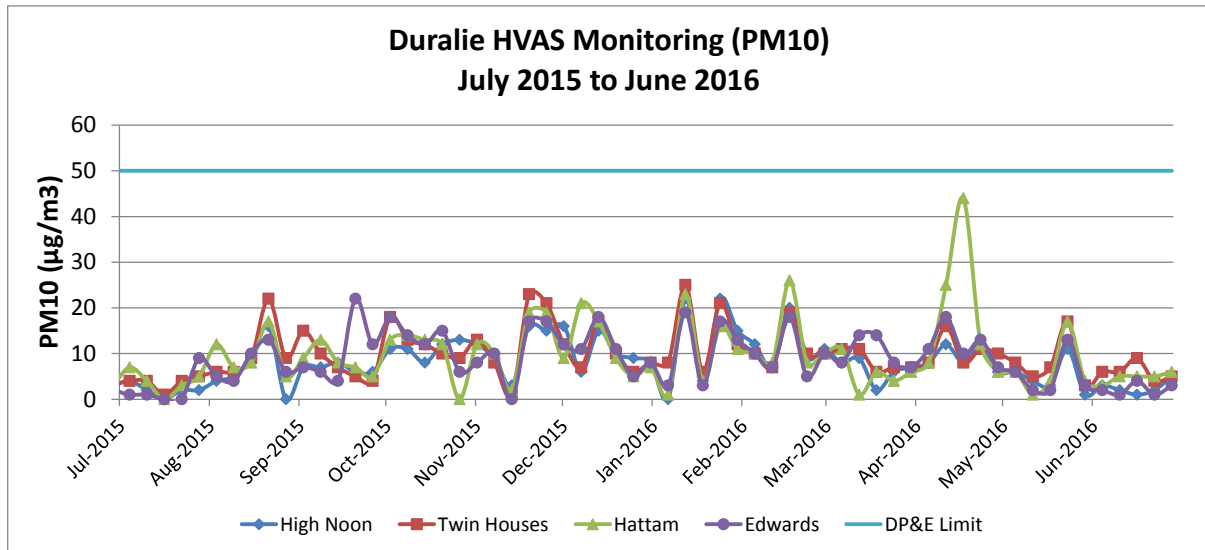


Figure 3-3: High Volume Air Sampling (PM₁₀) Results during the Reporting Period

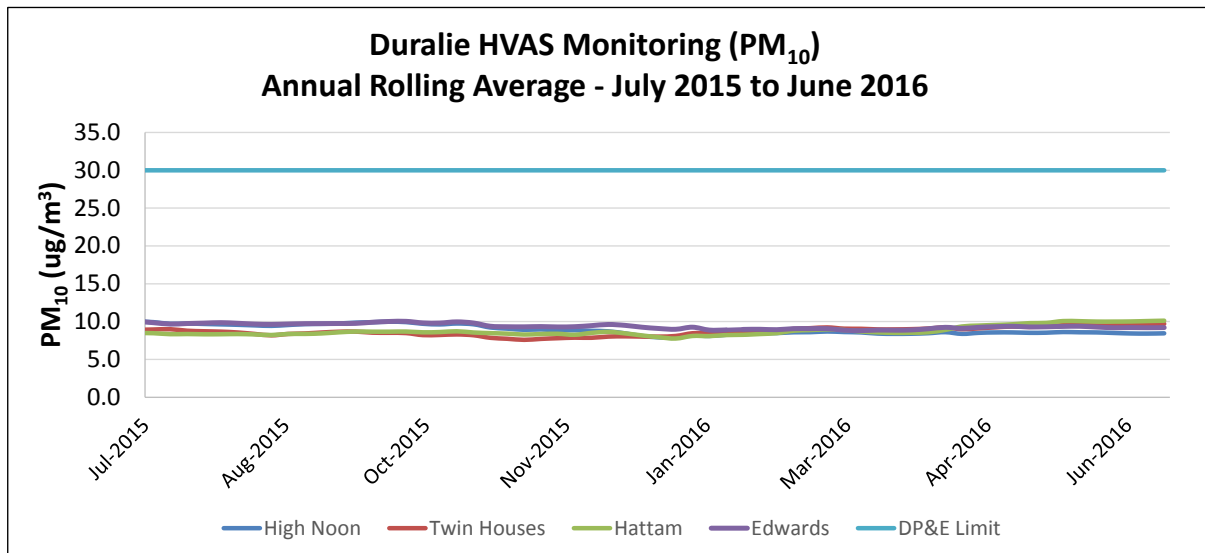


Figure 3-4: Rolling Annual Average HVAS (PM₁₀) Results during the Reporting Period

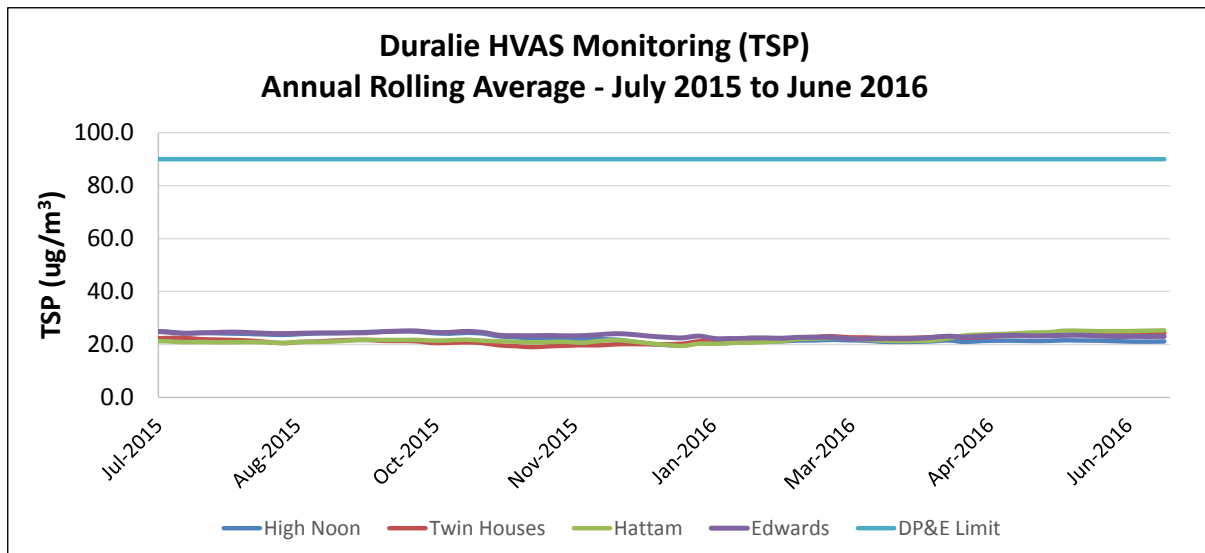


Figure 3-5: Rolling Annual Average HVAS (TSP) Results during the Reporting Period

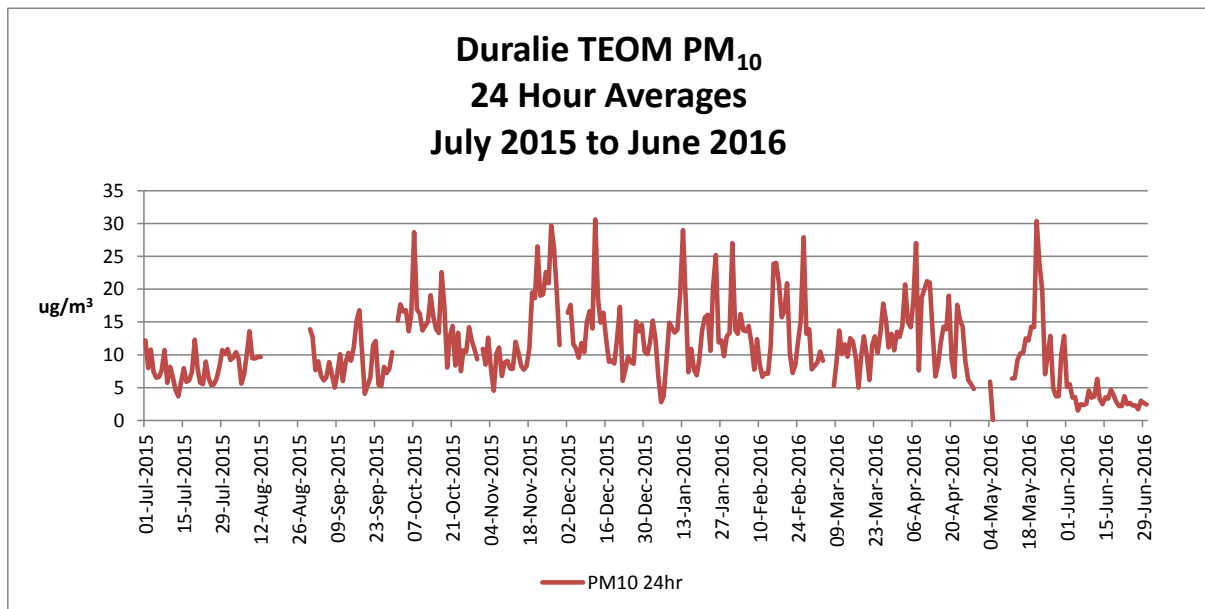


Figure 3-6: Real Time Dust Monitoring (PM₁₀) Results during the Reporting Period

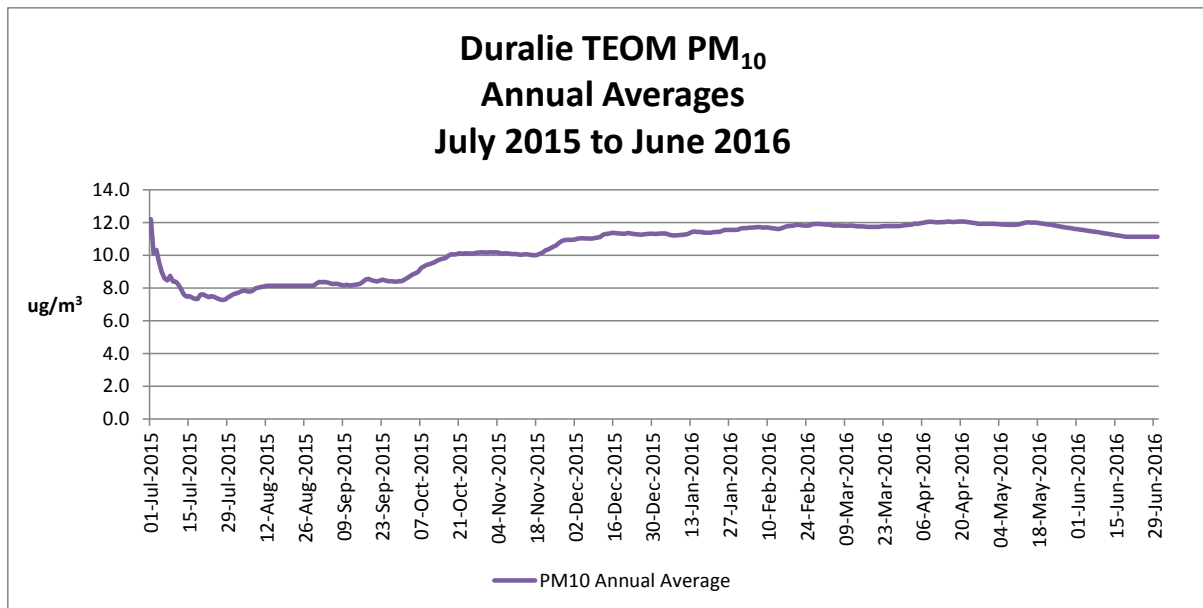


Figure 3-7: Rolling Annual Average TEOM (PM₁₀) Results during the Reporting Period

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
1/07/2015	12.2	12.2	1/09/2015	7.7	8.4	1/11/2015	10.9	10.2	1/01/2016	11.8	11.3	1/03/2016	8.3	11.9	1/05/2016	no data	11.9
2/07/2015	8.0	10.1	2/09/2015	9.0	8.4	2/11/2015	8.5	10.2	2/01/2016	15.2	11.3	2/03/2016	8.8	11.9	2/05/2016	no data	11.9
3/07/2015	10.8	10.3	3/09/2015	6.8	8.3	3/11/2015	12.6	10.2	3/01/2016	12.3	11.3	3/03/2016	10.5	11.9	3/05/2016	no data	11.9
4/07/2015	7.4	9.6	4/09/2015	6.1	8.3	4/11/2015	7.9	10.2	4/01/2016	6.7	11.3	4/03/2016	9.1	11.8	4/05/2016	5.9	11.9
5/07/2015	6.5	9.0	5/09/2015	6.6	8.3	5/11/2015	4.5	10.1	5/01/2016	2.8	11.3	5/03/2016	no data	11.8	5/05/2016	0.1	11.9
6/07/2015	6.7	8.6	6/09/2015	8.9	8.3	6/11/2015	10.2	10.1	6/01/2016	3.7	11.2	6/03/2016	no data	11.8	6/05/2016	no data	11.9
7/07/2015	7.7	8.5	7/09/2015	7.0	8.2	7/11/2015	11.1	10.1	7/01/2016	9.2	11.2	7/03/2016	no data	11.8	7/05/2016	no data	11.9
8/07/2015	10.7	8.7	8/09/2015	5.0	8.2	8/11/2015	6.8	10.1	8/01/2016	14.9	11.2	8/03/2016	5.3	11.8	8/05/2016	no data	11.9
9/07/2015	5.7	8.4	9/09/2015	7.1	8.2	9/11/2015	8.9	10.1	9/01/2016	14.1	11.2	9/03/2016	8.8	11.8	9/05/2016	no data	11.9
10/07/2015	8.2	8.4	10/09/2015	10.1	8.2	10/11/2015	9.1	10.1	10/01/2016	13.4	11.3	10/03/2016	13.7	11.8	10/05/2016	no data	11.9
11/07/2015	6.6	8.2	11/09/2015	6.0	8.2	11/11/2015	7.9	10.1	11/01/2016	13.8	11.3	11/03/2016	10.1	11.8	11/05/2016	no data	11.9
12/07/2015	4.7	7.9	12/09/2015	8.9	8.2	12/11/2015	7.9	10.0	12/01/2016	19.4	11.3	12/03/2016	11.6	11.8	12/05/2016	6.4	11.9
13/07/2015	3.7	7.6	13/09/2015	10.3	8.2	13/11/2015	12.0	10.1	13/01/2016	29.0	11.4	13/03/2016	9.7	11.8	13/05/2016	6.5	12.0
14/07/2015	5.9	7.5	14/09/2015	9.1	8.2	14/11/2015	10.3	10.1	14/01/2016	18.0	11.5	14/03/2016	12.5	11.8	14/05/2016	9.2	12.0
15/07/2015	8.0	7.5	15/09/2015	11.2	8.3	15/11/2015	8.3	10.0	15/01/2016	7.4	11.4	15/03/2016	12.0	11.8	15/05/2016	10.2	12.0
16/07/2015	5.9	7.4	16/09/2015	15.2	8.4	16/11/2015	7.7	10.0	16/01/2016	10.9	11.4	16/03/2016	9.6	11.8	16/05/2016	10.3	12.0
17/07/2015	6.1	7.3	17/09/2015	16.8	8.5	17/11/2015	8.3	10.0	17/01/2016	7.8	11.4	17/03/2016	5.0	11.7	17/05/2016	12.5	12.0
18/07/2015	7.5	7.3	18/09/2015	10.6	8.6	18/11/2015	11.0	10.0	18/01/2016	6.9	11.4	18/03/2016	9.7	11.7	18/05/2016	12.2	12.0
19/07/2015	12.3	7.6	19/09/2015	4.1	8.5	19/11/2015	19.5	10.1	19/01/2016	9.3	11.4	19/03/2016	12.8	11.7	19/05/2016	14.3	11.9
20/07/2015	7.9	7.6	20/09/2015	5.3	8.4	20/11/2015	18.6	10.2	20/01/2016	13.7	11.4	20/03/2016	10.0	11.7	20/05/2016	14.2	11.9
21/07/2015	5.8	7.5	21/09/2015	6.6	8.4	21/11/2015	26.5	10.3	21/01/2016	15.7	11.4	21/03/2016	6.2	11.7	21/05/2016	30.4	11.9
22/07/2015	5.5	7.4	22/09/2015	11.5	8.5	22/11/2015	19.0	10.4	22/01/2016	16.1	11.4	22/03/2016	11.5	11.8	22/05/2016	23.9	11.9
23/07/2015	9.0	7.5	23/09/2015	12.1	8.5	23/11/2015	19.2	10.4	23/01/2016	10.6	11.4	23/03/2016	12.8	11.8	23/05/2016	19.8	11.8
24/07/2015	6.5	7.5	24/09/2015	5.4	8.5	24/11/2015	22.6	10.5	24/01/2016	20.3	11.5	24/03/2016	10.3	11.8	24/05/2016	7.1	11.8
25/07/2015	5.4	7.4	25/09/2015	5.2	8.4	25/11/2015	20.9	10.6	25/01/2016	25.2	11.5	25/03/2016	13.4	11.8	25/05/2016	10.1	11.8
26/07/2015	5.5	7.3	26/09/2015	8.2	8.4	26/11/2015	29.7	10.8	26/01/2016	11.9	11.6	26/03/2016	17.8	11.8	26/05/2016	12.9	11.8
27/07/2015	6.4	7.3	27/09/2015	7.2	8.4	27/11/2015	26.3	10.9	27/01/2016	12.2	11.6	27/03/2016	15.2	11.8	27/05/2016	5.0	11.7
28/07/2015	8.3	7.3	28/09/2015	7.9	8.4	28/11/2015	19.4	10.9	28/01/2016	9.8	11.5	28/03/2016	11.1	11.8	28/05/2016	3.7	11.7
29/07/2015	10.7	7.4	29/09/2015	10.4	8.4	29/11/2015	11.5	10.9	29/01/2016	12.8	11.6	29/03/2016	13.2	11.8	29/05/2016	3.7	11.7
30/07/2015	10.1	7.5	30/09/2015	no data	8.4	30/11/2015	no data	10.9	30/01/2016	13.3	11.6	30/03/2016	10.7	11.8	30/05/2016	10.1	11.6
31/07/2015	10.9	7.6	1/10/2015	15.2	8.5	1/12/2015	no data	10.9	31/01/2016	27.0	11.6	31/03/2016	13.5	11.8	31/05/2016	12.9	11.6
1/08/2015	9.2	7.7	2/10/2015	17.7	8.6	2/12/2015	16.4	11.0	1/02/2016	13.8	11.7	1/04/2016	12.7	11.9	1/06/2016	5.1	11.6
2/08/2015	9.6	7.7	3/10/2015	16.6	8.7	3/12/2015	17.6	11.0	2/02/2016	13.2	11.7	2/04/2016	14.4	11.9	2/06/2016	5.5	11.6
3/08/2015	10.4	7.8	4/10/2015	16.8	8.8	4/12/2015	11.6	11.0	3/02/2016	16.2	11.7	3/04/2016	20.7	11.9	3/06/2016	3.5	11.5
4/08/2015	9.5	7.9	5/10/2015	13.6	8.9	5/12/2015	11.0	11.0	4/02/2016	13.8	11.7	4/04/2016	15.0	11.9	4/06/2016	3.6	11.5
5/08/2015	5.6	7.8	6/10/2015	16.3	9.0	6/12/2015	9.6	11.0	5/02/2016	13.6	11.7	5/04/2016	14.2	11.9	5/06/2016	1.5	11.5
6/08/2015	7.1	7.8	7/10/2015	28.7	9.2	7/12/2015	11.8	11.0	6/02/2016	14.4	11.7	6/04/2016	18.0	12.0	6/06/2016	2.5	11.5
7/08/2015	10.3	7.8	8/10/2015	16.9	9.3	8/12/2015	10.4	11.0	7/02/2016	11.8	11.7	7/04/2016	27.0	12.0	7/06/2016	2.4	11.4
8/08/2015	13.6	8.0	9/10/2015	16.3	9.4	9/12/2015	15.0	11.1	8/02/2016	7.8	11.7	8/04/2016	7.6	12.0	8/06/2016	2.5	11.4
9/08/2015	9.5	8.0	10/10/2015	13.7	9.5	10/12/2015	16.7	11.1	9/02/2016	12.4	11.7	9/04/2016	18.7	12.1	9/06/2016	4.6	11.4
10/08/2015	9.5	8.1	11/10/2015	14.4	9.5	11/12/2015	14.0	11.1	10/02/2016	8.4	11.7	10/04/2016	19.9	12.0	10/06/2016	3.5	11.4
11/08/2015	9.7	8.1	12/10/2015	15.0	9.6	12/12/2015	30.6	11.2	11/02/2016	6.7	11.7	11/04/2016	21.2	12.0	11/06/2016	3.7	11.3
12/08/2015	9.7	8.1	13/10/2015	19.1	9.7	13/12/2015	18.5	11.3	12/02/2016	7.2	11.6	12/04/2016	21.0	12.0	12/06/2016	6.4	11.3
13/08/2015	no data	8.1	14/10/2015	15.7	9.8	14/12/2015	14.9	11.3	13/02/2016	7.1	11.6	13/04/2016	13.6	12.0	13/06/2016	3.3	11.3
14/08/2015	no data	8.1	15/10/2015	13.9	9.8	15/12/2015	16.4	11.4	14/02/2016	11.5	11.6	14/04/2016	6.7	12.0	14/06/2016	2.5	11.3
15/08/2015	no data	8.1	16/10/2015	13.3	9.8	16/12/2015	12.3	11.4	15/02/2016	23.9	11.7	15/04/2016	8.4	12.1	15/06/2016	3.5	11.2
16/08/2015	no data	8.1	17/10/2015	22.6	10.0	17/12/2015	8.9	11.3	16/02/2016	24.0	11.7	16/04/2016	11.8	12.0	16/06/2016	3.3	11.2
17/08/2015	no data	8.1	18/10/2015	17.3	10.1	18/12/2015	9.1	11.3	17/02/2016	20.9	11.8	17/04/2016	14.3	12.0	17/06/2016	4.7	11.2
18/08/2015	no data	8.1	19/10/2015	8.1	10.0	19/12/2015	8.7	11.3	18/02/2016	15.7	11.8	18/04/2016	13.9	12.0	18/06/2016	3.9	11.2
19/08/2015	no data	8.1	20/10/2015	12.7	10.1	20/12/2015	12.5	11.3	19/02/2016	16.8	11.8	19/04/2016	19.0	12.1	19/06/2016	2.8	11.1
20/08/2015	no data	8.1	21/10/2015	14.4	10.1	21/12/2015	17.3	11.4	20/02/2016	20.9	11.9	20/04/2016	9.3	12.1	20/06/2016	2.2	11.1
21/08/2015	no data	8.1	22/10/2015	8.4	10.1	22/12/2015	6.0	11.3	21/02/2016	10.2	11.9	21/04/2016	6.6	12.1	21/06/2016	2.2	11.1
22/08/2015	no data	8.1	23/10/2015	13.3	10.1	23/12/2015	7.7	11.3	22/02/2016	7.2	11.8	22/04/2016	17.6	12.0	22/06/2016	3.7	11.1
23/08/2015	no data	8.1	24/10/2015	7.5	10.1	24/12/2015	9.7	11.3	23/02/2016	8.6	11.8	23/04/2016	15.3	12.0	23/06/2016	2.5	11.1
24/08/2015	no data	8.1	25/10/2015	10.7	10.1	25/12/2015	8.9	11.3	24/02/2016	12.3	11.8	24/04/2016	14.3	12.0	24/06/2016	2.7	11.1
25/08/2015	no data	8.1	26/10/2015	10.5	10.1	26/12/2015	8.6	11.3	25/02/2016	15.2	11.8	25/04/2016	8.9	12.0	25/06/2016	2.3	11.1
26/08/2015	no data	8.1	27/10/2015	14.2	10.2	27/12/2015	15.1	11.3	26/02/2016	27.9	11.9	26/04/2016	6.2	11.9	26/06/2016	2.3	11.1
27/08/2015	no data	8.1	28/10/2015	12.1	10.2	28/12/2015	13.6	11.3	27/02/2016	13.2	11.9	27/04/2016	5.6	11.9	27/06/2016	1.7	11.1
28/08/2015	no data	8.1	29/10/2015	10.9	10.2	29/12/2015	14.6	11.3	28/02/2016	13.9	11.9	28/04/2016	4.8	11.9	28/06/2016	3.0	11.1
29/08/2015	no data	8.1	30/10/2015	9.3	10.2	30/12/2015	10.5	11.3		7.8	11.9	29/04/2016	no data	11.9	29/06/2016	2.7	11.1
30/08/2015	13.9	8.3	31/10/2015	no data	10.2	31/12/2015	10.1	11.3				30/04/2016	no data	11.9	30/06/2016	2.4	11.1
31/08/2015	12.7	8.4		no data													

No data - power outages

Appendix 4:

Surface Water and Groundwater Monitoring Results

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	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
30-Jul-15	Monthly	Low flow	7.3	303	12	61	11	69	3	40	30	14	12	0.56	0.143	0.008	1.16	<0.001						
24-Aug-15	Discharge Event	Med flow and turbid	7.8	294	26	81	13	41	9	25	12	10	1.17	0.096	0.043	1.36	0.004							
25-Sep-15	Discharge Event	Mod flow turbid	7.9	446	142	49	54	47	4	90	38	20	13	4.2	0.081	0.048	2.83	0.002						
26-Sep-15	Discharge	mod flow v turbid	7.3	530	41		<5																	
27-Sep-15	Discharge	mod flow v turbid	7.3	510	29		<5																	
28-Sep-15	Discharge	Low flow v turbid	8.1	516	11		<5	47	4	90	38	20	13	4.2	0.081	0.049	2.83	0.002						
23-Oct-15	Discharge Event	Nil access train in loop	8.1	413	103	47	213	28																
4-Nov-15	Discharge	low flow brown	7.4	384	15		<5																	
5-Nov-15	Discharge	Nil access train in loop																						
8-Nov-15	Discharge	Low flow	7.3	286	97		35																	
9-Nov-15	Discharge	Low flow	7.3	448	9		10																	
14-Nov-15	Discharge Event	Mod flow turbid	7.9	323	14	46	7	63	5	42	35	17	14	0.87	0.040	0.012	0.94	0.002						
15-Nov-15	Discharge	turbid brown	7.5	350	63		31																	
16-Nov-15	Discharge	Nil access train in loop																						
17-Nov-15	Discharge	Nil access train in loop																						
18-Nov-15	Discharge	Low flow	7.7	471	5.1		<5																	
19-Nov-15	Discharge	Nil access train in loop																						
22-Dec-15	Discharge Event	low flow, brown	7.4	340	49.4	39	34	67	1	50	43	19	17	1.82	0.312	0.023	1.83	0.001						
23-Dec-15	Discharge	fast clear, brown	7.1	572	29.6		<5																	
24-Dec-15	Discharge	slow	8.5	363	8.4		<5																	
5-Jan-16	Discharge	Steady Flow	8.4	405			28																	
6-Jan-16	Discharge		8.4	281	82.9		48																	
7-Jan-16	Discharge	Steady Flow	7.7	213	101.0		44																	
8-Jan-16	Discharge	Steady flow it brown	7.7	230	61.9		19																	
9-Jan-16	Discharge	Low flow	7.5	190	60.8		20																	
10-Jan-16	Discharge	Low flow	7.6	196	58.0		20																	
11-Jan-16	Discharge	Mod flow clear	7.8	236	31.7		6																	
12-Jan-16	Discharge	Mod flow it brown	7.6	262	35.6		12																	
13-Jan-16	Discharge		7.5	216	25.5		10																	
14-Jan-16	Discharge	Mod flow it brown	7.3	231	20.8		16																	
15-Jan-16	Discharge	Low flow	7.5	222	31.2		20																	
16-Jan-16	Discharge Event																							
17-Jan-16	Discharge	Low flow	7.9	173	15.7		8																	
18-Jan-16	Discharge	Mod flow	8.1	214	14.4		<5	47	2	26	20	11	9	0.96	0.048	0.017	1.31	0.002						
19-Jan-16	Discharge	Mod flow it brown	8.2	219	14.2		<5																	
20-Jan-16	Discharge	Low flow	7.9	226	12.8		<5																	
23-Jan-16	Discharge	Mod flow it brown	8.0	290	16.4		<5																	
6-Feb-16	Discharge	Low flow very turbid	7.9	306	204.0		138																	
3-Mar-16	Monthly	Low flow	7.4	320	8.9	26	10	81	2	28	36	18	14	0.13	0.848	<0.005	1.64	<0.001						
31-Mar-16	Monthly	Trickle clear	7.4	466	5.9	45	10	138	9	10	53	21	16	0.08	0.829	<0.005	1.84	<0.001						
27-Apr-16	Monthly	Steady	7.2	389	3.8		<5	90	6	3	52	17	11	0.05	0.131	<0.005	1.06	<0.001						
30-May-16	Monthly	Nil flow																						
5-Jun-16	Discharge Event	High flow	7.4	285	66.3	58	27	8	4	87	20	14	7	2.02	0.074	0.046	1.75	0.002						
6-Jun-16	Discharge	High flow	7.6	303	29.0		12																	
7-Jun-16	Discharge	Mod flow	8.0	135	18.4		7																	
8-Jun-16	Discharge	Low flow	7.8	343	14.0		6																	
9-Jun-16	Discharge	Mod flow	7.3	360	13.0		9																	
10-Jun-16	Discharge	Low flow	7.3	359	10.1		8																	
20-Jun-16	Discharge	Mod flow	7.4	217	18.6		10																	
Min			7.1	135	3.8		6	8	1	3	20	11	7	0.05	0.040	0.008	0.94	0.001						
Avg			7.7	322	38.8		29	61	4	46	35	17	12	1.46	0.244	0.031	1.69	0.002						
Max			8.5	572	204.0		213	138	9	90	53	21	17	4.20	0.848	0.049	2.83	0.004						
Var			0.1	11559	1703.2		1793	1105	7	951	127	12	9	2.26	0.092	0.000	0.41	0.000						
SD			0.4	108	41.3		42	33	3	31	11	3	3	1.50	0.303	0.018	0.64	0.001						
*Water Quality Trigger			7.1-7.9	544	119	85-110%	80								0.064	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

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
30-Jul-15	Monthly	v low flow	7.6	231	13.1	49.4	149	418	84	61	1	46	25	14	12	4.87	1.15	0.22	9.22	<1	61	4	28
24-Aug-15	Discharge Event	Mod flow slightly turbid	8.0	468	93.5	83	242	404	126	40	4	120	28	24	16	3.94	0.105	0.059	2.96	<1	40	<2	48
25-Sep-15	Discharge Event	High flow turbid	7.7	399	230	64	206	71	94	45	2	78	50	18	12	4.96	0.065	0.052	3.12	<1	45	<2	38
23-Oct-15	Discharge Event	Mod flow	8.1	413	103	47	213	28	122	69	3	84	43	24	15	2.62	0.062	0.027	1.85	<1	69	<2	39
14-Nov-15	Discharge Event	Mod flow turbid	8.2	393	17.1	40	203	15	118	53	2	89	32	21	16	0.64	0.039	0.018	0.77	<1	53	<2	37
22-Dec-15	Discharge Event		7.7	341	89.6	53	254	46	117	25	<1	132	32	22	15	2.6	0.056	0.044	1.97	<1	25	<2	37
16-Jan-16	Discharge Event	Low flow	7.6	231	22.4	8.5	147.8	18	78	41	2	44	20	13	11	1.28	0.059	0.025	1.53	<1	41	<2	25
3-Mar-16	Monthly	Low flow	7.7	288	9.84	105.8	148	17	89	69	2	33	33	16	12	0.83	0.138	0.038	1.73	<1	69	<2	32
31-Mar-16	Monthly	Low flow/sill	7.4	596	2.42	72.9	309	9	158	69	4	136	56	27	22	0.08	0.181	0.015	0.35	<1	69	<2	60
27-Apr-16	Monthly	Low flow/sill	7.1	599	5.47		311	<5	158	100	5	80	54	27	22	0.04	0.697	0.02	0.99	<1	100	<2	58
30-May-16	Monthly	Nil flow																					
5-Jun-16	Discharge Event	High flow	7.3	230	64.8	61	117	30	64	8	3	89	20	14	7	2.02	0.074	0.047	1.74	<1	8	<2	26
Min			7.1	230	2.4	8.5	117	9	64	8	1	33	20	13	7	0.04	0.039	0.015	0.35	<1	8	<2	25
Avg			7.7	386	61.0	58.5	209	106	110	53	3	85	36	20	15	2.17	0.239	0.051	2.38	<1	53	3	39
Max			8.2	599	230.0	105.8	311	418	158	100	5	136	56	27	22	4.96	1.150	0.220	9.22	<1	100	4	60
Var			0.1	16615	4554.2	685.4	4311	26243	963	623	2	1212	171	28	20	3.25	0.127	0.003	5.83		623		143
SD			0.3	129	67.5	26.2	66	162	31	25	1	35	13	5	5	1.80	0.356	0.058	2.41		25		12
*Water Quality Trigger			7.1-7.9	544	119	85-110%	80									3.02	0.064						

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	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
30-Jul-15	Monthly	Dry																
24-Aug-15	Discharge Event	Low flow brown	7.3	447	200	76	77	30	7	130	22	25	16	5.82	0.092	0.032	8.14	0.005
25-Sep-15	Discharge Event	Steady turbid	7.4	984	360	54	334	78	3	249	100	50	36	9.21	0.157	0.037	8.44	0.006
23-Oct-15	Discharge Event	Low flow	6.8	790	46	42	36	43	5	282	62	47	27	1.01	0.018	0.01	0.75	0.002
14-Nov-15	Discharge Event	Low flow	7.8	963	18	51	19	71	4	278	88	55	33	0.79	0.013	0.01	0.71	0.001
22-Dec-15	Discharge Event	mod flow clear	7.5	840	37	52	11	26	1	336	61	54	30	1.01	0.023	0.006	0.87	0.002
16-Jan-16	Discharge Event	Low flow	7.3	429	13	8	10	46	3	98	32	23	17	0.62	0.01	<0.005	0.6	<0.001
3-Mar-16	Monthly	No flow																
31-Mar-16	Monthly	No flow																
27-Apr-16	Monthly	Too low to sample																
30-May-16	Monthly	Nil flow																
5-Jun-16	Discharge Event	High flow	7.9	443	58	66	38	18	3	113	29	18	10	1.59	0.028	0.006	1.45	0.002
Min			6.8	429	13	8	10	18	1	98	22	18	10	0.62	0.010	0.006	0.60	0.001
Avg			7.4	699	105	50	75	45	4	212	56	39	24	2.86	0.049	0.017	2.99	0.003
Max			7.9	984	360	76	334	78	7	336	100	55	36	9.21	0.157	0.037	8.44	0.006
Var			0.1	63504	16733	463	13572	514	4	9254	914	260	96	11.14	0.003	0.000	13.17	0.000
SD			0.4	252	129	22	116	23	2	96	30	16	10	3.34	0.055	0.014	3.63	0.002
*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.

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	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
30-Jul-15	Monthly	No flow																					
24-Aug-15	Discharge Event	Low flow brown	7.4	240	42	66	123	27	42	15	8	20	34	7	6	2.06	0.099	0.045	2.64	<1	15	4	30
25-Sep-15	Discharge Event	no flow																					
23-Oct-15	Discharge Event	No flow																					
14-Nov-15	Discharge Event	Low flow	7.2	187	33.2	39	95	34	34	27	4	2	31	7	4	1.66	0.096	0.015	2.78	<1	27	<2	24
22-Dec-15	Discharge Event	no flow																					
16-Jan-16	Discharge Event	Low flow	7.1	116	65.4	7.56	74	36	22	13	4	5	20	4	3	2.96	0.031	0.011	2.76	<1	13	<2	17
3-Mar-16	Monthly	No flow																					
31-Mar-16	Monthly	Dry/No flow																					
27-Apr-16	Monthly	Too low to sample																					
30-May-16	Monthly	Nil flow																					
5-Jun-16	Discharge Event	High flow	6.9	100	568	56	51	498	9	5	6	13	19	2	1	15.9	0.083	0.02	11.5	<1	5	<2	10
Min			6.9	100	33	8	51	27	9	5	4	2	19	2	1	1.66	0.031	0.011	2.64		5	4	10
Avg			7.1	161	177	42	86	149	27	15	6	10	26	5	4	5.65	0.077	0.023	4.92		15	4	20
Max			7.4	240	568	66	123	498	42	27	8	20	34	7	6	15.90	0.099	0.045	11.50		27	4	30
Var			0.0	4221	68080	656	940	54226	208	83	4	66	58	6	4	47.04	0.001	0.000	19.25		83	75	75
SD			0.2	65	261	26	31	233	14	9	2	8	8	2	2	6.86	0.032	0.015	4.39		9		9
*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 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
30-Jul-15																			
24-Aug-15	0.001	0.059	<0.0001	0.002	0.006	0.002	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.06	<0.01	0.37	2.6	0.89
25-Sep-15																			
23-Oct-15																			
14-Nov-15	0.002	0.044	<0.0001	<0.001	0.003	0.002	<0.001	0.003	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.22	<0.01	0.03	3.2	0.66
22-Dec-15																			
16-Jan-16	0.002	0.041	<0.0001	0.001	0.002	0.001	<0.001	0.002	<0.01	<0.001	0.001	<0.05	<0.0001	0.1	0.06	<0.01	0.03	1.6	0.38
3-Mar-16																			
31-Mar-16																			
27-Apr-16																			
30-May-16																			
5-Jun-16	0.002	0.096	<0.0001	0.009	0.003	0.007	<0.001	0.004	<0.01	<0.001	0.001	<0.05	<0.0001	<0.1	0.07	<0.01	0.31	2.4	0.58
Min	0.001	0.041		0.001	0.002	0.001		0.002						<0.1	0.06		0.03	1.6	0.38
Avg	0.002	0.060		0.004	0.004	0.003		0.003						0.10	0.10		0.19	2.5	0.63
Max	0.002	0.096		0.009	0.006	0.007		0.004						0.1	0.22		0.37	3.2	0.89
Var	0.000	0.001		0.000	0.000	0.000		0.000						0.01	0.01		0.03	0.4	0.04
SD	0.001	0.025		0.004	0.002	0.003		0.001						0.08	0.08		0.18	0.7	0.21
*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 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	Na mg/l	COD mg/l	BOD mg/l
30-Jul-15	Monthly	No flow																						
24-Aug-15	Discharge Event	Not sampled																						
25-Sep-15	Discharge Event	No access - track not finished																						
23-Oct-15	Discharge Event	No access - track not finished																						
18-Nov-15	Discharge Event	Low flow	7.1	96	70	46	61	16	27	12	7	4	7	6	3	10.7	0.19	0.037	10.1	<1	12	7		<2
22-Dec-15	discharge event	Low flow clear	6.7	63	23	39	40	6	18	14	2	<10	10	4	2	1.61	0.118	<0.005	2.43	<1	14	7		<2
16-Jan-16	Discharge Event	Trickle flow	7.4	44	122	85	28	30	25	11	4	9	8	5	3	8	0.067	0.017	7.39	<1	11	8		<2
3-Mar-16	Monthly	No flow																						
31-Mar-16	Monthly	No flow																						
27-Apr-16	Monthly	Nil access - active works.																						
30-May-16	Monthly	No flow																						
5-Jun-16	Discharge Event	Fast flow	7.4	73	26	70	37	13	12	5	4	8	13	3	1	1.11	0.01	<0.005	0.97	<1	5	7		<2
Mn			6.7	44	23	39	28	6	12	5	2	4	7	3	1	1.1	0.010	0.017	1.0		5	7		
Avg			7.2	69	60	60	42	16	21	11	4	7	10	5	2	5.4	0.096	0.027	5.2		11	7		
Max			7.4	96	122	85	61	30	27	14	7	9	13	6	3	10.7	0.190	0.037	10.1		14	8		
Var			0.1	469	2156	454	195	102	47	15	4	8	7	2	1	22.5	0.006	0.000	18.1		15	0		
SD			0.3	22	46	21	14	10	7	4	2	3	3	1	1	4.7	0.077	0.014	4.3		4	1		
*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*.

SW10 - Coal Shaft Creek (Holmes Upstream)

Date	As	Ba	Cd	Cr	Cu	Pb	Mo	Ni	Se	Ag	U	B	Hg	F	NH3 (as N) mg/l	NO2 (as N) mg/l	NO3 (as N) mg/l	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
30-Jul-15																			
24-Aug-15																			
25-Sep-15																			
23-Oct-15																			
18-Nov-15	<0.001	0.025	<0.0001	0.007	0.008	<0.001	<0.001	0.006	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	<0.01	2.4	0.19
22-Dec-15	<0.001	0.007	<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	0.84	1.9	0.09
16-Jan-16	<0.001	0.025	<0.0001	0.005	0.006	<0.001	<0.001	0.004	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.04	<0.01	0.02	1.7	0.11
3-Mar-16																			
31-Mar-16																			
27-Apr-16																			
30-May-16																			
5-Jun-16	<0.001	0.007	<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	0.04	0.8	0.04
		0.007		<0.001	0.002			0.002							0.010		0.020	0.800	0.040
		0.016		0.004	0.005			0.004							0.023		0.300	1.700	0.108
		0.025		0.007	0.008			0.006							0.040		0.840	2.400	0.190
		0.000		0.000	0.000			0.000							0.000		0.219	0.447	0.004
		0.010		0.003	0.003			0.002							0.015		0.468	0.668	0.062
*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.

GB1 - Mammy Johnsons River

EPL 11701 Point 31

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	
30-Jul-15	Monthly	Mod flow	7.51	332	5	63	171	5	81	73	2	10	50	16	10	0.14	0.033	0.005	0.80	<1	73	3	43	
24-Aug-15	Discharge Event	Low flow brown	7.6	419	23	76	216	14	93	73	5	12	50	19	11	1.04	0.052	0.014	1.15	<1	73	<2	49	
25-Sep-15	Discharge Event	High turbid	7.83	294	26	49	156	25	59	40	4	8	61	12	7	0.98	0.048	0.011	1.34	<1	40	<2	32	
26-Sep-15	Discharge	Mod flow turbid	7.51	266	28			24																
27-Sep-15	Discharge	Mod flow turbid	7.84	227	17			7																
28-Sep-15	Discharge	Low flow turbid	8.03	214	14			6																
23-Oct-15	Discharge Event	Steady flow	7	279	17	54	143	14	61		58	5	6	55	13	7	0.63	0.354	<0.005	1.71	<1	58	<2	32
4-Nov-15	Discharge	low flow it brown	7.55	256	20			5																
5-Nov-15	Discharge	low flow brown	7.12	281	14			8																
8-Nov-15	Discharge	mod flow slight turbid	7.52	225	52			48																
9-Nov-15	Discharge	mod flow brown	6.57	159	29			14																
14-Nov-15	Discharge Event	high flow turbid	7.25	168	42	67	85	65	36	30	3	<1	29	8	4	1.79	0.122	0.007	2.60	<1	30	<2	22	
15-Nov-15	Discharge	turbid brown	7.32	106	283			203																
16-Nov-15	Discharge	high flow turbid	6.57	133	38			5																
17-Nov-15	Discharge	mod flow brown	6.92	129	37			22																
18-Nov-15	Discharge	mod flow	7.56	136	26			<5																
19-Nov-15	Discharge	mod flow brown	7.6	150	32			<5																
22-Dec-15	Discharge Event	slow clear	7.19	244	11	56	156	7	65	54	1	1	46	13	8	0.31	0.426	<0.005	1.29	<1	54	<2	32	
23-Dec-15	discharge	slow clear	7.02	241	26			<5																
24-Dec-15	discharge	slow	8.12	197	16			11																
5-Jan-16	Discharge	Mod flow	7.43	287				108																
6-Jan-16	Discharge	High flow	7.29	63	74			32																
7-Jan-16	Discharge	Very high flow	7.12	66	56			20																
8-Jan-16	Discharge	High flow it brown	8.58	120	39			18																
9-Jan-16	Discharge	Low flow	7.07	112	35			10																
10-Jan-16	Discharge	Low flow	7.31	113	29			10																
11-Jan-16	Discharge	Mod flow	8.16	149	18			10																
12-Jan-16	Discharge	Mod flow	7.87	181	17			<5																
13-Jan-16	Discharge	Mod flow	7.51	152	20			<5																
14-Jan-16	Discharge	low flow it brown	7.84	204	12			7																
15-Jan-16	Discharge	Low flow	7.29	168	12			15																
16-Jan-16	Discharge Event	slight-mod flow	7.27	216	33	8	138	32	54	45	3	11	33	10	7	1.58	0.034	<0.005	1.69	<1	45	<2	31	
17-Jan-16	Discharge	Low flow	7.36	134	21			15																
18-Jan-16	Discharge	Mod flow it brown	7.34	193	12			10																
19-Jan-16	Discharge	Mod flow it brown	7.42	163	16			<5																
20-Jan-16	Discharge	Mod flow clear	7.46	442	18			<5																
23-Jan-16	Discharge	Mod flow it brown	7.21	220	17			<5																
6-Feb-16	Discharge	Mod flow v turbid	7.57	212	23			<5																
3-Mar-16	Monthly	Mod flow	7.47	265	9	70	136	60	59	55	2	6	47	12	7	31.00	0.391	0.009	3.05	<1	55	<2	31	
31-Mar-16	Monthly	Low flow	7.57	349	3	88	179	5	79	81	4	4	52	15	10	0.13	0.084	<0.005	1.55	<1	81	<2	44	
27-Apr-16	Monthly	Mod flow	7.23	241	4		123	<5	88	88	4	5	59	17	11	0.06	0.126	<0.005	0.94	<1	88	<2	46	
30-May-16	Monthly	Y Low flow	7.46	446	407	4	58	210	86	91	4	4	66	16	10	0.09	0.078	<0.005	0.88	<1	91	<2	40	
5-Jun-16	Discharge Event	Mod flow	7.38	230	67	69	117	60	46	44	4	8	44	10	5	1.59	0.123	<0.005	1.77	<1	44	<2	23	
6-Jun-16	Discharge	High flow	7.1	87	71			32																
7-Jun-16	Discharge	High flow	7.51	108	36			19																
8-Jun-16	Discharge	Mod flow	7.06	142	36			9																
9-Jun-16	Discharge	Mod flow	7.63	169	30			<5																
10-Jun-16	Discharge	Mod flow	7.39	157	21			6																
20-Jun-16	Discharge	Mod flow	7.29	312	23			12																
Min			6.6	63	3	8	85	5	36	30	1	1	29	8	4	0.06	0.033	0.005	0.80		30	<2	22	
Avg			7.4	206	32	60	153	26	67	61	3	7	49	14	8	3.28	0.156	0.009	1.56		61		35	
Max			8.6	442	283	88	216	203	93	91	5	12	66	19	11	31.00	0.426	0.014	3.05		91	3	49	
Var			0.1	7803	1647	416	1424	1362	323	396	2	11	116	12	5	76.62	0.021	0.000	0.46		396		78	
SD			0.4	88	41	20	38	37	18	20	1	3	11	3	2	8.75	0.146	0.003	0.68		20		9	
*Water Quality Toison			7.1 - 7.6	30	24	85 - 110%		15								1.24		0.011						

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
30-Jul-15	<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	0.08	<0.01	0.09	0.5	0.02
24-Aug-15	<0.001	0.05	<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	0.33	0.7	0.02
25-Sep-15	<0.001	0.04	<0.0001	<0.001	0.011	<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
26-Sep-15																			
27-Sep-15																			
28-Sep-15																			
23-Oct-15	<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	0.04	0.8	0.09
4-Nov-15																			
5-Nov-15																			
8-Nov-15																			
9-Nov-15																			
14-Nov-15	0.002	0.05	<0.0001	<0.001	0.001	0.002	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.04	0.9	0.12
15-Nov-15																			
16-Nov-15																			
17-Nov-15																			
18-Nov-15																			
19-Nov-15																			
22-Dec-15	0.002	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	0.05	<0.01	0.06	0.7	0.10
23-Dec-15																			
24-Dec-15																			
5-Jan-16																			
6-Jan-16																			
7-Jan-16																			
8-Jan-16																			
9-Jan-16																			
10-Jan-16																			
11-Jan-16																			
12-Jan-16																			
13-Jan-16																			
14-Jan-16																			
15-Jan-16																			
16-Jan-16	0.002	0.05	<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	0.03	1	0.06
17-Jan-16																			
18-Jan-16																			
19-Jan-16																			
20-Jan-16																			
23-Jan-16																			
6-Feb-16																			
3-Mar-16	0.002	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	0.01	<0.01	0.05	0.4	0.05
31-Mar-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	0.03	0.2	0.05
27-Apr-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	0.08	0.5	0.04
30-May-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	0.03	0.1	<0.01
5-Jun-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	0.04	<0.01	0.25	1	0.08
Min	0.002	0.040		<0.001	0.001	0.001		<0.001							0.010		0.03	0.1	0.02
Avg	0.002	0.050			0.003	0.001									0.034		0.09	0.6	0.06
Max	0.002	0.070		0.001	0.011	0.002		0.002							0.080		0.33	1.0	0.12
Var	0.000	0.000			0.000	0.000									0.000		0.01	0.1	0.00
SD	0.000	0.007			0.004	0.001									0.022		0.10	0.3	0.03
*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".

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
30-Jul-15	Monthly	Mod flow	7.6	364	5	60	187	9	85	79	2	12	48	16	11	0.17	0.460	<0.005	0.86	<1	79	2	42
24-Aug-15	Discharge Event	Low flow brown	7.6	424	11	73	219	11	105	71	6	16	50	19	14	0.92	0.043	0.013	1.19	<1	71	<2	52
25-Sep-15	Discharge Event	1345 mod flow turbid	7.9	284	51	59	146	22	59	52	4	8	53	12	7	1.73	0.050	0.009	1.89	<1	52	<2	30
26-Sep-15	Discharge	mod flow turbid	7.63	260	29			24															
27-Sep-15	Discharge	mod flow turbid	7.75	235	21			12															
28-Sep-15	Discharge	low flow turbid	7.86	296	26			6															
23-Oct-15	Discharge Event	Low flow	7.08	260	18	69	133	13	56	53	4	10	48	11	7	1.00	0.134	<0.005	1.39	<1	53	<2	29
4-Nov-15	Discharge	Low flow brown	7.99	240	22			16															
5-Nov-15	Discharge	Low brown	6.72	219	25			8															
8-Nov-15	Discharge	low flow	7.42	191	44			42															
9-Nov-15	Discharge	Low flow	6.35	162	45			19															
14-Nov-15	Discharge Event	High flow	7.28	170	27	61	86	25	36	30	3	<1	30	8	4	1.64	0.082	0.005	1.98	<1	30	<2	22
15-Nov-15	Discharge	turbid brown	7.5	120	102			37															
16-Nov-15	Discharge	mod flow brown	6.18	153	40			20															
17-Nov-15	Discharge	mod flow brown	6.78	220	36			67															
18-Nov-15	Discharge	mod flow	7.78	153	28			8															
19-Nov-15	Discharge	mod flow brown	8.01	172	22			6															
22-Dec-15	Discharge Event	slow clear	7.41	259	5	53	166	<5	59	51	<1	4	48	12	7	0.13	0.349	<0.005	0.98	<1	51	<2	32
23-Dec-15	discharge	slow clear	7.19	339	25			9															
24-Dec-15	discharge	slow	8	212	22			6															
5-Jan-16	Discharge	Mod flow	7.49	144				76															
6-Jan-16	Discharge	High flow	7.26	76	104			58															
7-Jan-16	Discharge	Very high flow	7.39	71	60			22															
8-Jan-16	Discharge	Mod flow	8.89	147	43			46															
9-Jan-16	Discharge	Low flow	7.29	119	40			12															
10-Jan-16	Discharge	Low flow	7.18	129	30			8															
11-Jan-16	Discharge	Mod flow clear	8.48	165	24			28															
12-Jan-16	Discharge	Mod flow it brown	8.22	190	22			52															
13-Jan-16	Discharge	Mod flow	7.41	166	20			7															
14-Jan-16	Discharge	Low flow it brown	7.64	224	18			11															
15-Jan-16	Discharge	Low flow	7.42	176	15			7															
16-Jan-16	Discharge Event	Mod flow	7.26	174	34	7	111	22	38	30	3	7	31	7	5	1.66	0.033	<0.005	1.70	<1	30	<2	25
17-Jan-16	Discharge	Low flow	7.4	145	25			14															
18-Jan-16	Discharge	Low flow	7.62	176	19			9															
19-Jan-16	Discharge	Low flow it brown	7.63	194	37			17															
20-Jan-16	Discharge	Low flow it brown	7.98	236	17			<5															
23-Jan-16	Discharge	Low flow it brown	7.52	329	21			9															
6-Feb-16	Discharge	Mod flow turbid	7.12	222	24			<5															
3-Mar-16	Monthly	Mod flow	7.47	285	6	58	146	<5	65	56	2	7	50	13	8	0.22	0.072	0.014	1.17	<1	56	<2	34
31-Mar-16	Monthly	Low flow	7.42	373	5	52	192	8	79	81	4	6	57	15	10	0.16	0.120	<0.005	1.74	<1	81	<2	48
27-Apr-16	Monthly	Low flow	7.1	396	5		204	8	85	87	4	5	59	16	11	0.06	0.133	<0.005	0.97	<1	87	<2	49
30-May-16	Monthly	Low flow	7.26	462	6	53	239	<5	99	93	5	6	80	20	12	0.07	0.097	<0.005	0.86	<1	93	<2	47
5-Jun-16	Discharge Event	Mod flow	7.49	256	102	77	131	80	47	43	4	16	41	9	6	2.73	0.123	0.007	2.63	<1	43	<2	25
6-Jun-16	Discharge	High flow	6.9	93	64			30															
7-Jun-16	Discharge	Mod flow	7.92	124	50			7															
8-Jun-16	Discharge	Mod flow	7.19	139	34			10															
9-Jun-16	Discharge	Mod flow	7.64	179	32			6															
10-Jun-16	Discharge	Mod flow	7.32	174	26			8															
20-Jun-16	Discharge	Mod flow	7.32	271	31			9															
Mn			6.2	71	5	7	86	<5	36	30	<1	<1	30	7	4	0.06	0.033	<0.005	0.86		30		22
Avg			7.5	216	32	57	163	21	68	61	4	9	50	13	9	0.87	0.141	0.010	1.45		61		36
Max			8.9	462	104	77	239	80	105	93	6	16	80	20	14	2.73	0.460	0.014	2.63		93		52
Var			0.2	7905	535	338	2105	379	519	458	1	18	172	17	9	0.79	0.017	0.000	0.30		458		115
SD			0.5	89	23	18	46	19	23	21	1	4	13	4	3	0.89	0.130	0.004	0.55		21		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.

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
30-Jul-15	<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	0.02	<0.01	0.09	0.3	0.02
24-Aug-15	<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	0.53	1.1	0.06
25-Sep-15	<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	0.05	<0.01	0.12	0.8	0.05
26-Sep-15																			
27-Sep-15																			
28-Sep-15																			
23-Oct-15	<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	0.04	<0.01	0.04	0.9	0.06
4-Nov-15																			
5-Nov-15																			
8-Nov-15																			
9-Nov-15																			
14-Nov-15	<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	0.02	<0.01	0.04	0.8	0.09
15-Nov-15																			
16-Nov-15																			
17-Nov-15																			
18-Nov-15																			
19-Nov-15																			
22-Dec-15	0.002	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	0.16	0.7	0.06
23-Dec-15																			
24-Dec-15																			
5-Jan-16																			
6-Jan-16																			
7-Jan-16																			
8-Jan-16																			
9-Jan-16																			
10-Jan-16																			
11-Jan-16																			
12-Jan-16																			
13-Jan-16																			
14-Jan-16																			
15-Jan-16																			
16-Jan-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	0.03	0.7	0.06
17-Jan-16																			
18-Jan-16																			
19-Jan-16																			
20-Jan-16																			
23-Jan-16																			
6-Feb-16																			
3-Mar-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	0.02	<0.01	0.16	0.5	0.03
31-Mar-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	0.2	0.03
27-Apr-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	0.06	0.5	0.04
30-May-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	0.04	0.2	0.01
5-Jun-16	<0.001	0.05	<0.0001	0.001	0.002	0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.10	<0.01	0.80	1.8	0.08
Min	<0.001	0.04		<0.001	<0.001	<0.001		<0.001							<0.01		0.0	0.2	<0.01
Avg	0.001	0.05													0.04		0.2	0.7	0.0
Max	0.002	0.05		0.001	0.002	0.001		0.002							0.10		0.8	1.8	0.1
Var	0.000	0.00													0.00		0.1	0.2	0.0
SD	0.001	0.01													0.03		0.2	0.4	0.0
*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 & Associstes 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project".

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	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
30-Jul-15	Monthly	Mod flow	7.7	159	5	70	81	8	47	50	2	5	22	9	6	0.12	0.006	<0.005	0.30	<1	50	2	19
24-Aug-15	Discharge Event	V high flow	8.2	219	11	79	112	10	50	50	3	6	23	10	6	0.54	0.020	0.017	0.65	<1	50	<2	24
25-Sep-15	Discharge Event	steady turbid	7.0	224	36	57	114	10	56	55	3	4	34	11	7	0.64	0.016	0.006	0.83	<1	55	<2	23
23-Oct-15	Discharge Event	High flow	7.3	166	4	76	84	5	43	46	2	3	29	9	5	0.15	0.018	<0.005	0.42	<1	46	<2	17
14-Nov-15	Discharge Event	High flow turbid	7.7	119	24	74	60	14	34	30	3	<1	16	7	4	1.40	0.034	<0.005	1.46	<1	30	<2	14
22-Dec-15	Discharge Event	steady brown	7.0	120	175	59	77	225	25	22	1	<1	22	5	3	0.25	0.306	<0.005	1.02	<1	22	4	14
16-Jan-16	Discharge Event	Strong flow turbid	6.9	90	45	8	57.6	36	18	16	3	<1	15	4	2	2.28	0.026	<0.005	1.75	<1	16	<2	12
3-Mar-16	Monthly	Mod flow	7.8	143	7	87	73	<5	31	29	2	3	22	6	4	0.36	0.013	<0.005	0.53	<1	29	<2	14
31-Mar-16	Monthly	High flow	7.9	140	6	92	71	10	31	37	2	3	20	6	4	0.34	0.016	<0.005	0.52	<1	37	<2	17
27-Apr-16	Monthly	Mod flow	7.4	134	6		68	<5	34	34	2	3	20	7	4	0.22	0.013	<0.005	0.40	<1	34	<2	13
30-May-16	Monthly	Mod flow	7.8	184	5	89	94	<5	43	43	2	4	28	9	5	0.16	0.011	<0.005	0.39	<1	43	<2	16
5-Jun-16	Discharge Event	Mod flow	7.8	194	56	63	99	41	34	37	3	6	24	7	4	1.25	0.053	0.011	1.48	<1	37	<2	13
Min			6.9	90	4	8	58	5	18	16	1	<1	15	4	2	0.12	0.006	0.006	0.30		16	<2	12
Avg			7.5	158	32	69	83	40	37	37	2	4	23	8	5	0.64	0.044	0.011	0.81		37	3	16
Max			8.2	224	175	92	114	225	56	55	3	6	34	11	7	2.28	0.306	0.017	1.75		55	4	24
Var			0.2	1712	2358	543	351	4983	119	142	0	2	29	4	2	0.44	0.007	0.000	0.25		142	2	15
SD			0.4	41	49	23	19	71	11	12	1	1	5	2	1	0.67	0.083	0.006	0.50		12	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 & Associstes 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	NH3 (as N) mg/l	NO2 (as N) mg/l	NO3 (as N) mg/l	N mg/l	P mg/l
30-Jul-15	<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	0.02	<0.01	0.06	0.2	0.02
24-Aug-15	<0.001	0.019	<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	0.11	0.5	0.05
25-Sep-15	<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	0.09	<0.01	0.07	0.3	0.02
23-Oct-15	<0.001	0.02	<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	0.06	0.5	0.03
14-Nov-15	<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	0.04	0.6	0.08
22-Dec-15	0.001	0.045	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.09	<0.01	0.32	1.6	0.39
16-Jan-16	0.001	0.022	<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	0.6	0.06
3-Mar-16	<0.001	0.017	<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	0.2	0.02
31-Mar-16	<0.001	0.016	<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	0.03	<0.1	0.02
27-Apr-16	<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	0.07	0.2	0.02
30-May-16	<0.001	0.017	<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
5-Jun-16	<0.001	0.02	<0.0001	0.002	0.002	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.12	<0.01	0.32	1.3	0.38
Min		0.014		<0.001	<0.001										<0.01		0.03	<0.1	0.02
Avg		0.021													0.06		0.09	0.6	0.10
Max		0.045		0.002	0.003										0.12		0.32	1.6	0.39
Var		0.000													0.00		0.01	0.2	0.02
SD		0.008													0.04		0.09	0.5	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 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
30-Jul-15	Monthly	Steady flow	7.82	373	5	66	192	14	81	79	2	12	53	16	10	0.12	0.035	<0.005	0.81	<1	79	3	41
24-Aug-15	Discharge Event	Nil RL High flow	7.51	390	19	74	201	10	85	64	5	13	46	16	11	1.26	0.049	0.014	1.49	<1	64	<2	48
25-Sep-15	Discharge Event	Nil RL High flow	7.6	290	42	56	149	33	63	53	4	8	57	12	8	1.86	0.079	0.013	2.22	<1	53	<2	33
23-Oct-15	Discharge Event	Nil RL High flow	7.12	261	15	66	134	8	56	52	3	8	49	11	7	0.8	0.078	<0.005	1.20	<1	52	<2	28
14-Nov-15	Discharge Event	Nil RL High flow	7.42	180	35	60	92	36	43	33	3	2	31	9	5	2.1	0.117	<0.005	2.40	<1	33	<2	23
22-Dec-15	Discharge Event	Nil RL, slow clear	8.1	253	8	60	162	7	65	55	<1	<1	47	13	8	5.76	0.162	0.019	5.59	<1	55	<2	33
16-Jan-16	Discharge Event	Nil RL	7.26	178	35	7	114	31	38	28	3	7	30	7	5	1.88	0.034	<0.005	1.74	<1	28	<2	24
03-Mar-16	Monthly	Nil RL Mod flow	7.59	290	7	72	149	<5	63	57	2	7	50	12	8	0.2	0.054	0.009	1.14	<1	57	3	34
31-Mar-16	Monthly	Nil RL Mod flow	7.5	378	5	78	195	8	85	84	4	6	58	16	11	0.21	0.117	<0.005	1.67	<1	84	<2	48
27-Apr-16	Monthly	Nil RL mod flow	7.31	412	5	213	<5	94	92	3	5	60	18	12	0.08	0.112	<0.005	1.05	<1	92	<2	48	
30-May-16	Monthly	Nil RL Low flow	7.48	511	5	63	264	<5	108	97	4	6	84	22	13	0.04	0.284	<0.005	1.40	<1	97	<2	46
05-Jun-16	Discharge Event	Nil RL Mod flow	7.5	255	87	66	130	76	47	43	4	12	42	9	6	2.68	0.157	0.01	2.83	<1	43	<2	24
Min			7.1	178	5	7	92	<5	38	28	<1	2	30	7	5	0.04	0.034	<0.005	0.81		28	<2	23
Avg			7.5	314	22	61	166	25	69	61	3	8	51	13	9	1.42	0.107	0.013	1.96		61		36
Max			8.1	511	87	78	264	76	108	97	5	13	84	22	13	5.76	0.284	0.019	5.59		97	3	48
Var			0.1	9944	604	358	2332	509	471	501	1	11	202	19	7	2.73	0.005	0.000	1.66		501		100
SD			0.3	100	25	19	48	23	22	22	1	3	14	4	3	1.65	0.071	0.004	1.29		22		10
#Measure Quality: Times			7.1	230	24	85	1100	15	45	38	3	12	42	9	6	1.24	0.157	0.011	2.83		43		24

*Water Quality Trigger

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Site 11 - Mammy Johnsons - Downstream of High Noon

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
30-Jul-15	<0.001	0.048	<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	0.04
24-Aug-15	<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	0.02	<0.01	0.19	0.9	0.06
25-Sep-15	<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	0.01	<0.01	0.1	1	0.08
23-Oct-15	0.001	0.039	<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	0.05	0.6	0.05
14-Nov-15	<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	0.02	<0.01	0.03	0.7	0.06
22-Dec-15	0.002	0.07	<0.0001	0.003	0.004	0.004	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.08	<0.01	0.19	0.9	0.08
16-Jan-16	0.001	0.037	<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	0.03	0.7	0.13
03-Mar-16	0.001	0.044	<0.0001	0.005	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.06	0.4	0.03
31-Mar-16	<0.001	0.046	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.2	0.01	<0.01	0.04	0.2	0.03
27-Apr-16	<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	0.08	<0.01	0.1	0.3	0.02
30-May-16	<0.001	0.056	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.08	<0.01	0.06	0.2	<0.01
5-Jun-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	0.1	<0.01	0.49	1.6	0.15
Min	<0.001	0.037		<0.001	0.001	0.001		<0.001							0.01		0.03	0.2	0.02
Avg		0.047			0.002	0.002									0.04		0.12	0.7	0.07
Max	0.002	0.070		0.005	0.004	0.004		0.002							0.10		0.49	1.6	0.15
Var		0.000			0.000	0.000									0.00		0.02	0.2	0.00
SD		0.009			0.001	0.002									0.04		0.13	0.4	0.04

*Water Quality Trigger

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"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 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	COD mg/l	BOD mg/l	Na mg/l
30-Jul-15	Monthly	Low flow	7.58	332	3.1	71	171	6	84	76	2	11	47	17	10	0.09	0.02	<0.005	0.72	<1	76		2	42
24-Aug-15	Discharge Event	Mod flow turbid	7.56	457	12.9	80	236	20	99	70	5	15	56	20	12	0.96	0.103	<0.005	1.51	<1	70		<2	53
25-Sep-15	Discharge Event	High flow turbid	7.74	270	24.0	60	138	15	59	39	3	7	56	12	7	0.81	0.056	0.007	1.40	<1	39		<2	29
23-Oct-15	Discharge Event	Mod flow	7.31	422	22.9	57	218	17	77	79	4	7	84	16	9	0.58	0.728	0.006	3.09	<1	79		<2	46
14-Nov-15	Discharge Event	Mod flow	7.18	115	170.9	74	58	108	25	21	3	<1	18	5	3	2.88	0.116	0.01	3.42	<1	21		<2	15
22-Dec-15	Discharge Event	slow clear	7.11	229	30.8	47	147	33	55	49	1	1	45	12	6	1.29	0.895	0.008	2.48	<1	49		<2	30
16-Jan-16	Discharge Event	mod flow turbid	7.35	160	33.1	8	102	26	34	30	3	5	28	7	4	2.10	0.038	<0.005	1.92	<1	30		10	23
3-Mar-16	Monthly	Mod flow	7.53	265	9.0	76	136	<5	65	58	2	5	44	13	8	0.21	0.042	<0.005	1.21	<1	58		19	29
31-Mar-16	Monthly	Low flow	7.55	292	2.2	95	150	<5	72	84	4	3	40	14	9	0.07	0.064	<0.005	1.57	<1	84		<2	34
27-Apr-16	Monthly	Mod flow	7.09	302	2.9		155	<5	77	83	4	4	40	16	9	0.04	0.077	<0.005	0.87	<1	83		<2	33
30-May-16	Monthly	Low flow	7.02	352	3.1	63	181	<5	86	97	7	5	49	18	10	0.07	0.071	<0.005	0.71	<1	97		<2	32
5-Jun-16	Discharge Event	Mod flow	7.4	232	75.6	71	119	59	43	41	3	7	42	9	5	1.75	0.117	<0.005	1.85	<1	41		<2	23
Min			7.0	115	2	8	58	5	25	21	1	<1	18	5	3	0.04	0.02	<0.005	0.71		21		<2	15
Avg			7.4	286	33	64	151	34	65	61	3	6	46	13	8	0.90	0.18	0.008	1.73		61		10	32
Max			7.7	457	171	95	236	108	99	97	7	15	84	20	12	2.88	0.73	0.010	3.42		97		19	53
Var			0.1	9680	2331	506	2322	1061	498	594	2	15	259	21	7	0.87	0.06	0.000	0.78		594		72	110
SD			0.2	98	48	22	48	33	22	24	2	4	16	5	3	0.93	0.25	0.002	0.88		24		9	11

*Water Quality Trigger

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Site 12 - Mammy Johnsons - Relton Property

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
30-Jul-15	<0.001	0.047	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	0.07	<0.01	0.10	0.3	0.02
24-Aug-15	<0.001	0.062	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.09	0.4	0.02
25-Sep-15	0.001	0.043	<0.0001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.09	0.7	0.04
23-Oct-15	<0.001	0.076	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.02	1	0.16
14-Nov-15	0.001	0.062	<0.0001	0.001	0.002	0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	0.04	<0.01	0.05	1.6	0.18
22-Dec-15	0.002	0.070	<0.0001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	0.07	<0.01	0.10	0.9	0.17
16-Jan-16	0.002	0.039	<0.0001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.03	0.7	0.05
3-Mar-16	<0.001	0.043	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	0.01	<0.01	0.05	0.4	0.03
31-Mar-16	0.002	0.041	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.03	0.2	0.02
27-Apr-16	<0.001	0.046	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.08	0.5	0.03
30-May-16	<0.001	0.050	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	<0.1	<0.01	<0.01	0.03	0.1	<0.01
5-Jun-16	<0.001	0.046	<0.0001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.05	<0.0001	0.10	0.02	<0.01	0.26	1.1	0.07
Min	0.001	0.039		<0.001	<0.001	<0.001		<0.001						<0.01	0.010		0.02	0.1	0.02
Avg	0.002	0.052													0.031		0.08	0.7	0.07
Max	0.002	0.076		0.001	0.002	0.002		0.002						0.100	0.070		0.26	1.6	0.18
Var	0.000	0.000													0.001		0.00	0.2	0.00
SD	0.001	0.012													0.026		0.06	0.4	0.06

*Water Quality Trigger

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"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
30-Jul-15	Monthly	Low flow	7.9	213	3	77	109	6	50	32	2	7	36	10	6	0.14	0.010	<0.005	0.70	<1	32	3	26
24-Aug-15	Discharge Event	Low flow turbid brown	7.6	240	10	80	123	5	50	28	3	7	36	10	6	0.39	0.013	<0.005	0.75	<1	28	<2	29
25-Sep-15	Discharge Event	Mod flow turbid	8.0	202	23	74	103	17	34	18	3	5	41	7	4	1.01	0.027	<0.005	1.06	<1	18	<2	20
23-Oct-15	Discharge Event	Mod flow	7.1	193	4	70	98	6	36	32	2	7	42	8	4	0.24	0.022	<0.005	0.46	<1	32	<2	20
14-Nov-15	Discharge Event	Mod flow clear	7.5	139	19	79	70	16	31	22	3	2	26	6	4	1.34	0.032	<0.005	1.28	<1	22	<2	18
22-Dec-15	Discharge Event	low clear	7.3	174	13	50	111	<5	43	36	<1	3	36	9	5	0.43	0.110	0.007	0.85	<1	36	<2	23
16-Jan-16	Discharge Event	over crossing about 10cm	7.6	153	16	8	97.9	14	31	23	3	5	30	6	4	1.27	0.023	<0.005	1.15	<1	23	<2	23
3-Mar-16	Monthly	Low flow	7.8	193	6	93	98	<5	43	37	2	4	37	9	5	0.22	0.022	<0.005	1.00	<1	37	<2	23
31-Mar-16	Monthly	Mod flow	7.6	213	5	77	109	7	45	43	3	3	36	8	6	0.26	0.026	<0.005	0.93	<1	43	<2	26
27-Apr-16	Monthly	High flow	7.2	217	3		111	<5	47	44	3	3	36	9	6	0.1	0.023	<0.005	0.92	<1	44	<2	23
30-May-16	Monthly	Low flow	7.1	241	2	56	123	<5	59	47	4	2	46	12	7	0.07	0.024	<0.005	0.88	<1	47	<2	22
5-Jun-16	Discharge Event	ph flow - crossing subm	6.9	71	121	81	36	98	9	6	4	7	16	2	1	1.85	0.085	<0.005	1.52	<1	6	<2	8
Min			6.9	71	2	8	36	<5	9	6	<1	2	16	2	1	0.07	0.010	<0.005	0.46		6	<2	8
Avg			7.5	187	19	68	99	21	40	31	3	5	35	8	5	0.61	0.035		0.96		31		22
Max			8.0	241	121	93	123	98	59	47	4	7	46	12	7	1.85	0.110	0.007	1.52		47	3	29
Var			0.1	2305	1087	526	588	989	166	144	0	4	62	7	3	0.36	0.001		0.08		144		28
SD			0.3	48	33	23	24	31	13	12	1	2	8	3	2	0.60	0.030		0.28		12		5
*Water Quality Trigger			7.1 - 7.8	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.

Site 15 - Mammy Johnsons - Tereel

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
30-Jul-15	<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	0.04	<0.01	0.06	0.3	0.02
24-Aug-15	<0.001	0.036	<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	0.52	0.8	<0.01
25-Sep-15	<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	0.04	<0.01	0.08	0.7	0.04
23-Oct-15	<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	0.02	0.5	0.03
14-Nov-15	<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	0.03	<0.01	0.03	0.5	0.03
22-Dec-15	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	0.12	<0.01	0.24	1.8	0.12
16-Jan-16	<0.001	0.031	<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	0.05	0.4	<0.01
3-Mar-16	<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	0.06	0.4	0.03
31-Mar-16	<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	0.03	0.3	0.03
27-Apr-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	0.04	<0.01	0.06	0.5	0.02
30-May-16	<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	0.06	0.3	<0.01
5-Jun-16	<0.001	0.039	<0.0001	<0.001	0.001	0.002	<0.001	<0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.02	<0.01	0.36	1.6	0.07
Min		0.031			<0.001	<0.001									0.01		0.02	0.3	<0.01
Avg		0.035													0.04		0.13	0.7	0.04
Max		0.044			0.001	0.002									0.12		0.52	1.8	0.12
Var		0.000													0.00		0.03	0.3	0.00
SD		0.003													0.03		0.16	0.5	0.03
*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	Turbidity	DO	TDS	TSS	Hardness	Alkalinity (as CaCO ₃)	Acidity (as CaCO ₃)	SO ₄	Cl	Ca	Mg	Al	Mn	Zn	Fe	CO ₃ (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
30-Jul-15	Monthly	Mod flow	7.4	230	5	74	117	7	59	63	2	7	31	12	7	0.11	0.011	<0.005	0.46	<1	63	3	25
24-Aug-15	Discharge Event	High flow	8.13	307	76	81	158	66	72	38	5	10	37	14	9	3.78	0.094	0.032	3.70	<1	38	<2	33
25-Sep-15	Discharge Event	Steady flow turbid	6.79	420	49	69	217	42	94	77	4	8	73	18	12	2.04	0.103	0.013	2.84	<1	77	<2	42
23-Oct-15	Discharge Event	High flow	8.03	314	7	77	161	7	84	75	3	6	57	17	10	0.18	0.093	<0.005	0.66	<1	75	<2	84
14-Nov-15	Discharge Event	High flow turbid	8.19	192	25	69	98	23	50	42	3	<1	26	10	6	1.33	0.044	<0.005	1.64	<1	42	<2	21
22-Dec-15	Discharge Event	steady clear	8.21	230	61	63	147	96	36	32	<1	3	24	8	4	1.51	0.145	0.011	2.17	<1	32	<2	16
16-Jan-16	Discharge Event	Strong flow turbid	6.76	166	43	8	106	30	31	24	3	1	21	6	4	2.41	0.032	0.006	1.95	<1	24	<2	18
3-Mar-16	Monthly	Mod flow	7.97	240	8	83	123	8	40	38	2	4	30	8	5	0.33	0.020	0.019	0.68	<1	38	<2	19
31-Mar-16	Monthly	Mod flow	8.2	192	6	87	98	10	40	45	2	4	23	8	5	0.31	0.024	<0.005	0.58	<1	45	<2	21
27-Apr-16	Monthly	Mod flow	7.35	179	5		91	<5	36	39	2	3	22	8	4	0.19	0.014	<0.005	0.41	<1	39	<2	16
30-May-16	Monthly	Mod flow	7.64	212	3	89	108	<5	52	54	2	4	35	11	6	0.13	0.012	<0.005	0.34	<1	54	<2	20
5-Jun-16	Discharge Event	Mod flow	7.96	196	183	72	510	262	79	67	5	10	65	15	10	4.55	0.336	0.014	6.81	<1	67	<2	35
Min			6.8	166	3	8	91	<5	31	24	<1	<1	21	6	4	0.11	0.011	<0.005	0.34		24	<2	16
Avg			7.7	240	39	70	161	55	56	50	3	5	37	11	7	1.41	0.077	0.016	1.85		50		29
Max			8.2	420	183	89	510	262	94	77	5	10	73	18	12	4.55	0.336	0.032	6.81		77	3	84
Var			0.3	5373	2681	490	13379	6146	456	302	1	9	321	16	8	2.33	0.009	0.000	3.62		302		366
SD			0.5	73	52	22	116	78	21	17	1	3	18	4	3	1.53	0.093	0.009	1.90		17		19
*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
30-Jul-15	<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	0.04	<0.01	0.08	0.3	0.02
24-Aug-15	0.002	0.042	<0.0001	0.003	0.008	0.002	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	0.1	0.11	<0.01	0.22	1.5	0.27
25-Sep-15	<0.001	0.044	<0.0001	0.001	0.003	0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	0.2	0.06	<0.01	0.18	1.4	0.33
23-Oct-15	<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	0.2	0.12	<0.01	0.10	0.8	0.05
14-Nov-15	<0.001	0.027	<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	0.04	0.7	0.12
22-Dec-15	0.001	0.040	<0.0001	<0.001	0.002	0.001	<0.001	0.001	<0.01	<0.001	<0.001	<0.05	<0.0001	<0.1	0.05	<0.01	0.15	1	0.13
16-Jan-16	0.001	0.027	<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
3-Mar-16	<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	0.04	0.2	0.02
31-Mar-16	<0.001	0.020	<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	0.02
27-Apr-16	<0.001	0.016	<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	0.2	0.02
30-May-16	<0.001	0.020	<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
05-Jun-16	0.003	0.074	<0.0001	0.003	0.004	0.004	<0.001	0.002	<0.01	<0.001	<0.001	<0.05	<0.0001	0.1	0.24	<0.01	1.70	4.5	0.42
Min	<0.001	0.016		<0.001	<0.001	<0.001		<0.001			<0.001			0.1	0.01		0.04	0.2	<0.01
Avg		0.032												0.1	0.07		0.23	1.0	0.13
Max	0.003	0.074		0.003	0.008	0.004		0.002			0.001			0.2	0.24		1.70	4.5	0.42
Var		0.000												0.0	0.00		0.22	1.4	0.02
SD		0.016												0.1	0.07		0.47	1.2	0.14
*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	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
9-Jul-15	Weekly	RL 71.050	8.2	2690	2.1																
14-Jul-15	Weekly	RL 71.004	8.3	2890	1.9																
21-Jul-15	Weekly		7.8	2900	1.4																
30-Jul-15	Monthly	RL 70.989	8.3	2750	1.8	1531	12	145	4	1220	187	243	108	0.03	0.38	<0.005	0.07	<1	145	2	289
7-Aug-15	Weekly	RL 70.024	8.5	2750	1.3																
14-Aug-15	Weekly	RL 71.014	8.2	3016	1.6																
18-Aug-15	Weekly	RL 70.982	8.2	2990	3.5																
24-Aug-15	Discharge Event	RL 71.149	8.2	2980	3.3	1663	10	142	5	1150	187	251	114	0.04	0.14	0.02	0.06	<1	142	<2	308
31-Aug-15	Weekly	RL 71.000	8.1	2850	2.2																
9-Sep-15	Weekly	RL 70.990	7.8	3100	6.3																
16-Sep-15	Weekly	RL 71.026	8.3	2790	3.5																
22-Sep-15	Weekly	RL 71.071	7.6	3240	2.5																
25-Sep-15	Discharge Event	RL 71.040	7.9	3020	4.6	1680	10	132	4	1220	243	238	108	0.04	0.04	<0.005	0.06	<1	132	<2	333
28-Sep-15	Weekly	RL 71.029	8.3	3090	1.4																
8-Oct-15	Weekly	RL 70.069	8.3	2730	1.8																
13-Oct-15	Weekly	RL 71.014	8.1	2650	5.9																
22-Oct-15	Weekly	RL 71.022	8.3	2760	2.4																
23-Oct-15	Discharge Event	RL 71.026	8.1	2820	3.9	1571	25	113	4	1350	261	210	91	0.04	0.07	<0.005	<0.05	<1	113	<2	316
27-Oct-15	Weekly	RL 71.011	8.0	2949	1.6																
3-Nov-15	Weekly	RL 70.991	8.2	2850	4.6																
13-Nov-15	Weekly	RL 71.011	7.9	3120	1.3																
14-Nov-15	Discharge Event	N/A	8.4	2940	1	1640	<5	85	3	1380	263	231	106	0.02	0.56	<0.005	<0.05	<1	85	<2	331
26-Nov-15	Weekly	RL 70.982	8.2	3420	30																
2-Dec-15	Weekly	RL 71.095	8.2	3360	2																
10-Dec-15	Weekly	RL 71.004	8.2	2970	3																
16-Dec-15	Weekly	RL 70.982	8.0	2970	2																
22-Dec-15	Discharge Event	RL 71.114	8.3	2620	1	1676	<5	73	<1	1410	275	233	109	0.02	0.09	<0.005	<0.05	<1	73	<2	360
29-Dec-15	Weekly	RL 71.253	8.4	2980	2																
4-Jan-16	Weekly	RL 71.374	8.4	3190	3																
14-Jan-16	Weekly	RL 71.439	8.3	2880	6																
18-Jan-16	Discharge Event	RL 71.628	7.8	3170	3	2029	<5	92	4	1300	241	251	107	0.11	0.25	<0.005	0.07	<1	92	<2	372
29-Jan-16	Weekly	RL 71.395	8.5	2470	4																
3-Feb-16	Weekly	RL 71.119	8.4	2600	8																
9-Feb-16	Weekly	RL 71.203	8.4	3240	3																
19-Feb-16	Weekly	RL 71.116	7.9	3290	1																
26-Feb-16	Weekly	RL 71.036	7.9	3310	2																
3-Mar-16	Monthly	RL 70.968	8.0	3130	3	1749	10	105	4	1660	250	279	107	0.05	0.19	<0.005	0.11	<1	105	<2	399
8-Mar-16	Weekly	RL 70.975	8.1	3210	4																
18-Mar-16	Weekly	RL 71.064	8.1	3120	6																
23-Mar-16	Weekly	RL 71.033	8.1	3540	2																
31-Mar-16	Monthly	RL 71.109	8.0	3350	1	1875	8	145	5	1460	274	279	108	0.01	0.25	<0.005	<0.05	<1	145	<2	388
5-Apr-16	Weekly	RL 71.094	8.1	3610	3																
14-Apr-16	Weekly	RL 71.119	8.2	3580	6																
20-Apr-16	Weekly	RL 71.061	8.2	3520	3																
27-Apr-16	Monthly	RL 71.062	8.0	3480	3	1950	6	155	4	1390	247	290	108	0.02	0.39	<0.005	0.06	<1	155	<2	420
4-May-16	Weekly	RL 71.047	8.0	3520	6																
12-May-16	Weekly	RL 71.058	8.1	3520	3																
16-May-16	Weekly	RL 70.994	7.6	3400	4																
26-May-16	Weekly	RL 71.057	8.0	3490	9																
30-May-16	Monthly	NA	8.0	3510	3	1967	5	171	7	1570	273	304	105	0.01	0.61	<0.005	<0.05	<1	171	<2	397
5-Jun-16	Discharge Event	RL 71.217	7.5	3050	7	1703	8	164	7	1200	246	272	93	0.11	0.45	<0.005	0.12	<1	164	<2	424
15-Jun-16	Weekly	RL 71.066	8.0	3370	2																
23-Jun-16	Weekly	RL 71.029	7.2	3250	4																
29-Jun-16	Weekly	RL 71.008	8.2	3280	2																
Min			7.2	2470	1	1531	<5	73	<1	1150	187	210	91	0.01	0.04	<0.005	<0.05		73	<2	289
Avg			8.1	3098	4	1753	10	127	5	1359	246	257	105	0.04	0.29		0.08		127		361
Max			8.5	3610	30	2029	25	171	7	1660	275	304	114	0.11	0.61		0.12		171	2	424
Var			0.1	86616	17	26600	35	1052	2	23681	898	780	44	0.00	0.04		0.00		1052		2067
SD			0.3	294	4	163	6	32	1	154	30	28	7	0.03	0.19		0.03		32		45

*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	NH ₃ (as N) mg/l	NO ₂ (as N) mg/l	NO ₃ (as N) mg/l	N mg/l	P mg/l
30-Jul-15	0.001	0.033	<0.0001	<0.001	<0.001	<0.001	0.007	0.01	<0.01	<0.001	0.001	0.06	<0.0001	0.2	0.22	0.03	2.03	2.8	<0.01
24-Aug-15	<0.001	0.036	<0.0001	<0.001	0.001	<0.001	0.006	0.008	<0.01	<0.001	0.001	<0.05	<0.0001	0.3	0.07	0.03	2.15	2.8	<0.01
25-Sep-15	<0.001	0.029	<0.0001	<0.001	<0.001	<0.001	0.007	0.005	<0.01	<0.001	0.001	0.06	<0.0001	0.3	0.02	0.03	1.69	2.2	<0.01
23-Oct-15	0.001	0.027	<0.0001	<0.001	<0.001	<0.001	0.007	0.004	<0.01	<0.001	0.001	0.06	<0.0001	0.2	0.15	0.05	1.37	2	<0.01
14-Nov-15	<0.001	0.025	<0.0001	<0.001	<0.001	<0.001	0.007	0.004	<0.01	<0.001	0.001	0.05	<0.0001	0.2	0.06	0.03	1.24	1.7	<0.01
22-Dec-15	<0.001	0.029	<0.0001	<0.001	<0.001	<0.001	0.01	0.004	<0.01	<0.001	<0.001	0.07	<0.0001	0.2	0.04	0.02	0.98	1	<0.01
18-Jan-16	0.002	0.035	0.0002	<0.001	<0.001	<0.001	0.014	0.01	<0.01	<0.001	0.01	0.09	<0.0001	0.2	0.06	0.05	1.13	1.8	<0.01
3-Mar-16	<0.001	0.033	<0.0001	<0.001	<0.001	<0.001	0.013	0.008	<0.01	<0.001	0.001	0.06	<0.0001	0.3	0.24	0.02	0.79	1.4	0.01
31-Mar-16	<0.001	0.031	<0.0001	<0.001	<0.001	<0.001	0.013	0.009	<0.01	<0.001	0.001	0.07	<0.0001	0.3	0.3	0.01	0.52	1	<0.01
27-Apr-16	<0.001	0.034	<0.0001	<0.001	<0.001	<0.001	0.013	0.009	<0.01	<0.001	0.001	0.09	<0.0001	0.2	0.24	<0.01	0.48	1.2	0.02
30-May-16	<0.001	0.033	<0.0001	<0.001	<0.001	<0.001	0.01	0.008	<0.01	<0.001	0.001	0.08	<0.0001	0.3	0.45	0.01	0.27	0.9	<0.01
5-Jun-16	<0.001	0.031	<0.0001	<0.001	<0.001	<0.001	0.009	0.007	<0.01	<0.001	0.001	0.06	<0.0001	0.3	0.35	<0.01	0.37	1.2	<0.01
Min	0.001	0.025					0.006	0.004			<0.001	0.05		0.2	0.02	0.01	0.27	0.9	<0.01
Avg	0.001	0.031					0.010	0.007			0.002	0.07		0.3	0.18	0.03	1.09	1.7	
Max	0.002	0.036					0.014	0.010			0.010	0.09		0.3	0.45	0.05	2.15	2.8	0.02
Var	0.000	0.000					0.000	0.000			0.000	0.00		0.0	0.02	0.00	0.41	0.5	
SD	0.001	0.003					0.003	0.002			0.003	0.01		0.1	0.14	0.01	0.64	0.7	

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
30-Jul-15	Monthly	No flow														
24-Aug-15	Discharge Event	Sampled prior to sump - no flow v notch	7.7	690	289	11										
25-Sep-15	Discharge Event	steady turbid	6.9	419	39.4	12										
26-Sep-15	Discharge	Low flow	7.4	502	40	9										
27-Sep-15	Discharge	Trickle	7.7	517	25	8										
28-Sep-15	Discharge	Trickle	7.1	506	18	7										
23-Oct-15	Discharge Event	No flow SBR	6.9	376	6.31	6										
4-Nov-15	Discharge	low flow light brown	7.5	216.6	96.2	27										
5-Nov-15	Discharge	mod flow brown	6.2	213	46.3	13										
8-Nov-15	Discharge	low flow slightly turbid	7.0	403	49.9	19										
9-Nov-15	Discharge	mod flow brown	6.9	489	21.6	8										
14-Nov-15	Discharge Event	Mod flow	7.0	267	81.1	42										
15-Nov-15	Discharge	turbid brown	7.1	305	62.4	11										
16-Nov-15	Discharge	mod flow brown	7.0	390	48.4	<5										
17-Nov-15	Discharge	nil flow														
18-Nov-15	Discharge	nil flow														
19-Nov-15	Discharge	nil flow														
22-Dec-15	Discharge Event	low clear	6.9	790	53.7	26										
23-Dec-15	discharge	steady clear	7.4	716	9.4	<5										
24-Dec-15	discharge	nil flow														
5-Jan-16	Discharge	Mod flow	7.7	339		6										
6-Jan-16	Discharge	High flow	7.3	249	43.4	6										
7-Jan-16	Discharge	Mod flow	7.2	265	22.7	<5										
8-Jan-16	Discharge	Mod flow clear	7.6	352	16	<5										
9-Jan-16	Discharge	Low flow	7.0	280	14.85	8										
10-Jan-16	Discharge	Low flow	6.9	275	13.61	<5										
11-Jan-16	Discharge	Nil flow														
12-Jan-16	Discharge	nil flow														
13-Jan-16	Discharge	nil flow														
14-Jan-16	Discharge	Nil flow														
15-Jan-16	Discharge	nil flow														
16-Jan-16	Discharge Event	Low flow	7.1	290	42	12										
17-Jan-16	Discharge	Low flow	6.5	286	21.9	13										
18-Jan-16	Discharge	nil flow														
19-Jan-16	Discharge	nil flow														
20-Jan-16	Discharge	nil flow														
23-Jan-16	Discharge	Mod flow	7.9	388	28.9	<5										
6-Feb-16	Discharge	Nil flow														
3-Mar-16	Monthly	nil flow														
31-Mar-16	Monthly	Nil flow														
27-Apr-16	Monthly	Nil flow														
30-May-16	Monthly	Nil flow														
5-Jun-16	Discharge Event	High flow	7.8	328	47.5	8										
6-Jun-16	Discharge	Nil flow														
7-Jun-16	Discharge	Nil flow														
8-Jun-16	Discharge	Nil flow														
9-Jun-16	Discharge	Nil flow														
10-Jun-16	Discharge	Nil flow														
20-Jun-16	Discharge	Mod flow	7.3	339	66.2	16										
Min			6.2	213	6	6										
Avg			7.2	392	48	13										
Max			7.9	790	289	42										
Var			0.2	23408	3026	82										
SD			0.4	153	55	9										
*Water Quality Trigger			7.1 - 7.9	544	119	80							3.02		0.064	

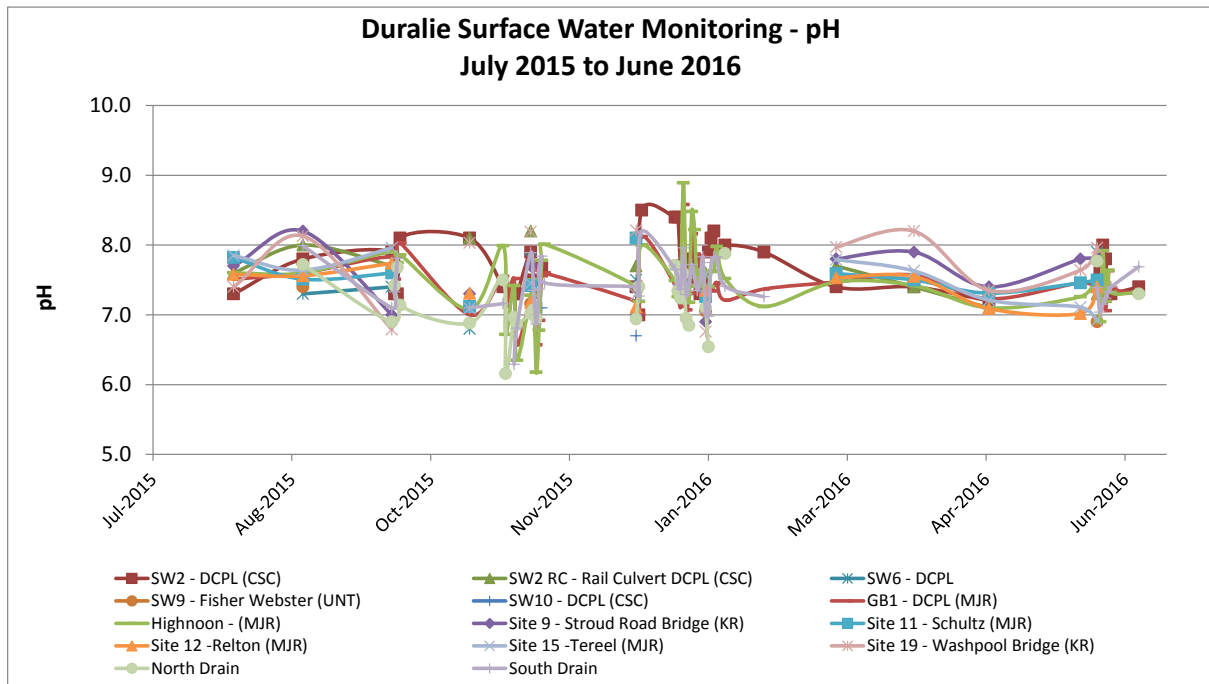
*Water quality triggers for the Duralie Coal Mine developed in accordance with the methodology in ANZECC/ARMCANZ (2000).

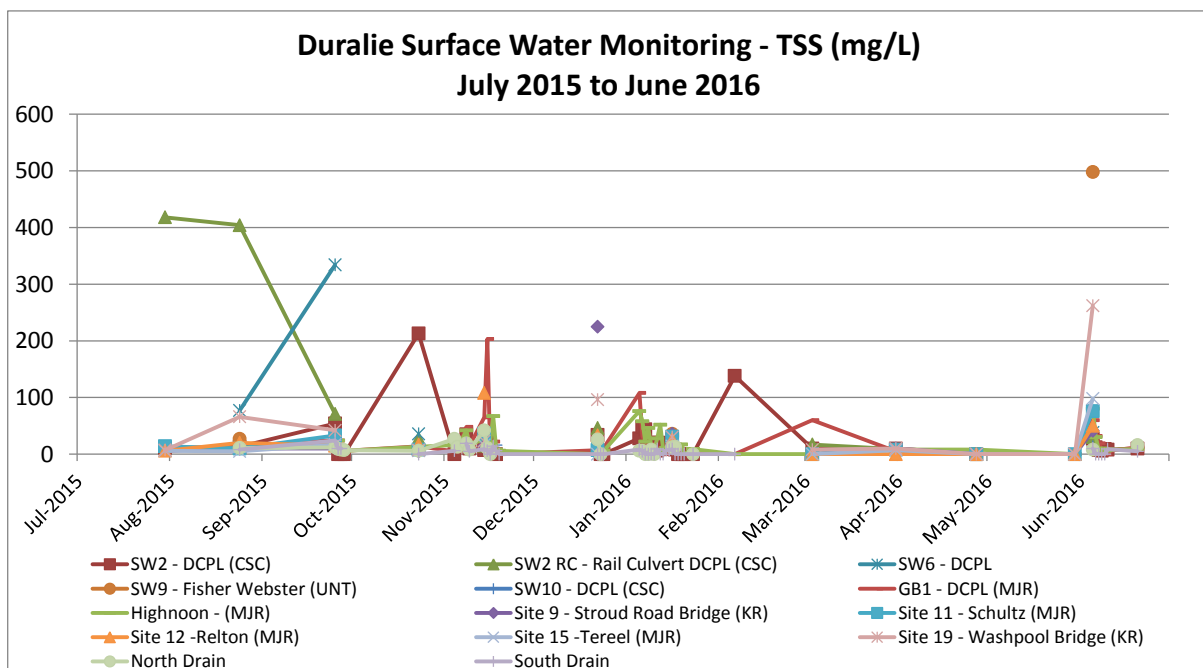
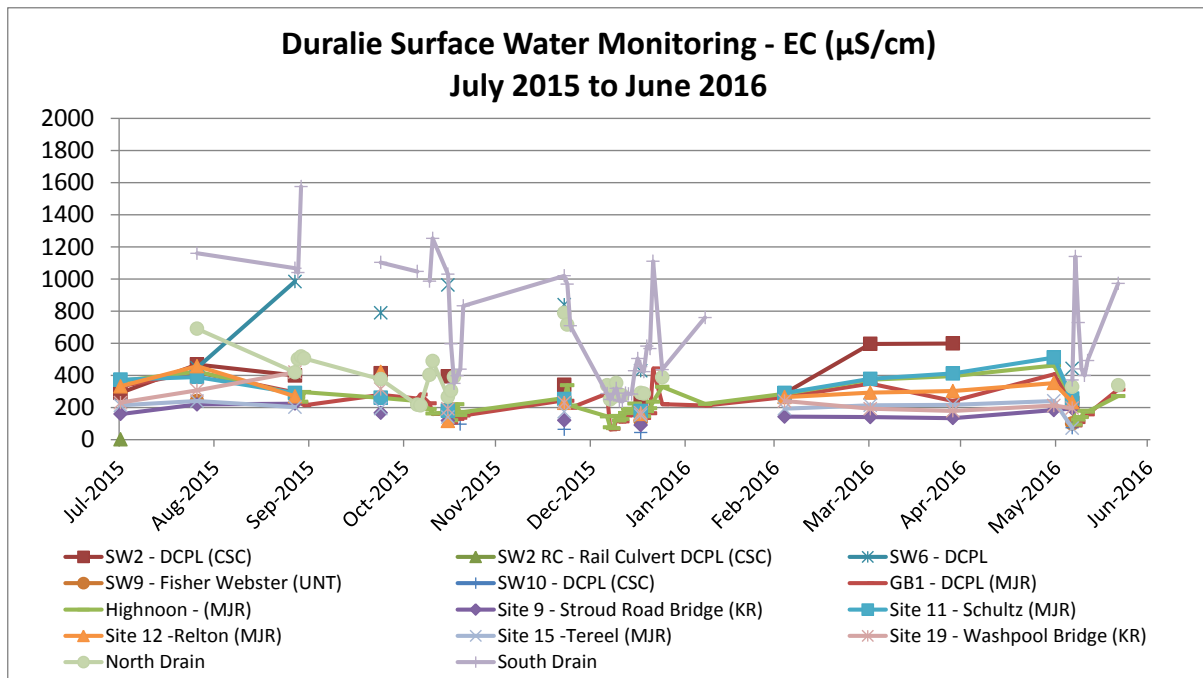
Gilberts & Associates 2011 - Development of Water Quality Trigger Levels for the Duralie Extension Project.

Site - Southern Arm of MWD Diversion Drain

Date	Category	Comment	ph	EC	Turbidity	TSS	Acidity (as mg/l CaCO ₃)	Alkalinity (as mg/l CaCO ₃)	SO ₄	Mn	Fe	Zn	Al	Ca	Mg	Cl
				uS/cm	NTU	mg/l			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
30-Jul-15	Monthly	No flow														
24-Aug-15	Discharge Event	Sampled prior to sump - no flow v notch	8.0	1160	15.7	8										
25-Sep-15	Discharge Event	High flow turbid	7.1	1067	52.3	24										
26-Sep-15	Discharge	Mod flow	7.3	1040	25.4	10										
27-Sep-15	Discharge	High flow	7.8	1576	23	10										
28-Sep-15	Discharge	Nil flow														
23-Oct-15	Discharge Event	Nil flow SBR	7.1	1103	5.04	<5										
4-Nov-15	Discharge	Low flow light brown	7.2	1047	24.5	6										
5-Nov-15	Discharge	no flow - diverted to MWD														
8-Nov-15	Discharge	low flow	6.3	987	22.5	19										
9-Nov-15	Discharge	mod flow brown	6.8	1253	7.19	5										
14-Nov-15	Discharge Event	high flow	7.9	1030	23.6	9										
15-Nov-15	Discharge	turbid brown	7.4	596	41.9	6										
16-Nov-15	Discharge	high flow brown	6.9	350	64.1	<5										
17-Nov-15	Discharge	high flow brown	7.4	397	587	14										
18-Nov-15	Discharge	low flow	7.8	438	32.3	6										
19-Nov-15	Discharge	mod flow clear	7.5	833	5.78	<5										
22-Dec-15	Discharge Event	low clear	7.4	1020	19.5	<5										
23-Dec-15	discharge	steady clear	7.3	968	11.64	<5										
24-Dec-15	discharge	steady	8.2	709	8.4	<5										
5-Jan-16	Discharge	Mod flow	7.7	286		8										
6-Jan-16	Discharge	Very high flow	7.4	249	43.4	5										
7-Jan-16	Discharge	Mod flow	7.4	286	24.9	<5										
8-Jan-16	Discharge	Mod flow	8.0	319	19.8	<5										
9-Jan-16	Discharge	Mod flow	7.3	241	19.29	<5										
10-Jan-16	Discharge	Mod flow	7.4	238	17.08	<5										
11-Jan-16	Discharge		7.7	289	11.14	9										
12-Jan-16	Discharge	Clear	7.5	285	10.65	<5										
13-Jan-16	Discharge	Mod flow	7.4	284	9.72	<5										
14-Jan-16	Discharge	Mod flow clear	7.5	428	80.9	7										
15-Jan-16	Discharge	Mod flow	7.8	505	6.97	7										
16-Jan-16	Discharge Event	10 cm	7.0	454	12.2	9										
17-Jan-16	Discharge	Mod flow	7.0	423	6.32	<5										
18-Jan-16	Discharge	Mod flow	7.8	582	4.44	<5										
19-Jan-16	Discharge	Mod flow	7.8	566	23.1	<5										
20-Jan-16	Discharge	Still, Clear	7.8	1110	3.67	<5										
23-Jan-16	Discharge	Mod flow	7.4	436	32.2	<5										
6-Feb-16	Discharge	Low flow clear	7.3	760	16.7	<5										
3-Mar-16	Monthly	Nil flow														
31-Mar-16	Monthly	Nil flow														
27-Apr-16	Monthly	Nil flow														
30-May-16	Monthly	Nil flow														
5-Jun-16	Discharge Event	High flow	7.4	371	40.1	10										
6-Jun-16	Discharge	Mbd flow	7.0	1140	11	<5										
7-Jun-16	Discharge	Mbd flow	7.2	729	13.39	<5										
8-Jun-16	Discharge	Mbd flow	7.2	440	16	<5										
9-Jun-16	Discharge	High flow	7.3	399	14.2	<5										
10-Jun-16	Discharge	High flow	7.4	492	10.4	9										
20-Jun-16	Discharge	Mbd flow	7.7	972	10.9	5										
Mn			6.3	238	4	5										
Avg			7.4	663	35	9										
Max			8.2	1576	587	24										
Var			0.1	126065	8085	23										
SD			0.4	355	90	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.





Groundwater

DB1W

Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	15.70	15.70	15.70	15.86	15.7	15.74	15.86	0.01	0.08
pH		6.0	6.0	6.1	6.0	6.0	6.0	6.1	0.01	0.07
Conductivity @ 25°C	(µS/cm)	4420	3240	4250	4310	3240	4055	4420	300167	548
ORP	(mV)	58	-69	27	26	-69	10	58	3017	55
Dissolved Oxygen	(%)	36	30	19	30	19	29	36	50	7
TDS	(mg/L)	2880	3140	3030	3050	2880	3025	3140	11633	108
Alkalinity as CaCO3	(mg/L)	119	113	101	130	101	116	130	146	12
Acidity as CaCO3	(mg/L)	120	118	90	143	90	118	143	471	22
Sulphate	(mg/L)	352	366	370	325	325	353	370	414	20
Chloride	(mg/L)	984	1120	1040	1090	984	1059	1120	3556	60
Calcium	(mg/L)	309	280	266	260	260	279	309	477	22
Magnesium	(mg/L)	72	64	57	56	56	62	72	55	7
Sodium	(mg/L)	539	489	485	493	485	502	539	636	25
Aluminium	(mg/L)	0.44	0.50	0.85	1.47	0.44	0.82	1.47	0.22	0.47
Manganese	(mg/L)	1.0	1.1	1.0	0.9	0.9	1.0	1.1	0.01	0.09
Zinc	(mg/L)	0.04	0.05	0.07	0.06	0.04	0.05	0.07	0.00	0.01
Iron	(mg/L)	33.8	34.8	34.1	30.1	30.1	33.2	34.8	4.45	2.11

DB2W

Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	14.03	14.64	13.50	13.56	13.50	13.93	14.64	0.28	0.53
pH		6.21	6.16	6.40	6.27	6.2	6.3	6.4	0.01	0.10
Conductivity @ 25°C	(µS/cm)	1300	1012	1379	1410	1012	1275	1410	32944.92	181.51
ORP	(mV)	72	22	-3	-29	-29	16	72	1859.88	43.13
Dissolved Oxygen	(%)	29	26	21	33	21	27	33	25.58	5.06
TDS	(mg/L)	807	844	822	904	807	844	904	1817.58	42.63
Alkalinity as CaCO3	(mg/L)	155	174	172	181	155	171	181	121.67	11.03
Acidity as CaCO3	(mg/L)	82	71	64	89	64	77	89	124.33	11.15
Sulphate	(mg/L)	152	160	166	138	138	154	166	146.67	12.11
Chloride	(mg/L)	180	232	238	243	180	223	243	851.58	29.18
Calcium	(mg/L)	100	88	98	95	88	95	100	27.58	5.25
Magnesium	(mg/L)	26	24	22	22	22	24	26	3.67	1.91
Sodium	(mg/L)	146	132	144	138	132	140	146	40.00	6.32
Aluminium	(mg/L)	<0.01	<0.01	<0.01	<0.01					
Manganese	(mg/L)	0.82	0.94	0.86	0.78	0.78	0.85	0.94	0.00	0.07
Zinc	(mg/L)	<0.005	<0.005	<0.005	<0.005					
Iron	(mg/L)	14.4	15.0	13.9	12.6	12.6	14.0	15.0	1.04	1.02

DB3W

Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	2.84	2.62	2.69	2.95	2.62	2.78	2.95	0.02	0.15
pH		6.4	6.3	7.2	6.5	6.3	6.6	7.2	0.16	0.40
Conductivity @ 25°C	(µS/cm)	124	84	126	114	84	112	126	374.14	19.34
ORP	(mV)	184	119	49	31	31	96	184	4902.25	70.02
Dissolved Oxygen	(%)	64	33	25	36	25	40	64	0.00	0.00
TDS	(mg/L)	267	293	136	558	136	314	558	0.00	0.00
Alkalinity as CaCO3	(mg/L)	35	38	39	39	35	38	39	3.58	1.89
Acidity as CaCO3	(mg/L)	18	19	17	23	17	19	23	6.92	2.63
Sulphate	(mg/L)	3	4	4	4	3	4	4	0.25	0.50
Chloride	(mg/L)	8	12	11	12	8	11	12	3.58	1.89
Calcium	(mg/L)	2	2	3	2	2	2	2	0.00	0.00
Magnesium	(mg/L)	1	1	2	2	1	1	1	0.00	0.00
Sodium	(mg/L)	21	24	19	16	16	20	24	11.33	3.37
Aluminium	(mg/L)	12	15	3	14	3	11	15	31.57	5.62
Manganese	(mg/L)	0.08	0.15	0.06	0.14	0.06	0.11	0.15	0.00	0.04
Zinc	(mg/L)	0.04	0.06	0.02	0.07	0.02	0.05	0.07	0.00	0.02
Iron	(mg/L)	14.4	19.5	3.1	17.6	3.1	13.7	19.5	53.90	7.34

DB4W										
Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	6.60	6.78	6.03	6.13	6.03	6.39	6.78	0.13	0.36
pH		6.6	6.4	6.9	6.5	6.4	6.6	6.9	0.05	0.23
Conductivity @ 25°C	(µS/cm)	3860	2790	4040	4170	2790	3715	4170	396433.33	629.63
ORP	(mV)	156	36	-128	-40	-128	6	156	14490.67	120.38
Dissolved Oxygen	(%)	48	40	38	29	29	39	48	60.92	7.80
TDS	(mg/L)	2690	2730	2590	2840	2590	2713	2840	10691.67	103.40
Alkalinity as CaCO3	(mg/L)	232	236	245	214	214	232	245	169.58	13.02
Acidity as CaCO3	(mg/L)	56	55	44	78	44	58	78	202.92	14.24
Sulphate	(mg/L)	182	233	206	221	182	211	233	483.00	21.98
Chloride	(mg/L)	764	1040	976	1040	764	955	1040	17124.00	130.86
Calcium	(mg/L)	180	161	170	171	161	171	180	60.33	7.77
Magnesium	(mg/L)	90	92	89	91	89	91	92	1.67	1.29
Sodium	(mg/L)	517	507	528	516	507	517	528	74.00	8.60
Aluminium	(mg/L)	0.02	0.01	0.80	0.01	0.01	0.21	0.80	0.15	0.39
Manganese	(mg/L)	1.6	1.8	1.0	1.9	1.0	1.6	1.9	0.16	0.40
Zinc	(mg/L)	<0.005	<0.005	0.08	<0.005	0.1	0.08	0.08		
Iron	(mg/L)	4.6	5.5	33.4	6.4	4.6	12.5	33.4	195.29	13.97

DB5W										
Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	11.56	11.53	11.40	11.67	11.40	11.54	11.67	0.01	0.11
pH		5.6	5.7	6.2	5.8	5.6	5.8	6.2	0.06	0.25
Conductivity @ 25°C	(µS/cm)	2440	2740	2760	2056	2056	2499	2760	108644.00	329.61
ORP	(mV)	96	-19	24	45	-19	37	96	2294.92	47.91
Dissolved Oxygen	(%)	40	39	25	36	25	35	40	47.33	6.88
TDS	(mg/L)	1620	1580	1480	1340	1340	1505	1620	15566.67	124.77
Alkalinity as CaCO3	(mg/L)	43	44	44	63	43	49	63	93.67	9.68
Acidity as CaCO3	(mg/L)	174	152	140	151	140	154	174	202.92	14.24
Sulphate	(mg/L)	239	266	243	136	136	221	266	3352.67	57.90
Chloride	(mg/L)	507	680	614	515	507	579	680	6902.00	83.08
Calcium	(mg/L)	37	36	35	30	30	35	37	9.67	3.11
Magnesium	(mg/L)	44	45	37	28	28	39	45	61.67	7.85
Sodium	(mg/L)	373	374	356	296	296	350	374	1352.25	36.77
Aluminium	(mg/L)	0.04	0.03	0.03	<0.01	0	0	0	0.00	0.01
Manganese	(mg/L)	1.2	1.6	1.3	0.9	0.93	1.25	1.56	0.07	0.26
Zinc	(mg/L)	0.046	0.044	0.035	0.010	0.01	0.03	0.05	0.00	0.02
Iron	(mg/L)	56.0	69.4	57.7	40.4	40.4	55.9	69.4	141.92	11.91

DB6W										
Parameter	Units	9-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	22.29	21.90	21.80	21.60	21.60	21.90	22.29	0.08	0.29
pH		6.6	6.6	7.4	6.6	6.6	6.8	7.4	0.14	0.38
Conductivity @ 25°C	(µS/cm)	6300	6330	5970	5940	5940	6135	6330	43500.00	208.57
ORP	(mV)	37	-40	-94	-22	-94	-30	37	2902.92	53.88
Dissolved Oxygen	(%)	30	59	29	40	29	40	59	193.67	13.92
TDS	(mg/L)	4140	4200	4090	3860	3860	4073	4200	22091.67	148.63
Alkalinity as CaCO3	(mg/L)	586	626	616	628	586	614	628	376.00	19.39
Acidity as CaCO3	(mg/L)	116	89	84	119	84	102	119	326.00	18.06
Sulphate	(mg/L)	86	97	101	78	78	91	101	109.67	10.47
Chloride	(mg/L)	1220	1630	1470	1490	1220	1453	1630	29091.67	170.56
Calcium	(mg/L)	338	318	320	273	273	312	338	765.58	27.67
Magnesium	(mg/L)	207	201	227	171	171	202	227	537.00	23.17
Sodium	(mg/L)	665	606	694	608	606	643	694	1892.92	43.51
Aluminium	(mg/L)	0.02	<0.01	<0.01	0.03	0.02	0.03	0.03	0.00	0.01
Manganese	(mg/L)	0.295	0.307	0.301	0.297	0.295	0.300	0.307	0.00	0.01
Zinc	(mg/L)	<0.005	0.005	<0.005	<0.005	0.005	0.005	0.005		
Iron	(mg/L)	3.9	3.9	3.5	3.6	3.5	3.7	3.9	0.05	0.22

DB7W

Parameter	Units	8-Sep-15	30-Nov-15	16-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	10.30	10.36	9.80	10.60	9.80	10.27	10.60	0.11	0.34
pH		7.0	6.9	7.4	6.9	6.9	7.0	7.4	0.05	0.22
Conductivity @ 25°C	(µS/cm)	2770	2180	2830	2850	2180	2658	2850	102491.67	320.14
ORP	(mV)	112	140	-109	-30	-109	28	140	13910.92	117.94
Dissolved Oxygen	(%)	24	26	33	24	24	27	33	18.25	4.27
TDS	(mg/L)	1750	1670	1680	1720	1670	1705	1750	1366.67	36.97
Alkalinity as CaCO3	(mg/L)	368	404	387	399	368	390	404	256.33	16.01
Acidity as CaCO3	(mg/L)	45	31	28	39	28	36	45	59.58	7.72
Sulphate	(mg/L)	90	106	112	80	80	97	112	214.67	14.65
Chloride	(mg/L)	513	664	636	629	513	611	664	4453.67	66.74
Calcium	(mg/L)	155	132	135	140	132	141	155	104.33	10.21
Magnesium	(mg/L)	57	52	49	49	49	52	57	14.25	3.77
Sodium	(mg/L)	388	359	362	371	359	370	388	170.00	13.04
Aluminium	(mg/L)	1.1	0.2	0.3	1.2	0.2	0.7	1.2	0.29	0.54
Manganese	(mg/L)	0.654	0.699	0.660	0.553	0.553	0.642	0.699	0.00	0.06
Zinc	(mg/L)	0.013	<0.005	0.005	0.010	0.005	0.009	0.013	0.00	0.00
Iron	(mg/L)	1.04	0.35	0.33	1.54	0.33	0.82	1.54	0.34	0.59

DB8W

Parameter	Units	9-Sep-15	30-Nov-15	16-Mar-16	2-Jun-16	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	21.62	21.4	21.23	21	21.31	21.62	0.07	0.26

DB9W

Parameter	Units	9-Sep-15	30-Nov-15	16-Mar-16	2-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	20.74	20.97	20.8	20.77	20.74	20.82	20.97	0.01	0.10
pH		7.3	6.94	7.41	7.26	6.9	7.2	7.4	0.04	0.20
Conductivity @ 25°C	(µS/cm)	3240	3290	3140	3120	3120	3198	3290	6558.33	80.98
ORP	(mV)	118	-96	-90	-49	-96	-29	118	10072.92	100.36
Dissolved Oxygen	(%)	51	41	29	28	28	37	51	118.92	10.90
TDS	(mg/L)	1980	1910	1790	1860	1790	1885	1980	6433.33	80.21
Alkalinity as CaCO3	(mg/L)	116	127	119	125	116	122	127	26.25	5.12
Acidity as CaCO3	(mg/L)	12	6	6	9	6	8	12	8.25	2.87
Sulphate	(mg/L)	230	249	246	194	194	230	249	637.58	25.25
Chloride	(mg/L)	604	799	756	762	604	730	799	7445.58	86.29
Calcium	(mg/L)	147	129	148	134	129	140	148	89.67	9.47
Magnesium	(mg/L)	14	13	13	11	11	13	14	1.58	1.26
Sodium	(mg/L)	492	473	523	482	473	493	523	473.67	21.76
Aluminium	(mg/L)	0.03	0.01	0.13	0.03	0.0	0.1	0.1	0.00	0.05
Manganese	(mg/L)	0.174	0.227	0.147	0.034	0.034	0.146	0.227	0.01	0.08
Zinc	(mg/L)	0.006	<0.005	0.016	0.007	0.006	0.010	0.016	0.00	0.01
Iron	(mg/L)	0.81	1.4	1.07	0.17	0.17	0.86	1.40	0.27	0.52

DB10W

Parameter	Units	9-Sep-15	30-Nov-15	16-Mar-16	2-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	13.7	12.05	12.1	13.49	12.05	12.84	13.70	0.78	0.88
pH		5.59	5.89	6.05	5.83	5.6	5.8	6.1	0.04	0.19
Conductivity @ 25°C	(µS/cm)	4170	4250	3930	3930	3930	4070	4250	27200.00	164.92
ORP	(mV)	176	54	62	47	47	85	176	3738.25	61.14
Dissolved Oxygen	(%)	50	33	32	33	32	37	50	75.33	8.68
TDS	(mg/L)	2410	2520	2320	2010	2010	2315	2520	48033.33	219.17
Alkalinity as CaCO3	(mg/L)	17	27	18	44	17	27	44	156.33	12.50
Acidity as CaCO3	(mg/L)	94	50	19	106	19	67	106	1614.25	40.18
Sulphate	(mg/L)	394	428	415	364	364	400	428	780.25	27.93
Chloride	(mg/L)	722	992	915	945	722	894	992	14076.33	118.64
Calcium	(mg/L)	77	73	87	79	73	79	87	34.67	5.89
Magnesium	(mg/L)	82	78	81	70	70	78	82	29.58	5.44
Sodium	(mg/L)	631	601	652	610	601	624	652	519.00	22.78
Aluminium	(mg/L)	0.23	0.14	0.2	0.12	0.1	0.2	0.2	0.00	0.05
Manganese	(mg/L)	0.772	0.792	0.859	0.834	0.772	0.814	0.859	0.00	0.04
Zinc	(mg/L)	0.061	0.064	0.083	0.088	0.061	0.074	0.088	0.00	0.01
Iron	(mg/L)	13.7	12.4	13.4	15.2	12.40	13.68	15.20	1.34	1.16

DB11W

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

Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL (TOC)	(m)	9.80	10.78	10.70	10.68	9.8	10.49	10.78	0.21	0.46
pH		6.97	6.8	7.4	6.9	6.8	7.02	7.40	0.07	0.26
Conductivity @ 25°C	(µS/cm)	3000	2090	2760	3670	2090.0	2880.00	3670.00	425666.67	652.43
ORP	(mV)	99.3	90	-69	-69	-69.0	12.83	99.30	8941.52	94.56
Dissolved Oxygen	(%)	44	36	37	39	36.0	39.00	44.00	12.67	3.56
TDS	(mg/L)	1910	1820	1810	2070	1810.0	1902.50	2070.00	14491.67	120.38
Alkalinity as CaCO3	(mg/L)	266	291	289	275	266.0	280.25	291.00	140.92	11.87
Acidity as CaCO3	(mg/L)	27	18	17	36	17.0	24.50	36.00	79.00	8.89
Sulphate	(mg/L)	166	178	182	174	166.0	175.00	182.00	46.67	6.83
Chloride	(mg/L)	512	671	653	856	512.0	673.00	856.00	19938.00	141.20
Calcium	(mg/L)	203	183	201	234	183.0	205.25	234.00	448.25	21.17
Magnesium	(mg/L)	30	27	26	37	26.0	30.00	37.00	24.67	4.97
Sodium	(mg/L)	369	346	361	376	346.0	363.00	376.00	166.00	12.88
Aluminium	(mg/L)	0.03	0.03	0.02	0.06	0.0	0.04	0.06	0.00	0.02
Manganese	(mg/L)	0.674	0.667	0.704	1.070	0.7	0.78	1.07	0.04	0.19
Zinc	(mg/L)	0.010	<0.005	<0.005	0.007	0.0	0.01	0.01	0.00	0.00
Iron	(mg/L)	2.39	2.32	2.27	4.06	2.3	2.76	4.06	0.75	0.87

BH4BW

Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	4.65	4.64	4.58	4.82	4.6	4.67	4.82	0.01	0.10
pH		6.1	6.1	6.6	6.0	6.0	6.21	6.56	0.06	0.24
Conductivity @ 25°C	(µS/cm)	250	203	295	353	203.0	275.25	353.00	4097.58	64.01
ORP	(mV)	195	-10	75	15	-10.0	68.75	195.00	8356.25	91.41
Dissolved Oxygen	(%)	70	29	32	27	27.0	39.50	70.00	417.67	20.44
TDS	(mg/L)	175	186	214	282	175.0	214.25	282.00	2309.58	48.06
Alkalinity as CaCO3	(mg/L)	87	94	73	98	73.0	88.00	98.00	120.67	10.98
Acidity as CaCO3	(mg/L)	29	36	37	48	29.0	37.50	48.00	61.67	7.85
Sulphate	(mg/L)	6	7	7	6	6.0	6.50	7.00	0.33	0.58
Chloride	(mg/L)	18	28	34	35	18.0	28.75	35.00	60.92	7.80
Calcium	(mg/L)	15	13	16	16	13.0	15.00	16.00	2.00	1.41
Magnesium	(mg/L)	10	9	9	11	9.0	9.75	11.00	0.92	0.96
Sodium	(mg/L)	27	30	25	23	23.0	26.25	30.00	8.92	2.99
Aluminium	(mg/L)	9	8	20	6	5.8	10.55	19.70	38.86	6.23
Manganese	(mg/L)	1.7	1.6	1.3	1.5	1.3	1.51	1.65	0.02	0.16
Zinc	(mg/L)	0.062	0.040	0.073	0.042	0.0	0.05	0.07	0.00	0.02
Iron	(mg/L)	110.0	61.8	32.0	13.8	13.8	54.40	110.00	1765.41	42.02

SI1W

Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	9.50	9.54	9.50	9.72	9.50	9.57	9.72	0.01	0.11
pH		7.1	7.1	7.6	7.0	7.0	7.2	7.6	0.08	0.28
Conductivity @ 25°C	(µS/cm)	2690	2880	2780	2760	2690	2778	2880	6158.33	78.48
ORP	(mV)	166	121	50	107	50	111	166	2287.33	47.83
Dissolved Oxygen	(%)	28	37	24	27	24	29	37	31.33	5.60
TDS	(mg/L)	1850	1950	1920	2050	1850	1943	2050	6891.67	83.02
Alkalinity as CaCO ₃	(mg/L)	426	478	460	458	426	456	478	467.67	21.63
Acidity as CaCO ₃	(mg/L)	42	28	33	37	28	35	42	35.33	5.94
Sulphate	(mg/L)	654	714	696	693	654	689	714	638.25	25.26
Chloride	(mg/L)	236	314	313	306	236	292	314	1418.92	37.67
Calcium	(mg/L)	180	160	186	160	160	172	186	182.33	13.50
Magnesium	(mg/L)	158	146	150	133	133	147	158	108.92	10.44
Sodium	(mg/L)	256	237	249	238	237	245	256	83.33	9.13
Aluminium	(mg/L)	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.00	0.01
Manganese	(mg/L)	0.010	0.001	0.002	0.024	0.0	0.01	0.02	0.00	0.01
Zinc	(mg/L)	<0.005	<0.005	<0.005	<0.005					
Iron	(mg/L)	0.25	<0.05	0.05	0.05	0.05	0.12	0.25	0.01	0.12

SI2W

Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	18.30	18.45	18.30	18.60	18.3	18.41	18.60	0.02	0.14
pH		7.0	7.4	7.6	7.1	7.0	7.29	7.61	0.07	0.26
Conductivity @ 25°C	(µS/cm)	2830	3070	1847	2920	1847	2667	3070	308462	555
ORP	(mV)	164	93	-3	77	-3	83	164	4698	69
Dissolved Oxygen	(%)	31	27	nr	31	27	30	31	5	2
TDS	(mg/L)	2030	2300	1220	2210	1220	1940	2300	243000	493
Alkalinity as CaCO ₃	(mg/L)	356	375	249	336	249	329	375	3098	56
Acidity as CaCO ₃	(mg/L)	32	19	9	23	9	21	32	91	10
Sulphate	(mg/L)	984	1050	593	784	593	853	1050	42777	207
Chloride	(mg/L)	188	242	138	214	138	196	242	1956	44
Calcium	(mg/L)	153	130	89	126	89	125	153	702	26
Magnesium	(mg/L)	166	158	91	129	91	136	166	1153	34
Sodium	(mg/L)	366	334	206	317	206	306	366	4835	70
Aluminium	(mg/L)	0.17	0.13	0.17	0.05	0.05	0.13	0.17	0.00	0.06
Manganese	(mg/L)	0.026	0.006	0.014	0.015	0.006	0.015	0.026	0.000	0.008
Zinc	(mg/L)	<0.005	0.006	<0.005	<0.005					
Iron	(mg/L)	0.23	0.14	0.24	0.13	0.13	0.19	0.24	0.00	0.06

SI3W

Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	1-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL	(m)	27.72	27.90	27.25	27.77	27.25	27.66	27.90	0.08	0.28
pH		6.9	6.9	7.5	7.1	6.9	7.1	7.5	0.07	0.27
Conductivity @ 25°C	(µS/cm)	5290	5600	4480	5030	4480	5100	5600	225133.33	474.48
ORP	(mV)	169	-24	-154	-41	-154	-13	169	17969.67	134.05
Dissolved Oxygen	(%)	36	20	23	21	20	25	36	55.33	7.44
TDS	(mg/L)	3580	3620	2920	3490	2920	3403	3620	106425.00	326.23
Alkalinity as CaCO ₃	(mg/L)	323	351	466	486	323	407	486	6637.67	81.47
Acidity as CaCO ₃	(mg/L)	45	29	40	41	29	39	45	46.92	6.85
Sulphate	(mg/L)	519	607	382	368	368	469	607	13104.67	114.48
Chloride	(mg/L)	919	1290	965	1110	919	1071	1290	27940.67	167.15
Calcium	(mg/L)	359	373	289	282	282	326	373	2200.92	46.91
Magnesium	(mg/L)	109	105	88	88	88	98	109	123.00	11.09
Sodium	(mg/L)	648	633	561	620	561	616	648	1451.00	38.09
Aluminium	(mg/L)	0.12	0.07	2.18	0.06	0.06	0.61	2.18	1.10	1.05
Manganese	(mg/L)	0.022	0.051	6.890	5.230	0.022	3.048	6.890	12.55	3.54
Zinc	(mg/L)	0.023	0.019	0.137	0.006	0.006	0.046	0.137	0.00	0.06
Iron	(mg/L)	0.14	0.09	2.33	0.25	0.09	0.70	2.33	1.18	1.09

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

Waste Emplacement - South

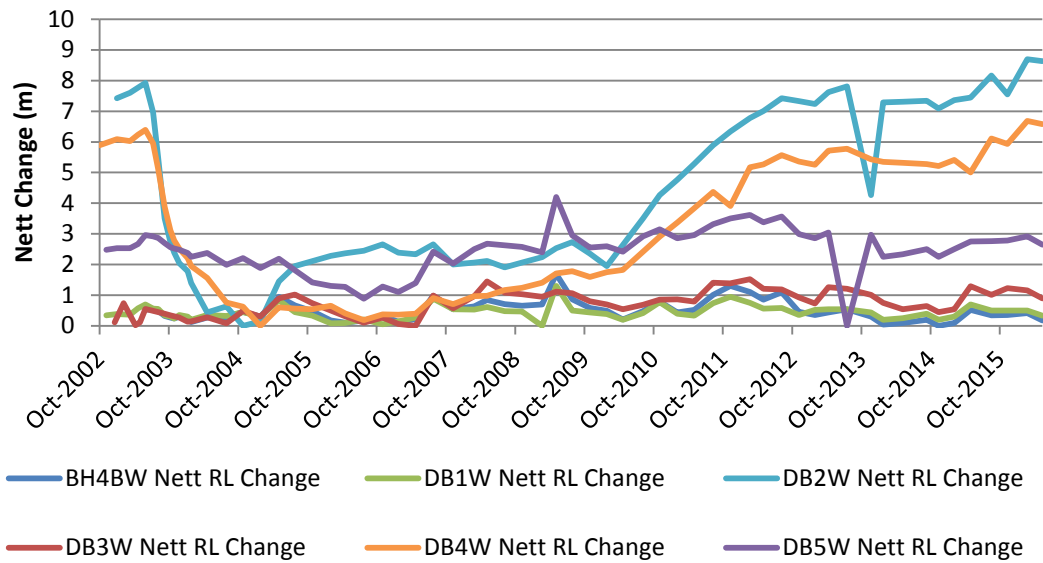
Parameter	Units	8-Sep-15	30-Nov-15	15-Mar-16	2-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL (TOC)	(m)	12.7	12.03	11.01	11.5	11.01	11.81	12.70	0.53	0.72
pH		6.9	6.97	7.16	6.49	6.5	6.9	7.2	0.08	0.28
Conductivity @ 25°C	(µS/cm)	1902	1997	1963	2008	1902	1968	2008	2273.67	47.68
ORP	(mV)	182	26	24	42	24	69	182	5790.33	76.09
Dissolved Oxygen	(%)	33	44	27	19	19	31	44	110.92	10.53
TDS	(mg/L)	984	1400	1460	1240	984	1271	1460	45230.67	212.68
Alkalinity as CaCO3	(mg/L)	232	266	259	256	232	253	266	218.25	14.77
Acidity as CaCO3	(mg/L)	61	50	50	58	50	55	61	31.58	5.62
Sulphate	(mg/L)	409	439	445	406	406	425	445	404.25	20.11
Chloride	(mg/L)	159	234	223	214	159	208	234	1112.33	33.35
Calcium	(mg/L)	127	123	144	128	123	131	144	85.67	9.26
Magnesium	(mg/L)	27	26	26	24	24	26	27	1.58	1.26
Sodium	(mg/L)	268	263	286	262	262	270	286	124.25	11.15
Aluminium	(mg/L)	42.6	14.4	12.2	34.6	12.2	26.0	42.6	224.84	14.99
Manganese	(mg/L)	0.581	0.586	0.622	0.718	0.581	0.627	0.718	0.00	0.06
Zinc	(mg/L)	0.115	0.048	0.055	0.109	0.048	0.082	0.115	0.00	0.04
Iron	(mg/L)	20.40	7.26	7.01	16.30	7.01	12.74	20.40	44.74	6.69

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

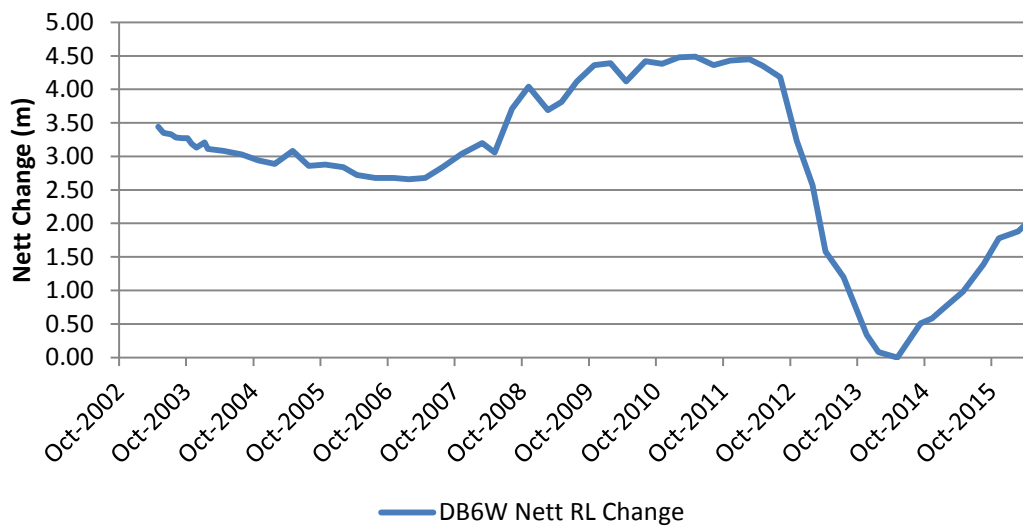
Waste Emplacement - East

Parameter	Units	16-Sep-15	30-Nov-15	17-Mar-16	2-Jun-16	Min	Avg	Max	Variance	Std Dev
Depth to standing WL (TOC)	(m)	66.8	68.9	65	62.7	62.70	65.85	68.90	6.95	2.64
pH		6.88	6.56	7.79	7.11	6.6	7.09	7.79	0.27	0.52
Conductivity @ 25°C	(µS/cm)	4170	5380	5210	5230	4170	4998	5380	310091.67	556.86
ORP	(mV)	176	-142	-120	-64	-142	-38	176	21337.00	146.07
Dissolved Oxygen	(%)	29	31	17	17	17	24	31	57.00	7.55
TDS	(mg/L)	3470	4820	4570	4700	3470	4390	4820	386600.00	621.77
Alkalinity as CaCO3	(mg/L)	210	221	212	218	210	215	221	26.25	5.12
Acidity as CaCO3	(mg/L)	49	26	30	31	26	34	49	104.67	10.23
Sulphate	(mg/L)	1130	1220	1330	1110	1110	1198	1330	10091.67	100.46
Chloride	(mg/L)	882	1010	989	1020	882	975	1020	4031.58	63.49
Calcium	(mg/L)	901	844	872	833	833	863	901	928.33	30.47
Magnesium	(mg/L)	43	32	29	26	26	33	43	55.00	7.42
Sodium	(mg/L)	313	291	321	308	291	308	321	160.92	12.69
Aluminium	(mg/L)	2.41	3.88	2.01	0.08	0.08	2.10	3.88	2.45	1.57
Manganese	(mg/L)	3.47	3.71	3.14	2.62	2.62	3.24	3.71	0.22	0.47
Zinc	(mg/L)	0.067	0.083	0.133	0.008	0.008	0.073	0.133	0.00	0.05
Iron	(mg/L)	4.82	9.28	15.8	2.39	2.39	8.07	15.80	34.68	5.89

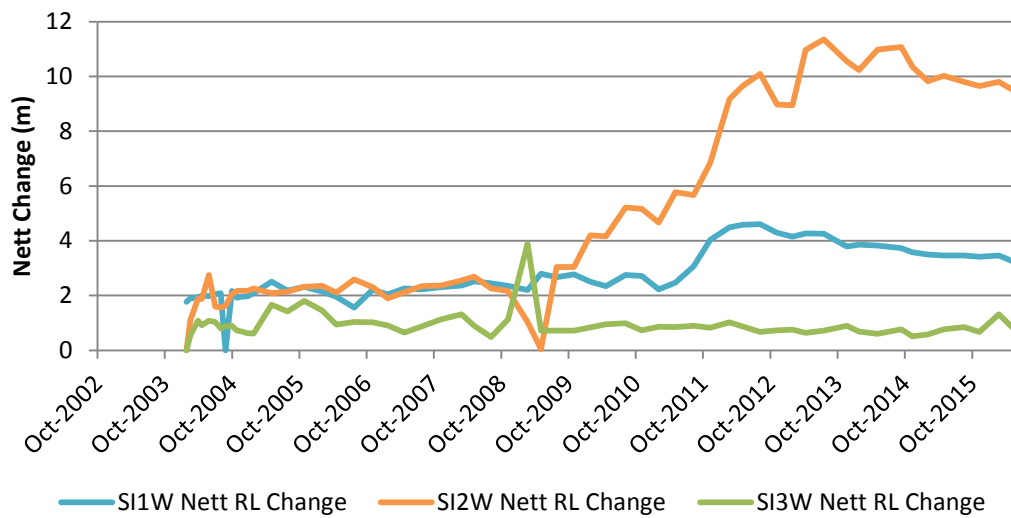
Groundwater Nett RL Change - Pit to River



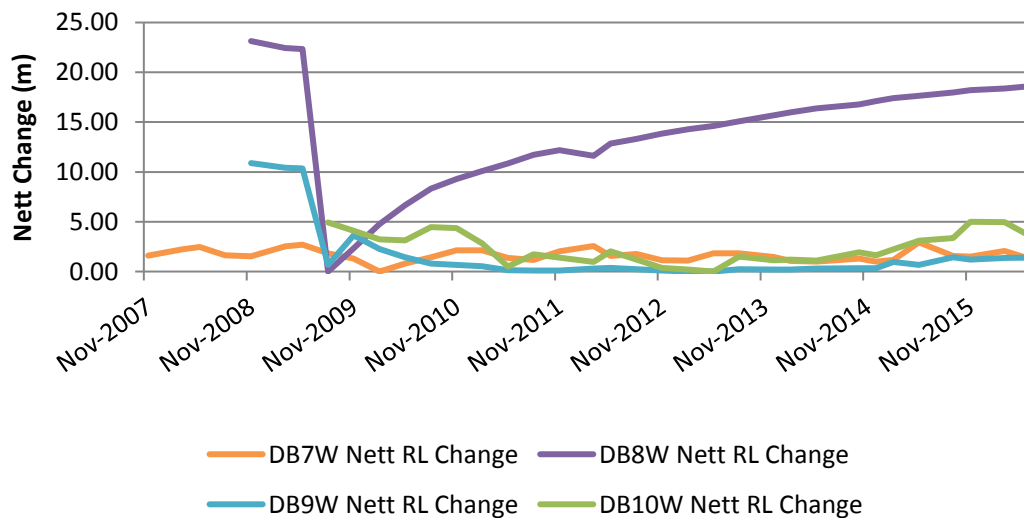
Groundwater Nett RL Change - Upgrade of Pit



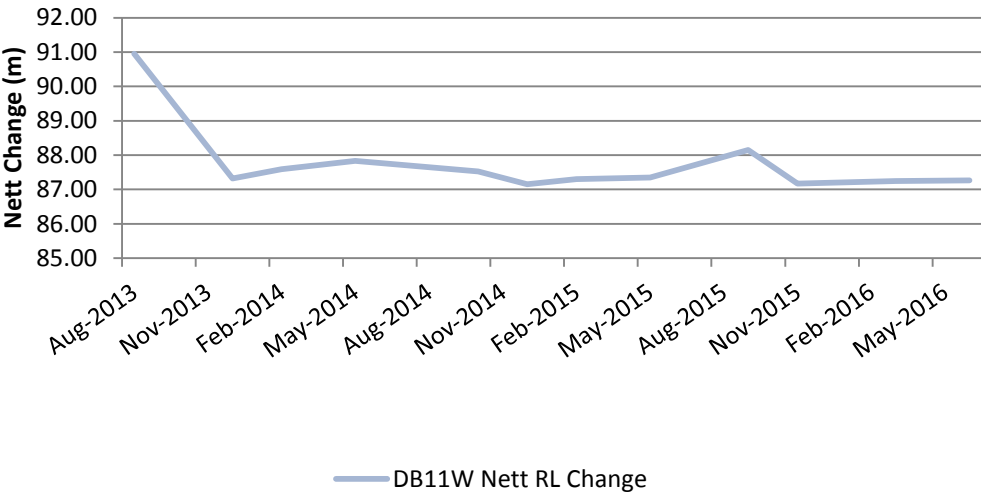
Groundwater Nett RL Change - Western Irrigation Area



Groundwater Nett RL Change - Pit to River



Groundwater Nett RL Change - DB11W



Appendix 5:

Blast Monitoring

Duralie Coal Mine Blast Monitoring Results

Location	Date	Time	Schultz (AB1)		Fisher-Webster (AAAB3)		Moylan (AAAB4)		Weismantel Inn		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	%		%			
Clareval Block 7 (re-fire)	01-Jul-15	16:32:00	<0.22	<110.0	<0.22	<110.0	0.25	99.1	0.57	106.4	0.0%	0	0.0%	0	1	1A
Clareval Block 6	04-Jul-15	12:47:00	<0.22	<110.0	0.49	91.0	0.47	113.1	1.52	124.8	0.0%	0	0.0%	0	2	Nil
Clareval Block 6	10-Jul-15	16:42:00	0.31	87.7	0.57	89.0	1.08	108.6	4.56	118.4	0.0%	0	0.0%	0	3	Nil
Clareval Block 6	17-Jul-15	12:37:00	<0.22	<110.0	0.43	89.0	0.48	101	2.01	114.4	0.0%	0	0.0%	0	4	Nil
Clareval Block 6	24-Jul-15	16:43:00	0.37	99.8	0.41	89.0	0.7	106.4	3.4	115.9	0.0%	0	0.0%	0	5	1A
Clareval Block 7	29-Jul-15	12:38:00	0.29	92.2	0.35	89.0	0.46	98.3	1.2	105.5	0.0%	0	0.0%	0	6	Nil
Clareval Block 5	03-Aug-15	12:39:00	0.33	92.2	0.35	89.0	0.51	102.6	0.99	106.4	0.0%	0	0.0%	0	7	Nil
Clareval Block 6	05-Aug-15	12:40:00	<0.22	<110.0	0.41	89.0	0.58	99.8	1.95	110	0.0%	0	0.0%	0	8	Nil
Clareval Block 6	12-Aug-15	12:41:00	0.26	102.8	0.43	89.0	0.36	103.5	1.74	111.2	0.0%	0	0.0%	0	9	1A
Clareval Block 2	14-Aug-15	12:44:00	<0.22	<110.0	<0.22	<110.0	0.23	101.6	0.46	109.8	0.0%	0	0.0%	0	10	Nil
Clareval Block 6	19-Aug-15	12:45:00	0.33	90.2	0.27	89.0	1.01	109.1	5.73	118.2	0.0%	0	0.0%	0	11	Nil
Clareval Block 6	27-Aug-15	12:43:00	<0.22	<110.0	0.49	89.0	0.5	105.8	1.25	114.2	0.0%	0	0.0%	0	12	1B
Clareval Block 5	04-Sep-15	12:43:00	<0.22	<110.0	0.49	89.0	0.61	101.6	2.17	111.2	0.0%	0	0.0%	0	13	1A
Clareval Block 6	10-Sep-15	12:40:00	<0.22	<110.0	0.49	89.0	2.08	106.1	3.4	116.4	0.0%	0	0.0%	0	14	1A
Clareval Block 5	16-Sep-15	12:39:00	<0.22	<110.0	0.41	89	0.66	96.6	2.46	107	0.0%	0	0.0%	0	15	Nil
Clareval Block 2	22-Sep-15	12:36	<0.22	<110.0	<0.22	<110.0	0.27	98.3	0.82	107	0.0%	0	0.0%	0	16	Nil
Clareval Block 5	25-Sep-15	12:35:00	0.30	92.2	0.62	89	0.45	89.5	2.63	106.7	0.0%	0	0.0%	0	17	1A
Clareval Block 7	02-Oct-15	13:07:00	0.31	90.2	0.32	89	0.38	102.1	1.05	111.1	0.0%	0	0.0%	0	18	2B
Clareval Block 7	12-Oct-15	16:45:00	0.27	90.2	0.35	89	0.41	99.8	0.94	109.8	0.0%	0	0.0%	0	19	Nil
Clareval Block 6	16-Oct-15	12:37:00	0.31	90.2	0.41	89	0.58	107	2.34	114.9	0.0%	0	0.0%	0	20	Nil
Clareval Block 2	21-Oct-15	12:32:00	<0.22	<110.0	<0.22	<110.0	0.25	100.4	0.41	106.9	0.0%	0	0.0%	0	21	2B
Clareval Block 6	30-Oct-15	12:37:00	<0.22	<110.0	<0.22	<110.0	0.28	98	1.29	103.4	0.0%	0	0.0%	0	22	Nil
Clareval Block 6	05-Nov-15	12:40:00	<0.22	<110.0	0.42	108.2	0.65	108.6	3.52	113.5	0.0%	0	0.0%	0	23	1B
Clareval Block 5	11-Nov-15	12:37:00	0.43	85.4	0.35	106.8	0.84	108.8	1.26	116.7	0.0%	0	0.0%	0	24	Nil
Clareval Block 6	19-Nov-15	12:40:00	<0.22	<110.0	0.27	108.6	0.32	105.3	1.27	109.6	0.0%	0	0.0%	0	25	Nil
Clareval Block 6	28-Nov-15	12:38:00	<0.22	<110.0	<0.22	<110.0	0.56	108.8	1.33	110.8	0.0%	0	0.0%	0	26	Nil
Clareval Block 7	01-Dec-15		<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.0%	0	0.0%	0	27	Nil
Clareval Block 2	09-Dec-15	12:41:00	0.30	90.3	0.26	102.6	0.48	108.8	1.07	112.2	0.0%	0	0.0%	0	28	Nil
Clareval Block 5	16-Dec-15	11:52:00	<0.22	<110.0	<0.22	<110.0	0.29	107.2	0.48	115.7	0.0%	0	0.0%	0	29	Nil
Clareval Block 5	18-Dec-15	16:37:00	<0.22	<110.0	<0.22	<110.0	0.28	108.1	0.84	111.1	0.0%	0	0.0%	0	30	Nil
Clareval Block 6	11-Jan-16	12:41:00	0.24	84.5	0.52	108.4	0.95	109.4	2.51	115.3	0.0%	0	0.0%	0	31	Nil
Clareval Block 7	21-Jan-16	12:44:00	<0.22	<110.0	0.38	101.4	0.46	107.7	0.76	107.8	0.0%	0	0.0%	0	32	Nil
Clareval Block 7	28-Jan-16	16:42:00	<0.22	<110.0	0.27	103.6	0.55	104.3	0.9	110.5	0.0%	0	0.0%	0	33	Nil
Clareval Block 6	01-Feb-16	12:23:00	<0.22	<110.0	0.33	102.9	0.56	103.8	1.26	110.1	0.0%	0	0.0%	0	34	Nil
Clareval Block 6	04-Feb-16	12:35:00	<0.22	<110.0	0.33	115.2	0.4	111.3	1.27	120.9	2.9%	1	0.0%	0	35	Nil
Clareval Block 6	11-Feb-16	16:43:00	<0.22	<110.0	0.60	109.5	1.98	116.2	5.48	117	5.6%	2	0.0%	0	36	Nil
Clareval Block 6	16-Feb-16	16:41:00	<0.22	<110.0	0.35	107.9	0.31	105.1	1.05	112	5.4%	2	0.0%	0	37	Nil
Clareval Block 7	23-Feb-16	12:43:00	<0.22	<110.0	0.422	97.9	<0.22	<110.0	<0.22	<110.0	5.3%	2	0.0%	0	38	Nil
Clareval Block 5	24-Feb-16	15:24:00	<0.22	<110.0	0.291	102.2	0.79	113.3	2.06	116.1	5.1%	2	0.0%	0	39	Nil

Duralie Coal Mine Blast Monitoring Results

Location	Date	Time	Schultz (AB1)		Fisher-Webster (AAAB3)		Moylan (AAAB4)		Weismantel Inn		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	%		%			
Clareval Block 7	01-Mar-16	12:48:00	<0.22	<110.0	<0.22	<110.0	0.38	112.7	1.26	117.8	5.0%	2	0.0%	0	40	2B
Clareval Block 7	04-Mar-16	12:38:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.57	114.1	4.9%	2	0.0%	0	41	Nil
Weismantel Strip 16	09-Mar-16	12:33:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.66	113.9	4.8%	2	0.0%	0	42	Nil
Weismantel Strip 16	11-Mar-16	16:43:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.31	106.0	4.7%	2	0.0%	0	43	Nil
Weismantel Strip 16	17-Mar-16	16:44:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	4.5%	2	0.0%	0	44	Nil
Weismantel Strip 16 (re-f	17-Mar-16	17:34:00	Not Monitored								4.4%	2	0.0%	0	45	Nil
Weismantel Strip 16	19-Mar-16	13:17:00	<0.22	<110.0	0.249	109.1	<0.22	<110.0	0.53	111.6	4.3%	2	0.0%	0	46	Nil
Clareval Block 2	24-Mar-16	12:46:00	0.33	88.9	0.32	106.6	0.65	108.8	1.28	114.0	4.3%	2	0.0%	0	47	Nil
Clareval Block 2	01-Apr-16	12:50:00	<0.22	<110.0	0.38	106.4	0.35	104.0	1.76	108.7	4.2%	2	0.0%	0	48	Nil
Weismantel Strip 16	02-Apr-16	12:41:00	<0.22	<110.0	0.25	107.5	<0.22	<110.0	0.36	110.1	4.1%	2	0.0%	0	49	Nil
Clareval Block 2	08-Apr-16	12:34:00	<0.22	<110.0	0.35	107.9	0.43	111.0	0.82	115.8	4.0%	2	0.0%	0	50	Nil
Weismantel Strip 16	13-Apr-16	9:34:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.77	112.0	3.9%	2	0.0%	0	51	Nil
Clareval Block 2	18-Apr-16	12:34:00	0.26	87.2	0.45	105.6	0.6	104.3	1.76	113.3	3.8%	2	0.0%	0	52	Nil
Weismantel Strip 16	19-Apr-16	16:49:00	<0.22	<110.0	0.3	113.9	<0.22	<110.0	0.77	112.7	3.8%	2	0.0%	0	53	Nil
Clareval Block 7	23-Apr-16	9:52:00	<0.22	<110.0	0.36	108.6	0.37	105.5	0.73	106.9	3.7%	2	0.0%	0	54	Nil
Weismantel Strip 16	27-Apr-16	16:37:00	<0.22	<110.0	0.27	104.8	0.33	108.1	1.15	115.3	3.6%	2	0.0%	0	55	Nil
Weismantel Strip 16	28-Apr-16	16:31:00	<0.22	<110.0	0.27	106.4	<0.22	<110.0	0.74	115.5	3.6%	2	0.0%	0	56	Nil
Weismantel Strip 16	03-May-16	12:45:00	<0.22	<110.0	<0.22	<110.0	<0.22	<110.0	0.8	117.0	3.5%	2	0.0%	0	57	Nil
Clareval Block 6	05-May-16	12:34:00	<0.22	<110.0	0.3	104.5	0.51	109.2	1.55	113.4	3.4%	2	0.0%	0	58	Nil
Weismantel Strip 16	10-May-16	13:02:00	<0.22	<110.0	0.53	107.5	<0.22	<110.0	0.87	105.7	3.4%	2	0.0%	0	59	Nil
Weismantel Strip 16	17-May-16	12:40:00	<0.22	<110.0	0.58	108.6	<0.22	<110.0	0.87	113.3	3.3%	2	0.0%	0	60	Nil
Weismantel Strip 16	20-May-16	12:34:00	<0.22	<110.0	0.47	112.1	<0.22	<110.0	0.89	112.7	3.3%	2	0.0%	0	61	Nil
Weismantel Strip 16	25-May-16	12:43:00	<0.22	<110.0	0.41	112.0	0.4	108.1	1.04	112.6	3.2%	2	0.0%	0	62	Nil
Weismantel Strip 16	27-May-16	12:42:00	<0.22	<110.0	0.37	109.1	0.4	108.1	1.03	107.8	3.2%	2	0.0%	0	63	Nil
Clareval Block 7	04-Jun-16	16:45:00	<0.22	<110.0	0.51	100.6	0.42	109.4	0.82	108.5	3.1%	2	0.0%	0	64	Nil
Weismantel Strip 16	10-Jun-16	16:37:00	<0.22	<110.0	0.58	117.5	<0.22	<110.0	1.48	120.4	4.6%	3	0.0%	0	65	Nil
Weismantel Strip 16	15-Jun-16	12:48:00	<0.22	<110.0	0.34	105.6	<0.22	<110.0	0.63	101.1	4.5%	3	0.0%	0	66	2B
Weismantel Strip 16	20-Jun-16	12:38:00	<0.22	<110.0	0.5	109.6	<0.22	<110.0	1.02	117.6	4.5%	3	0.0%	0	67	Nil
Weismantel Strip 16	22-Jun-16	16:49:00	<0.22	<110.0	0.33	107.5	<0.22	<110.0	0.76	107.8	4.4%	3	0.0%	0	68	Nil
Weismantel Strip 16	23-Jun-16	10:52:00	<0.22	<110.0	0.3	106.6	0.41	104.0	1.43	112.6	4.3%	3	0.0%	0	69	Nil
Weismantel Strip 16	28-Jun-16	13:18:00	<0.22	<110.0	0.41	113.7	0.57	105.5	1.25	113.3	4.3%	3	0.0%	0	70	Nil
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	4.2%	3	0.0%	0	71	Nil

Note 1 Site exceedance, monitored blasts & cumulative exceedances reference blasts between 4/9/13 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 115dB(L) or ground vibration of 5mm/s.*
- No blast is to exceed an overpressure of 120dB(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.
3/12/2014 20:45	Thunder/lightning storm prior to rain starting.	N/A	Noise monitor Exceeded 42 dbL in heavy rain/lightning storm at 20.45 hrs. Only alarm for the night.	N/A	N/A
5/12/2014 23:00	Thunder storms and rain	N/A	Only explanation was the viscous thunder that was happening at that time.	N/A	N/A
6/12/2014 1:00	Thunder storms and rain	N/A	Thunder	N/A	N/A
7/12/2014 20:45	Thunder storms and rain	N/A	Thunder	N/A	N/A
9/12/2014 6:15	Yes	N/A	No operations at time of alarm.	N/A	N/A
2/05/2015 23:30	No, rain at the time	N/A	Investigation into alarm as there was rain at the time which should have excluded alarm.		
19/05/2015 6:30	Yes	N/A	No operations at time of alarm.		
21/05/2015 23:45	No, thunder and rain.	N/A	Thunder	N/A	N/A
31/05/2015 6:45	No, rain at the time	N/A	Rain at time of alarm. No operations at time of alarm.	N/A	N/A
1/06/2015 1:45	No, wind at the time of alarm.	Dominant noise was wind interference.		N/A	N/A
15/06/2015 21:45	Yes	Reviewed audio at 22:00. Dominant noise was interference and crackling on the audio, background insects and frogs. Mine noise not audible.	Interference on audio.	N/A	N/A
17/06/2015 5:45	Yes	N/A	No operations at time of alarm.	N/A	N/A
29/06/2015 6:45	Yes	N/A	No operations at time of alarm.	N/A	N/A
2/07/2015 22:00	Comments below				
2/07/2015 23:15	Yes, moderate southerly near 3m/s.	Reviewed audio at 23:15. Dominant noise was wind and insects and some background truck noise.	OCE had just switched to lower dump after 23:00hrs. Noise exceedance alarm @23:15 had just started hauling to lower dump. No other elevated noise sources. A southerly wind had picked up considerably not long prior.	Trucks moved to lower dump.	No further alarms. Noise levels dropped below alarm level when wind eased at 1am.
12/07/2015 23:30	Yes, moderate westerly near 3m/s.	N/A	Dominant noise was wind interference. No operations on Sunday night shift at time of alarm.	N/A	N/A
13/07/2015 21:45	Yes, moderate westerly near 3m/s.	N/A	Dominant noise was wind interference. No operations on Sunday night shift at time of alarm.	N/A	N/A
10/12/2015 21:00	Yes, moderate south westerly near 3m/s.	Alarms due to wind.	N/A	N/A	
11/12/2015 21:30	Yes, moderate south westerly near 3m/s.	Alarms due to wind.	N/A	N/A	
12/12/2015 0:15	Yes, moderate south westerly near 3m/s.	Alarms due to wind.	N/A	N/A	
12/12/2015 1:30	Yes, moderate south westerly near 3m/s.	Alarms due to wind.	N/A	N/A	
13/12/2015 22:15	Light North wind	N/A	Sunday shift, no operations at mine.	N/A	N/A
22/12/2015 0:15	No, Rainfall.	N/A	Rainfall	N/A	N/A
15/02/2016 23:15	Yes	N/A	Possible wind and rain recorded	N/A	N/A

Appendix 7:

Complaints

Duralie Complaint Summary

Period: 12 Months to June 2016

Total No. of Complaints: 14 (10 noise, 3 blasting, 1 air quality, 0 train, 0 other)

Total No. of Complainants: 7

Date/Time of Complaint	Complainant Location	Method of Complaint	Nature of Complaint	Investigation/Outcome
10/07/2015 16:45hrs	Approx. 2.6km SW of blast	Direct to mobile	Blast and Vibration	Complaint received direct to DCPL mobile advising the complainant had just felt the blast. DCPL representative returned call and discussed the blast location and the blast results recorded at the monitor located at the residence, 1.09mm/s ground vibration, 104.0dB(L) overpressure. The complainant stated new house damage had been observed. DCPL representative advised a building inspection could be undertaken. The complainant accepted and DCPL will have the inspection arranged. The report will be provided to the complainant.
23/07/2015 12:00hrs	Approx. 2.6km SW of blast	Direct to phone	Mine Noise	DCPL called complainant to make arrangements for a building inspection following a previous complaint. The complainant advised they wanted to record a noise complaint and stated there had been general noise non-stop for the last few days. No other specifics were advised, just general noise from the mine. DCPL advised operations have been generally unchanged and in the same areas in recent times. Noise monitoring results haven't indicated any elevated noise levels. The complainant didn't request any further response however DCPL advised they would follow up the matter.
29/07/2015 9:42hrs	4.5km NE of noise source	Community hotline	Evaporative fan noise	DCPL contacted the complainant following receipt of complaint at 9:42am. The complainant advised the evaporative fan noise had been particularly bad this morning (29/7) and over the past few days and the noise was clearly audible inside the complainant's house. At the time of the call the noise levels had eased so no operational change was made. DCPL representative advised since previous complaints the waste dump evaporators had been relocated to the west and new bunding constructed. The operational hours had also been reduced during the winter months. DCPL will continue to monitor the performance of the evaporative sprays and make changes as required. DCPL advised the complaint they would continue to monitor his situation if he felt the noise levels were unacceptable.
5/08/2015 12:00hrs	Approx. 5km SE of mine	Email	Evaporative fan noise	Email received from complainant regarding noise from evaporative sprays two weeks prior to the date of writing (25th and 26th July). Review of evaporative fan operational times noted were started at approximately 8:30am and turned off 9:30pm, with operational times on Sunday 26 July from 8:30am to 9:00pm. This is part of an ongoing investigation including an email to the landholder, subsequent correspondence with manufacturer and site visit to assess fans, and assessment by an acoustics consultant on potential relocation options for two units near the Main Dam.
5/08/2015 12:00hrs	Approx. 5km SE of mine	Email	Evaporative fan noise	Email received from complainant regarding noise from evaporative sprays the weekend prior to the date of complaint (1st and 2nd of August 2015). Review of evaporative fan operational times noted were started at approximately 6:00am and turned off 12:30am, with operational times on Sunday 26 July from 7:00am to 12:3am. This is part of an ongoing investigation, refer to comments above.
7/08//2015 9:43hrs	4.5km NE of noise source	Community hotline	Evaporative fan noise	Contacted complainant to discuss the complaint received. A visit was offered to the resident by the Operations Manager and E&C Superintendent which was accepted. Yancoal representatives visited the landholders property and discussion held including operation of the units and current operations of the pit. Outlined existing and planned controls.
21/10/2015 00:23hrs	Approx. 5km SE of mine	Community hotline	Evaporative fan noise	Complaint: Evaporative fan noise well after midnight. Remains part of an ongoing investigation and response. Offer to meet with complainant remains open.
18/12/2015 22:00hrs	Approx. 1.5km W of mining operation	Community hotline	Noise	No call back requested. Operations inspected, no abnormal or noise enhancing activities. Ensure general noise mitigation measures are being implemented.
11/02/2016 17:05hrs	Approx. 3.4km NNE of blast	Community hotline	Blasting and vibration	Blast results reviewed - Fisher Webster monitor 0.6mm/s and 109.5dB(L). Blast video reviewed. No visible dust beyond site boundary. Meteorological conditions: Wind speed 11km/hr, Wind direction 77deg (ENE), no cloud cover. Wind not in direction of complainant. DCPL returned call at 1:00pm on 12/02/16. Internal investigation into blast design and loading was undertaken.

15/02/2016 13:40hrs	Wards River	Email	Dust and Waste Dumps.	<p>EPA requested information following receipt of a complaint.</p> <p>Email response to EPA:</p> <p>Are environmental controls in place?</p> <ul style="list-style-type: none"> • We confirm that all required environmental controls are in place and operating, including water carts for dust suppression <p>Height of Overburden Emplacements?</p> <ul style="list-style-type: none"> • We confirm that overburden emplacements are being constructed in accordance with the approval and within approved heights limits. <p>Additional information.</p> <ul style="list-style-type: none"> • Approved clearing activities at Duralie has increased the visibility of waste emplacements from the Bucketts Way. • All of the visual screening required under the development consent has been constructed. • Duralie will continue to rehabilitate and revegetate cleared areas progressively as quickly as active mining will permit. • 24hr PM10 results confirm that Duralie continues to operate in accordance with its planning approval and its EPL. <p>Follow-up call made on 1-Mar-2016 to EPA. No further action.</p>
13/04/2016 9:38hrs	Approx. 3.4km NNE of blast	Community hotline	Blasting and vibration	<p>Complaint: "Big explosion and buildings shaking"</p> <p>DCPL representative called complainant at 10:30am. Complainant advised the blast was very loud and had shaken the house and shed. DCPL representative advised the results from the nearby blast monitor were below trigger levels. The complainant then stated her husband was at the neighbouring property where the monitor is located and confirmed the blast noise and vibration was minimal. DCPL advised this was useful information and would be provided to the Blast Engineer to investigate potential causes and factor into future blasting in this location. Blast designs continue to consider options for reducing vibration and overpressure.</p>
4/05/2016 16:00hrs	4.5km NE of noise source	Direct to mobile	Evaporative fan noise	<p>Call direct to mobile. Complainant advised they had hardly heard the evaporative fans since last year but this morning they were loud up to 10:30am. DCPL representative and complainant discussed evap fan run times leading into winter and that four fans had been removed from the waste dump. DCPL advised this morning a strong temperature inversion was present which may have contributed to the noise. Evap fan run hours will be reduced during the winter months and avoid times with strong inversions. DCPL will ensure evaporative fan controls continue to be implemented.</p>
12/05/2016 0:10hrs	Wards River	Community hotline	Mine noise	<p>Complainant stated there was a constant droning of mine noise during the night. DCPL representative called the complainant back on 13/5/16 to discuss complaint. The complainant advised the mine noise was being heard during the night and mornings over the last few weeks. During summer it could be heard when doors were open. DCPL advised the recent noise monitoring has recorded low levels particularly in Wards River and complaints have been low. However DCPL also advised the operations had recently move to the north end of Weismantel and back to surface level which may have increased noise emissions, additionally the recent cooler nights and temperature inversion may enhance noise affectation, DCPL advised the monitoring would continue near the residence and operations would be advised to consider noise mitigation measures leading into the cooler months. The complainant stated there appreciation for the return call and commented on the improved shuttle noise since the old trains used several years ago.</p>
14/05/2016 00:20hrs	Wards River	EPA hotline	Mine noise	<p>Complaint: "Rumbling noise from machinery continuing all day from Duralie Mine, and still present at 00:20 on 14/5/16."</p> <p>EPA requested a response to the above enquiry. An email was sent to the EPA on 18/5/2016 with comments on current operations, real-time noise monitoring data, weather conditions and the pro-active measures and controls implemented at Duralie Coal. No further action was required by the EPA.</p>

Appendix 8:

Duralie Coal Mine Annual Biodiversity Report 2016



Duralie Coal Mine – Annual Biodiversity Report 2016

FOR THE YEAR ENDING 30 JUNE 2016

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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) and the Commonwealth Department of the Environment (DotE) and was subsequently approved on 14 January 2016 and 14 March 2016 respectively. Key changes to the BMP included amendments to the biodiversity offset performance criteria in accordance with the DP&E guideline for Biodiversity Management Plans. The BMP performance criteria includes management measures for the short, medium and long-term and address each of the sub-sections in Section 6 of the BMP separately.

2 STATUS OF BMP PERFORMANCE CRITERIA

The performance criteria for the 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). 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 to July 2015 to June 2016 was undertaken in accordance with the BMP Section 5.4 Vegetation Clearance Plan. Prior to any clearance operations vegetation pre-clearance surveys were undertaken. Appendix 1 contains a summary of the habitat features cleared and any fauna observed (species, number and condition) during clearance operations. This information is used to determine the requirements for nest box replacement in offset areas (refer Section 8).

Areas cleared of vegetation during the reporting period included Strip 16 of the Weismantel Pit. 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 eight tree hollows from nine 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.

5 NEST BOX PROGRAMME

BMP Table 12
Nest Box Programme 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 nest 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.

Australian Museum Consulting (AMC) 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. An annual nest box monitoring report was completed by AMC at the end of the third year of monitoring (i.e. September 2015) (full text available in the DCM environment office), the executive summary from the report is reproduced below. Further nest box installations and monitoring is scheduled for September 2016.

I refer to the nest box programme for the Duralie Extension Project, which is being implemented by Australian Museum Consulting (AM Consulting) for Duralie Coal Pty Ltd, in accordance with the Biodiversity Management Plan prepared by Greening Australia.

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; and
- 45 nest boxes targeting a variety of hollow-dependent species, installed between 9 September 2014 and 12 September 2014.

Squirrel Glider nest boxes installed during February 2013:

Compared with the results from March 2015 when the same nest boxes were monitored, fewer animals were observed within the nest boxes, but all contained signs of species in the form of leaf nests, or in one case a bark nest. The target species (Squirrel Glider) was not observed during this survey. During March 2013 honey bees were recorded for the first time in a nest box (S3). The entrance hole to the nest box was blocked to kill the hive, and was re-opened during the April 2015 nest box survey, with the hive left in-situ. During the September 2015 surveys no bees were observed, and the majority of the bee hive was no longer present, apart from small traces which remained attached to the inside of the lid (Plate 1). It is possible gliders consumed the empty hive once the entrance hole to the nest box was re-opened and bees were no longer alive. A leaf nest was still present within the nest box.

Two additional observations of changes in nest box use over time include:

- S7: during March 2015, the leaves at S7 had been broken down by caterpillars and only a remnant nest remained. During the current survey a new leaf nest was present, indicating gliders have since utilised the nest box.
- S5: the first occupant of the nest box was the Brush-tailed Phascogale which had constructed a deep bark nest, while during March 2015 the nest box contained a leaf nest on top of the bark and was inhabited by sugar gliders. During the current survey no leaves were observed, only the bark nest remained with phascogale scats in one corner.

Nest boxes installed during August 2013:

Compared with previous surveys when the same nest boxes were monitored, an additional two nest boxes contained an animal or showed signs of previous occupation. This included the Lorikeet nest box at A38 which contained a nest constructed mostly of lichen, and the Phascogale nest box at A41 which contained a leaf nest.

There were two examples of multiple species using separate nest boxes in the same tree:

- at A8 the Common Brushtail Possum was occupying the Large Owl/Cockatoo nest box while the Brown Antechinus occupied the Pardalote nest box;
- at A48 Sugar Gliders occupied the Antechinus nest box while the Common Brushtail Possum occupied a Possum nest box. This is also the first time sugar gliders have been confirmed at this tree (i.e. during March 2015 a leaf nest was recorded for the first time in the Antechinus nest box).

There were two examples of nest box occupancy changes. At A19 the Owlet-nightjar nest box was previously occupied by sugar gliders, but during the current survey contained three Peron's Tree Frogs. This is the second occasion frogs have been recorded within a nest box. During the current survey, two Peron's Tree Frogs leapt from the nest box and appeared to spread their legs, fingers and toes to glide from the nest box to the ground. Both frogs were captured and returned to the nest box. In addition, the Dollarbird nest box at A11 originally contained bird eggs during October 2013, but during the current survey was occupied by a Common Brushtail Possum.

Nest boxes installed during September 2014:

*Compared with the results from July 2015 when the same nest boxes were monitored, no additional nest boxes were occupied or showed signs of occupation. There was a change in occupation recorded during the current surveys. The Owl/Cockatoo nest box at B23 has now been occupied by two different hollow nesting bird species, the Australian Wood Duck and Australian Owlet-nightjar (*Aegotheles cristatus*). During the current surveys the nest box was occupied by a female Australian Wood Duck, likely sitting on eggs. During November and December 2014 this nest box was occupied by the Australian Owlet-nightjar, which was raising a clutch of four eggs.*

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 <i>Sporobolus</i> and fireweed (Figure 7 and Section 6.11).	Second cultivation spray in all installation VMUs undertaken including control of exotic <i>Sporobolus</i> 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.

Weed control activities were undertaken from September 2015 to April 2016 for the target species across all VMU's within the offset areas and mining leases. The key species targeted included blackberry, lantana and Giant Parramatta grass. This was the third round of weed control activities in the offset areas. The trial revegetation works were undertaken during autumn 2016 and pre-cultivation spraying was undertaken in preparation for the revegetation works.

In April 2015 DCPL arranged a meeting the 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. Correspondence has also been held with GLC regarding the Karuah River Catchment Management Plan and the potential for a coordinated weeds management approach in the catchment. Several management options will be trialed in 2016. Management of Privet adjacent to Mammy Johnsons River commenced in spring 2015.

Additionally, the GLC weeds officer discussed bio-control options for Giant Parramatta Grass. DCPL are currently liaising with GLC to undertake a trial of the GPG fungus in infestations on Yancoal properties in conjunction with DPI in spring 2016. An update on any progress will be provided in the 2017 report.

Success of weed management has been monitored and documented in the *Annual Monitoring of Landscape function and Vegetation Structure for the Duralie Biodiversity Offset Report 2014* (available in the DCM environment office). The Landscape Function Analysis (LFA) monitoring will next be updated following revegetation works scheduled in spring 2016.

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 has investigated opportunities to enter into a partnership with a local wild dog control organisation. This would include a control program for Yancoal properties involving trapping, baiting and shooting and also broader engagement and training with local landholders for a coordinated approach to wild dog control. Further progress will be reported in the 2017 report.

A follow-up feral animal survey is scheduled to be undertaken in 2016/17 to determine requirements for ongoing control measures.

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 life of current BMP/3 years. 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 excluded from the Offset (Section 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 excluded from the Offset (Section 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 excluded from the Offset (Section 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 has been excluded from the Offset for life of the current BMP. 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.

During spring of 2012 back-burning activities on an adjacent property to the east of the offset area caused a section of the offset to catch fire. The local RFS was called to assist with managing the fire. A section of the offset to the east of Johnson's Creek Road along the Buckley's Range was affected by the fire. During spring 2013 another fire was observed starting to the east of the train load-out facility and burnt an area towards Mammy Johnson's River.

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 have commenced to date. Continued discussions have been held with the RFS to conduct fire management activities and 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.

During February 2016 weeds eradication activities were undertaken as a precursor to revegetation activities. The Contractor identified weeds and gathered and placed into stockpiles before igniting and burning them in-situ. The burning of the stockpiles spread to the surrounding exotic pasture vegetation resulting in approximately 20 hectares of exotic pasture vegetation being burnt. An incident report was submitted to the DP&E and EPA. To the best of our knowledge, no native vegetation or Endangered Ecological Communities (EEC) were burnt or disturbed as a result of the fire incident.

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 required quantities and species required for revegetation completed.

Greening Australia completed a report on seed collection targets for the biodiversity offsets in November 2013. Following this a licenced contractor was engaged to undertake seed collection activities during Summer 2013/14. A detailed list of seed collected was shown in the *2014 Annual Biodiversity Report Appendix 2*. At the end of the 2013/14 seed collection round 12kg of tree and shrub seed was still remaining as certain species were not available at the time of collection.

These species have continued to be collected on an opportunistic basis. Additional seed has also been collected for use in the DCM rehabilitation areas on an opportunistic basis. Further seed collection may be undertaken if found necessary to meet the completion criteria of the BMP offset revegetation and mine site rehabilitation.

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, 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	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

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
			(Section 6.11). Plant palettes adjusted where field trails or research demonstrate alternative species/density (Section 6.10).		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.

DCPL have completed an operational review for cultivation within the offset area in 2014 and initial revegetation works for Vegetation Management Units I, S and U were planned during the spring of 2015. Due to unforeseen operational delays (significant rainfall, NSW Rural Fire Service (RFS) back burning activities and contractor availability), the planned revegetation works were postponed until autumn of 2016.

Pre-cultivation spraying was undertaken in summer to autumn 2016 in preparation for the trial revegetation works. Initial revegetation works for Vegetation Management Units 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.

Following the trial revegetation works the annual LFA monitoring will be undertaken and include a review of the success of the trials. The monitoring and reporting for the trial revegetation program is yet to be completed and will be included in the 2017 annual report. Recommendations from the review will be used to develop an operational plan for the full offset revegetation with the works scheduled for spring 2016 and autumn 2017 with the timing dependent on suitable weather conditions.

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 Biodiversity Management Plan an annual report reviewing DCPL's environmental performance and progress against the requirements of the Biodiversity Management Plan 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 and includes the following 5 components:

- Landscape Function Analysis;
- Vegetation structure analysis;
- Ephemeral drainage line assessment (select VMU's only);
- Photo point monitoring; and
- Observational Recordings.

The annual vegetation and landscape function monitoring was repeated in May 2014 and the results are provided in the *Annual Monitoring of Landscape function and Vegetation Structure for the Duralie Biodiversity Offset Report 2014* (available in the DCM environment office).

Following the trial revegetation works completed in autumn 2016 the annual LFA monitoring will be undertaken again and include a review of the success of the trials. Recommendations from the review will be used to develop an

operational plan for the full offset revegetation with the works scheduled to be undertaken during spring 2016 and autumn 2017.

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

Further to the information provided in the 2015 *Annual Biodiversity Report* regarding the status of the public positive covenant registration:

- On 8 January 2015 DCPL lodged three public positive covenants and three Restrictions on Use of Land instruments to secure the Duralie biodiversity offsets with NSW Land and Property Information (LPI) office for registration;
- In May 2015 DCPL received confirmation from LPI that the Positive Covenants and Restrictions on the Use of Land for the Duralie Offsets have been registered on title.

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. No changes to the conservation bond were required as a result of the modification to the Duralie Extension Project Approval (08_0203) approved on 5 December 2014.

15 COMMONWEALTH APPROVAL COMPLIANCE REPORTS

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

- *DCM Implementation of the Giant Barred Frog Management Plan Annual Report 2015, submitted on 20 August 2015 (Condition 10);*
- *DCM Implementation of the Biodiversity Management Plan Annual Report 2016 on 14 January 2016 (Condition 14(i));*
- *Duralie Coal Extension Project Annual Compliance Report 2016, submitted on 13 April 2016 (Condition 20).*

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

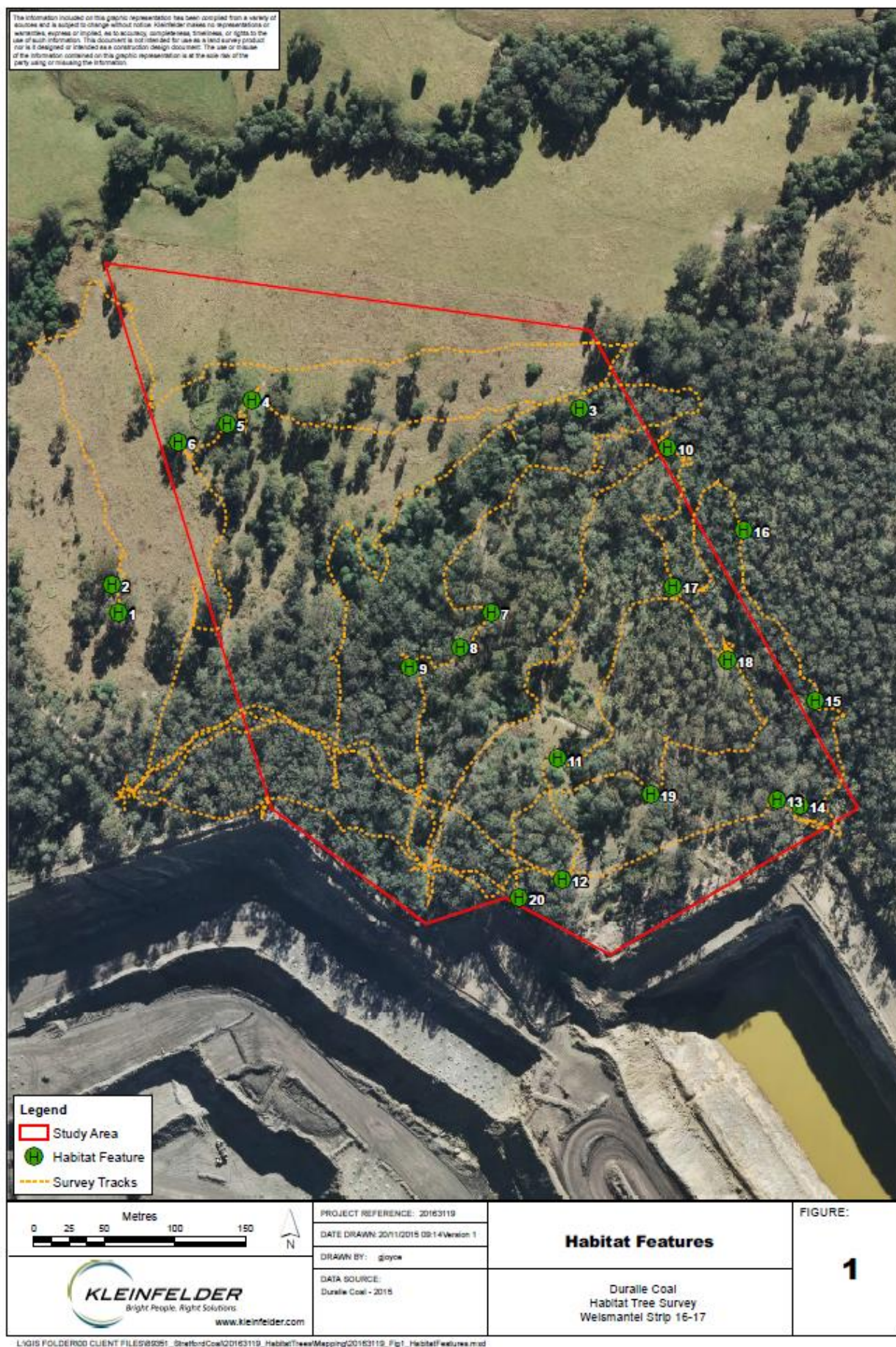
Appendix 1:

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: Jan 2015 to Jun 2016

Area Cleared	Date cleared	Tree #	Location		Habitat Features				Fauna Observed	
			Easting	Northing	Total #	Feature	Feature Height	Dimensions Width (mm)	Species	Comments
Weismantel Strip 16 & 17	20/01/2016	4	6429500	399027	1	Nest	20	50	Signs of use	0 hollows, Inactive Birds nest
	20/01/2016	5	6429484	399009	1	Termite Nest	10	>20	No sign of use	
	20/01/2016	6	6429471	398974	1	Hollows	15	5 - 20	No sign of use	
	20/01/2016	7	6429350	399196	1	Pipe	10	>20	No sign of use	<i>Antechinus Stuartii</i> x 2, Alive/Uninjured, 1 hollow 2x <i>antechinus</i> released
	20/01/2016	8	6429325	399174	1	Pipe	5	>20	No sign of use	
	20/01/2016	9	6429311	399138	1	Termite Nest	15	5 - 20	No sign of use	
	20/01/2016	11	6429246	399244	1	Hollows	on ground	>20	No sign of use	
	20/01/2016	12	6429160	399247	1	Split trunk	3	5 - 20	No sign of use	
	20/01/2016	20	6429147	399216	1	log pile	on ground	-	No sign of use	huge pile of logs, possible reptile/mammal habitat
				Total	9	(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
Wednesday, July 01, 2015	3		
Thursday, July 02, 2015	3		
Friday, July 03, 2015	3		
Saturday, July 04, 2015	0		
Sunday, July 05, 2015	0		
Monday, July 06, 2015	4	22:05	
Tuesday, July 07, 2015	4	22:10	
Wednesday, July 08, 2015	4	23:30	
Thursday, July 09, 2015	4	23:30	
Friday, July 10, 2015	4		
Saturday, July 11, 2015	0		
Sunday, July 12, 2015	0		
Monday, July 13, 2015	4		
Tuesday, July 14, 2015	4		
Wednesday, July 15, 2015	4		
Thursday, July 16, 2015	4		
Friday, July 17, 2015	4	22:50	
Saturday, July 18, 2015	0		
Sunday, July 19, 2015	0		
Monday, July 20, 2015	4	22:50	
Tuesday, July 21, 2015	4	23:20	
Wednesday, July 22, 2015	4	23:30	
Thursday, July 23, 2015	3		
Friday, July 24, 2015	3		
Saturday, July 25, 2015	0		
Sunday, July 26, 2015	0		
Monday, July 27, 2015	2		
Tuesday, July 28, 2015	0		
Wednesday, July 29, 2015	0		
Thursday, July 30, 2015	3		
Friday, July 31, 2015	0		
Saturday, August 01, 2015	0		
Sunday, August 02, 2015	0		
Monday, August 03, 2015	3		
Tuesday, August 04, 2015	3		
Wednesday, August 05, 2015	3		
Thursday, August 06, 2015	3		
Friday, August 07, 2015	3		
Saturday, August 08, 2015	0		

Sunday, August 09, 2015	0	
Monday, August 10, 2015	0	
Tuesday, August 11, 2015	0	
Wednesday, August 12, 2015	0	
Thursday, August 13, 2015	0	
Friday, August 14, 2015	1	
Saturday, August 15, 2015	0	
Sunday, August 16, 2015	0	
Monday, August 17, 2015	4	23:35
Tuesday, August 18, 2015	4	
Wednesday, August 19, 2015	4	
Thursday, August 20, 2015	4	22:25
Friday, August 21, 2015	4	
Saturday, August 22, 2015	0	
Sunday, August 23, 2015	0	
Monday, August 24, 2015	4	
Tuesday, August 25, 2015	4	
Wednesday, August 26, 2015	4	
Thursday, August 27, 2015	0	
Friday, August 28, 2015	0	
Saturday, August 29, 2015	0	
Sunday, August 30, 2015	0	
Monday, August 31, 2015	0	
Tuesday, September 01, 2015	0	
Wednesday, September 02, 2015	1	
Thursday, September 03, 2015	2	
Friday, September 04, 2015	3	
Saturday, September 05, 2015	0	
Sunday, September 06, 2015	0	
Monday, September 07, 2015	3	
Tuesday, September 08, 2015	3	
Wednesday, September 09, 2015	2	
Thursday, September 10, 2015	3	
Friday, September 11, 2015	3	22:50
Saturday, September 12, 2015	0	
Sunday, September 13, 2015	0	
Monday, September 14, 2015	4	
Tuesday, September 15, 2015	4	22:15
Wednesday, September 16, 2015	3	
Thursday, September 17, 2015	0	
Friday, September 18, 2015	2	
Saturday, September 19, 2015	0	
Sunday, September 20, 2015	0	
Monday, September 21, 2015	2	
Tuesday, September 22, 2015	0	
Wednesday, September 23, 2015	0	
Thursday, September 24, 2015	2	
Friday, September 25, 2015	2	
Saturday, September 26, 2015	0	
Sunday, September 27, 2015	0	

Monday, September 28, 2015	1	
Tuesday, September 29, 2015	0	
Wednesday, September 30, 2015	0	
Thursday, October 01, 2015	1	
Friday, October 02, 2015	2	
Saturday, October 03, 2015	0	
Sunday, October 04, 2015	0	
Monday, October 05, 2015	0	
Tuesday, October 06, 2015	4	
Wednesday, October 07, 2015	3	
Thursday, October 08, 2015	4	
Friday, October 09, 2015	4	22:25
Saturday, October 10, 2015	2	
Sunday, October 11, 2015	0	
Monday, October 12, 2015	4	
Tuesday, October 13, 2015	4	
Wednesday, October 14, 2015	4	
Thursday, October 15, 2015	3	
Friday, October 16, 2015	3	
Saturday, October 17, 2015	2	
Sunday, October 18, 2015	0	
Monday, October 19, 2015	4	
Tuesday, October 20, 2015	0	
Wednesday, October 21, 2015	2	
Thursday, October 22, 2015	3	
Friday, October 23, 2015	4	
Saturday, October 24, 2015	0	
Sunday, October 25, 2015	0	
Monday, October 26, 2015	4	22:25
Tuesday, October 27, 2015	4	22:30
Wednesday, October 28, 2015	4	22:30
Thursday, October 29, 2015	4	23:20
Friday, October 30, 2015	4	
Saturday, October 31, 2015	4	22:56
Sunday, November 01, 2015	0	
Monday, November 02, 2015	4	
Tuesday, November 03, 2015	3	
Wednesday, November 04, 2015	3	
Thursday, November 05, 2015	0	
Friday, November 06, 2015	0	
Saturday, November 07, 2015	0	
Sunday, November 08, 2015	0	
Monday, November 09, 2015	0	
Tuesday, November 10, 2015	0	
Wednesday, November 11, 2015	3	22:35
Thursday, November 12, 2015	0	
Friday, November 13, 2015	2	
Saturday, November 14, 2015	0	
Sunday, November 15, 2015	0	
Monday, November 16, 2015	4	22:35

Tuesday, November 17, 2015	4	22:35
Wednesday, November 18, 2015	2	23:30
Thursday, November 19, 2015	4	
Friday, November 20, 2015	2	
Saturday, November 21, 2015	0	
Sunday, November 22, 2015	0	
Monday, November 23, 2015	4	23:40
Tuesday, November 24, 2015	4	
Wednesday, November 25, 2015	4	
Thursday, November 26, 2015	4	22:55
Friday, November 27, 2015	4	
Saturday, November 28, 2015	4	
Sunday, November 29, 2015	0	
Monday, November 30, 2015	4	23:40
Tuesday, December 01, 2015	3	
Wednesday, December 02, 2015	0	
Thursday, December 03, 2015	0	
Friday, December 04, 2015	2	
Saturday, December 05, 2015	0	
Sunday, December 06, 2015	0	
Monday, December 07, 2015	3	22:05
Tuesday, December 08, 2015	3	
Wednesday, December 09, 2015	0	
Thursday, December 10, 2015	1	
Friday, December 11, 2015	2	
Saturday, December 12, 2015	0	
Sunday, December 13, 2015	0	
Monday, December 14, 2015	3	
Tuesday, December 15, 2015	0	
Wednesday, December 16, 2015	0	
Thursday, December 17, 2015	0	
Friday, December 18, 2015	2	
Saturday, December 19, 2015	0	
Sunday, December 20, 2015	0	
Monday, December 21, 2015	3	23:10
Tuesday, December 22, 2015	4	
Wednesday, December 23, 2015	4	22:10
Thursday, December 24, 2015	3	
Friday, December 25, 2015	0	
Saturday, December 26, 2015	0	
Sunday, December 27, 2015	0	
Monday, December 28, 2015	0	
Tuesday, December 29, 2015	3	22:30
Wednesday, December 30, 2015	3	
Thursday, December 31, 2015	4	
Friday, 1 January 2016	0	
Saturday, 2 January 2016	0	
Sunday, 3 January 2016	0	
Monday, 4 January 2016	3	22:40
Tuesday, 5 January 2016	3	

Wednesday, 6 January 2016	0	
Thursday, 7 January 2016	4	
Friday, 8 January 2016	3	
Saturday, 9 January 2016	0	
Sunday, 10 January 2016	0	
Monday, 11 January 2016	0	
Tuesday, 12 January 2016	0	
Wednesday, 13 January 2016	0	
Thursday, 14 January 2016	0	
Friday, 15 January 2016	0	
Saturday, 16 January 2016	0	
Sunday, 17 January 2016	0	
Monday, 18 January 2016	0	
Tuesday, 19 January 2016	0	
Wednesday, 20 January 2016	0	
Thursday, 21 January 2016	0	
Friday, 22 January 2016	2	
Saturday, 23 January 2016	0	
Sunday, 24 January 2016	0	
Monday, 25 January 2016	2	
Tuesday, 26 January 2016	0	
Wednesday, 27 January 2016	3	23:00
Thursday, 28 January 2016	4	
Friday, 29 January 2016	3	
Saturday, 30 January 2016	2	
Sunday, 31 January 2016	0	
Monday, 1 February 2016	4	
Tuesday, 2 February 2016	3	
Wednesday, 3 February 2016	2	
Thursday, 4 February 2016	2	
Friday, 5 February 2016	3	
Saturday, 6 February 2016	0	
Sunday, 7 February 2016	0	
Monday, 8 February 2016	3	
Tuesday, 9 February 2016	3	
Wednesday, 10 February 2016	1	
Thursday, 11 February 2016	2	
Friday, 12 February 2016	1	
Saturday, 13 February 2016	0	
Sunday, 14 February 2016	0	
Monday, 15 February 2016	3	22:45
Tuesday, 16 February 2016	2	
Wednesday, 17 February 2016	3	
Thursday, 18 February 2016	2	
Friday, 19 February 2016	1	
Saturday, 20 February 2016	0	
Sunday, 21 February 2016	0	
Monday, 22 February 2016	3	
Tuesday, 23 February 2016	1	
Wednesday, 24 February 2016	1	

Thursday, 25 February 2016	1	
Friday, 26 February 2016	0	
Saturday, 27 February 2016	0	
Sunday, 28 February 2016	0	
Monday, 29 February 2016	2	
Tuesday, 1 March 2016	2	
Wednesday, 2 March 2016	1	
Thursday, 3 March 2016	0	
Friday, 4 March 2016	0	
Saturday, 5 March 2016	0	
Sunday, 6 March 2016	0	
Monday, 7 March 2016	4	
Tuesday, 8 March 2016	4	23:05
Wednesday, 9 March 2016	3	22:25
Thursday, 10 March 2016	3	
Friday, 11 March 2016	3	
Saturday, 12 March 2016	0	
Sunday, 13 March 2016	0	
Monday, 14 March 2016	2	
Tuesday, 15 March 2016	1	
Wednesday, 16 March 2016	1	
Thursday, 17 March 2016	0	
Friday, 18 March 2016	0	
Saturday, 19 March 2016	0	
Sunday, 20 March 2016	0	
Monday, 21 March 2016	0	
Monday, 21 March 2016	0	
Tuesday, 22 March 2016	0	
Wednesday, 23 March 2016	0	
Thursday, 24 March 2016	1	
Friday, 25 March 2016	0	
Saturday, 26 March 2016	0	
Sunday, 27 March 2016	0	
Monday, 28 March 2016	0	
Tuesday, 29 March 2016	0	
Wednesday, 30 March 2016	2	
Thursday, 31 March 2016	3	
Friday, 1 April 2016	3	
Saturday, 2 April 2016	0	
Sunday, 3 April 2016	0	
Monday, 4 April 2016	4	
Tuesday, 5 April 2016	3	23:05
Wednesday, 6 April 2016	2	
Thursday, 7 April 2016	3	22:35
Friday, 8 April 2016	3	
Saturday, 9 April 2016	0	
Sunday, 10 April 2016	0	
Monday, 11 April 2016	3	
Tuesday, 12 April 2016	3	
Wednesday, 13 April 2016	3	

Thursday, 14 April 2016	4	23:00
Friday, 15 April 2016	2	
Saturday, 16 April 2016	0	
Sunday, 17 April 2016	0	
Monday, 18 April 2016	2	22:05
Tuesday, 19 April 2016	0	
Wednesday, 20 April 2016	0	
Thursday, 21 April 2016	0	
Friday, 22 April 2016	0	
Saturday, 23 April 2016	0	
Sunday, 24 April 2016	0	
Monday, 25 April 2016	0	
Tuesday, 26 April 2016	2	
Wednesday, 27 April 2016	0	
Thursday, 28 April 2016	0	
Friday, 29 April 2016	0	
Saturday, 30 April 2016	0	
Sunday, 1 May 2016	0	
Monday, 2 May 2016	3	22:25
Tuesday, 3 May 2016	0	
Wednesday, 4 May 2016	3	
Thursday, 5 May 2016	0	
Friday, 6 May 2016	0	
Saturday, 7 May 2016	0	
Sunday, 8 May 2016	0	
Monday, 9 May 2016	0	
Tuesday, 10 May 2016	0	
Wednesday, 11 May 2016	0	
Thursday, 12 May 2016	0	
Friday, 13 May 2016	0	
Saturday, 14 May 2016	0	
Sunday, 15 May 2016	0	
Monday, 16 May 2016	2	22:10
Tuesday, 17 May 2016	2	22:15
Wednesday, 18 May 2016	2	
Thursday, 19 May 2016	2	
Friday, 20 May 2016	2	
Saturday, 21 May 2016	0	
Sunday, 22 May 2016	0	
Monday, 23 May 2016	4	
Tuesday, 24 May 2016	4	23:50
Wednesday, 25 May 2016	3	
Thursday, 26 May 2016	3	23:40
Friday, 27 May 2016	2	
Saturday, 28 May 2016	0	
Sunday, 29 May 2016	0	
Monday, 30 May 2016	4	
Tuesday, 31 May 2016	4	
Wednesday, 1 June 2016	4	22:45
Thursday, 2 June 2016	3	23:10

Friday, 3 June 2016	4	22:30
Saturday, 4 June 2016	0	
Sunday, 5 June 2016	0	
Monday, 6 June 2016	3	
Tuesday, 7 June 2016	4	23:45
Wednesday, 8 June 2016	4	22:50
Thursday, 9 June 2016	3	
Friday, 10 June 2016	3	
Saturday, 11 June 2016	0	
Sunday, 12 June 2016	0	
Monday, 13 June 2016	4	
Tuesday, 14 June 2016	2	
Wednesday, 15 June 2016	4	23:40
Thursday, 16 June 2016	3	
Friday, 17 June 2016	3	
Saturday, 18 June 2016	0	
Sunday, 19 June 2016	0	
Monday, 20 June 2016	3	
Tuesday, 21 June 2016	3	23:25
Wednesday, 22 June 2016	3	
Thursday, 23 June 2016	4	
Friday, 24 June 2016	4	
Saturday, 25 June 2016	0	
Sunday, 26 June 2016	0	
Monday, 27 June 2016	3	23:00
Tuesday, 28 June 2016	4	
Wednesday, 29 June 2016	4	
Thursday, 30 June 2016	0	