Rio Tinto

Mount Thorley Warkworth

2016 Annual Environmental Review

March 2017

Reagent Honeyeater on off-set land at Merriwa

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Name of Operations	Mount Thorley Warkworth
Name of Operator	Coal & Allied Operations Pty Limited
Development consent /project approval	SSD-6464 & SSD-6465
Name of holder of development consent/project approval	Coal & Allied Operations Pty Limited
Mining Lease Number	Contained within Section 1.3 of this report
Name of Mining Lease Holder	Mount Thorley Operations Pty Ltd Warkworth Mining Limited
Water Licence Number	Contained within Section 1.4 of this report
Name of Water Licence Holder	Contained within Section 1.4 of this report
MOP/RMP Start Date	05/02/2016
MOP/RMP End Date	30/11/2021
Annual Review Start Date	01/01/2016
Annual Review End Date	31/12/2016

I, Colin Mackey, certify that this audit report is a true and accurate record of the compliance status of Mt Thorley Warkworth for the period 1 January 2016 to 31 December 2016 and that I am authorised to make this statement on behalf of Rio Tinto Coal Australia.

Note.

a) The Annual Review is an 'environmental audit' for the purposes 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 the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250, 000.

b) The Crimes Act 1900 contains other offences relating to the 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 2yeasrs imprisonment or $22,000, or both).

Name of Authorised Reporting Officer	Mr Colin Mackey
Title of Authorised Reporting Officer	General Manager Operations
Signature of Authorised Reporting Officer	
Date	280317.

Executive Summary

Mount Thorley Warkworth (MTW) is an integrated operation of two open cut coal mines, Warkworth Mining Limited (WML) and Mount Thorley Operations (MTO). This Annual Review reports on the environmental performance of Mount Thorley Warkworth (MTW) for the period 1 January 2016 to 31 December 2016.

This report has been prepared in accordance with conditions of the development consents and Mining Leases (ML) held by MTW which require a report of the operation's environmental performance to be provided on an annual basis. The structure of the 2016 Annual Review intends to align with the NSW Government *Post-approval requirements for State significant mining developments – Annual Review Guideline (October 2015)*. MTW produced 18.05 million tonnes of run-of-mine (ROM) coal during 2016, and 12.40 million tonnes of saleable coal, against an approved ROM coal production rate of 28 million tonnes per annum (mtpa).

Noise

MTW's noise performance improved significantly in 2016. Work was completed in attenuating 100% of MTW's Heavy Mobile Equipment (HME) fleet. There were no non-compliances recorded against MTW's consented noise limits. A total of 1,840 hours of mine stoppage were recorded due to proactive and reactive measures to minimise noise. There was a 62% reduction in the number of attended noise measurements which exceeded the trigger for action compared to 2015.

Blasting

During the reporting period 378 blast events were initiated at MTW. There were no non- compliances against the airblast overpressure or ground vibration criteria listed in MTWs Environment Protection Licences or Planning Approvals. On 8 June 2016 there was a minor non-compliance recorded when a blast monitor failed to capture blast data. One category 3 blast fume event was notified to DP&E in accordance with their notification requirements. The fume event dissipated at height over mine owned land. No category 4 or 5 events were recorded.

Air Quality

During 2016, MTW complied with all short term and annual average air quality criteria. A total of 2,599 hours of mine stoppage was recorded following implementation of proactive and reactive measures to minimise dust. A total of 197 ha of land were aerially seeded during autumn to minimise wind eroded dust from overburden areas not yet available for rehabilitation.

Heritage

There were no incidents nor any unauthorised disturbance caused to Aboriginal cultural or historic heritage sites at MTW during 2016. Two non-CHMS audits were conducted during the 2016 period, in the form of a Communities and Social Performance (CSP) and an independent MTW Environmental audit. A total of 18 sites were salvage mitigated during 2016 and 102 Aboriginal cultural heritage sites inspected. A site tour was conducted to visit several of the historic sites of particular interest to the Cultural Heritage Advisory Group and broader historic community.

Surface Water

Surface water monitoring activities continued in 2016 in accordance with the MTW Water Management Plan. Improvements to water management in 2016 have focused on reducing the risk of uncontrolled water releases from site. This has included improving sediment and erosion control measures and improving the separation of the active mine areas and mature rehabilitation catchments. One incident involving water required notification to government agencies when a sediment dam adjacent to WSR had a partial embankment failure. The incident has been investigated by the NSW EPA and is currently before the Land & Environment Court. MTW implemented a number of mitigation measures to ensure no material environmental harm resulted from the incident.

Groundwater

Groundwater monitoring activities were undertaken in 2016 in accordance with the MTW Water Management Plan and groundwater monitoring programme. The monitoring results are used to establish and monitor trends in physical and geochemical parameters of surrounding groundwater potentially influenced by mining.

Groundwater monitoring data is reviewed on a quarterly basis. There were no non-compliances related to groundwater in 2016.

Visual amenity

Construction of the first stage of a visual bund to screen the southern end of Warkworth mine from Putty Road was completed in late 2016. There was a notable (64%) reduction in lighting complaints from 2015 returning to levels consistent with 2014 statistics. A management strategy for lighting plants was implemented to ensure clear accountability and process for lighting emplacement on dumps to avoid intrusive lighting to our near neighbours.

Rehabilitation and Land Management

A total of 84.9 ha rehabilitation was completed during 2016 against a MOP target of 82.6 ha. Total disturbance undertaken was 120.2 ha, 28.9ha lower than the MOP projection of 149.1 ha. Capping of the Interim Tailings Storage Facility continued during 2016 and is due for completion in 2017. An annual site weed survey was undertaken during November 2016 and will form the basis of ongoing weed management works during 2017.

Biodiversity and Offset Management

In 2016, planting works to restore Warkworth Sands Woodland continued in the Northern Biodiversity Area, with over 8,000 seedlings planted between May and July. Restoration activities also commenced in a small area of Ironbark woodland in the Southern Biodiversity Area, with over 2,000 seedlings planted in July. Weed control, track and fence repairs and vertebrate pest management activities were conducted during 2016 in the Goulburn River Biodiversity Area in accordance with the Regional and Local Offsets Management Plans.

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1. STATEMENT OF COMPLIANCE

Table 1 is a Statement of Compliance against the relevant approvals. Table 2 provides a brief summary of the non-compliances and a reference to where these are addressed within this Annual Review.

Table 1: Reference Table

Were all conditions of the relevant approval(s) complied with?	
DA SSD-6465 (MTO)	No
DA SSD-6464 (WML)	No

Table 2: Non-compliances

Relevant approval	Condition number	Condition description (summary)	Compliance status	Where addressed in Annual Review
DA SSD-6464 (WML)	Schedule 3 Condition 32	Water Discharges / Pollution of Waters	Non-Compliant (Medium)	11.1
DA SSD-6465 (MTO) DA SSD-6464 (WML)	Schedule 3 Condition 14 Schedule 3 Condition 16	Blast Management Plan	Non-Compliant (Administrative non-compliance)	11.2

Compliance status key for Table 2

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 unlikely 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 unlikely to occur
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Source: NSW Government *Post-approval requirements for State significant mining developments – Annual Review Guideline (October 2015).*

2. INTRODUCTION

Mount Thorley Warkworth Coal Mine (MTW) is an integrated operation consisting of Warkworth Mining Limited (WML) and Mount Thorley Operations (MTO), situated 14 km southwest of Singleton, in the Upper Hunter Valley region of NSW.

MTW is managed and operated by Coal & Allied, a Rio Tinto Group Company, on behalf of the joint venture partners:

- Mount Thorley: Coal & Allied Industries Limited (80%) and POSCO Australia Pty Ltd (20%)
- Warkworth: Coal & Allied Warkworth Australasia Pty Ltd (26.82%), Coal & Allied Resources Limited (28.75%), Mitsubishi Development Pty Ltd (28.9%), Nippon Steel Australia Pty Ltd (9.53%), Mitsubishi Materials [Australia] Pty Limited (6%)

MTW is located in an area adjacent to other coal mines (Figure 1). Other industry in the locality includes: the Mount Thorley Industrial Estate; the Dyno Nobel Facility; Steggles Quarantine Facility; and the Redbank Power Station (currently not in operation). Other surrounding land uses predominantly consist of a military base and agriculture. The villages of Bulga and Warkworth are located to the southwest and northwest of MTW operations respectively.

2.1 Document purpose

This report summarises the environmental performance of MTW in accordance with conditions of the development consents and Mining Leases (ML) held by site. The structure of the 2016 Annual Review intends to align with the NSW Government *Post-approval requirements for State significant mining developments – Annual Review Guideline (October 2015).*

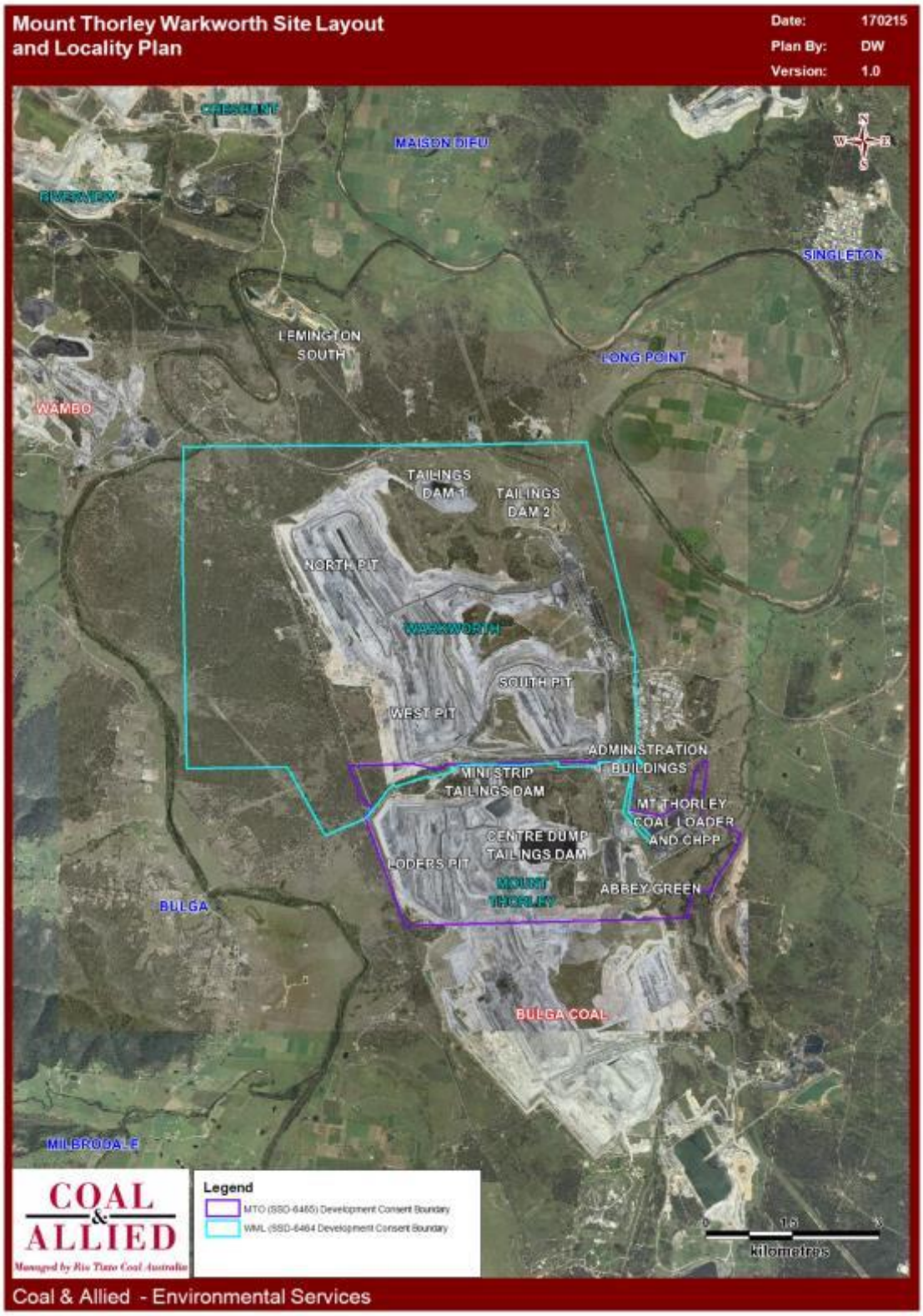

Figure 1: MTW Site Layout and Locality Plan

2.2 Mine Contacts

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3. APPROVALS

3.1 Approvals, leases and licenses

3.1.1 Current Approvals

The status of MTO and WML development consents, licenses and relevant approvals at 31st December 2016 are summarised in Table 3 to Table 9.

Table 3: Operations Approvals- Warkworth

Approval Number	Description	Authority	Dates
EPBC 2009/5081	Approval under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) to extend the existing Warkworth Coal Mine over an additional 705 hectares of land at Warkworth NSW including associated modifications to existing mine infrastructure	DSEWPaC	9/8/2012 – 31/3/2033
EPBC 2002/629	Approval under the EPBC Act to construct and operate an open cut coal mine extension at the Warkworth Coal Mine	DSEWPaC	18/2/2004 (varied on 6/4/2004, 24/5/2004, 19/11/2004 and 13/7/2012) – 25/2/2039
SSD-6464	Warkworth Continuation Project	DP&E	26/11/2015

Table 4: Operations Approvals - Mount Thorley

Approval Number	Description	Authority	Dates
SSD-6465	Mount Thorley Continuation Project	DP&E	26/11/2015

Table 5: Licences and Permits

Licence Number	Description	Authority	Expiry Date
Warkworth			
EPL1376	Environment Protection Licence	EPA	N/A
NDG018727*	Dangerous Goods Licence	WorkCover	N/A
50661122	Radiation Licence	EPA	02 May 2017
XSTR100160	Licence to Store – Explosives Act	WorkCover NSW	13 November 2018
Mount Thorley			
EPL24	Environment Protection Licence	EPA	N/A

EPL1976	Environment Protection Licence	EPA	N/A
NDG018727*	Dangerous Goods Licence	WorkCover	N/A
5061110	Radiation Licence	EPA	31 July 2017

* Mount Thorley and Warkworth operate under the same Dangerous Goods License

Note: Environment Protection Licences remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Table 6: Mining Tenements

Mining Tenement	Type	Purpose	Status	Dates
Warkworth				
CCL 753	Consolidated Coal Lease	Prospecting and Mining Coal	Granted	23/05/1990 - 17/02/2023
ML 1412	Mining Lease	Prospecting and Mining Coal	Granted	11/01/1997 - 10/01/2018
ML 1590	Mining Lease	Prospecting and Mining Coal	Granted	27/02/2007 - 26/02/2028
MLA 352	Mining Lease Application	Prospecting, Mining Coal and Purposes	Application Pending	Mining Lease Application Lodged 2nd June 2010
Mount Thorley				
CL 219	Coal Lease	Prospecting and Mining Coal	Granted	23/09/1981 - 22/09/2023
(Part) ML 1547	Sub-Lease	Mining Purposes	Registered	The part sublease area known as the "Bulga Mining Sublease" expired on 30th June 2015. An application to relinquish this sublease was made on 14th December 2015.
EL 7712	Exploration Licence	Prospecting Coal	Granted	23/2/2011 - 22/02/2016
MLA 353	Mining Lease Application	Prospecting, Mining Coal and Purposes	Application Pending	Mining Lease Application Lodged 2nd June 2010

Note: The authority for all mining tenements is Department of Industry, Skills and Regional Development (Resources & Energy Division).

Table 7: Other Approvals

Approval	Authority	Dates
Emplacement Areas		
Warkworth		
Swan Lake Void	DPI	21/10/2002
Tailings Dam 2	DPI	22/10/2002
Tailings Dam 2 –130RL	DPI	9/12/2003
Mount Thorley		
Section 126 Variation to Reject Emplacement Area	DPI	20/3/2001
Section 126 Construction of Reject Emplacement Area Centre Ramp Tailings Dam	DPI	9/4/2001
Mini Strip 24 Tailings Storage Facility	DPI	8/9/2004
Dam Safety Committee Centre Ramp Tailings Storage Facility Stage 2	DPI	12/2/2004
Section 126 Centre Ramp Tailings Dam – Raising height of embankment	DPI	10/5/2006
Section 126 Abbey Green South Tailings Dam	DPI	10/5/2006
Other Approvals		
Installation of a single 500mm water pipeline under Putty Road	RMS	31/10/2007
Installation of two 600mm tailings pipelines under Putty Road	RMS	1/2/2007
Resource Recovery Exemption for coal washery rejects at Mount Thorley Warkworth	DECC	1/2/2010

Table 8: Water Licences

Licence Number	Type	Purpose	Legislation	Description	Renewal Date
20BL168821	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: MTAGP1, MTAGP2, ABGOH07, ABGOH43, ABGOH44, ABGOH45	Perpetuity
20BL170011 (cancelled - replaced by WAL40464)	Bore	Excavation - Mining	Part 5 Water Act 1912	Mount Thorley Excavation	N/A
20BL170012 (cancelled - replaced by WAL40465)	Bore	Excavation - Mining	Part 5 Water Act 1912	Warkworth Pit Excavation	N/A

Licence Number	Type	Purpose	Legislation	Description	Renewal Date
20BL171729	Bore	Monitoring Bore	Part 5 Water Act 1912	G3	Perpetuity
20BL171841	Bore	Monitoring Bore	Part 5 Water Act 1912	OH1126	Perpetuity
20BL171842	Bore	Monitoring Bore	Part 5 Water Act 1912	OH944	Perpetuity
20BL171843	Bore	Monitoring Bore	Part 5 Water Act 1912	OH1137	Perpetuity
20BL171844	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: OH1123 (E), OH1123 (W)	Perpetuity
20BL171845	Bore	Monitoring Bore	Part 5 Water Act 1912	OH1124	Perpetuity
20BL171846	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: OH786, OH942	Perpetuity
20BL171847	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: OH1127, OH787	Perpetuity
20BL171848	Bore	Monitoring Bore	Part 5 Water Act 1912	OH1125	Perpetuity
20BL171849	Bore	Monitoring Bore	Part 5 Water Act 1912	OH1122	Perpetuity
20BL171850	Bore	Monitoring Bore	Part 5 Water Act 1912	OH1138	Perpetuity
20BL171891	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: OH1121, OH788, OH943	Perpetuity
20BL171892	Bore	Monitoring Bore	Part 5 Water Act 1914	Bores: WOH2153 (PZ2), WOH2154 (PZ1), WOH2155 (PZ4), WOH2156 (PZ3)	Perpetuity
20BL171893	Bore	Monitoring Bore	Part 5 Water Act 1918	Bores: WOH2141 (PZ6), Ground Water Alluvial Modelling	Perpetuity
20BL171894	Bore	Monitoring Bore	Part 5 Water Act 1913	WOH2139 (PZ5)	Perpetuity
20BL172272	Bore	Monitoring Bore	Part 5 Water Act 1912	PZ9S, PZ9D	Perpetuity
20BL172273	Bore	Monitoring Bore	Part 5 Water Act 1912	PZ8S, PZ8D	Perpetuity
20BL172439	Bore	Monitoring Bore	Part 5 Water Act 1912	Windermere	Perpetuity
20BL172518	Bore	Monitoring Bore	Part 5 Water Act 1912	Windermere: MBW01, MBW02,	Perpetuity

Licence Number	Type	Purpose	Legislation	Description	Renewal Date
				MBW03, MBW04	
20BL173276	Bore	Monitoring Bore	Part 5 Water Act 1912	Windermere	Perpetuity
20BL173065	Bore	Monitoring Bore	Part 5 Water Act 1912	SR012	Perpetuity
20FW213276 (formerly 20CW802601)	Flood Work Approval	Block Dam	Water Management Act 2000	Charlton Rd Levee	23 August 2020
20WA209905 (Formerly 20SL051292)	Stream Diversion	Bywash Dams	Water Management Act 2000	Doctors Creek Bywash	31 July 2022
20CA209904 WAL - 19022	Stream Diversion	Bywash Dams	Water Management Act 2000	Sandy Hollow Creek	25 February 2023

Table 9: Water Access Licences

Licence Number	Description	Water Source	Water Sharing Plan	Water Source – Management Zone	Approved Extraction (ML)*	Actual Extraction 2016 (ML)
WAL963	Warkworth Mining Limited Hunter River Pump (General Security)	Hunter River	Hunter Regulated River WSP	Zone 2b (Hunter River From Wollombi Brook Junction To Oakhampton Rail Bridge)	243	0
WAL969	Glennies Creek Pump (General Security)	Hunter River	Hunter Regulated River WSP	Zone 1b (Hunter River From Goulburn River Junction To Glennies Creek Junction)	39	0
WAL10543	Mount Thorley Joint Venture (MTJV) water supply scheme, held by Singleton Shire Council (our share 1,012 units)	Hunter River	Hunter Regulated River WSP	Zone 2b (Hunter River From Wollombi Brook Junction To Oakhampton Rail Bridge)	1,012	407
WAL10544	(Hunter Regulated River – Domestic and Stock)	Hunter River	Hunter Regulated River WSP	Zone 2b (Hunter River From Wollombi Brook Junction To Oakhampton Rail Bridge)	5	0
WAL18233	Old Farm	Hunter River	Hunter Unregulated	Hunter Regulated River	5	3[#]

Licence Number	Description	Water Source	Water Sharing Plan	Water Source – Management Zone	Approved Extraction (ML)*	Actual Extraction 2016 (ML)
		Alluvium	and Alluvial Water Sources WSP	Alluvial Water Source – Downstream Glennies Creek Management Zone		
WAL18558	Hawkes	Wollombi Brook	Hunter Unregulated and Alluvial Water Sources WSP	Lower Wollombi Brook Water Source	50	9#
WAL19022	Sandy Hollow Creek	Unregulated River	Hunter Unregulated and Alluvial Water Sources WSP	Singleton Water Source	60	0
WAL40464 (previously 20BL170011)	Mt Thorley Pit Excavation	Permian Coal Seams	North Coast Fractured and Porous Rock Groundwater Sources WSP (commenced 1/7/16) Previously Water Act 1912	Sydney Basin – North Coast Groundwater Source	180	110#
WAL40465 (previously 20BL170012)	Warkworth Pit Excavation	Permian Coal Seams	North Coast Fractured and Porous Rock Groundwater Sources WSP (commenced 1/7/16) Previously Water Act 1912	Sydney Basin – North Coast Groundwater Source	750	140#

* Approved extraction limits are for a financial year.

3.1.2 Management Plans, Programmes and Strategies

Table 10 details the Management Plans and strategies which are required under the Warkworth (SSD-6464) and Mount Thorley (SSD-6465) Development Consent instruments.

A Mining Operations Plan (MOP) was developed to replace the previous MOP and cover the existing MTW operations, as well as the approved operations outlined in the Environmental Impact Statements for the Warkworth Continuation 2014 and Mt Thorley Operations 2014. The MOP outlines the proposed operational and environmental management activities planned for MTW. Details regarding the submission and approval dates for the current MOP are shown in Table 11.

Table 10: Status of Management Plans Required under Warkworth Continuation (SSD-6464) and Mount Thorley Operations (SSD-6465) Project Approvals

Plan / Program / Strategy	Status (approval date)
Air Quality Management Plan	03/02/2016
Noise Management Plan	30/09/2016
Blast Management Plan	26/08/2016
Water Management Plan	29/01/2016
WML Biodiversity Management Plan	03/02/2016
WML Aboriginal Heritage Management Plan	28/01/2016
MTO Heritage Management Plan	13/08/2014
Rehabilitation Management Plan (addressed in MOP)	05/02/2016
Environmental Management Strategy	03/02/2016
MTW Historic Heritage Management Plan - Draft	Due May 2017
MTW Aboriginal Heritage Management Plan	Pending
Wollombi Brook Aboriginal Cultural Heritage Conservation Area Conservation Management Plan - draft	Due May 2017
Management Plan for Goulburn River Biodiversity Area	Pending
Management Plan for Bowditch Biodiversity Area	Pending
Management Plan for Southern Biodiversity Area	Pending
Management Plan for Northern Biodiversity Area	Pending
Management Plan for Northern Biodiversity Area	Pending
Warkworth Sands Woodland Integrated Management Plan (Condition 34)	Pending
Warkworth Sands Woodland Performance Criteria (Condition 32a)	Pending

Table 11: MOP Approval status for Mount Thorley Warkworth

Mining Operations Plan	Date Submitted	Date Approved
Mount Thorley Warkworth MOP 2016	30/11/2015	05/02/2016

4. OPERATIONS SUMMARY

4.1 Summary of Mining Activities

Areas to be mined are geologically modelled, a mine plan is formed and the relevant mining locations are surveyed prior to mining. Figure 2 illustrates the mining process. MTW have no active underground workings.

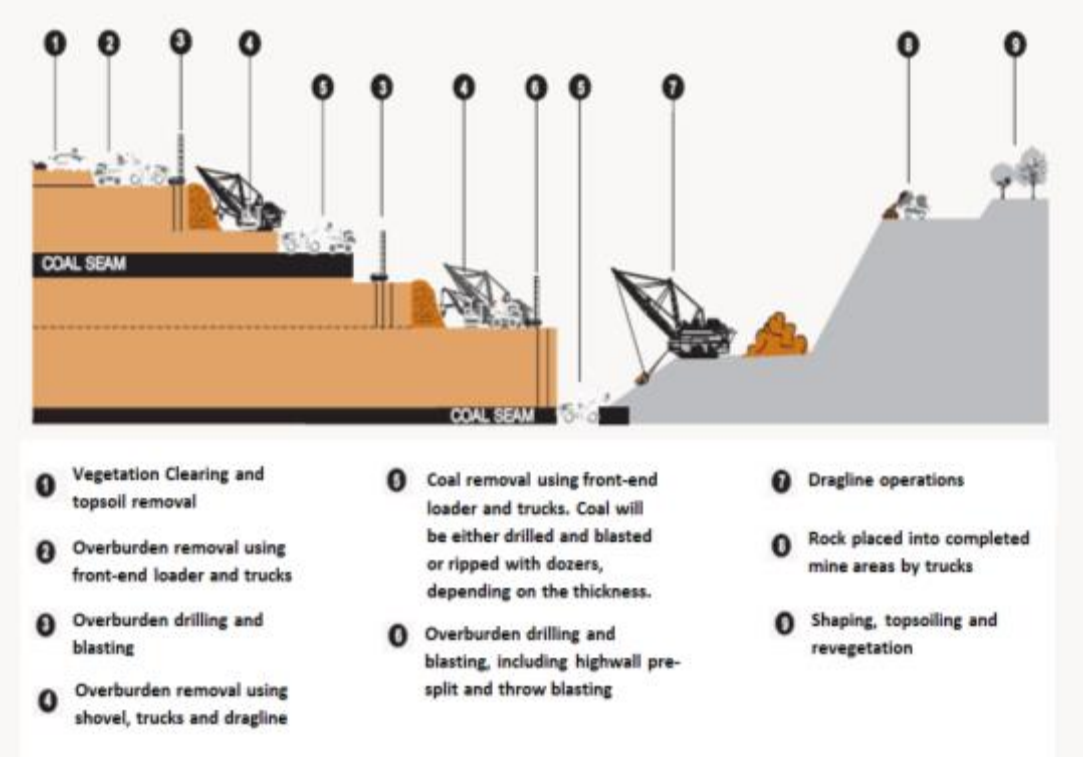

Figure 2: Mining Process

Within the Warkworth lease, mining activities will continue to advance in a westerly direction in both North and West Pits. South Pit has reached its final western limit with the final strip to be completed to depth in 2017. Within the Mount Thorley lease, mining has reached the western limit with remaining reserves to be mined to depth over the coming two years. All mining related activity is in line with the current MOP.

The planned 2017 production and waste schedule for MTW is summarised below:

- 17.9 Mt ROM coal;
- 11.7 Mt Product coal;
- 131 Mbcm overburden (including rehandle); and
- 5.6 Mt Tailings and reject

The Planned ROM coal production represents approximately 62% of the approved maximum ROM coal production for MTW.

Coal will continue to be transported via conveyer to the Mount Thorley Coal Loader and railed to the port.

4.2 Mineral Processing

All processing and rejects/tailings disposal activities undertaken in 2016 were consistent with the approved MOP and no changes were made to the processing and rejects/tailings disposal methods.

The currently active tailing emplacements are the Centre Ramp Tailings Storage Facility and Abbey Green South Tailings Storage Facility. Tailings Dam 2 was previously used to receive ash from Redbank Power Station. Ash emplacement to Tailings Dam 2 ceased in July 2014 following the cessation of operations at Redbank Power Station. The contract to receive ash from Redbank has been finalised and no more ash will be received. During 2016 preparatory capping works on Tailings Dam 2 commenced with capping to commence in 2017.

4.3 Production Statistics

Under the Project approvals in place during the reporting period, extraction of up to 28 million tonnes of ROM coal from MTW is permitted in a calendar year, comprising up to 18 million tonnes from ROM coal from the Warkworth Mine and 10 million tonnes from the Mount Thorley Mine. MTW Production Statistics for the previous, current and future reporting period are summarised in Table 12.

Table 12: Summary of Production at MTW in 2016

Material	Approved Limits	Reporting Period 2015	Reporting Period 2016	Forecast for 2017
Prime Waste (kbcm)	N/A	103,156	96,938	101,829
MTO ROM Coal (Mtpa)	10 (SSD-6465)	3.32	3.96	4.12
WML ROM Coal (Mtpa)	18 (SSD-6464)	13.74	14.09	13.78
ROM Coal (Mtpa)	28 (Combined)	17.06	18.05	17.90
Coarse Reject (kt)	N/A	3,583	3,791	3,759
Fine Reject – Tailings (kt)	N/A	1,403	1,588	1,575
Product (kt)	N/A	11,864	12,396	11,731

4.4 Summary of Changes (developments and equipment upgrades)

- Some additional replacement heavy equipment is planned for purchase in 2017, including 5 new 320t haul trucks and a 500t Excavator. Sound attenuation of the existing truck fleet was completed 2016.
- Mining activity during the reporting period with regard to volumes, location and equipment was consistent with 2015
- South Pit accelerated rehabilitation plan has progressed in line with the consent condition

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

An annual environmental inspection was undertaken by officers of DRE and DP&E on 8th June 2016. Both departments were generally satisfied with the contents of the report; however a number of actions were identified as part of the inspection and review of the document. The actions and responses are shown in Table 13.

Table 13: Response to Actions arising from DRE review of 2015 AR

Issue	Recommended Action	Annual Review section
Rehabilitation Plan	11ha of rehabilitation was to be undertaken at Mt Thorley during the reporting period, this was not completed please provide justification for this change in area by the 20 December 2016.	Refer to correspondence dated the 16 December 2016
Management of standing water in tailings facilities	A reasonable volume of standing water was identified during the Annual Review inspection on the Centre Ramp Tailings Dam and Mini-Strip Tailings Dam. DRE encourages active management to minimise standing water on the surface of the tailings dams. Report on management practices undertaken during the reporting year in future Annual Reviews.	Refer to section 8.6
Rehabilitation Plan	Provide justification for changes to rehabilitation locations in future Annual Reviews within the Rehabilitation Programme Variation section.	Refer to Section 8.3.1
Rehabilitation performance results	The Department requests that results of monitoring undertaken against the rehabilitation completion criteria as presented in the Mining Operations Plan, is reported in the rehabilitation section of future Annual Reviews.	Refer to section 8.1.1
Rehabilitation Summary	Table A as presented in the Annual Review should differentiate between the reporting year's rehabilitation and maintenance work that is undertaken. In future AR's please ensure that this information is included.	Refer to Appendix 3

6. ENVIRONMENTAL PERFORMANCE

6.1 Meteorological Data

Meteorological data is collected to assist in day to day operational decisions, planning, and environmental management and to meet Project Approval requirements. MTW operates a real time meteorological (weather) station which is located on Charlton Ridge. The meteorological station measures wind speed, wind direction, temperature, humidity, solar radiation, rainfall, and sigma theta. The meteorological station instruments are installed, calibrated, and maintained according to the relevant Australian Standard AS 3580.14 (2011). Meteorological data is available to employees and contractors via the Coal & Allied intranet. This service provides the mining operations with the trend assessment details required for informed operational decisions aimed at minimising impacts from the operation. Daily Meteorological data summaries are presented in the Monthly Environmental Monitoring reports, available via the Rio Tinto website (www.riotinto.com).

6.2 Noise

6.2.1 Management

MTW manages noise to ensure compliance with permissible noise limits at nearby private residences. A combination of both proactive and reactive control mechanisms are employed on a continuous basis to ensure effective management of noise emissions is maintained. Noise management strategies and processes employed at MTW are detailed in the MTW Noise Management Plan (available for viewing via the Rio Tinto website www.riotinto.com).

MTW's noise performance improved significantly in 2016, demonstrated across a number of key metrics:

- Community noise complaints received – reduced by 35% from 2015;
- Number of CRO noise measurements which exceed the trigger for action – reduced by 62% from 2015; and
- Number of equipment downtime hours logged in response to noise management triggers – reduced by 76% from 2015.

A range of projects and processes were introduced and undertaken during 2016 to deliver this improved performance. These are described herein.

6.2.2 Sound Attenuation Program

Extensive work has been undertaken since 2013 to sound attenuate 100% of MTW's Heavy Mobile Equipment (HME) fleet. MTW's current HME fleet consists of the following:

- 76 Haul Trucks
- 7 Water Carts
- 26 Dozers
- 6 Excavators
- 6 Drills.

All new equipment purchased by MTW will be sound attenuated before being used onsite.

6.2.3 Real Time Noise Management

MTW's Real-Time noise management framework provides an effective tool for managing instances of elevated noise, ensuring compliance is maintained, and responding to community concerns.

Acting as a conduit between the monitoring system, the mine Shift Co-ordinator, and members of the local community, the Community Response Officer role is pivotal in the effective implementation of the management framework, validating real-time alerts through supplementary handheld noise measurements and audible observations, driving operational change as required, and responding to community complaints. A summary of supplementary handheld noise measurements conducted by the Community Response Officers in 2016 is presented in Table 14.

MTW launched the "InSite" website, which allows members of the general public to access noise, meteorological, air quality data as well as any operational changes made during shift via an interactive website. Viewer access: http://insite.riotinto.com.

Table 14: Summary of hand held noise monitoring conducted by Community Response Officer 2016

Monitoring Location	Number of Assessments	Number of measurements >WML trigger^	Number of measurements > MTO trigger^	Average WML noise level ($L_{Aeq\ 5min}$ dB(A))*	Average MTO noise level ($L_{Aeq\ 5min}$ dB(A))*
Wollemi Peak Road (Bulga RFS)	1,284	46	27	32.8	33.5
Bulga Village	309	-	1	32.4	32.4
Inlet Road West	278	-	-	29.0	28.4
Long Point	506	2	-	31.3	28.0
Other	10	-	-	-	-
South Bulga	4	-	-	32.0	33.3
Wambo Road	471	8	1	33.3	32.5
Total	2,862	56	29	-	-

^Triggers are internally set thresholds for operational response and are specified in the MTW Noise Management Plan. The number of measurements greater than the trigger cannot be used an assessment or interpretation of compliance. Compliance assessment is provided in 6.2.3 and 6.2.4.

*Average noise levels do not take account of measurements taken where the noise source of interest was recorded as inaudible.

In response to the events listed in Table 14 which exceeded the trigger, up to 1,840 hours of equipment downtime were recorded to manage noise during 2016. This is a significant decrease (approximately 76%) in the number of downtime hours recorded in 2015 and

resembles the reduction in number of supplementary noise measurements completed which exceed the trigger for management action.

6.2.4 Performance

A total of 92 compliance measurements were completed in accordance with the MTW Noise Monitoring Programme during the reporting period. Each measurement involves an assessment of mine noise against the various L_{Aeq} and $L_{A1,\ 1min}$ noise criteria in place under the Warkworth and Mount Thorley Approvals (a total of 576 assessments). Noise monitoring results are presented in the monthly Environmental Monitoring Reports, available via the Rio Tinto website (www.riotinto.com).

In accordance with Section 4 of the NSW Industrial Noise Policy, MTW has assessed measured noise levels collected during the attended compliance programme for low frequency content, and applied the modifying factor adjustment where applicable. The application of the modifying factor results in 13 exceedances of the WML L_{Aeq} Impact Assessment Criteria, two exceedances of the WML L_{Aeq} Acquisition Criteria and nine exceedances of the MTO L_{Aeq} Impact Assessment Criteria (refer to Table 15). The Department of Planning and Environment was notified in writing of each measurement.

MTW reports these measurements so as to ensure full disclosure, however it remains MTW's position that the prescribed methodology is unsuitable when applied to receptors at large distances from mine noise sources due to the nature of noise attenuation. Excess attenuation of noise with distance is greater for high frequency noise than it is for low frequency noise. At significant distance from a noise source (such as private residences from the MTW complex) this often results in large differentials between L_{Aeq} and L_{Ceq}. The NSW Industrial Noise Policy requires the penalty to be applied in these instances, irrespective of actual low frequency affectation. As such, MTW does not consider these instances to constitute non-compliance with the conditions of approval.

During 2015, NSW EPA released the Draft NSW Industrial Noise Guideline for industry and public comment. The Draft guideline sets out a proposed change to the framework for the assessment of low frequency noise emissions from industrial premises. Coal & Allied looks forward to the finalisation of the guideline, and the introduction of a more appropriate methodology for assessing low frequency affectation for open cut mines in the Hunter Valley in the future.

Table 15: Attended noise measurements exceeding consent conditions following application of INP low frequency penalty

Location	Date/Time	Relevant Criteria	Criterion (dB)*	L_{Aeq}(dB)	Revised L_{Aeq} (dB)	Exceeds by (dB)
Bulga Village	17/03/2016	WML L_{Aeq} impact assessment criteria	40	36	41	1
Bulga RFS	31/05/2016	MTO L_{Aeq} impact assessment criteria	37	33	38	1

Location	Date/Time	Relevant Criteria	Criterion (dB)*	L_{Aeq}(dB)	Revised L_{Aeq} (dB)	Exceeds by (dB)
Inlet Road West	31/05/2016	MTO L_{Aeq} impact assessment criteria	35	31	36	1
Bulga RFS	16/06/2016	WML L_{Aeq} impact assessment criteria	35	35	40	5
Bulga Village	16/06/2016	MTO L_{Aeq} impact assessment criteria	38	35	40	2
Inlet Road	16/06/2016	WML L_{Aeq} impact assessment criteria	35	31	36	1
South Bulga	16/06/2016	WML L_{Aeq} impact assessment criteria	35	33	38	3
Wambo Road	16/06/2016	WML L_{Aeq} impact assessment criteria	38	34	39	1
Bulga RFS	16/06/2016	MTO L_{Aeq} impact assessment criteria	37	35	40	3
South Bulga	16/06/2016	MTO L_{Aeq} impact assessment criteria	36	33	38	2
Bulga Village	29/08/2016	WML LAeq impact assessment criteria	38	38	43	5
Inlet Road	29/08/2016	WML L_{Aeq} impact assessment criteria	38	37	42	4
Inlet Road	29/08/2016	WML L_{Aeq} acquisition criteria	40	38	42	2
Inlet Road West	29/08/2016	WML L_{Aeq} impact assessment criteria	35	31	36	1
Wambo Road	29/08/2016	WML L_{Aeq} impact assessment criteria	38	38	43	5
Wambo Road	29/08/2016	WML L_{Aeq} acquisition criteria	40	38	43	3
Inlet Road	29/08/2016	MTO L_{Aeq} impact assessment criteria	37	36	41	4
South Bulga	29/08/2016	MTO L_{Aeq} impact assessment criteria	36	35	40	4
Bulga RFS	12/09/2016	WML L_{Aeq} impact assessment criteria	35	35	40	5
Inlet Road	12/09/2016	WML L_{Aeq} impact assessment criteria	35	34	39	4

Location	Date/Time	Relevant Criteria	Criterion (dB)*	L_{Aeq}(dB)	Revised L_{Aeq} (dB)	Exceeds by (dB)
South Bulga	12/09/2016	WML L_{Aeq} impact assessment criteria	35	33	38	3
Bulga RFS	12/09/2016	MTO L_{Aeq} impact assessment criteria	37	35	40	3
South Bulga	12/09/2016	MTO L_{Aeq} impact assessment criteria	36	33	38	2
Inlet Road	17/11/2016	WML L_{Aeq} impact assessment criteria	35	32	37	2

6.2.5 Comparison against Last Years' Results

A comparison of non-compliances and exceedances between years is used as a measure of the effectiveness of noise management measures employed on site. Non-compliance is determined with reference to the applicable conditions of consent and the *NSW Industrial Noise Policy*.

Details of this comparison are provided in Table 16, which demonstrates a continuation of the effective management delivered in 2016.

Table 16: Comparison of 2016 noise monitoring results against previous years'

Year	Number of assessments	Number of measurements greater than allowable noise limits (under applicable met conditions)	Number of non-compliances
2016	576	0	0
2015	665	0	0
2014	700	0	0
2013	456	11	7
2012	562	13	3
2011	572	11	4
2010	561	3	3
2009	569	10	4

Given the large dataset available, a comparison between the results collected through the supplementary noise monitoring regime from year to year is also considered valuable. Improved noise performance is demonstrated through this data, with reductions in the number of measurements which exceed the noise management trigger at all monitoring locations. Further, reductions in the average noise levels measured across the reporting period are evident at the majority of monitoring locations with the exception of the South Bulga and Wambo Road monitoring locations which have largely remained the same. There

has been a significant reduction in the number of assessments undertaken in 2016 compared to 2015 and this coincides with a general reduction in measured average noise levels, a ~ 35% reduction in noise complaints and also the completion of sound attenuation of all haul trucks, water carts, excavators and drills operating at MTW in 2016.

Table 17: Comparison of CRO noise measurement performance

Monitoring Location	Number of Assessments		Number of measurements >WML trigger^		Number of measurements > MTO trigger^		Average WML noise level ($L_{Aeq\ 5min}$ dB(A))*		Average MTO noise level ($L_{Aeq\ 5min}$ dB(A))*	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Wollemi Peak Road (Bulga RFS)	3,006	1,284	87	46	104	27	33.8	32.8	35.1	33.5
Bulga Village	1,082	309	5	0	2	1	33.7	32.4	33.3	32.4
Inlet Road West	1,250	278	12	0	10	0	30.8	29.0	30.2	28.4
Long Point	1,292	506	0	2	0	0	32.9	31.3	30.6	28.0
South Bulga	72	4	0	0	0	0	31.5	32.0	32.9	33.3
Wambo Road	1,424	471	6	8	0	1	33.6	33.3	31.9	32.5
Total	8,126	2852	110		116	29	NA	NA	NA	NA

^Triggers are internally set thresholds for operational response and are specified in the MTW Noise Management Plan. The number of measurements greater than the trigger cannot be used an assessment or interpretation of compliance. Compliance assessment is provided in 6.2.3 and 6.2.4.

*Average noise levels do not take account of measurements taken where the noise source of interest was recorded as inaudible.

6.2.6 Comparison against EA Predictions

Table 18 provides a comparison of 2016 attended monitoring data and the predicted noise levels modelled in the 2014 Warkworth Continuation EIS. Comparison has been made against the modelled worst case noise levels for Year 3 of the development (nominally 2017). The comparison data has been sourced from the modelled noise levels at the nearest residential receivers to the current monitoring locations. Reported 2016 data is the calculated quarterly average of WML contribution to measured $L_{Aeq\ (15\ minute)}$ results obtained through compliance assessment (irrespective of applicability of noise criteria due to meteorological conditions).

Where a monitoring event has been assessed as being “inaudible” or “not measurable”, a conservative value of 25dB has been used to calculate the L_{Aeq} average for the quarter. The comparison shows that measured noise is lower than that predicted.

Table 18: Predicted Night Time WML (EIS 2014) $L_{Aeq\ (15\ minute)}$ noise levels and averaged 2016 monitoring results

Monitoring Location	Year 3 Modelled Noise	Quarter 1 2016 average	Quarter 2 2016 average	Quarter 3 2016 average	Quarter 4 2016 average
	$L_{Aeq\ (15\ minute)}$ (dB)	$L_{Aeq\ (15\ minute)}$ (dB)	$L_{Aeq\ (15\ minute)}$ (dB)	$L_{Aeq\ (15\ minute)}$ (dB)	$L_{Aeq\ (15\ minute)}$ (dB)
Mount Thorley Industrial Estate	≤35	<30	N/A	N/A	N/A
Bulga Village	≤38	IA	30	31.0	26.7
Gouldsville Road	≤35	26.7	<30	<30	IA
Inlet Road West*	≤35	27.0	28.3	28.7	26.3
Long Point*	≤35	IA	<30	IA	IA
Wollemi Peak Road*/Bulga RFS	≤38	<30	31.0	30.0	<30
South Bulga	≤38	<30	29.7	28.7	<30
Wambo Road	≤38	30.7	30.3	31.5	N/A
Inlet Road	≤37	N/A	29.3	32.0	26.3

*Denotes – No nearby receiver location modelled

Note: The Inlet Road Monitoring Location was added to the monitoring programme and the Mount Thorley Industrial Estate monitoring location was removed from the monitoring programme from April 2016. This followed DP&E approval of revised projects (Warkworth Continuation Project SSD6464 and Mt Thorley Continuation Project SSD6465) in November 2015, with revision to noise criteria taking affect from 31st March 2016. Monitoring at the Wambo Road Monitoring location was temporarily suspended from October due to safety concerns.

6.3 Blasting

6.3.1 Blasting Management

The objective of blasting operations at MTW is to ensure that optimal fragmentation is obtained whilst minimising dust and fume generation, adhering to safety standards and conforming to approvals criteria for ground vibration and airblast overpressure.

During the reporting period, Coal and Allied operated a network of "Kaboom" blast monitors, designed, serviced and maintained by a local supplier (Benchmark Monitoring). The system operates in accordance with AS2187.2-2006 to measure ground vibration and airblast overpressure of each event at a high sampling frequency. Monitors function as regulatory compliance instruments in accordance with the MTW Blast Monitoring Programme (appended to Blast Management Plan) and are located on (or in locations representative of) privately owned land. During 2016 monitors were situated at the following locations (Figure 3):

- Abbey Green (Abbey Green Station, Putty Road, Glenridding);

- Bulga Village (Wambo Road, Bulga);
- Mount Thorley Industrial Estate (known as MTIE - Putty Road, Mount Thorley)
- Wambo Road (Wambo Road, Bulga);
- Warkworth Village (former Warkworth Public School, Warkworth); and
- Wollemi Peak Road (intersection of Putty & Wollemi Peak Roads, Bulga).

Figure 3: Blast Monitoring Locations

6.3.2 Performance

During the reporting period MTW detonated 321 blast events. Results of ground vibration and airblast overpressure recorded during 2016 are presented in Figure 4 to Figure 9. All blasts returned results below the relevant airblast overpressure / ground vibration criteria for all monitoring locations.

Road closures occurred for all blasts within 500 metres of a public road. Public roads were also closed on occasions to mitigate potential impact upon road users from dust or when blast fume management zones encompassed public roads.

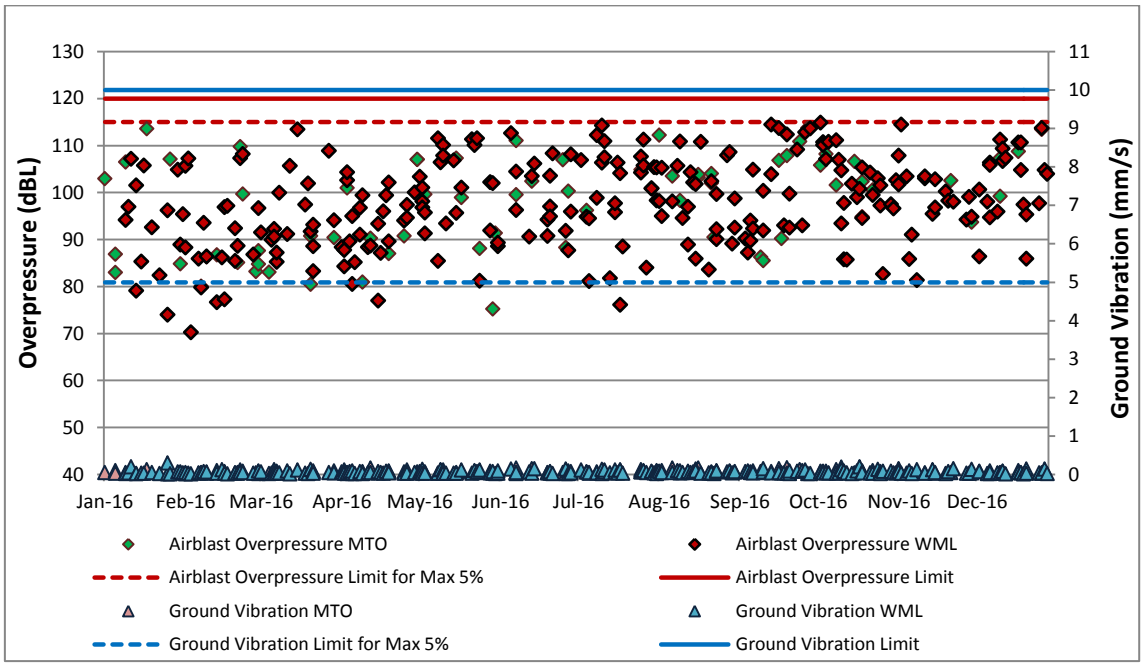

Figure 4: Abbey Green blasting results

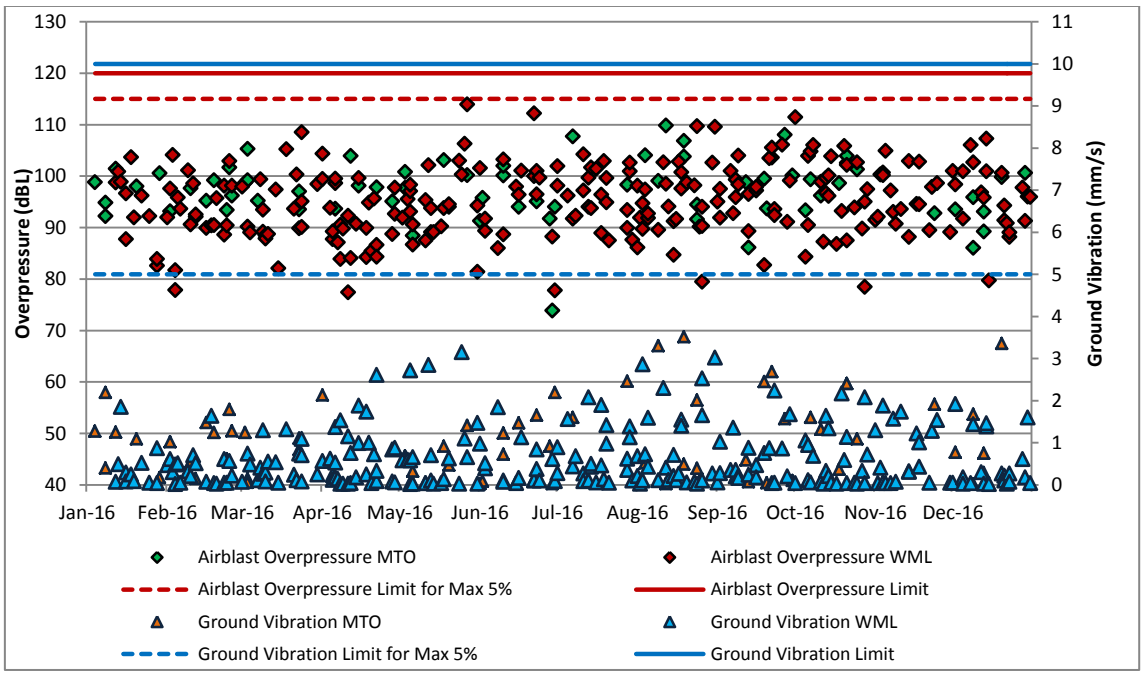

Figure 5: Bulga Village blast results

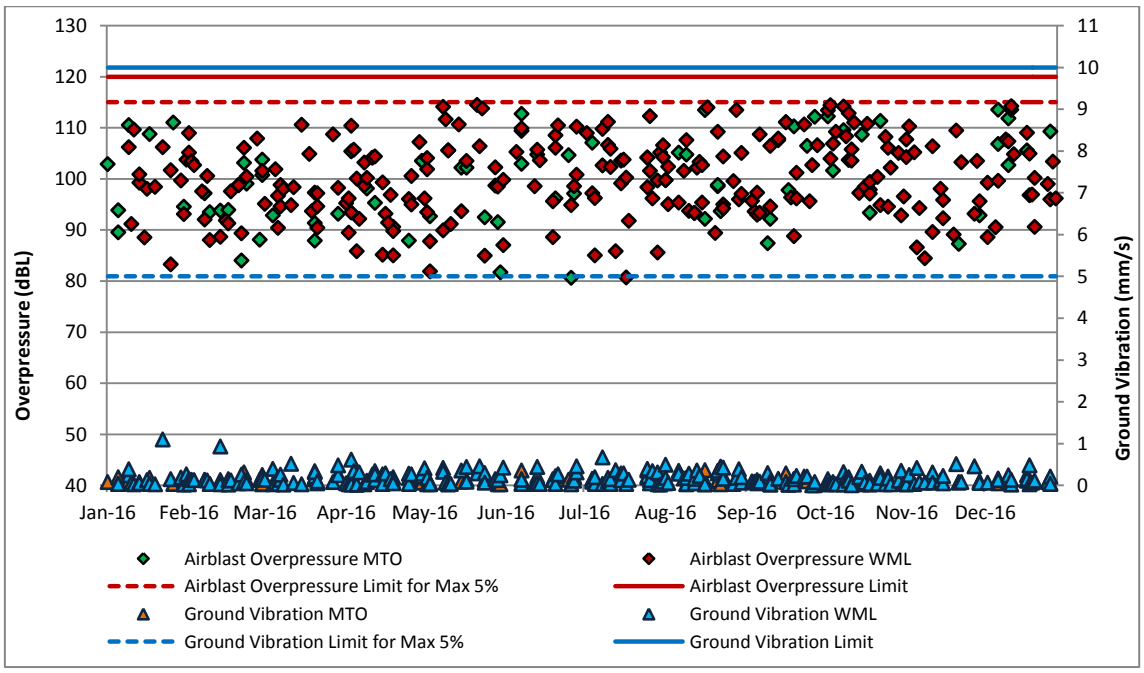

Figure 6: MTIE blast results

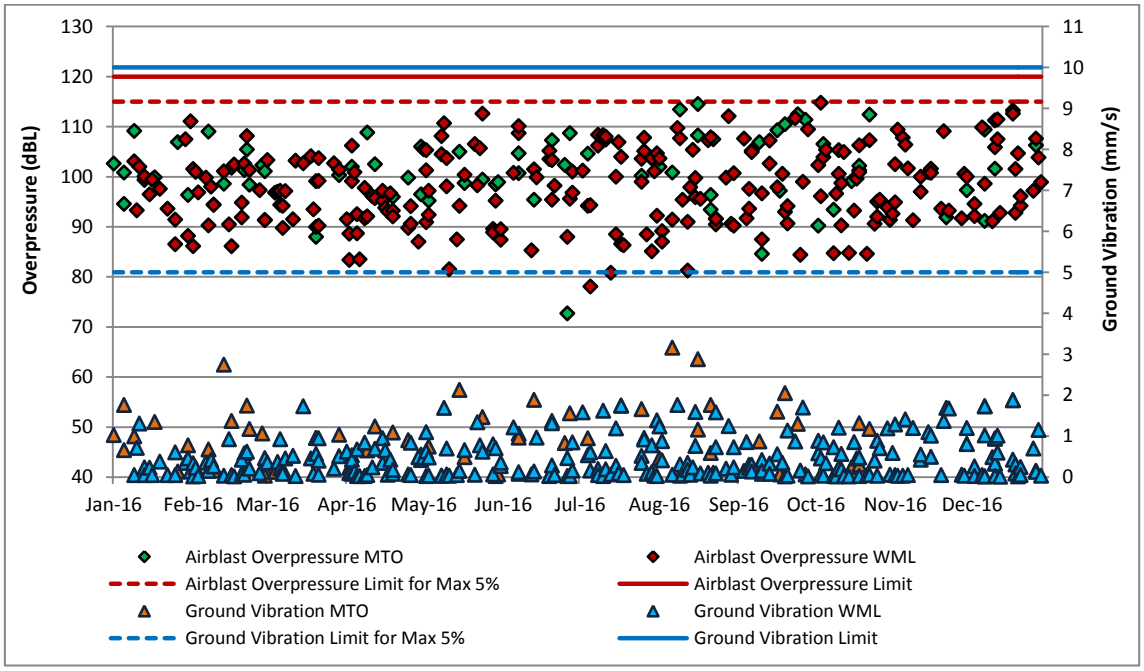

Figure 7: Wollemi Peak Road Bulga blast results

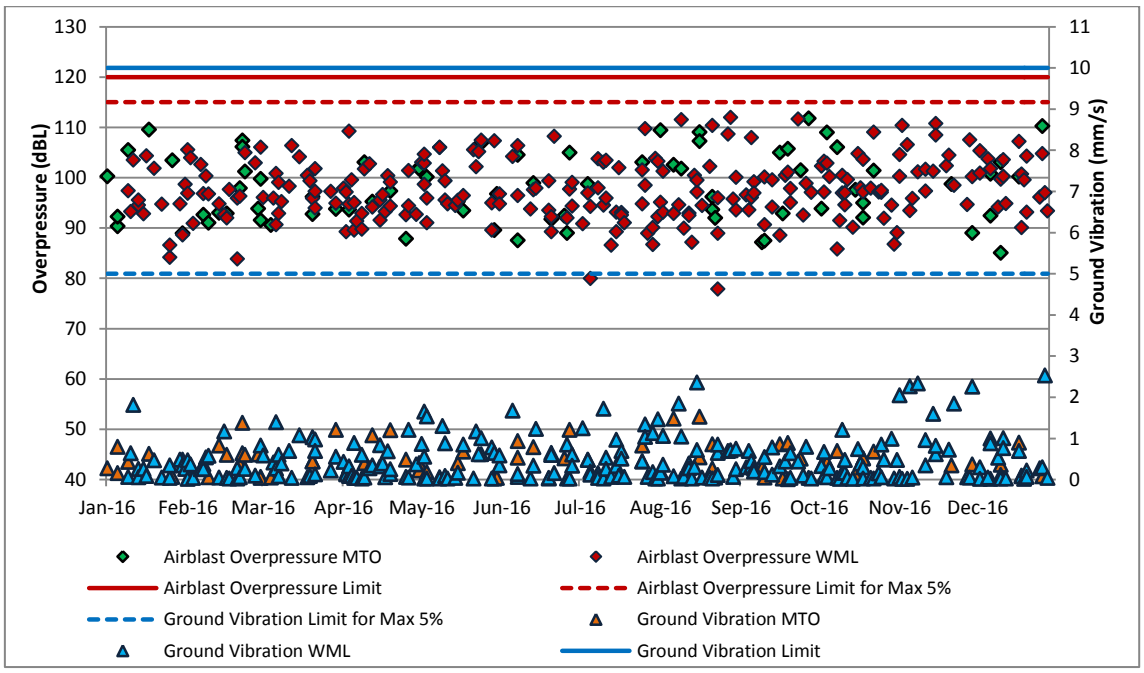

Figure 8: Wambo Road blast results

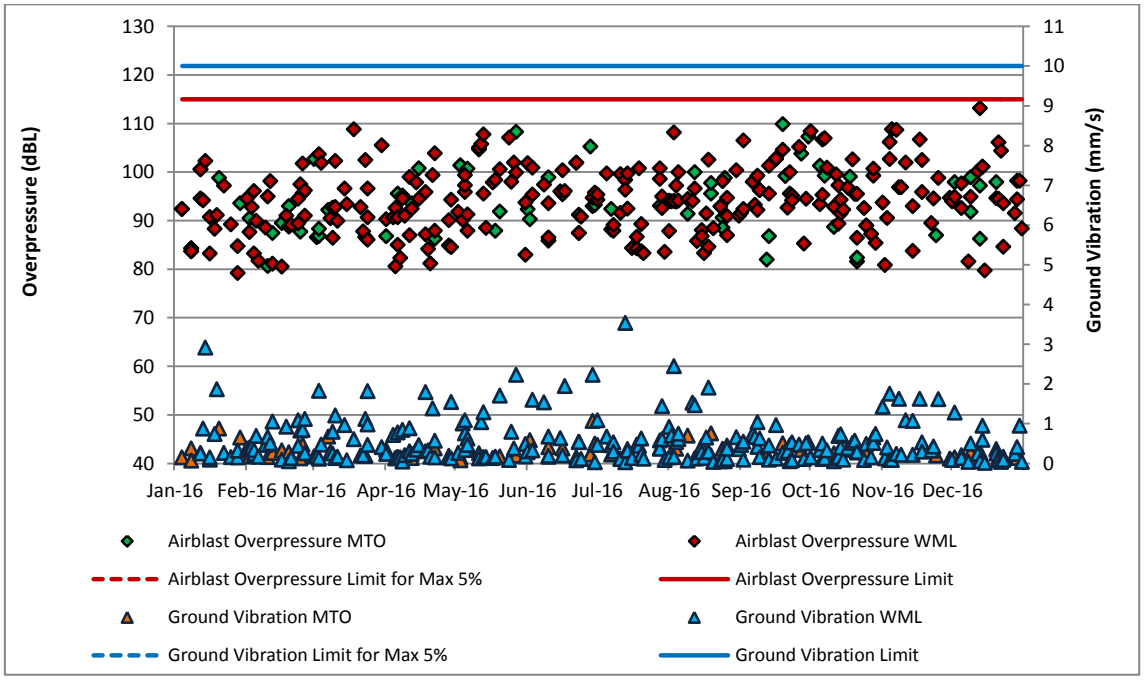

Figure 9: Warkworth blast results

6.3.3 Blast fume management

MTW operates a Post Blast Fume Generation Mitigation and Management Plan. This document outlines the practices to be utilised to reduce generation of post blast fume, and reduce potential offsite impact from any fume which may be produced. This includes risk assessment of the likelihood of fume production, specialised blasting design, appropriate product selection, on-bench water management, implementation of fume management zones and use of blasting permissions to identify likely path of any fume which may be produced.

All blasts are observed for fume and any fume produced is ranked according to the Australian Explosive Industry & Safety Group (AEISG) Scale.

During 2016, no blast produced visible post-blast fume ranking as Level 4 or Level 5 according to the AEISG Scale.

A category three blast fume event was notified to the DP&E on 2 December, in accordance with notification requirements specified in the MTW Blast Management Plan. Mines are required to notify the DP&E of Category 3 blasts if they are visible when leaving the mine boundary. A report was subsequently provided to DP&E for the event on 9 December 2016. The blast fume originated from a blast fired in the North Pit of the Warkworth mine. The plume left the MTW premises, crossing the Putty Road and Wollombi Brook at elevation, and dissipated on lands owned by MTW to the east of the Putty Road.

Rankings for visible blast fume according to the AEISG scale for shots fired during 2016 and comparison to rankings distribution during previous years is provided in Table 19.

Table 19: Visible blast fume rankings according to the AEISG colour scale

AEISG Ranking	2016	2015	2014
0	294	374	355
1	43	56	61
2	27	27	18
3	14	9	8
4	0	0	0
5	0	0	0
Total*	378	442	474

* Where a number of individual blasts were fired as a blast event fume was assessed for each individual blast pattern rather than for the event as a whole.

6.3.4 Comparison of Monitoring Results Against Previous Years' Performance and EA Predictions

Blasting results recorded in 2016 are similar to results recorded in previous years and are consistent with EA predictions.

6.4 Air Quality

6.4.1 Management

Air quality management at MTW is prescribed by the Air Quality Management Plan (available on the Rio Tinto Website), the management plan;

- Describes procedures required to ensure compliance with the Approval conditions relating to air quality including the measures that Coal & Allied will use to manage air quality.

- Details the management framework and mitigation actions to be taken while operating
- Provides a mechanism for assessing air quality monitoring results against the relevant impact assessment criteria.

6.4.2 Air Quality Performance

6.4.2.1 Real-Time Air Quality Management

MTW's real-time air quality monitoring stations continuously log information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger limits.

769 real-time alarms for air quality and wind conditions were received and acknowledged during 2016. In response 2,598.8 hours of equipment downtime was recorded due to air quality management. A detailed breakdown of air quality related equipment stoppages (per month, per equipment type) is presented in Figure 10.

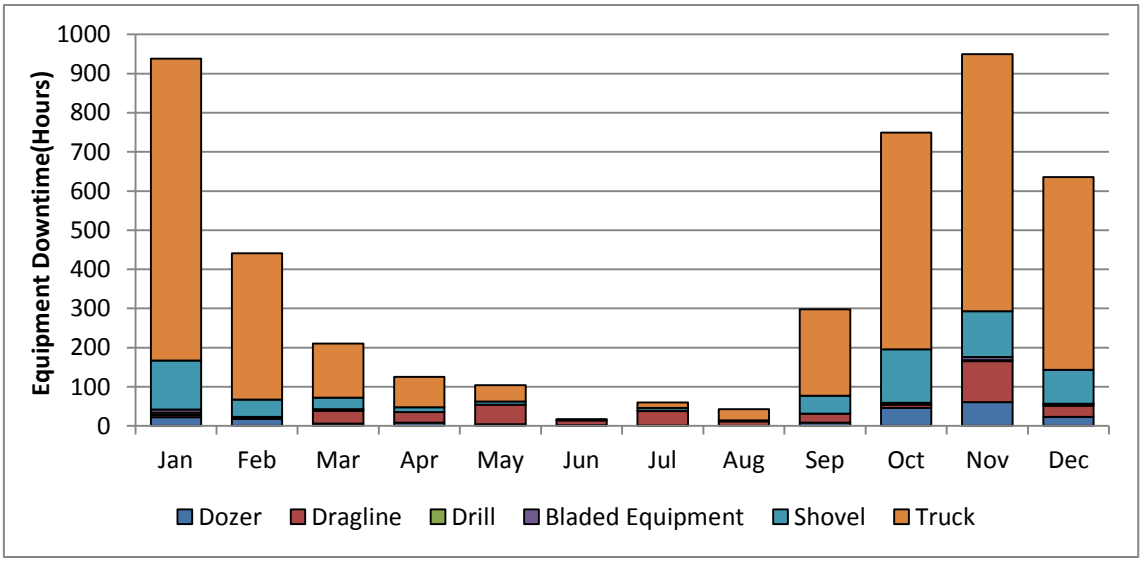

Figure 10: Equipment downtime for dust management by month

6.4.2.2 Temporary Stabilisation

Aerial Seeding was undertaken in early May 2016 by a fixed wing aircraft to provide temporary cover to areas exposed to wind-generated dust and erosion at MTW. Waste dumps and exposed areas were selected for seeding if they were not planned to be disturbed within six months. The 197 hectares of area seeded included waste dumps and ahead of mining disturbance (see Figure 11). All areas were seeded using an exotic pasture grass and legume mix suitable for autumn sowing. A starter fertiliser was mixed with the seed prior to loading to provide sufficient nutrients for plant growth.

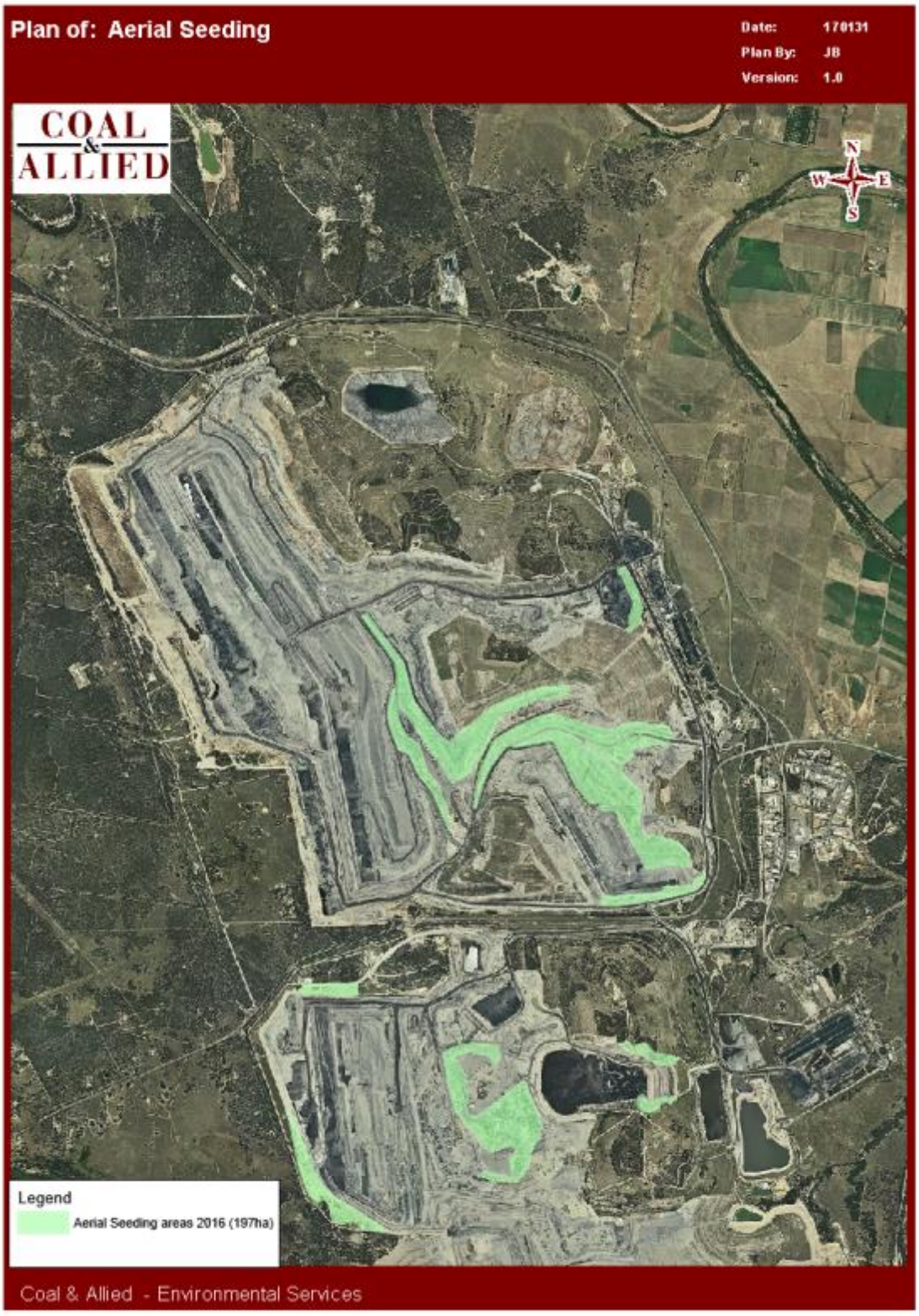

Figure 11: 2016 Aerial Seeding Areas

6.4.3 Air Quality Monitoring

Air quality monitoring at MTW is undertaken in accordance with the MTW Air Quality Monitoring Programme and protocol for evaluating non-compliances (http://www.riotinto.com/documents/MTW_Air_Quality_Management_Plan_160204_v3.2_APPROVED_reduced.pdf). The monitoring network comprises an extensive array of monitoring equipment which is utilised to assess performance against the relevant conditions of MTW's approvals. Air quality monitoring locations are shown in Figure 12. During 2016, MTW complied with all short term and annual average air quality criteria.

Air quality compliance criteria are shown in Table 20 and Table 21, along with a summary of MTW's performance against the criteria. Whilst MTW operates under two separate Planning Approvals the following compliance assessment has been undertaken on a 'whole of MTW site' basis, rather than individually assessing the contribution of each approval area to the measured results.

Air quality monitoring data is made publically available through the MTW Monthly Environmental Monitoring Report and daily data can be accessed on InSite (http://insite.riotinto.com).

During the reporting period the EPA undertook a programme to contemporise air quality monitoring requirements in the Hunter Valley. As a result MTW was required to commission additional air quality monitoring units (DustTraks) on the mine site boundary at upwind and downwind locations. Five DustTrak units have been established at the following locations:

- WML North Pit (EPA ID No. 9)
- Dragline Crossing (EPA ID No. 10)
- Heavy Vehicle Bridge (EPA ID No. 11)
- MTIE (EPA ID No. 12)
- MTO Boundary (EPA ID No. 13)

Following the commissioning of these additional sites the EPA removed the requirement to monitor High Volume Air Sampler (HVAS) TSP and depositional dust under EPLs 1376 and 1976. Mount Thorley Warkworth has sought approval of the Department of Planning and Environment to cease monitoring of HVAS PM10, TSP and depositional dust currently under consent conditions. The MTIE TEOM was removed on the 27 September 2016 from the MTW air quality monitoring network following the installation of the MTIE DustTrack Unit.

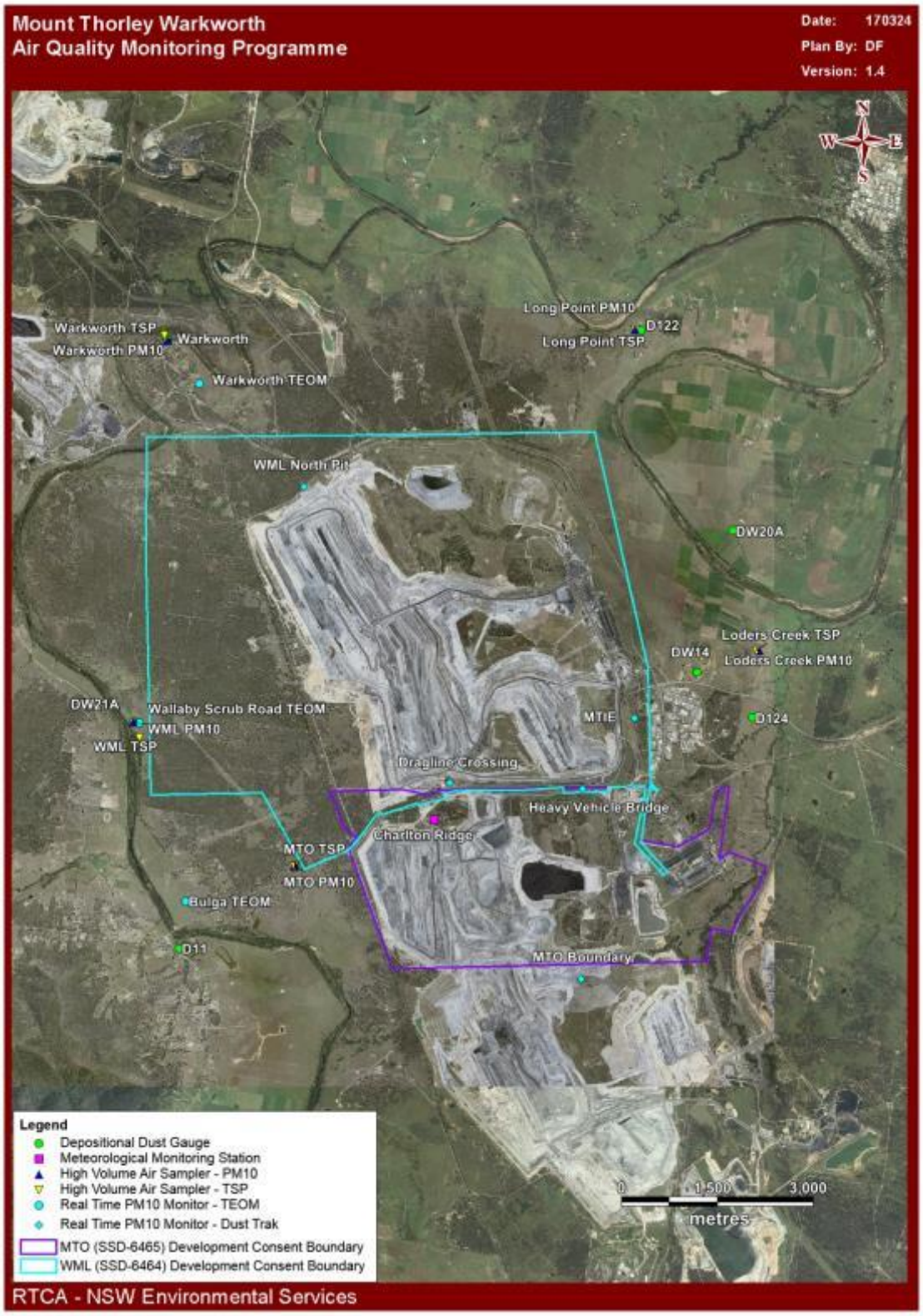

Figure 12: Air and Meteorological Monitoring Locations MTW 2016

Table 20: Air quality impact assessment criteria and 2016 compliance assessment

Pollutant	Criterion	Averaging Period	Compliance
Deposited Dust	4 g/m^2/month	Maximum total deposited dust level	100%
	2 g/m^2/month	Maximum increase in deposited dust level	100%
Total Suspended Particulate matter (TSP)	90 µg/m^3	Long Term (Annual)	100%
Particulate matter <10µm (PM_{10})	30 µg/m^3	Long Term (Annual)	100%
	50 µg/m^3	Short Term (24 hour)	100%

Table 21: Air quality land acquisition criteria and 2016 compliance assessment

Pollutant	Criterion	Averaging Period	Compliance
Deposited Dust	4 g/m^2/month	Maximum total deposited dust level	100%
	2 g/m^2/month	Maximum increase in deposited dust level	100%
Total Suspended Particulate matter (TSP)	90 µg/m^3	Long Term (Annual)	100%
Particulate matter <10µm (PM_{10})	30 µg/m^3	Long Term (Annual)	100%
	[a]150 µg/m^3	Short Term (24 hour)	100%
	[b]50 µg/m^3	Short Term (24 hour)	100%

[a] – Background PM_{10} concentrations due to all other sources plus the incremental increase in PM_{10} concentrations due to the mine alone
[b] – Incremental increase in PM_{10} concentrations due to the mine alone

6.4.3.1 Deposited Dust

Deposited dust is monitored at nine locations situated on, or representative of privately-owned land, in accordance with AS3580.10.1 (2003). The annual average insoluble matter deposition rates in 2016 compared with the impact assessment criterion and previous years' data is shown in Figure 13.

During 2016, all annual average insoluble matter deposition rates recorded on privately owned land were compliant with the long term impact assessment and land acquisition criteria. All monitoring locations also demonstrated compliance with the maximum allowable insoluble solids increase criteria of 2g/m2/month (Figure 14).

During 2016 monthly dust deposition rates equal to or greater than the long-term impact assessment criteria of 4g/m2/month were recorded at number of sites. Where field observations denote a sample as contaminated (typically with insects, bird droppings or vegetation), the results are excluded from Annual Average compliance assessment.

Meteorological conditions and the results of nearby monitors for the sampling period are also considered when determining MTW's level of contribution to any elevated result. Details of excluded results are presented in the relevant MTW Monthly Environmental Monitoring Report.

There was a substantial increase (1.5 g/m2/month) in depositional dust at D124 compared to 2015 levels. Six out of the required twelve sampling results for D124 were considered to be contaminated and therefore excluded from the annual average calculation. The other six results, which were used to produce the annual average, noted the presence of additional material (insects, bird droppings and vegetation), but not enough to deem the sample contaminated. There were no operational changes at MTW that are likely to have caused an increase of this magnitude. The magnitude of the increase is inconsistent with the next nearest deposition monitor DW14 and nearby Loders Creek TSP monitor.

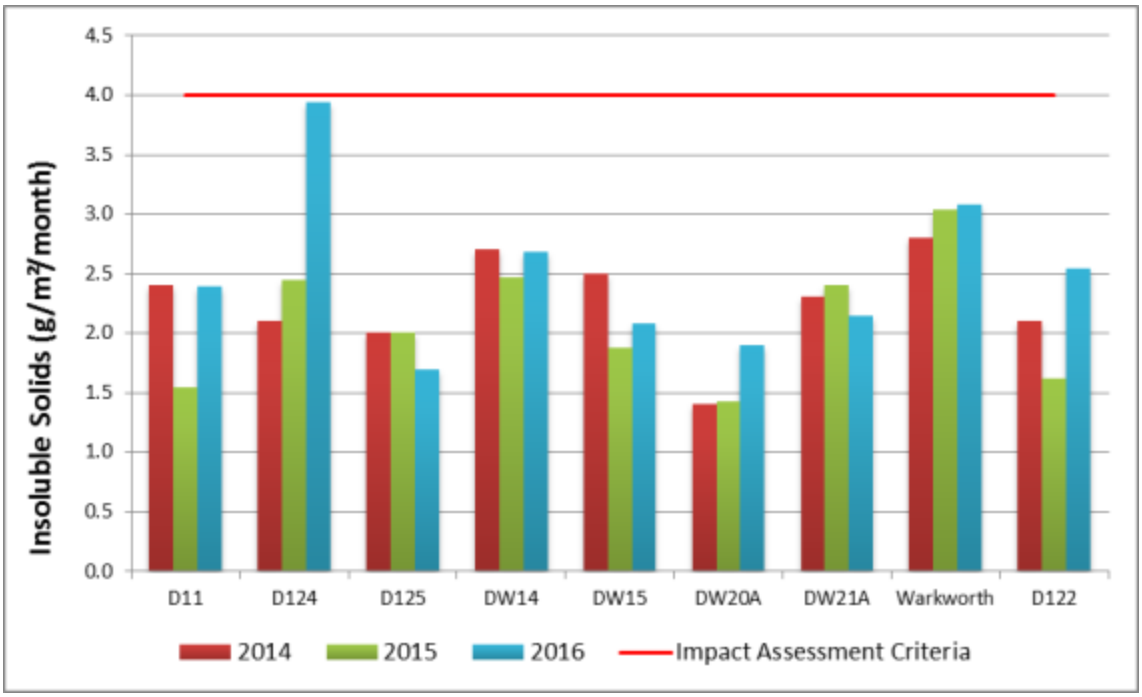

Figure 13: 2016 Depositional Dust results compared against the impact assessment criteria and previous years' results

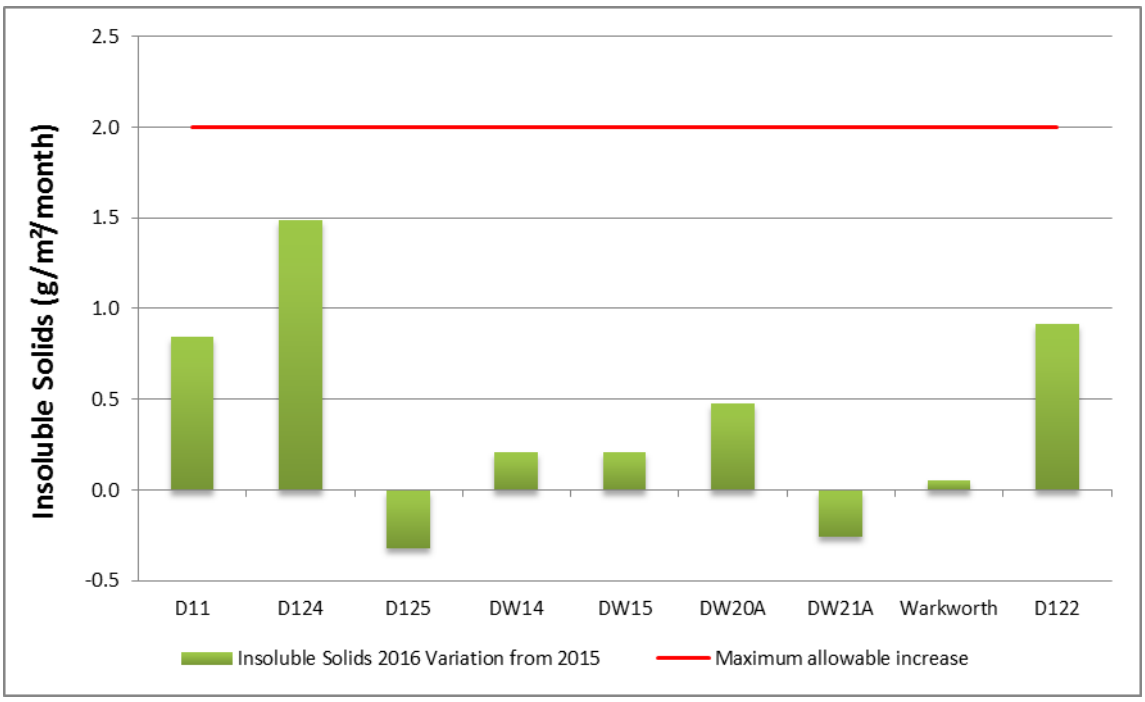

Figure 14: Variation in insoluble solids deposition rate from 2015 to 2016 compared against the impact assessment criteria

6.4.3.2 Total Suspended Particulates (TSP)

Total Suspended Particulates (TSP) are measured at five locations situated on or representative of privately owned land in accordance with AS3580.9.3(2003). Annual average TSP concentrations recorded in 2016 compared against the long term impact assessment criterion and previous years' data, are shown Figure 15. During 2016 all annual average results were compliant with the impact assessment and land acquisition criteria.

During the reporting period, 9 out of 305 TSP measurements were not able to be collected on the scheduled sampling date (based on a sampling frequency of every six days) due to power failures and technical issues with the monitors.

The annual average TSP concentrations recorded in 2016 are generally consistent with those recorded during previous years (Figure 15).

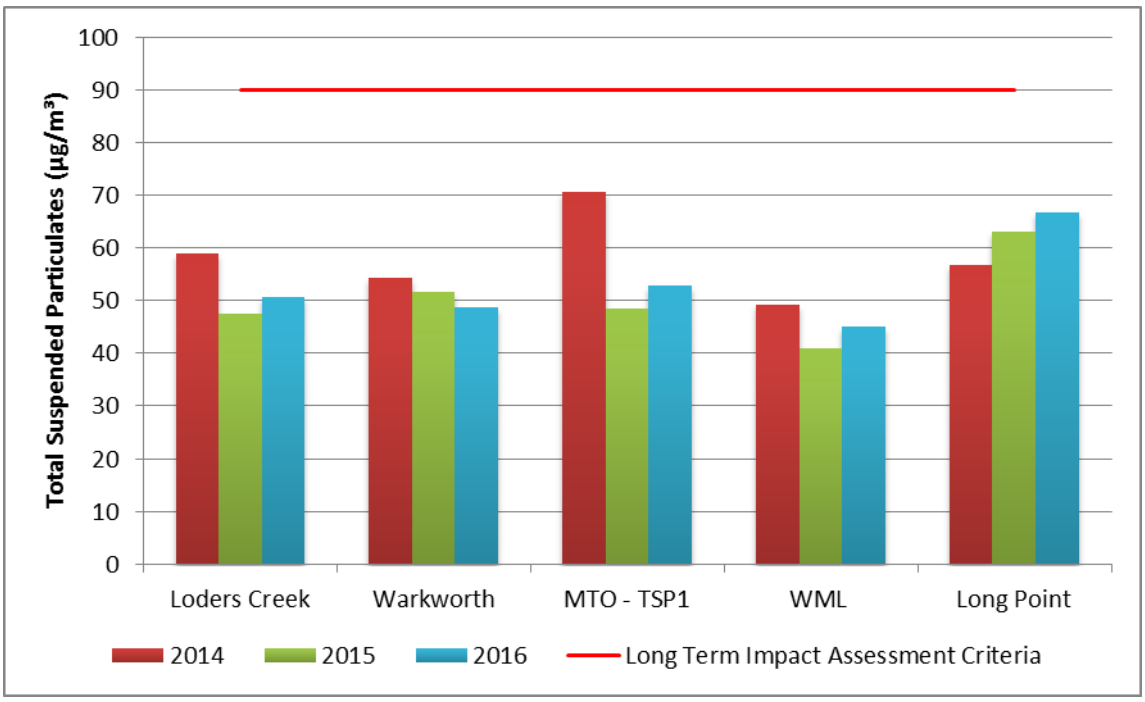

Figure 15: 2015 TSP Annual Average compared against the impact assessment criteria and previous years' results

6.4.3.3 Particulate Matter <10µm (PM_{10})

Compliance assessment for Particulate Matter <10µm (PM_{10}) is measured at five locations on privately owned land in accordance with AS3580.9.6 (2003). During 2016, all short term and annual average results were compliant with the impact assessment and land acquisition criteria.

6.4.3.4 Short term PM_{10} impact assessment criteria

Monitoring results for PM_{10} (24 hour) collected through the High Volume Air Sampler monitoring network are compared against the short term impact assessment criteria (Figure 16). All 24hr average results recorded by MTW's surrounding network of TEOM monitors are presented on a quarterly basis in Figure 17 to Figure 20.

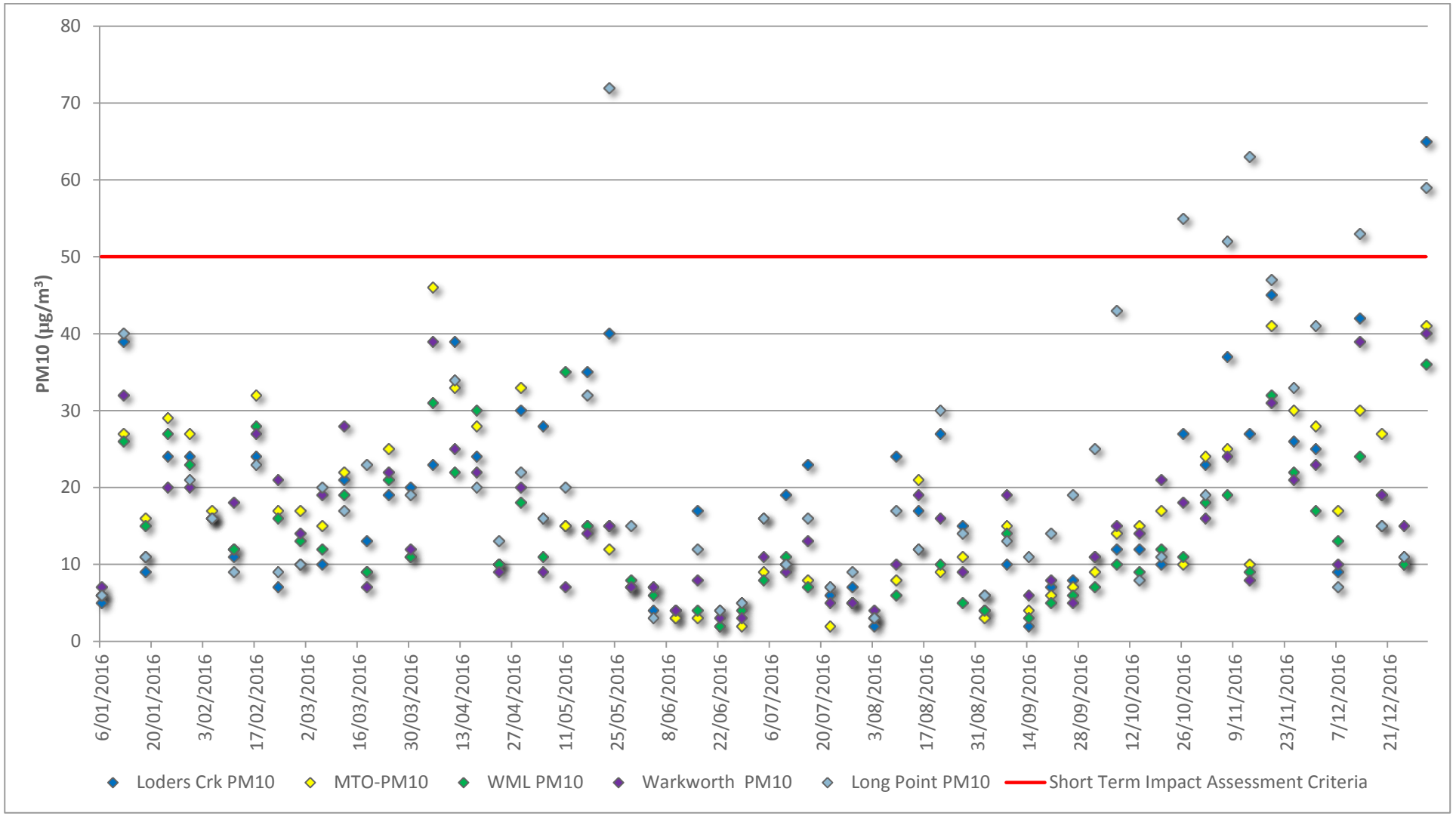

Figure 16: PM_{10} 24hr monitoring results (measured by MTW PM_{10} HVAS network)

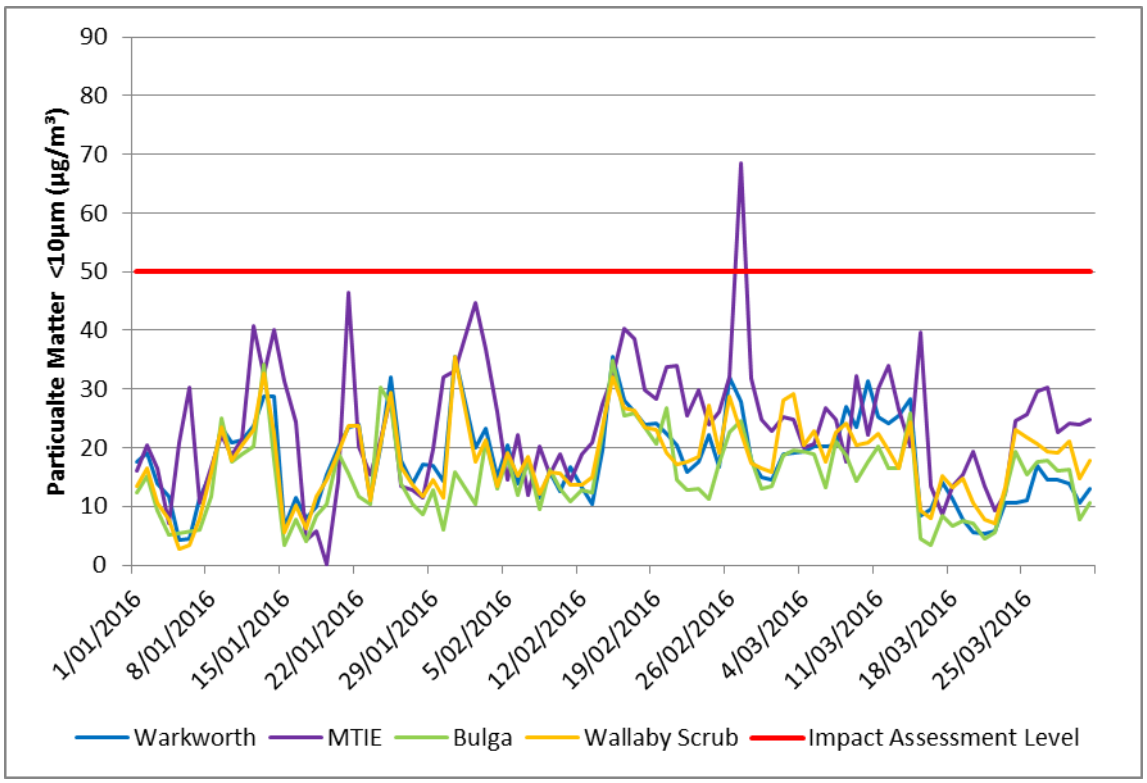

Figure 17: 24hr average PM_{10} measured at TEOM monitors surrounding MTW - Quarter One 2016

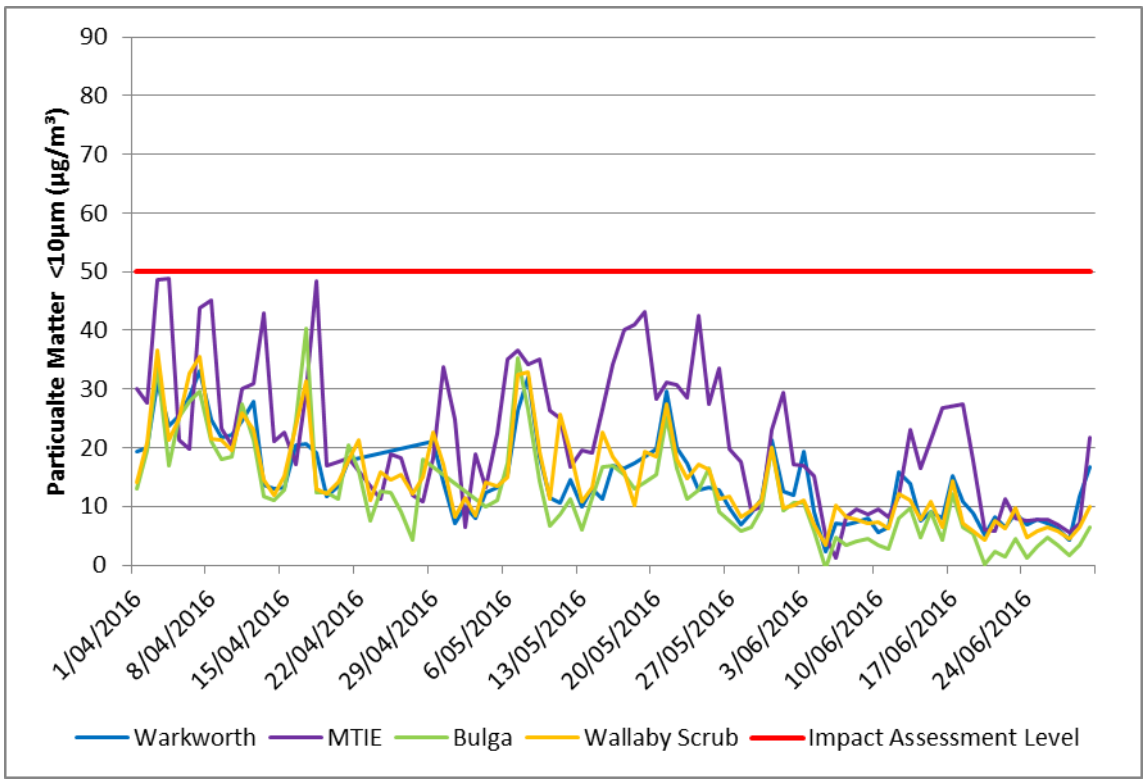

Figure 18: 24hr average PM_{10} measured at TEOM monitors surrounding MTW - Quarter Two 2016

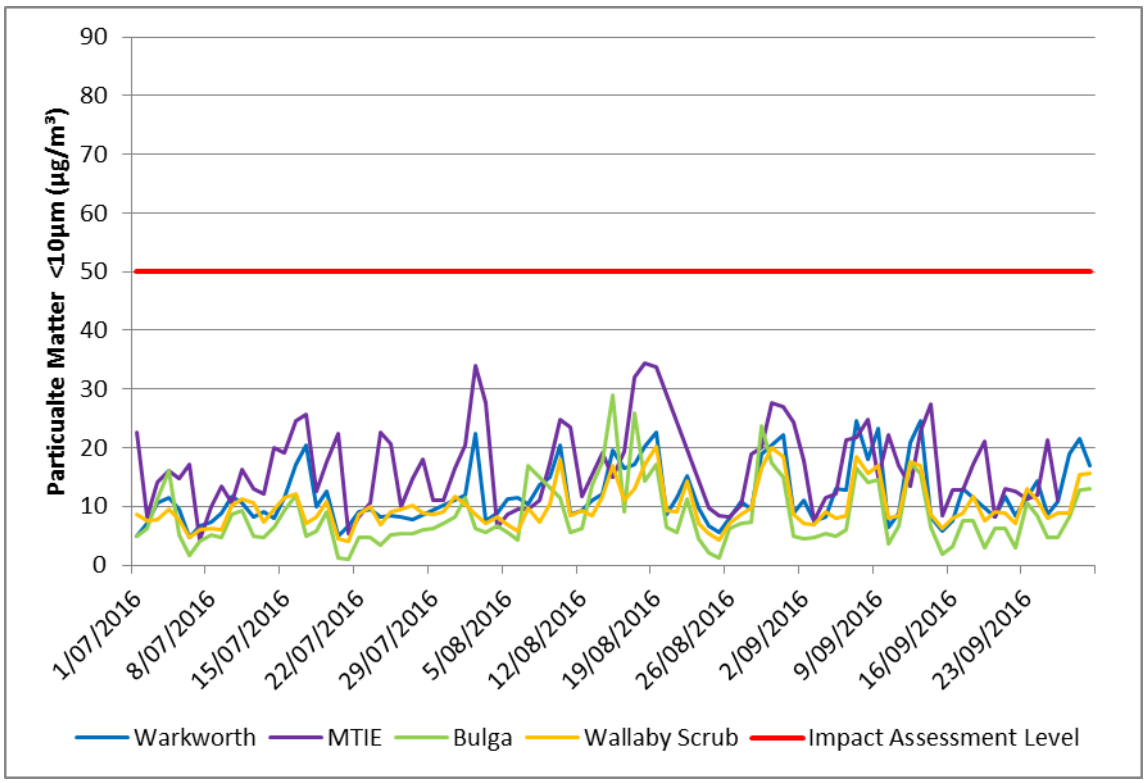

Figure 19: 24hr average PM_{10} measured at TEOM monitors surrounding MTW - Quarter Three 2016

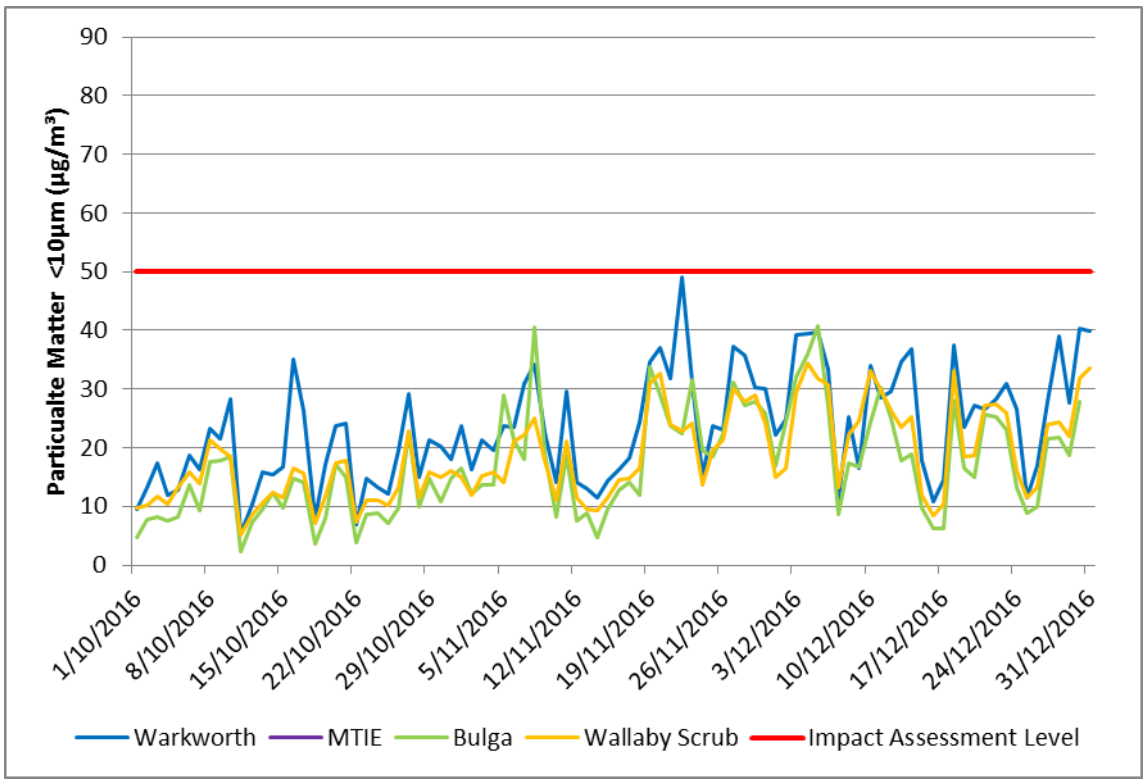

Figure 20: 24hr average PM_{10} measured at TEOM monitors surrounding MTW - Quarter Four 2016

Seven high volume air samples and one TEOM PM_{10} measurements exceeded the 24 hour short term impact assessment criteria during the reporting period. Each was investigated to determine the level of contribution from MTW activities in accordance with the compliance protocol outlined in the MTW Air Quality and Greenhouse Gas Management Plan. The DP&E were notified of each exceedance and an investigation undertaken. All recorded exceedances were determined to be compliant with the relevant criterion.

A summary of the investigations undertaken for each short term PM_{10} exceedance are provided in Table 22.

Table 22 : 24 hour PM_{10} investigations - 2016

Date	Site	24hr PM_{10} result ($\mu g/m^3$)	Estimated contribution from MTW ($\mu g/m^3$)	Discussion
27/02/2016	Mount Thorley Industrial Estate TEOM	68.6	25.4	Internal investigation has determined the maximum potential MTW contribution to the result to be in the order of 25.4$\mu g/m^3$ or ~37% of the measured result, determined by assessing contribution due to meteorological conditions.
23/05/2016	Long Point HVAS PM10	72	-	An analysis of meteorological data has determined that the Long Point monitoring location was upwind of MTW throughout the day. Therefore it is unlikely that MTW operations contributed to the result and thus an estimation of contribution has not been calculated.
26/10/2016	Long Point HVAS PM10	55	-	An analysis of meteorological data has determined that the Long Point monitoring location was upwind of MTW throughout the day. Therefore it is unlikely that MTW operations contributed to the result and thus an estimation of contribution has not been calculated.
7/11/2016	Long Point HVAS PM10	52	-	An analysis of meteorological data has determined that the Long Point monitoring location was upwind of MTW throughout the day. Therefore it is unlikely that MTW operations contributed to the result and thus an estimation of contribution has not been calculated.
13/11/2016	Long Point HVAS PM10	63	-	An analysis of meteorological data has determined that the Long Point monitoring location was upwind of MTW throughout the day. Therefore it is unlikely that MTW operations contributed to the result and thus an estimation of contribution has not been calculated.
13/12/2016	Long Point HVAS PM10	53	-	An analysis of meteorological data has determined that the Long Point monitoring location was upwind of MTW throughout the day. Therefore it is unlikely that MTW operations contributed to the result and thus an estimation of contribution has not been calculated.
31/12/2016	Long Point HVAS PM10	59	23	Internal Investigation determined maximum potential MTW contribution to be 39% of the measured result. As the calculated contribution was less than 75% of the measured result MTW operations are not considered to be a significant contributor to the result as described in the MTW Air Quality Management Plan.

31/12/2016	Loders Creek HVAS PM10	65	-	An analysis of meteorological data has determined that the Long Point monitoring location was upwind of MTW throughout the day. Therefore it is unlikely that MTW operations contributed to the result and thus an estimation of contribution has not been calculated.

6.4.3.5 Long term PM_{10} impact assessment criteria

Annual average PM_{10} concentrations have been compared with the long term PM_{10} impact assessment criterion and previous years' data (Figure 21). All annual average PM_{10} concentrations recorded on privately owned land were compliant with the assessment criterion. All monitoring locations except Warkworth recorded minor increases in PM_{10} compared to 2015. This is likely attributable to decrease in rainfall in comparison to 2015.

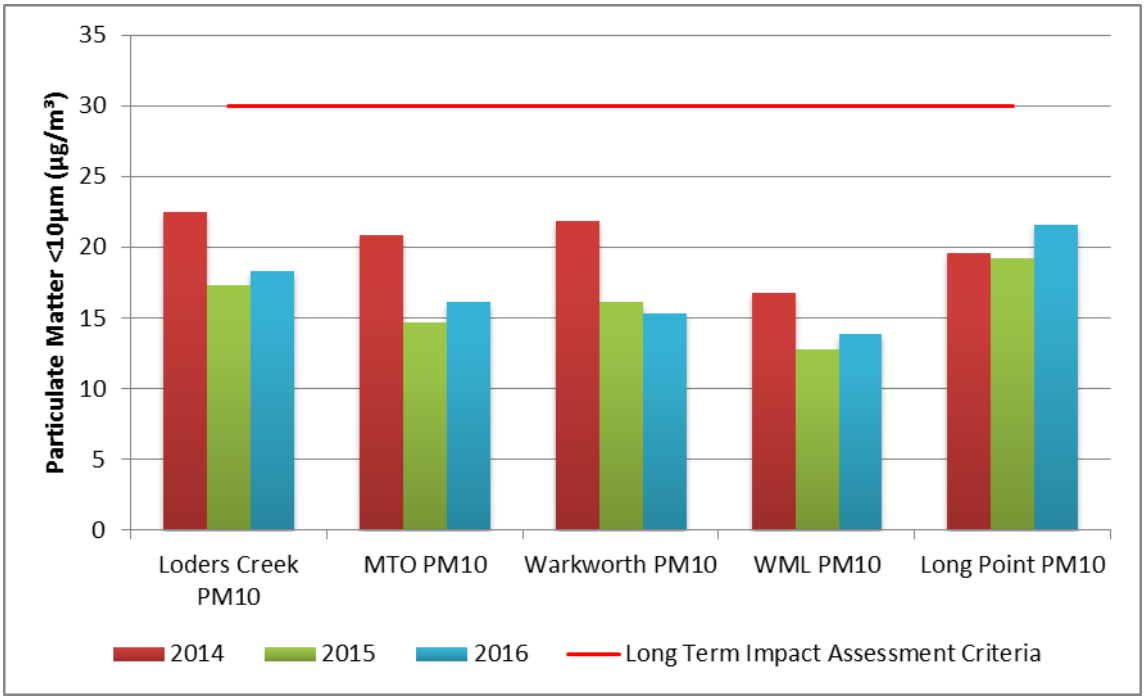

Figure 21: Annual average HVAS PM_{10} results 2014 to 2016

6.4.3.6 Comparison of 2016 Air Quality data against EA predictions

Table 23 and Table 24 show a comparison between 2016 air quality data and the predictions made in the 2014 Warkworth Continuation Environmental Impact Statement (EIS). Comparisons have been made against the predictions listed in the EIS for Year 3 (2017) for the nearest private residence to each monitoring location.

Annual average PM_{10}, with the exception of Long Point, were consistent with the modelled range for Year 3 of the development (nominally 2017). Long Point PM_{10} recorded an annual average result of 21.6µg/m³, marginally exceeding the predicted annual average (16µg/m³). Given prevailing winds in the Hunter Valley and the location of the monitor relative to MTW operations it is unlikely that the measured increases are a direct result of MTW activity.

Table 23: 2016 PM_{10} Annual Average results compared against cumulative predictions for Years 3 - Warkworth Continuation EIS (2014).

Monitoring Location	Long Term (annual average) PM_{10} criteria	
	Year 3 ($\mu g/m^3$)	2016 Annual Average ($\mu g/m^3$)
MTO PM_{10}	23	16.1
Loders Creek PM_{10}	19	18.3
WML PM_{10}	16	13.8
Warkworth PM_{10}	30	15.3
Long Point PM_{10}	16	21.6

TSP annual averages at all monitoring locations except Warkworth TSP were higher than modelled predictions for the Year 3 scenario, but generally consistent with previous years. The difference between modelled predictions and the measured result can be explained as a function of model inputs which do not account for TSP contribution from regional particulate events such as bushfires, stock movement, dust from local roads and driveways and agricultural activity.

Table 24: 2016 TSP Annual Average results compared against Cumulative Predictions for Year 3 – Warkworth Continuation EIS (2014).

Monitoring Location	Long Term (annual average) TSP criteria	
	Year 3 ($\mu g/m^3$)	2016 Annual Average ($\mu g/m^3$)
MTO TSP1	52	53.0
Loders Creek TSP	43	50.6
WML- HV2a	39	45.3
Warkworth	65	48.8
Long Point	38	66.9

6.5 Heritage Summary

6.5.1 Aboriginal Heritage

6.5.1.1 Aboriginal Archaeological and Cultural Heritage Investigations

One Aboriginal cultural heritage assessment was conducted at MTW in 2016, in accordance with the OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. This assessment, in the form of a salvage mitigation program, was conducted on the 15th-16th February 2016. The salvage activities took place within the Stage 1 AHMP Area, to the West of the existing West Pit. A total of 18 sites were salvage mitigated during this work program.

In addition to this salvage mitigation program, a total of two ACHMP compliance inspections were conducted during 2016: between the 18th-19th February and between the 11th-14th October. These compliance inspections were conducted by representatives of the

Aboriginal community selected by Coal & Allied and were assisted by internal personnel. A total of 87 Aboriginal cultural heritage sites were inspected during the February compliance inspection program, with a further 15 cultural heritage sites being inspected during the October 2016 program. One new Aboriginal cultural heritage site was identified and recorded into the Coal & Allied internal CH database during the October audit.

The Coal & Allied Upper Hunter Valley Aboriginal Cultural Heritage Working Group (CHWG) is the primary forum for Aboriginal community consultation on matters pertaining to cultural heritage. The CHWG is comprised of representatives from Rio Tinto Coal Australia and Registered Aboriginal Parties (RAPs) from Upper Hunter Valley Aboriginal native title and community groups, corporations and individuals. The CHWG met and discussed cultural heritage management matters associated with MTW on seven occasions during 2016: on 21st January, 17th March, 28th April, 9th June, 11th August, 20th October and 15th December.

6.5.1.2 Audits and Incidents

During the reporting period there were 62 GDPs assessed for cultural heritage management considerations at MTW. Ground disturbance works were conducted on an Aboriginal cultural heritage sites avoidance basis so that no extant sites were impacted by these activities. There were no incidents nor any unauthorised disturbance caused to Aboriginal cultural heritage sites at MTW during 2016.

Two non-CHMS audits were conducted during the 2016 period, in the form of a Communities and Social Performance (CSP) and an independent MTW Environmental audit. No Cultural Heritage or Historic Heritage findings or observations were recorded during these audits.

6.5.2 Historic Heritage

6.5.2.1 Historic Heritage Activities

In 2012 Rio Tinto Coal Australia established the Community Heritage Advisory Group (CHAG) as a community consultation forum for all matters pertaining to management of historic (non-Indigenous) heritage located on Rio Tinto Coal Australia lands. The CHAG is comprised of community representatives with particular knowledge and interests in the historic heritage of the region such as historical groups, individuals and local government. The CHAG met five times over 2016 to discuss the results and recommendations arising from historic heritage surveys conducted over the entirety of MTW mining leases, and following one meeting on the 12th August 2016 a site tour was conducted to visit several of the historic sites of particular interest or concern to the CHAG and broader historic community.

There were no incidents nor any unauthorised disturbance caused to historic heritage sites at MTW during 2016.

6.6. Visual Amenity and Lighting

6.6.1. Management

MTW aims to minimise visual amenity impacts from its operations. Two of the main controls used are lighting management and visual screening

Lighting

MTW aims to provide sufficient lighting for work to be undertaken safely, whilst minimising disturbance to neighbouring residents and public roads, particularly nearby residents in Bulga Village, Mount Thorley, Warkworth Village, Long Point, and Milbrodale; and vehicular traffic on the Putty Road and Golden Highway. MTW has developed and implemented a work instruction which describes management of lighting to minimise light spillage and glow during both mining operations and periods of construction at MTW.

Actions undertaken in 2016 to manage lighting impacts include:

- Regular inspections conducted by Community Response Officers to observe operating practices and to ensure lights are not shining towards nearby residential areas or affecting public roads. Lights are checked each shift and if they are believed to adversely impact the public methods of control are identified and implemented.
- Yellow lights are used in preference to white lights in areas based on risk and external exposure.
- Alternate sheltered dumps are operated or work areas are shut down if lighting or visual amenity issues arise and cannot be sufficiently managed.
- In late 2016 a management strategy for lighting plants was implemented in the Tipping and Dumping Strategy. This ensures that there is a clear accountability and process for lighting emplacement on dumps to avoid intrusive lighting to our near neighbours.

Visual Screening

Visual screening of MTW operations uses various methods to best suit the terrain and infrastructure constraints around the boundary of the mine.

The first preference for visual mitigation is to retain existing vegetation where it provides an effective visual screen. This has a number of benefits including maintaining established visual screening, ecological communities and landscape character. Where necessary existing vegetation will be augmented with additional planting to enhance or maintain the screening effect.

Bunding has an immediate screening effect, providing complete screening in areas where vegetation would be inadequate to filter views or where additional height is required. Bunds will be vegetated for visual amenity and to mitigate erosion.

Built screens (i.e. solid fences or walls) will be used as an alternative when bunds and tree screens are not practicable. Temporary screens (i.e. fencing and shade mesh) will be used as required for interim screening.

A Visual Screening Plan was developed in 2016 in consultation with Singleton Council. In accordance with this plan an earthen bund was constructed to screen Warkworth's southern operations from view of Putty Road. This represented the first stage of visual screening from Putty road with construction of the bund to continue with progression of mining. The bunds will be vegetated.

Visual amenity was also improved on the eastern side of Warkworth with continuation of rehabilitation in this area.

6.7. Waste

6.7.1. Management

The management of waste generated on the site is undertaken in accordance with Coal & Allied's Total Waste Management System which is designed to track and record all wastes leaving the site to meet regulatory requirements.

Non-hazardous waste not suitable for recycling is removed by a licensed contractor and disposed of at the Singleton Council Landfill, or other appropriate licensed facilities. Co-mingled recyclable non-hazardous wastes are removed by a licensed contractor where wastes are sorted for further recycling.

Hydrocarbon wastes are managed and recycled in accordance with Coal & Allied's environmental work instruction for non-mineral waste management. Hydrocarbon waste is recycled via a licensed waste hydrocarbon disposal company.

The sewage treatment and disposal facilities at MTW consist of packaged sewage treatment plants which treat, disinfect and dispose, or re-use the treated effluent on site.

All waste management contractors working at MTW are licensed by the EPA.

6.7.2. Performance

During the reporting period MTW continued to undertake regular inspections of areas where wastes are generated and stored, to reinforce the principles of good waste management including waste segregation and maximising recycling.

In 2016 around 19 per cent of non-mineral waste material generated at MTW was disposed to licensed offsite landfill facilities, with the remaining wastes diverted to recycling or secondary use pathways.

There were no non-compliances or complaints related to waste management in 2016.

7. WATER MANAGEMENT

7.1. Water Balance

7.1.1. Water Management

An adaptive management approach is implemented at MTW to achieve the following objectives for water management:

- Fresh water usage is minimised;
- Impacts on the environment and MTW neighbours are minimised; and
- Interference to mining production is minimal.

This is achieved by:

- Preferentially using mine water for coal preparation and dust suppression where feasible;
- An emphasis on control of water quality and quantity at the source;
- Segregating waters of different quality where practical;
- Recycling on site water;
- Ongoing maintenance and review of the water management system; and
- Releasing water to the environment in accordance with statutory requirements.

Plans showing the layout of all water management structures and key pipelines are shown in Figure 22. The MTW Water Management Plan contains further detail on management practices and is available on the Rio Tinto website.

Improvements to water management in 2016 have focused on reducing the risk of unauthorised water releases from site. Civil works commenced in 2010 to construct a diversion drain along the toe of the Abbey Green rehabilitation area (Mt Thorley), to direct clean water runoff to an unnamed tributary of Loders Creek and segregate from haul road runoff. Works are scheduled for completion in 2017. Sediment and erosion control upgrade works were completed at the 'Boral Shed" area at MTO adjacent to the Putty Rd.

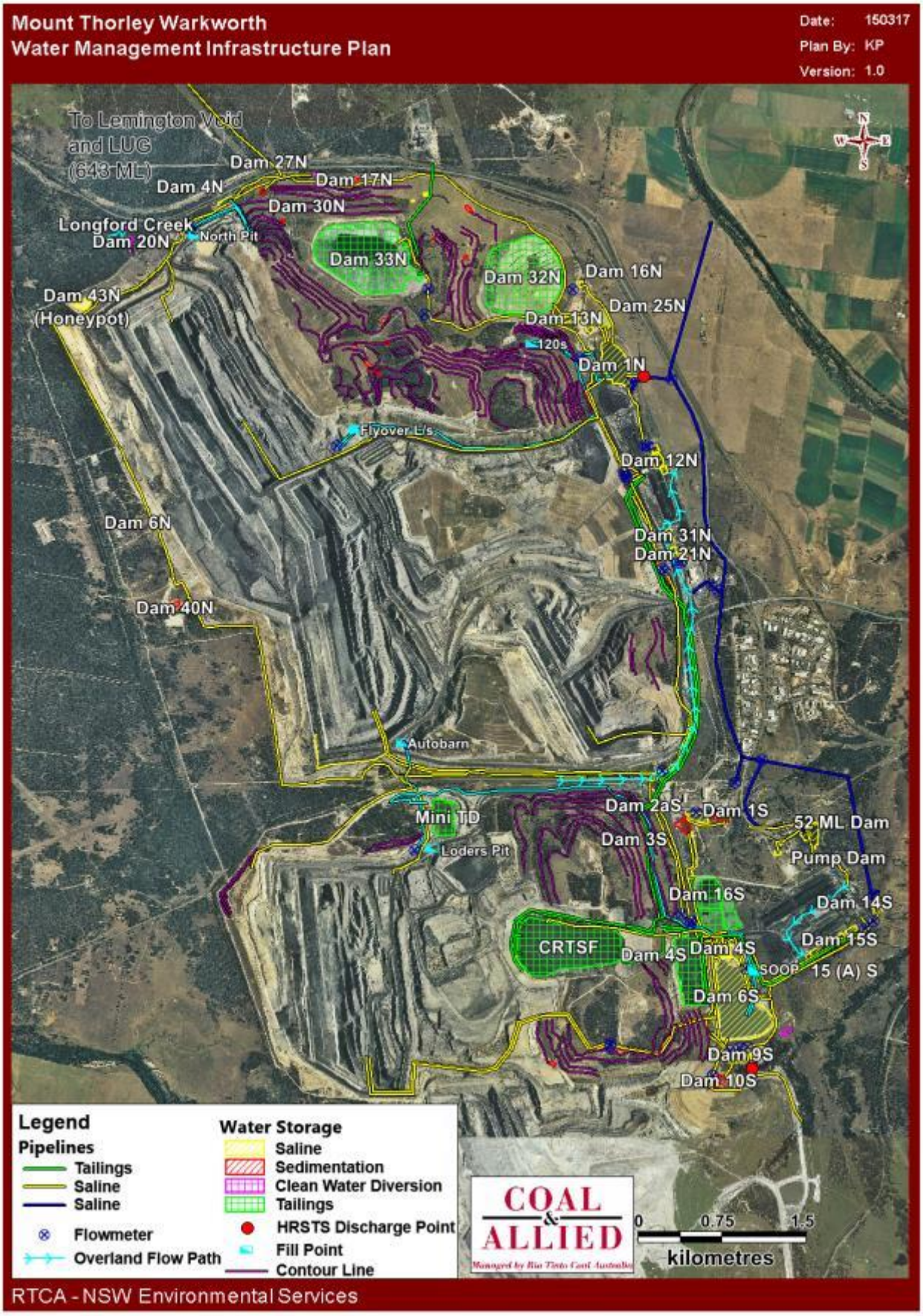

Figure 22: Water Management Infrastructure Plan

7.1.2. Water Performance

7.1.2.1. Water Balance

MTW uses a water balance to record and assess water flux, but also to forecast and plan water management needs. These annual site water balances are then compared to previous results. A 2016 static water balance for MTW is presented in Table 25 and a simplified schematic of this balance is included as Figure 23. A salt flux schematic is shown in Figure 24.

Table 25: Static Model Results, annual water balance

Water Stream	Volume (ML) (% Total)
Inputs	
Rainfall Runoff	5,028 (70%)
Hunter River (MTJV supply scheme)	407 (6%)
Potable (Singleton Shire Council / trucked)	23 (<1%)
Groundwater	262 (4%)
Recycled to CHPP from tailings (not included in total)	4,063
Imported (LUG bore)	339 (5%)
Water from ROM Coal	1,073 (15%)
Total Inputs	**7,132**
Outputs	
Dust Suppression	2,990 (36%)
Evaporation – mine water dams	1,210 (15%)
Entrained in process waste	1,801 (22%)
Discharged (HRSTS)	195 (2%)
Water in coarse reject	698 (8%)
Water in product coal	1,378 (16%)
Miscellaneous use (wash-down etc.)	110 (1%)
Total Outputs	**8,382**
Change in storage (decreased)	**1250**

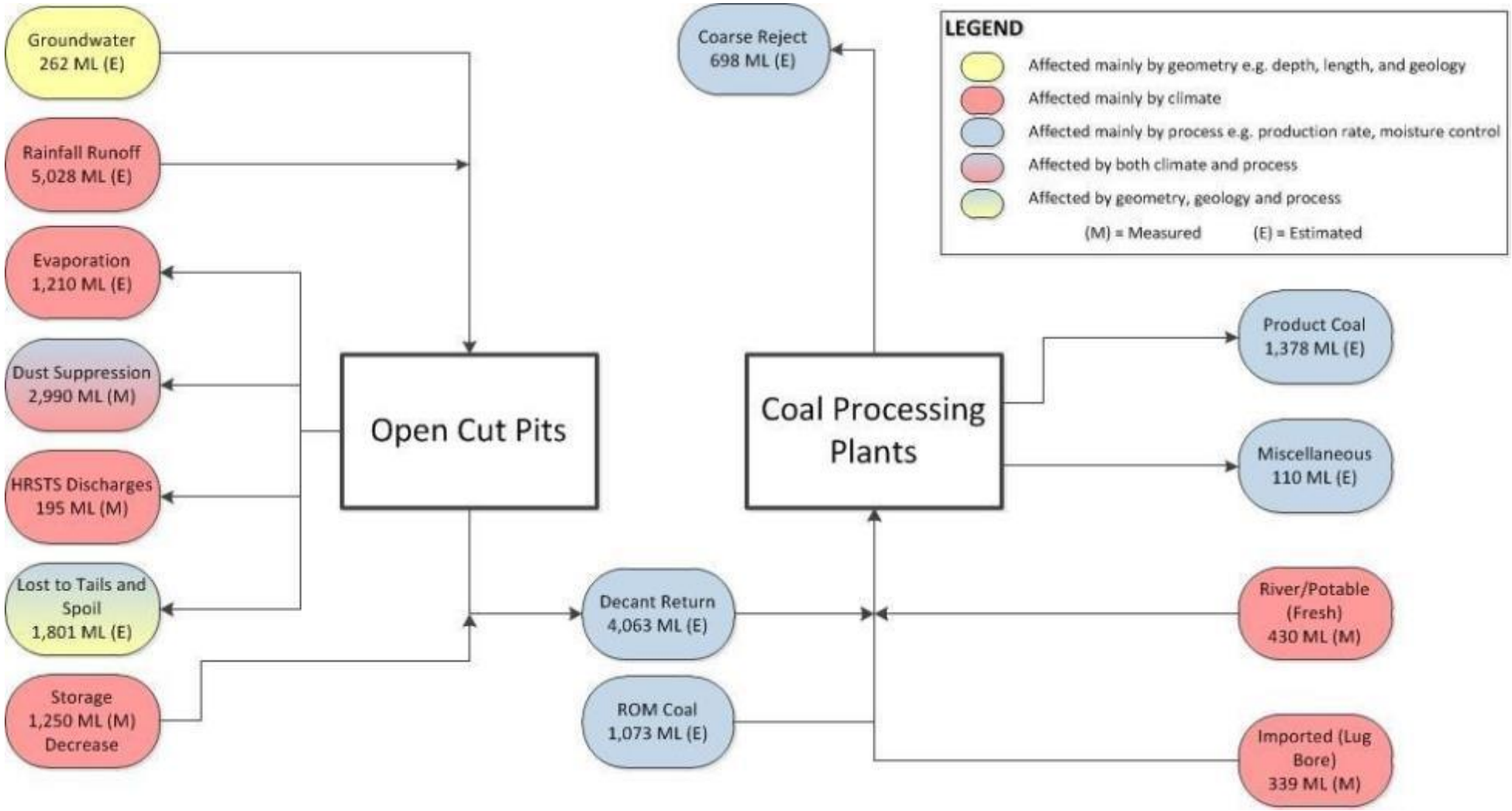

Figure 23: Schematic Diagram MTW Water Flux

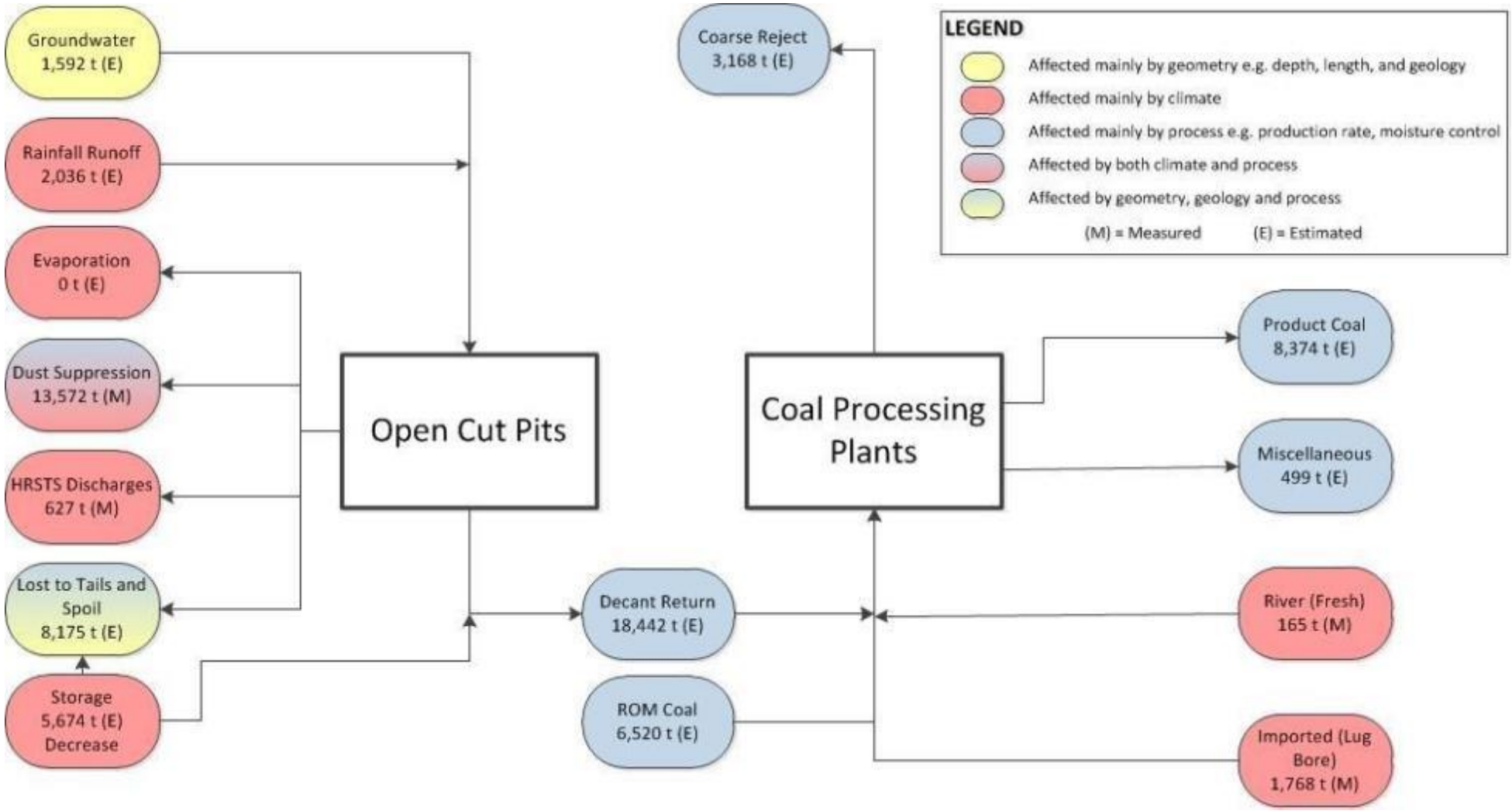

Figure 24: Schematic Diagram MTW Salt Flux

7.1.2.2. Water Inputs

A total of 664.2 mm of rainfall was recorded at MTW in 2016 producing a calculated 5,028 ML of runoff from developed, disturbed and mining catchments. Water falling on clean water catchments is diverted off site into natural systems where possible. Rainfall runoff was the largest input to the site mine water balance in 2016.

As the site water inventory is drawn down, water is imported to meet site demand. A small volume of water (339 ML) was abstracted from the LUG Bore during the reporting period. No mine water was imported from neighbouring mines during 2016.

MTW is able to source water from the Hunter River via the Mount Thorley Joint Venture (MTJV) water supply scheme. Singleton Shire Council holds the high security water licence on behalf of the scheme members. Singleton Shire Council maintains and operates the scheme to supply raw water to MTW, Glencore's Bulga-Beltana complex, and to meet Council's own needs. MTW's share of the scheme allocation is 1,012 ML per financial year. A total of 407 ML of water was abstracted during the reporting period to augment site supplies, with the majority utilised for ancillary (non-mining purposes).

Abstraction of water from the Hunter River in 2016 increased by 236 ML compared to 2015. The increase in abstraction is due to a failure of the pump in the LUG bore during November, necessitating the unplanned take of increased volumes of water from the river in December. Water take by source is listed in Table 9.

Groundwater Licences under Part 5 of the *Water Act 1912* are held for each mining excavation area, to account for passive take via seepage inflows. Bore licences 20BL170011 (Mount Thorley Pit) and 20BL170012 (Warkworth Pit) were converted to Water Access Licences, issued under the *Water Management Act 2000*, in late 2016. Water Licences held by MTW are detailed in Table 8 and Table 9.

Licence conditions require the volume and quality of water taken by the works to be measured and reported on an annual basis. Groundwater inflows via pit wall seepage are at low rates, with a significant proportion evaporating at the coal face. The remainder reports to the pit floor, where it may accumulate along with direct rainfall, rainfall runoff and leakage from spoils. As a result it is not possible to physically measure the volume of water taken by these groundwater licences, nor the quality of waters extracted via seepage to the pits. In line with the Statement of Commitments listed in the 2014 Warkworth Continuation Environmental Impact Statement, a formal review of depressurisation of coal measures and alluvium will be undertaken annually, commencing with the 2016 reporting period. A copy of this review is given in Appendix 5.

7.1.2.3. Water Outputs

Significant water uses at MTW in 2016 were for dust suppression on haul roads, mining areas and coal stockpiles (2,990ML), evaporation from Dams (1,210ML) and water entrained in Process Waste (1,801ML).

MTW participates in the Hunter River Salinity Trading Scheme (HRSTS) allowing it to discharge from licensed discharge points during declared discharge events associated with increased flow in the Hunter River. HRSTS discharges are undertaken in accordance with HRSTS regulations, EPL 1376 and EPL 1976. MTW maintains two licensed HRSTS discharge monitoring locations:

- Dam 1N, located at WML North, which discharges to Doctor's Creek
- Dam 9S, located at MTO South, which discharges to Loders Creek.

As required by the EPLs, MTO and WML submitted an HRSTS discharge report for the 2015/16 financial year. A total of 195 ML of excess water was discharged off site during 2016 via the Hunter River Salinity Trading Scheme (HRSTS). There were no non-compliances related to HRSTS discharges during the reporting period.

7.2. Surface Water

7.2.1. Water Management

Surface water monitoring activities continued in 2015 in accordance with the MTW Water Management Plan and MTW Surface Water Monitoring Programme. MTW maintains a network of surface water monitoring sites located at selected site dams and surrounding natural watercourses, see Figure 25. Water quality monitoring is undertaken to verify the effectiveness of the water management system onsite, and to identify the emergence of potentially adverse effects on surrounding watercourses. Primary water storage dams are monitored routinely to verify the quality of mine water, used in coal processing, dust suppression, and other day to day activities around the mine.

Surface water monitoring data review involves a comparison of measured pH, EC and TSS results against internal trigger values which have been derived from the historical data set. The response to measured excursions outside the trigger limits is detailed in the MTW Water Management Plan.

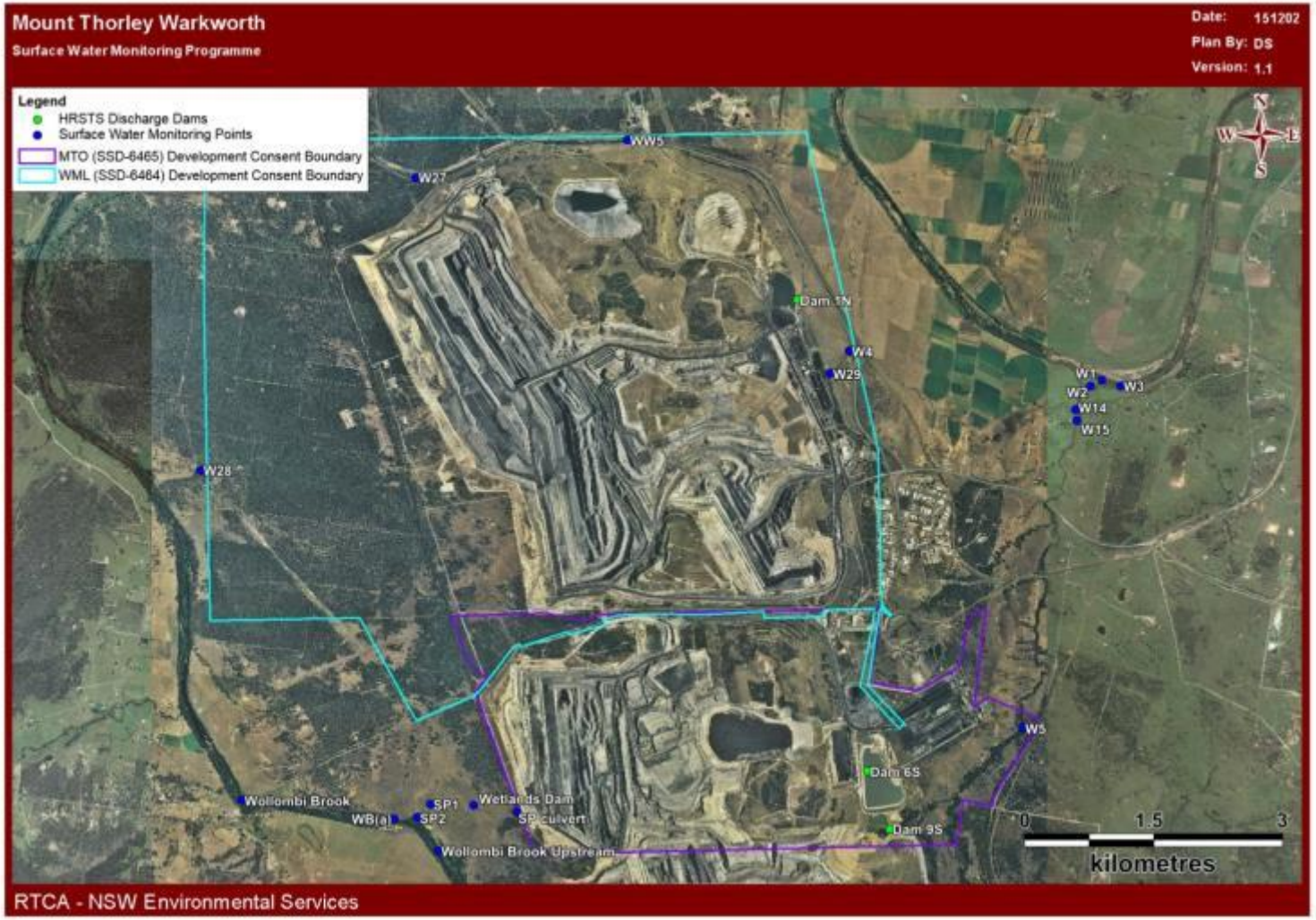

Figure 25: Surface Water Monitoring Points

7.2.2. Surface Water Monitoring

Routine surface water monitoring was undertaken from 21 sites. Sampling of surface waters was carried out in accordance with AS/NZS 5667.6 (1998). Analysis of surface water was carried out in accordance with approved methods by a NATA accredited laboratory.

Water quality is evaluated through the assessment of pH, Electrical Conductivity (EC) and Total Suspended Solids (TSS). All surface water sites were also sampled for comprehensive analysis annually. The sampling frequency for ephemeral water sites was modified in 2016, from quarterly to a rain-event trigger system, in an effort to ensure samples taken were more representative of typical water quality for those streams (up to eight sampling events per annum can now be taken under the revised sampling protocol). Due to dry conditions during the reporting period fewer sampling runs were completed than in 2015 (two instead of four), however there was a marked improvement in data recovery as sites were not recorded as dry during the monitoring event. All required sampling and analysis was undertaken, except as detailed in Table 26. Trigger tracking results are described in Table 27.

Table 26: MTW Water Monitoring Data Recovery for 2015 (by exception)

Location	Data Recovery (%)	Comment
W28	50%	No safe access to site in January
WW5	50%	Site recorded as dry in March and December

A summary of all surface water monitoring results is provided in the MTW Monthly Environmental Monitoring Reports, and can be viewed via the Rio Tinto website.

Figure 26 to Figure 31 show long term water quality trends for the Hunter River, Wollombi Brook, other surrounding tributaries and site dams. Measurements of EC and pH were generally stable during the reporting period and consistent with historical seasonal trends. Electrical conductivity shows an increasing trend during 2016 in site Dams 6S and 9S; drier weather conditions resulted in evapo-concentration of salts in mine water, combined with reduced fresh-water inputs from rainfall runoff.

A number of TSS trigger limits were exceeded in January, June and September, following significant runoff associated with rainfall events; these are outlined below in Table 27. Trigger tracking results are provided where three consecutive measurements of EC or pH are recorded; there were no instances of repeated exceedances of these measures during the reporting period. These are provided in the Monthly reports given on the Rio Tinto website.

Table 27: Surface Water Monitoring - Trigger Tracking Results

Location	Date	Trigger Limit	Action taken in response
W1	08/09/2016	**TSS – 50mg/L (ANZECC criteria)**	Elevated TSS associated with a high-flow event in the river at the time, resulting in mobilisation of sediment upstream of MTW. Consistent with nearby downstream W3 measurement. No further action.
W3	08/09/2016	**TSS – 50mg/L (ANZECC criteria)**	Elevated TSS associated with a high-flow event in the river at the time, resulting in mobilisation of sediment. Consistent with nearby upstream W1 measurement, suggesting no significant contribution from MTW via Loders or Doctors Creek. No further action.
W4	06/01/2016	**TSS – 50mg/L (ANZECC criteria)**	Elevated TSS associated with high runoff due to rainfall event (106mm of rain recorded from 3/01/2016 to 6/01/2016). Consistent with upstream sample W29 (49 mg/L at W29 vs 55 mg/L at W4); no mine site sources of sediment identified. No follow up required.
	22/06/2016		Elevated TSS associated with high runoff due to rainfall event (59mm of rain recorded 4/06/2016 to 6/06/2016). Re-assess following next event based sampling run and undertake field investigations where repeat exceedance identified.
W14	06/01/2016	**TSS – 50mg/L (ANZECC criteria)**	Elevated TSS associated with high runoff due to rainfall event (106mm of rain recorded 3/01/2016 to 6/01/2016). Upstream sample W29 indicates contribution of sediment from catchment downstream of the mine. No follow up required.
W15	06/01/2016	**TSS – 50mg/L (ANZECC criteria)**	W15: Elevated TSS associated with high runoff due to rainfall event (106mm of rain recorded 3/01/2016 to 6/01/2016). W5 was not on the revised rain event sampling protocol at the time so unable to compare with upstream sediment levels. There was no operational change or activities at the mine to suggest this would have been mine related. Monitoring programme to be updated to include W5 on rain event sampling protocol.
W27	06/01/2016	**TSS – 50mg/L (ANZECC criteria)**	Elevated TSS associated with high runoff due to rainfall event (106mm of rain recorded 3/01/2016 to 6/01/2016). Review of site indicates upstream erosion and sediment controls in place and compliant. No follow up required.
W28	22/06/2016	**TSS – 50mg/L (ANZECC**	Elevated TSS associated with high runoff due to rainfall event (59mm of rain recorded

Location	Date	Trigger Limit	Action taken in response
		criteria)	4/06/2016 to 6/06/2016). TSS recorded is consistent with historical trend; sample taken from dam, not flowing at time of sampling. Re-assess following next event based sampling run.
W29	22/06/2016	**TSS – 50mg/L (ANZECC criteria)**	Elevated TSS associated with high runoff due to rainfall event (59mm of rain recorded 4/06/2016 to 6/06/2016). Re-assess following next event based sampling run and undertake field investigations where repeat exceedance identified.

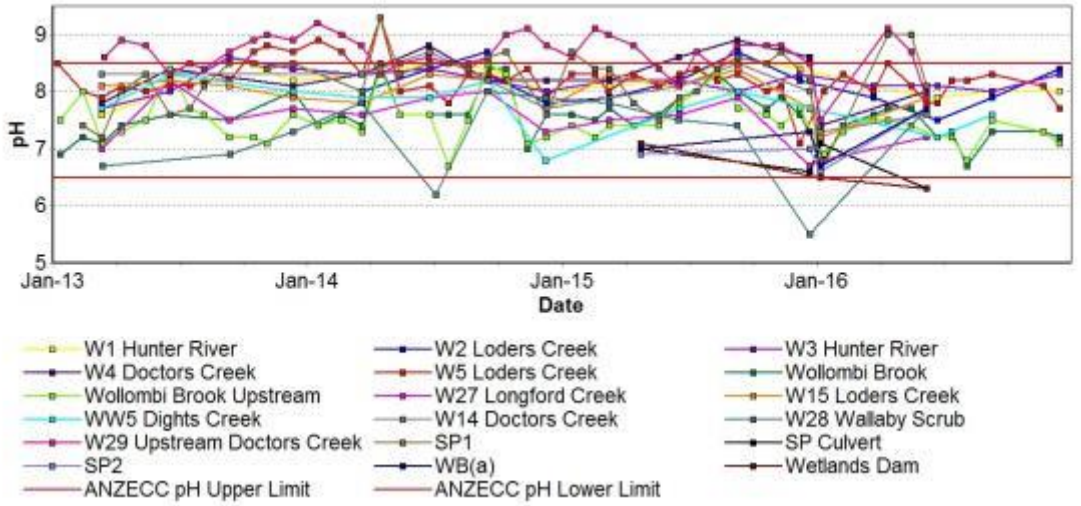

Figure 26: Watercourse pH Trends 2013 to 2016

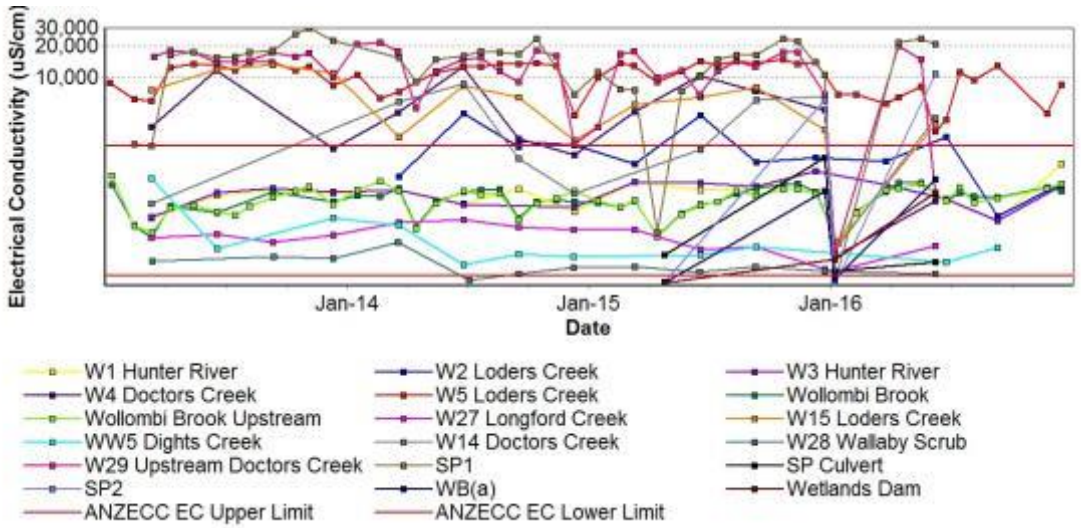

Figure 27: Watercourse EC Trends 2013 to 2016

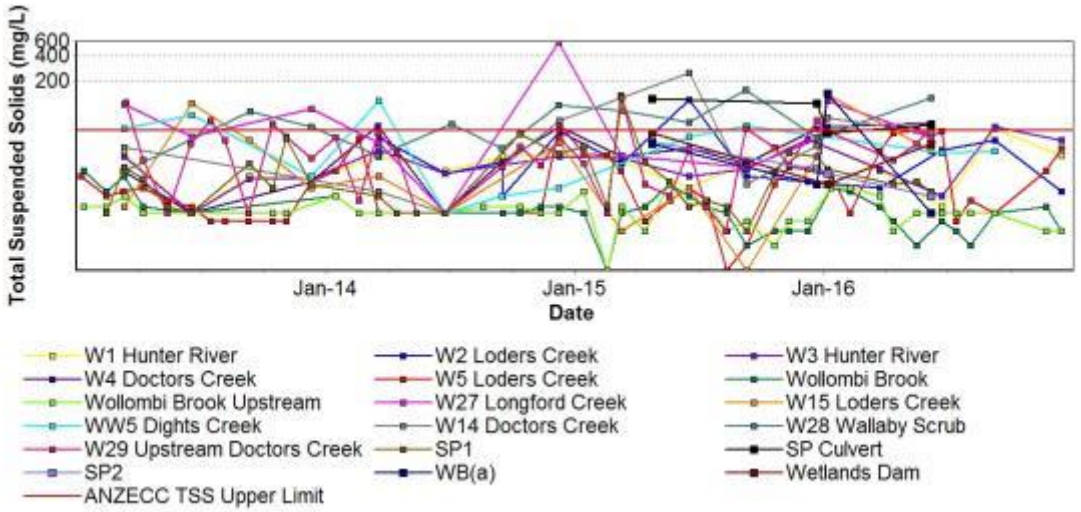

Figure 28: Watercourse TSS trends 2013 to 2016

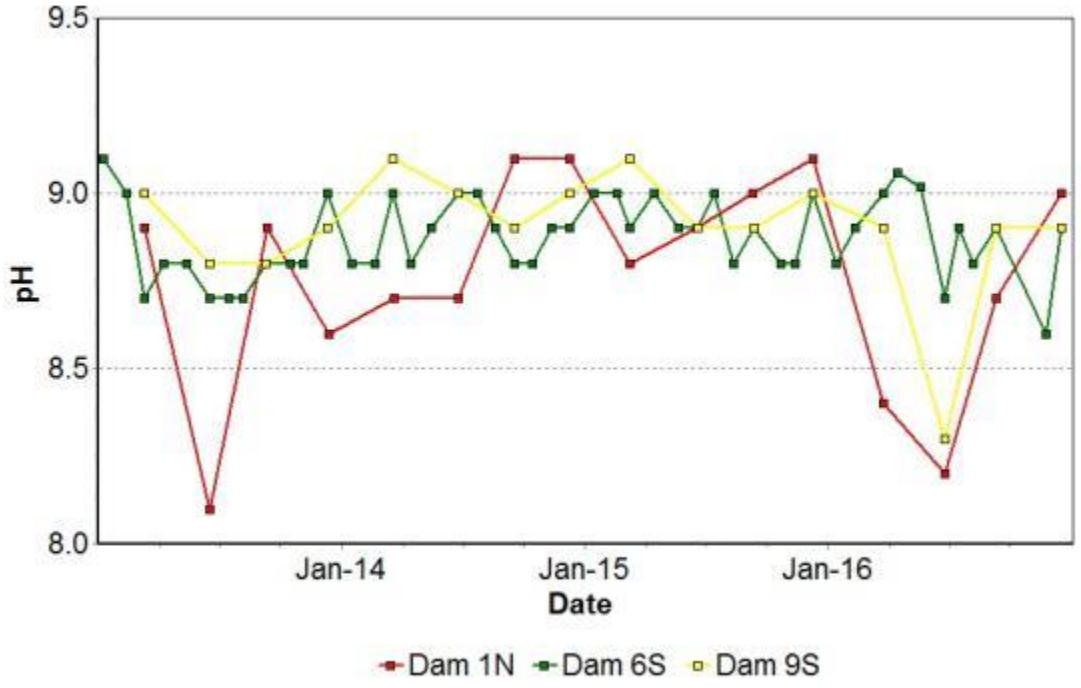

Figure 29: Site Dams pH trends 2013 to 2016

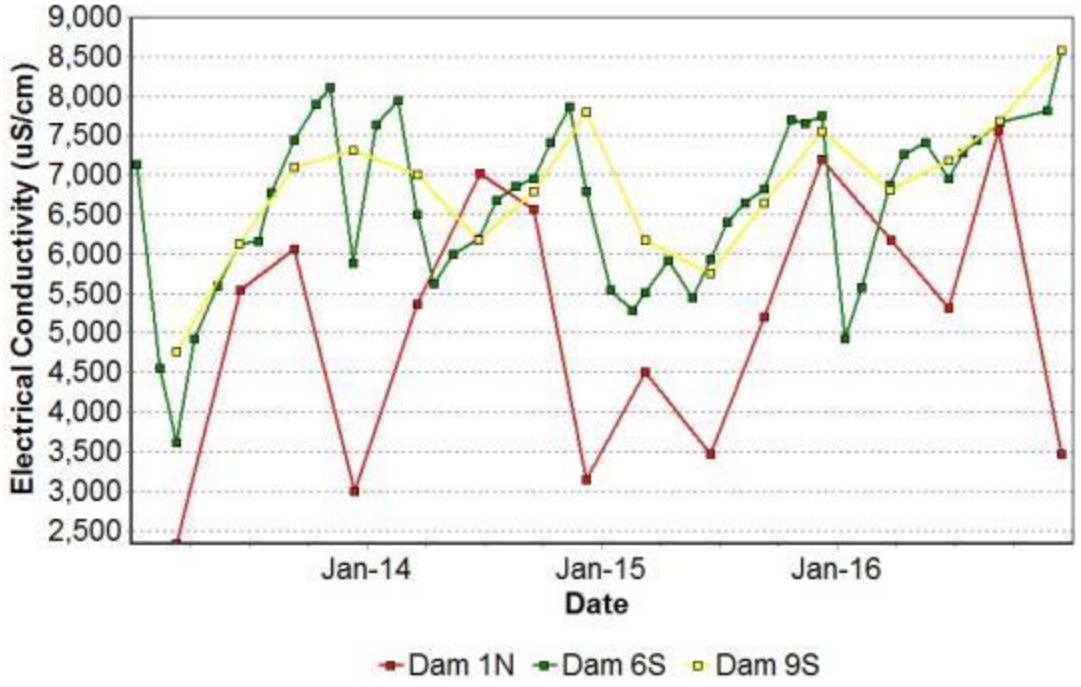

Figure 30: Site Dams EC trends 2013 to 2016

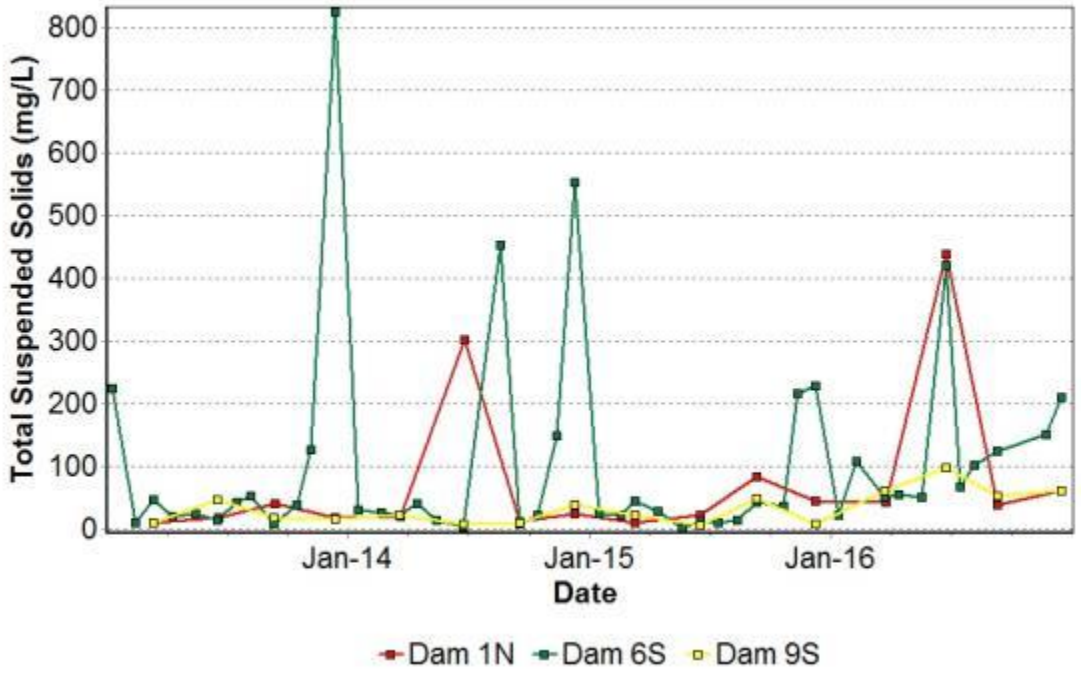

Figure 31: Site Dams TSS trends 2013 to 2016

7.2.3. Stream Health and Channel Stability

A programme to monitor and report on the stream and riparian vegetation health in Loders Creek and Wollombi Brook potentially affected by the development commenced in 2016, with baseline surveys completed.

Monitoring includes the following:

- Documenting locations and dimensions of significant erosive or depositional features;
- Photographs upstream, downstream, at both the left and right banks;
- Rating the site with the Ephemeral Stream Assessment protocol developed by the CSIRO to assess the erosional state of the creek at the monitoring location (a measure of channel stability);
- Rating the site with the Rapid Appraisal of Riparian Condition protocol developed by Land & Water Australia. This assesses the ecological condition of riparian habitats using indicators that reflect functional aspects of the physical, community and landscape features of the riparian zone (a measure of stream health); and
- Taking measurements of the channel cross-sections (transects) for comparison purposes for any future monitoring.

Results in 2017 will be compared to baseline data to monitor their condition over time and reported in the next Annual Review.

7.2.4. Audits and Reviews

An independent environmental audit of the Mount Thorley Operations and Warkworth Mining Operations was undertaken in January 2016. There were no findings related to surface water. A full summary of findings is given in Chapter 10.

As part of the NSW whole-of-government approach to minimising the impact of tailings, waste water holding and sedimentation dams ("dams") on the environment, a cross agency environmental compliance audit program commenced in September 2016 at a selection of NSW mine sites. The program focused on dam compliance and was conducted by the NSW Environment Protection Authority (EPA), the Department of Planning and Environment (DPE) and the Resources Regulator within the NSW Department of Industry. Mount Thorley Operations was audited in October 2016; a report is expected in early 2017.

7.3. Groundwater

7.3.1. Groundwater Management

Groundwater monitoring activities were undertaken in 2016 in accordance with the MTW Water Management Plan and groundwater monitoring programme. The monitoring results are used to establish and monitor trends in physical and geochemical parameters of surrounding groundwater potentially influenced by mining.

The groundwater monitoring programme at MTW measures the quality of groundwater against background data, EIS predictions and historical trends. Ground water quality is evaluated through the parameters of pH, EC, and standing water level. A comprehensive suite of analytes are measured on an annual basis, including major anions, cations and metals. Prior to sampling for comprehensive analysis, bore purging is undertaken to ensure a representative sample is collected.

Groundwater monitoring data is reviewed on a quarterly basis. The review involves a comparison of measured pH and EC results against internal trigger values (5th and 95th percentile) which have been derived from the historical data set. The response to measured excursions outside the trigger limits is detailed in the MTW Water Management Plan.

The monitoring locations are shown in Figure 32.

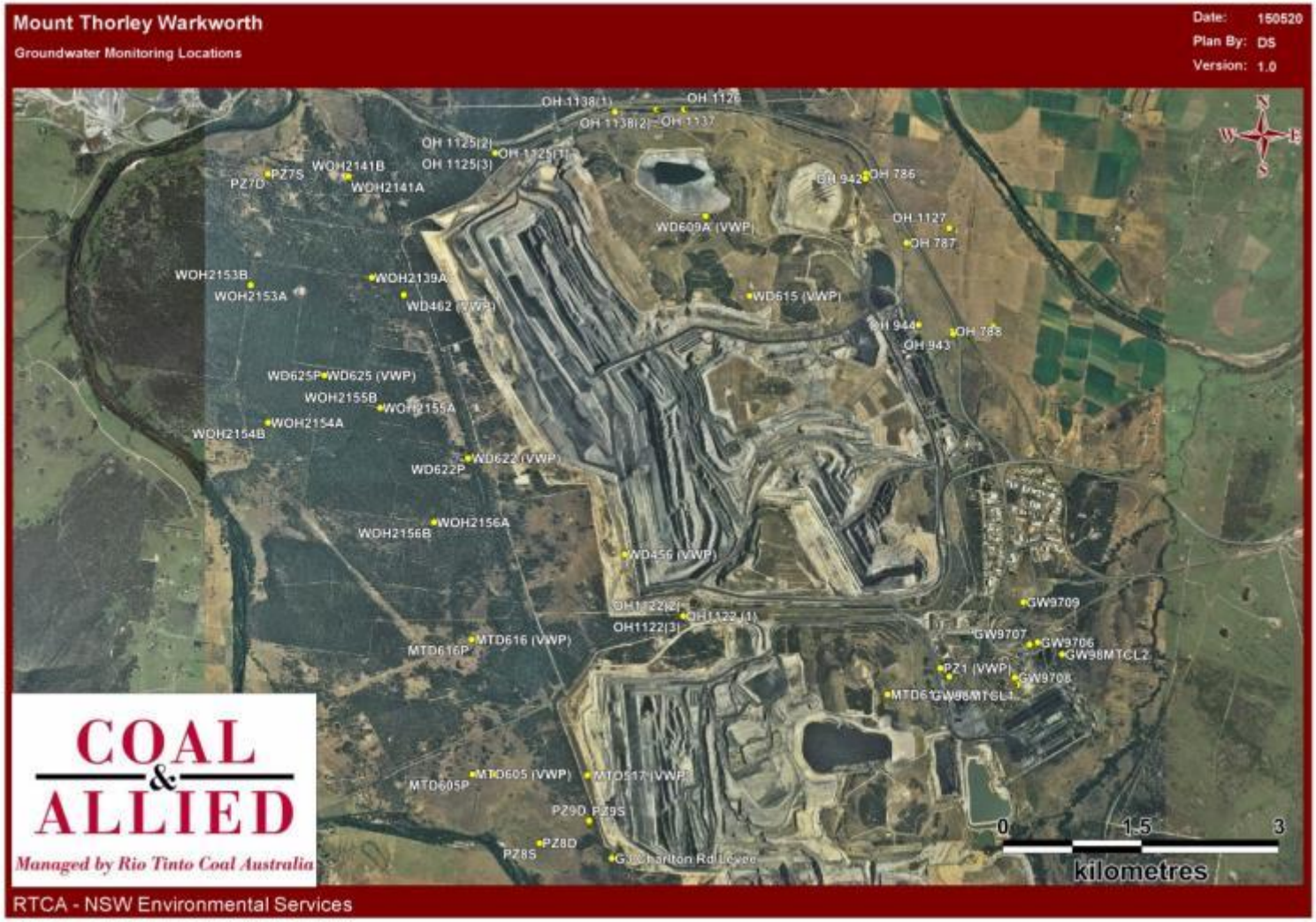

Figure 32: Groundwater Monitoring Network at MTW in 2016

7.3.2. Groundwater Performance

Sampling of ground waters was carried out on 142 occasions from 39 bores across Mount Thorley Warkworth in accordance with AS/NZS 5667.6 (1998). Where laboratory analysis was undertaken, this was performed by a NATA accredited laboratory. Groundwater sampling and analysis was undertaken as required with the following exceptions detailed in Table 28.

Table 28: MTW Water Monitoring Data Recovery for 2016 (by exception)

Location	Data Recovery (%)	Comment
PZ7S	75%	No safe access to site during June monitoring event.
PZ7D	75%	No safe access to site during June monitoring event.
OH1122(3)	0%	Site recorded as dry during 2016 monitoring events. To be removed from monitoring programme.
WOH2139(a)	25%	No safe access to site due to track damage during June, September and December monitoring events.
WOH2141B	0%	Insufficient water to allow sampling during 2016 monitoring events.
WOH2156B	75%	Insufficient water to allow sampling during June monitoring event.

A summary of the monitoring results for MTW Groundwater Sites is provided in the Monthly Environmental Monitoring Reports, available via the Rio Tinto website (www.riotinto.com).

7.3.3. Groundwater Monitoring Summary

The following section presents groundwater monitoring data in relation to the geographic locations and target stratigraphy for groundwater monitoring bores. Each location is discussed below, and a summary of monitoring data presented. Where monitoring results were recorded outside the internal trigger limit, these results are summarised in tables for each location.

7.3.3.1. Bayswater Seam Bores

Groundwater monitoring in the Bayswater seam was undertaken from seven sites during 2016. A total of 28 samples were collected during the reporting period. The pH, EC and SWL trends for 2013 to 2016 for Bayswater groundwater bores are shown in Figure 33, Figure 34 and Figure 35 respectively. Trigger tracking results are given in Table 29. Results were generally stable and consistent with historical trends.

Table 29: Bayswater Seam Groundwater 2016 internal trigger tracking

Location	Date	Trigger limit	Action taken in response
GW9706	09/09/2015	pH - 95th percentile	Watching Brief *
	02/12/2015		
	04/03/2016		Trend consistent with nearby monitoring bore GW9707. Water level steady and does not indicate impact due to mining. Watching brief to be maintained.

* = 1st/2nd trigger. Watching Brief established pending outcomes of subsequent monitoring events. No specific actions required

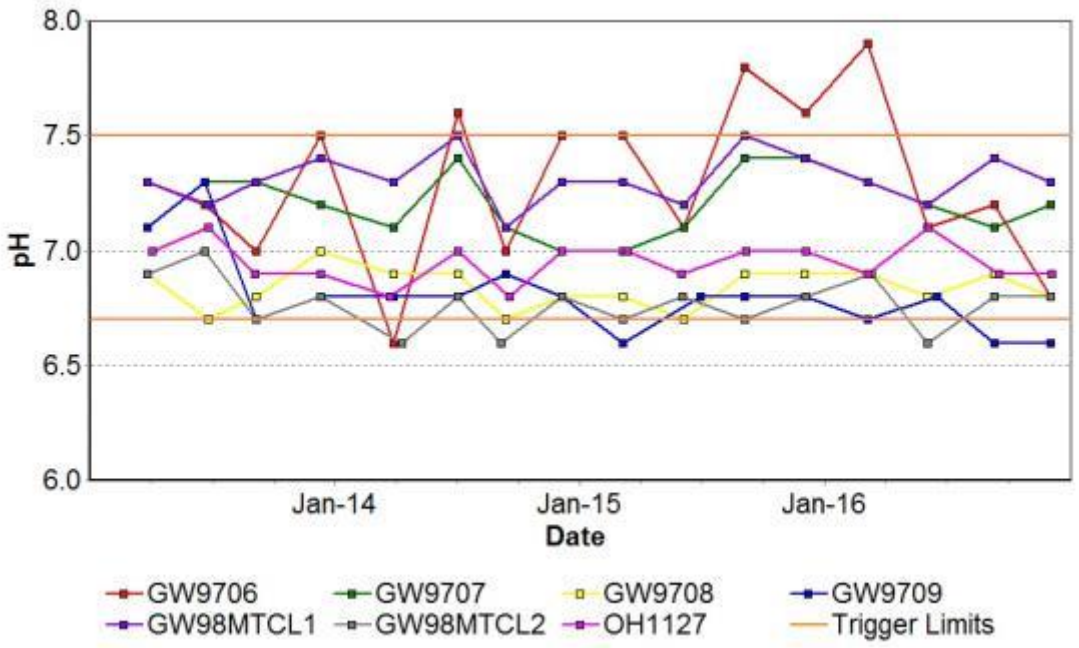

Figure 33: Bayswater Seam pH trends 2013 to 2016

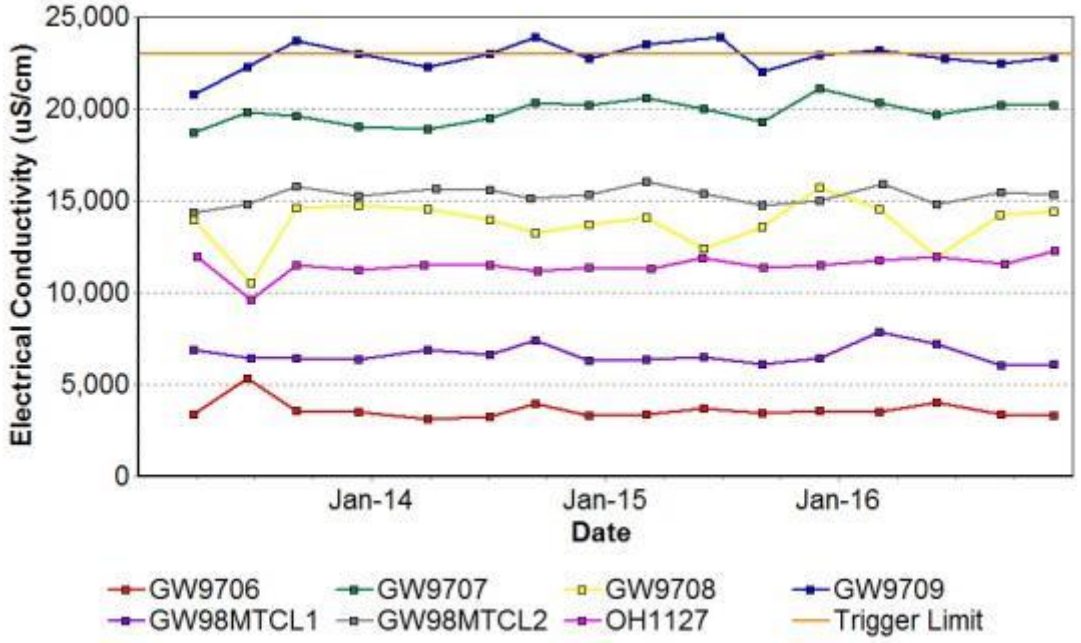

Figure 34: Bayswater Seam EC trends 2013 to 2016

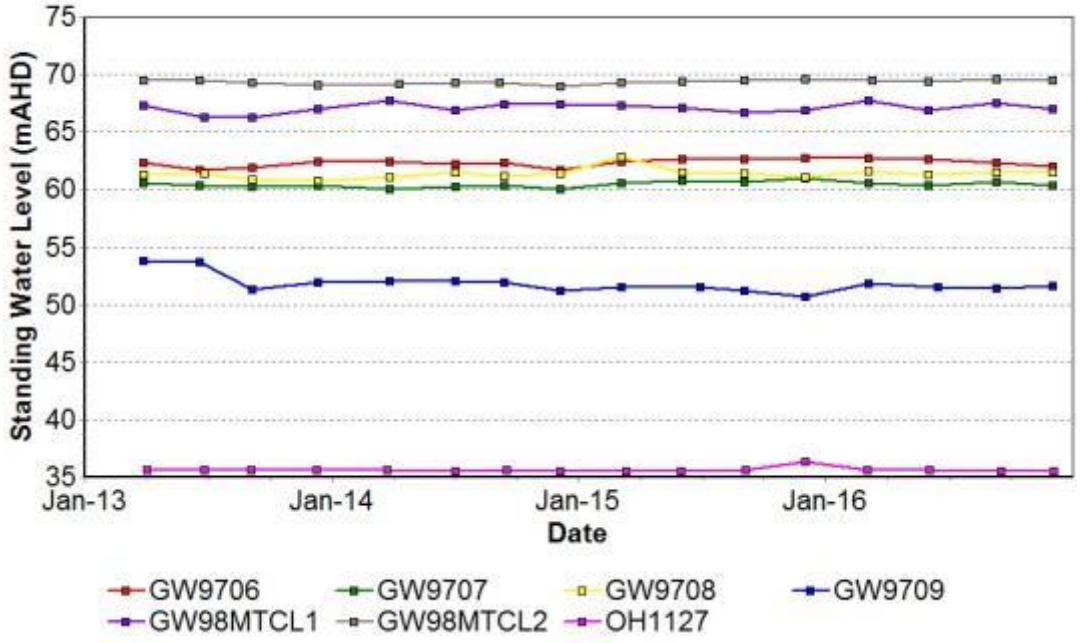

Figure 35: Bayswater SWL trends 2013 to 2016

7.3.3.2. Bowfield Seam Bores

Groundwater monitoring in the Bowfield seam was undertaken at one site during 2016. A total of 4 samples were collected during the reporting period. The pH, EC and SWL trends for 2013 to 2016 are shown in Figure 36, Figure 37 and Figure 38 respectively. Water quality results were similar to historical data, however the water level was variable (spike in water

level observed in June). Monitoring is ongoing to determine if this is a result of short-term recovery due to rainfall recharge or another mechanism.

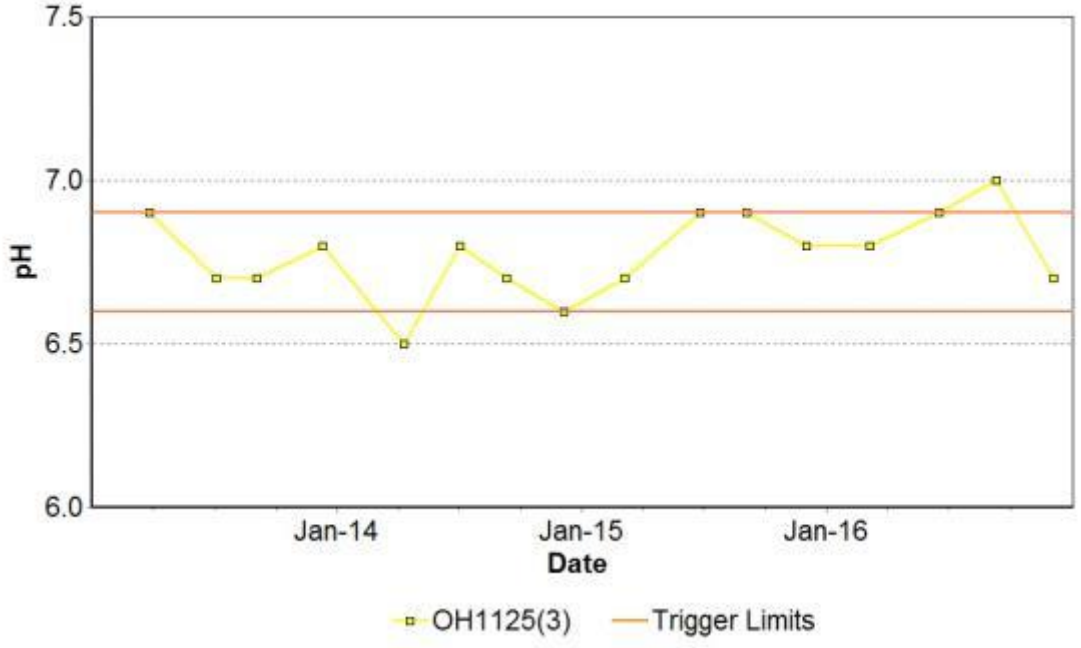

Figure 36 : Bowfield Seam pH Trend 2013 to 2016

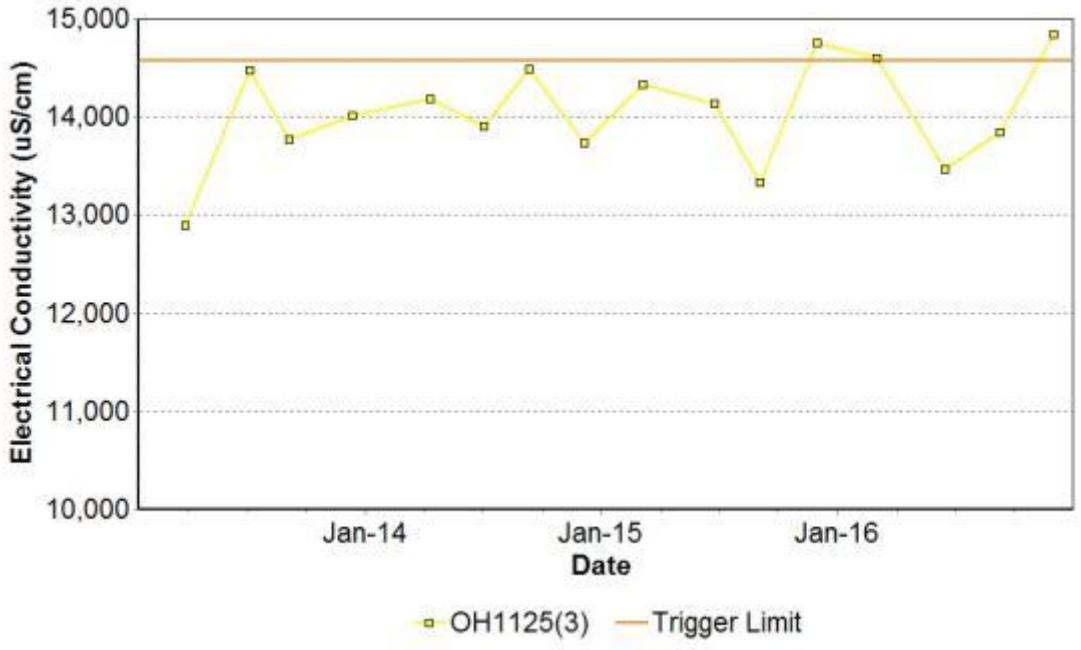

Figure 37: Bowfield Seam EC Trends 2013 to 2016

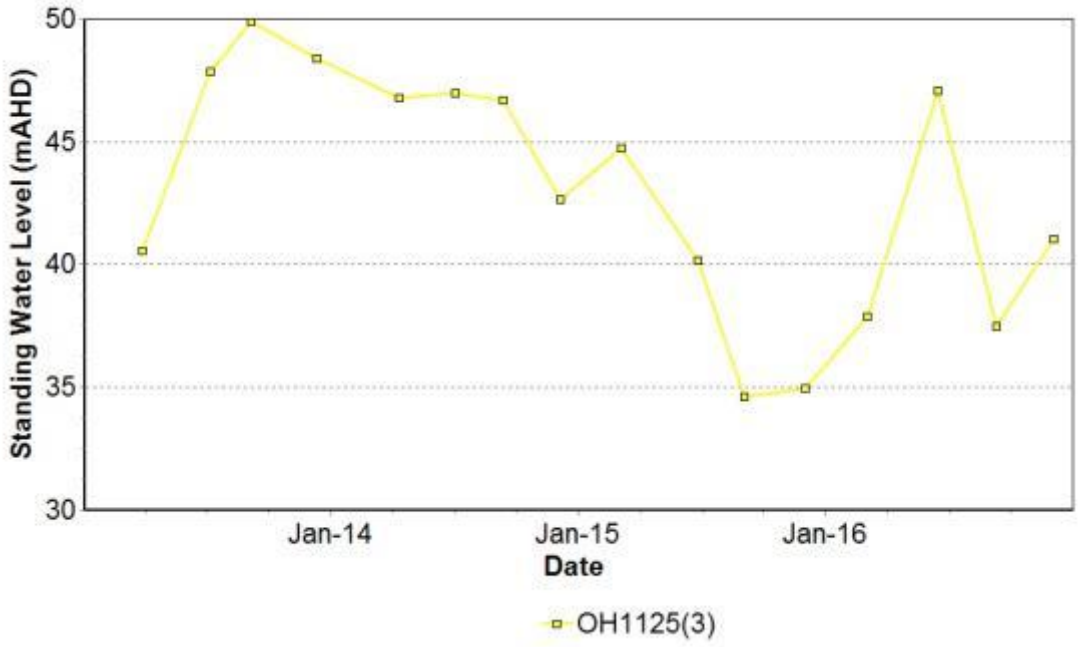

Figure 38: Bowfield Seam SWL Trend 2013 to 2016

7.3.3.3. Blakefield Seam Bores

Groundwater monitoring in the Blakefield seam was undertaken from three sites during 2016. A total of 9 samples were collected during the reporting period. The pH, EC and SWL trends for 2013 to 2016 are shown in Figure 39, Figure 40 and Figure 41 respectively. Water quality trends were generally steady, however an increasing pH trend was observed in WOH2139A, likely due to coal seam depressurisation as mining advances West, in the direction of the bore (supported by the water trend). Trigger tracking results are given in Table 30.

Table 30: Blakefield Seam Groundwater 2016 internal trigger tracking

Location	Date	Trigger limit	Action taken in response
WOH2139A	16/06/2016	pH - 95th percentile	Watching Brief *
	23/09/2016		
	02/12/2016		Results are stable and consistent with historical trend. May be associated with coal seam depressurisation as mining advances West. No further action required.

* = 1st/2nd trigger. Watching Brief established pending outcomes of subsequent monitoring events. No specific actions required

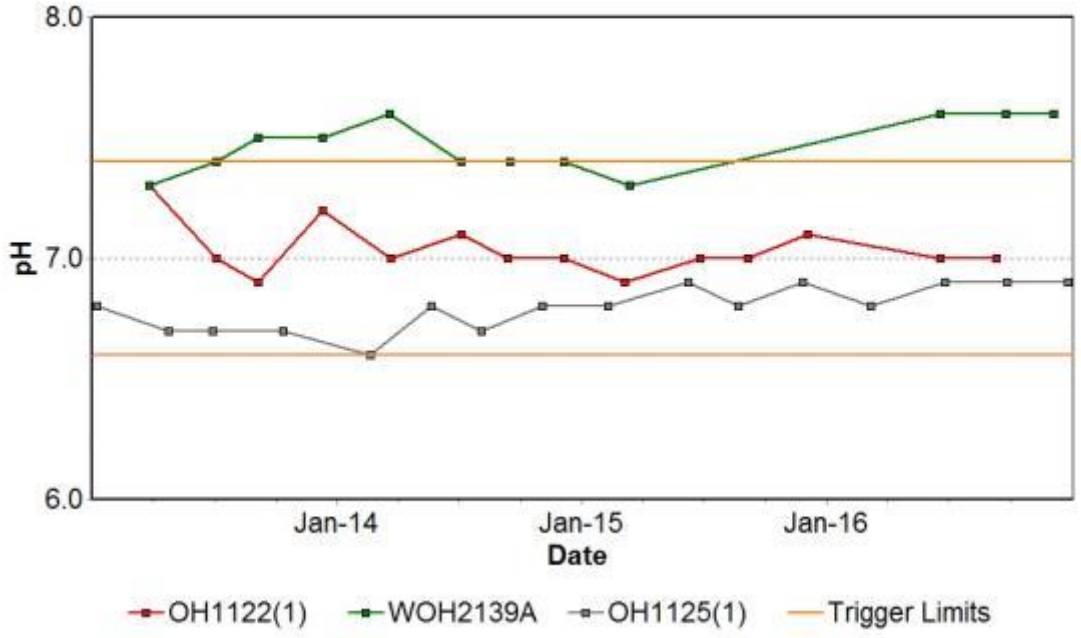

Figure 39: Blakefield Seam Groundwater pH Trends 2013 to 2016

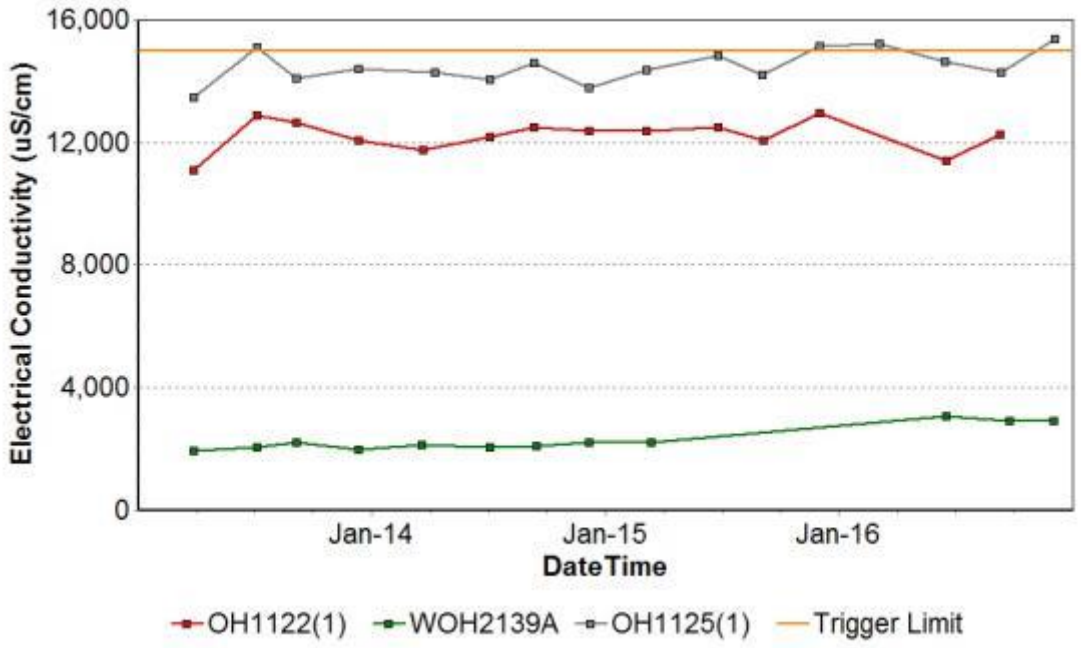

Figure 40: Blakefield Seam Groundwater EC Trends 2013 to 2016

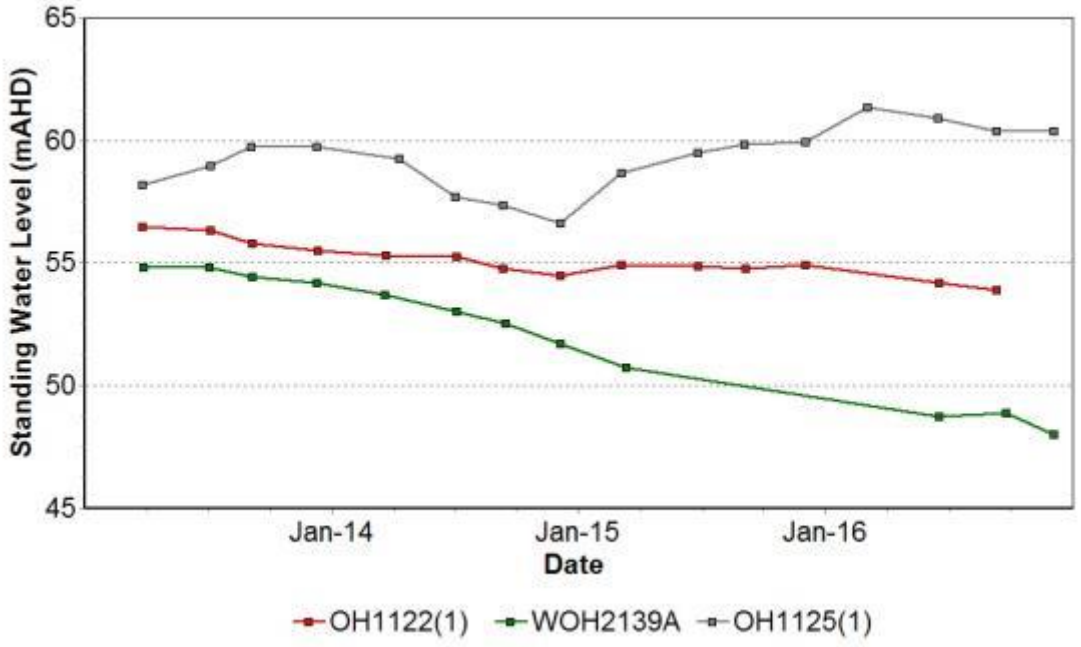

Figure 41: Blakefield Seam Groundwater SWL Trends 2012 to 2015

7.3.3.4. Hunter River Alluvium Bores

Groundwater monitoring in the Hunter River Alluvium was undertaken from six sites during 2016. A total of 22 samples were collected during the reporting period. The pH, EC and SWL trends for 2013 to 2016 for Hunter River Alluvium groundwater bores are shown in Figure 42 to Figure 54. Results were generally stable and consistent with historical trends, however an increasing EC trend was observed in bore OH943 (but within historical data range), with a falling trend in EC observed in bore OH994 (limited historical data available, so reason for trend cannot be inferred). Monitoring of trends in these bores will continue.

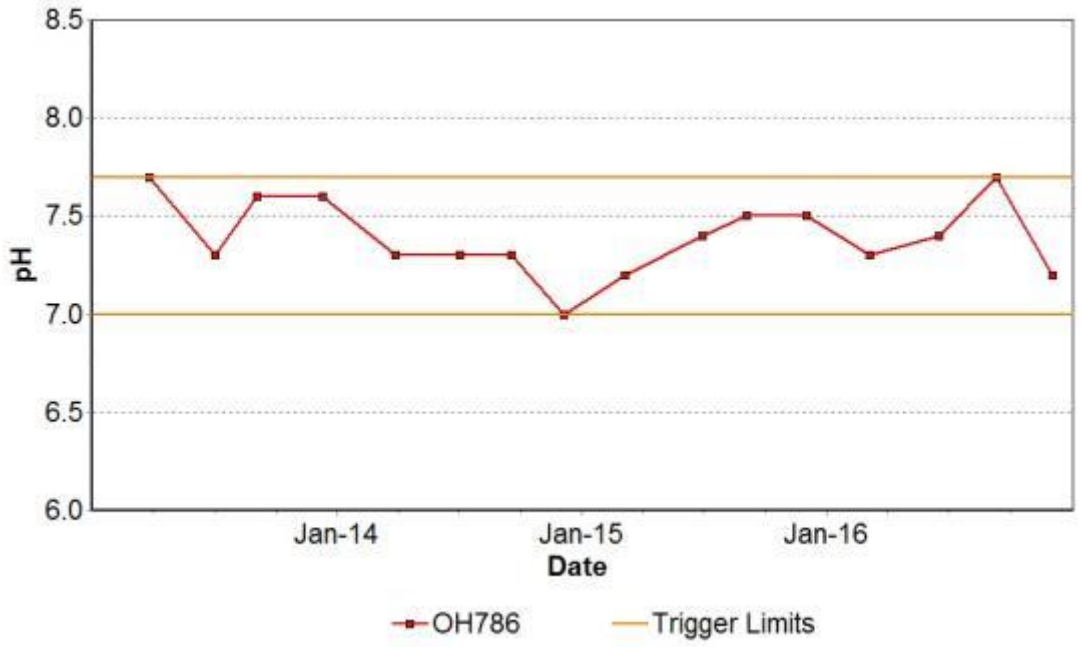

Figure 42: Hunter River Alluvium Bore OH786 pH Trend 2013 to 2016

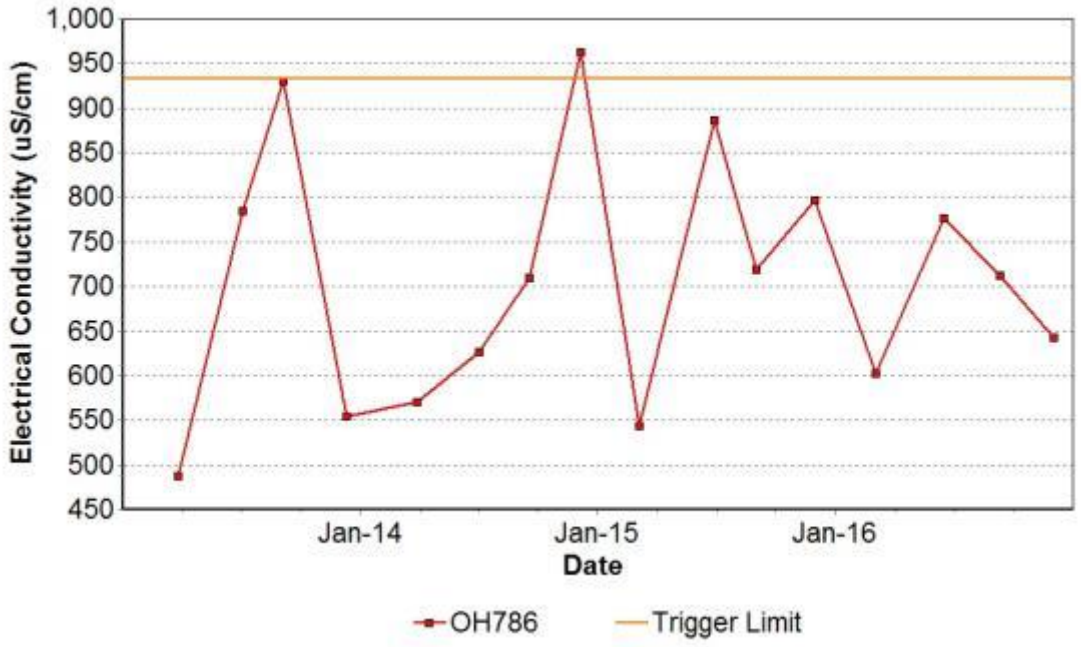

Figure 43: Hunter River Alluvium Bore OH786 EC Trend 2013 to 2016

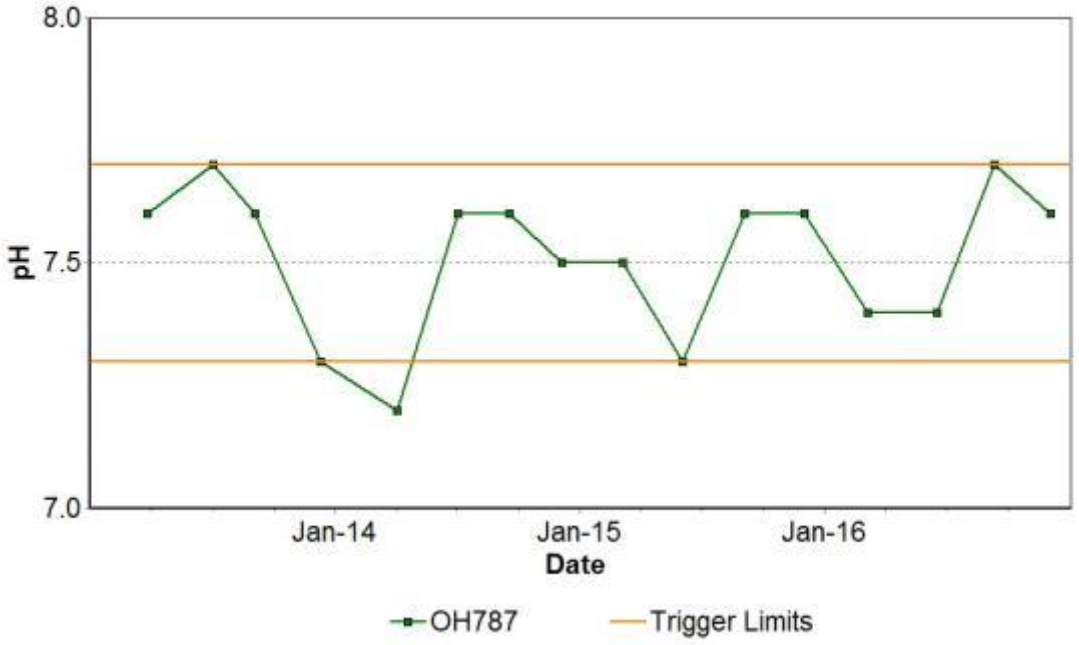

Figure 44: Hunter River Alluvium Bore OH787 pH Trend 2013 to 2016

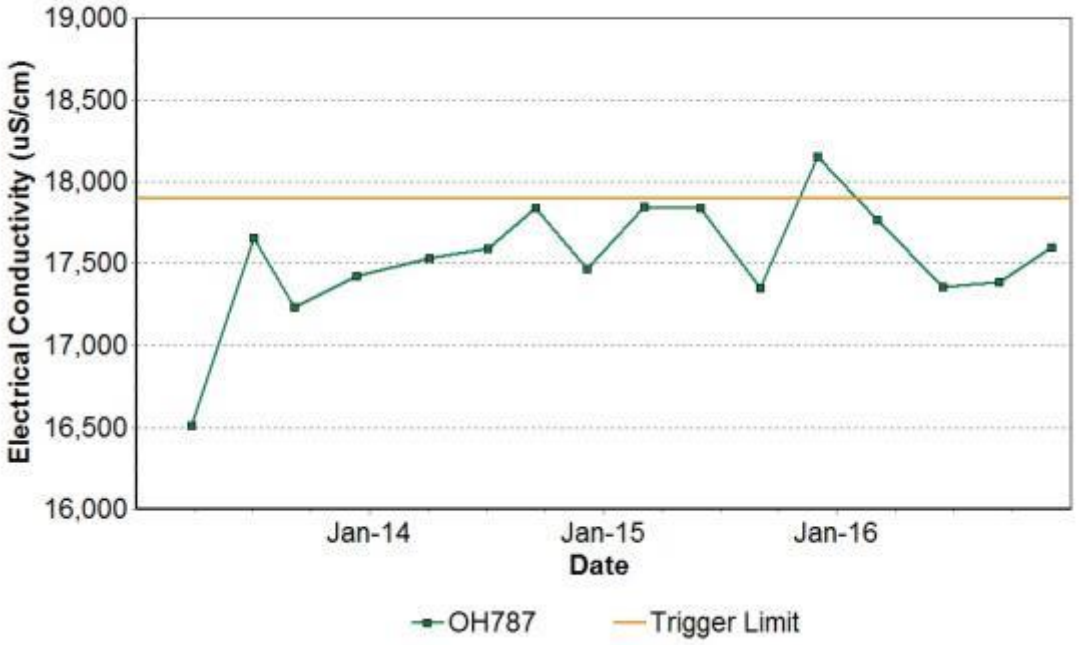

Figure 45: Hunter River Alluvium Bore OH787 EC Trend 2013 to 2016

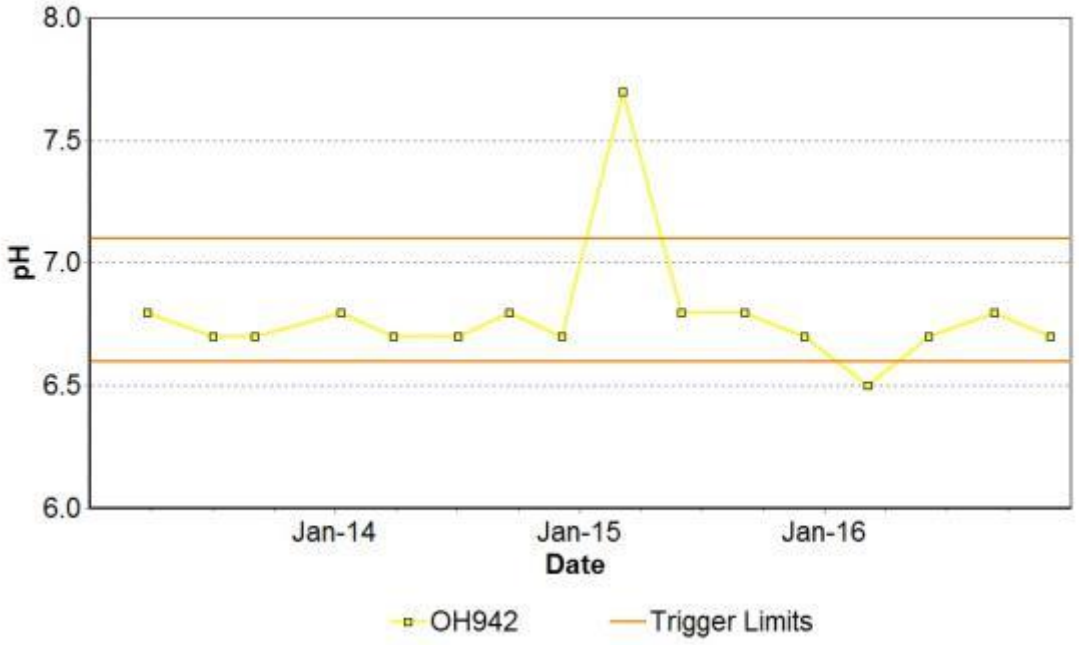

Figure 46: Hunter River Alluvium Bore OH942 pH Trend 2013 to 2016

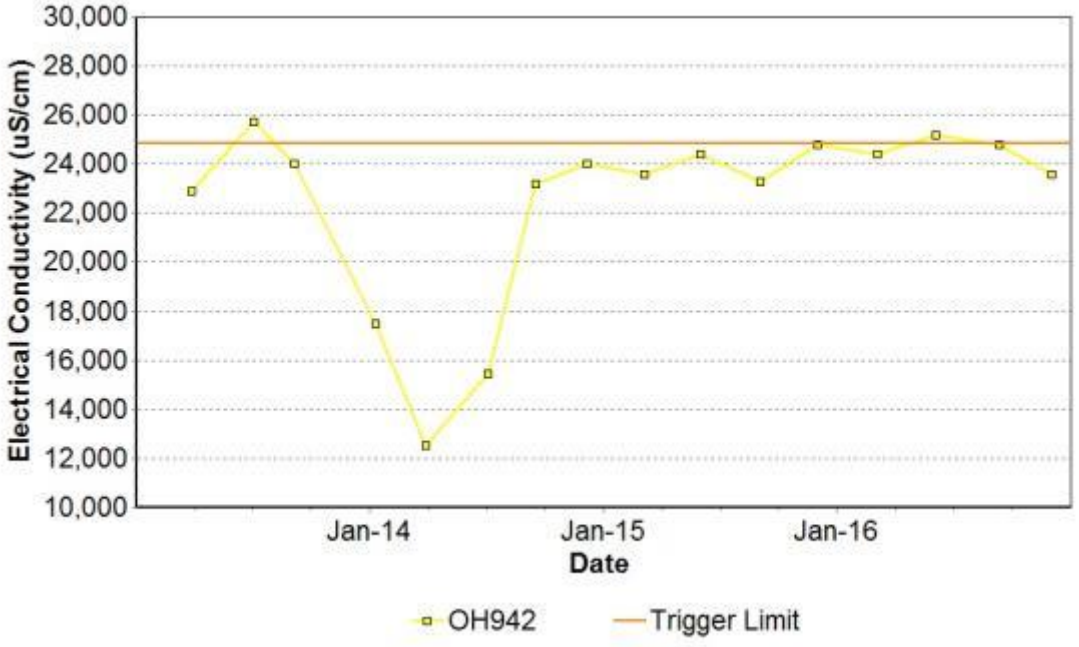

Figure 47: Hunter River Alluvium Bore OH942 EC Trend 2013 to 2016

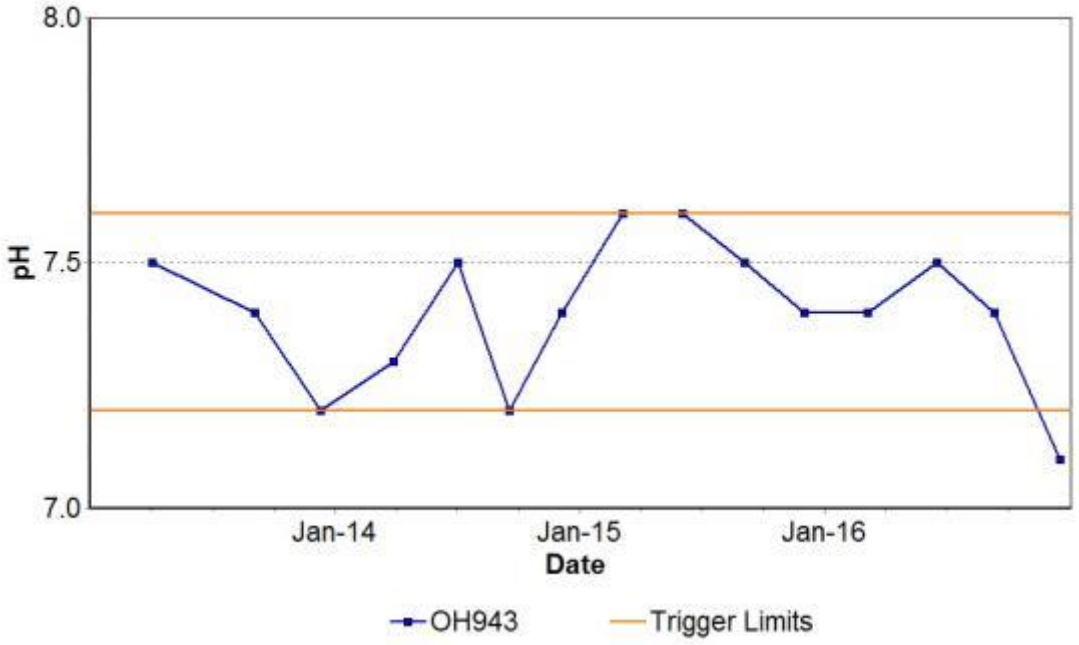

Figure 48: Hunter River Alluvium Bore OH943 pH Trend 2013 to 2016

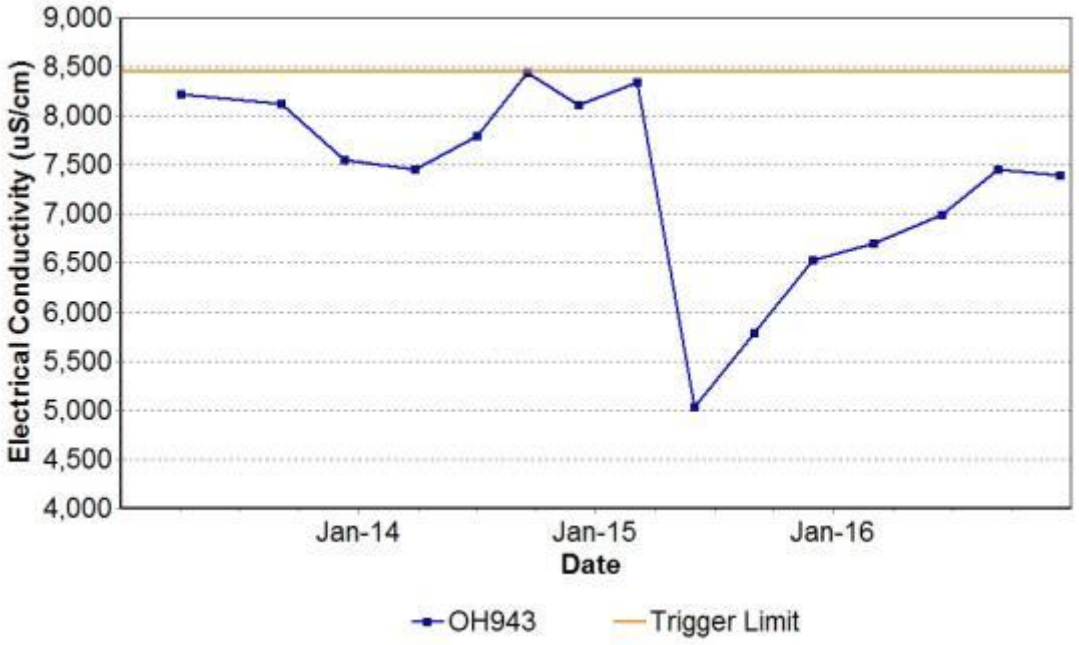

Figure 49: Hunter River Alluvium Bore OH943 EC Trend 2013 to 2016

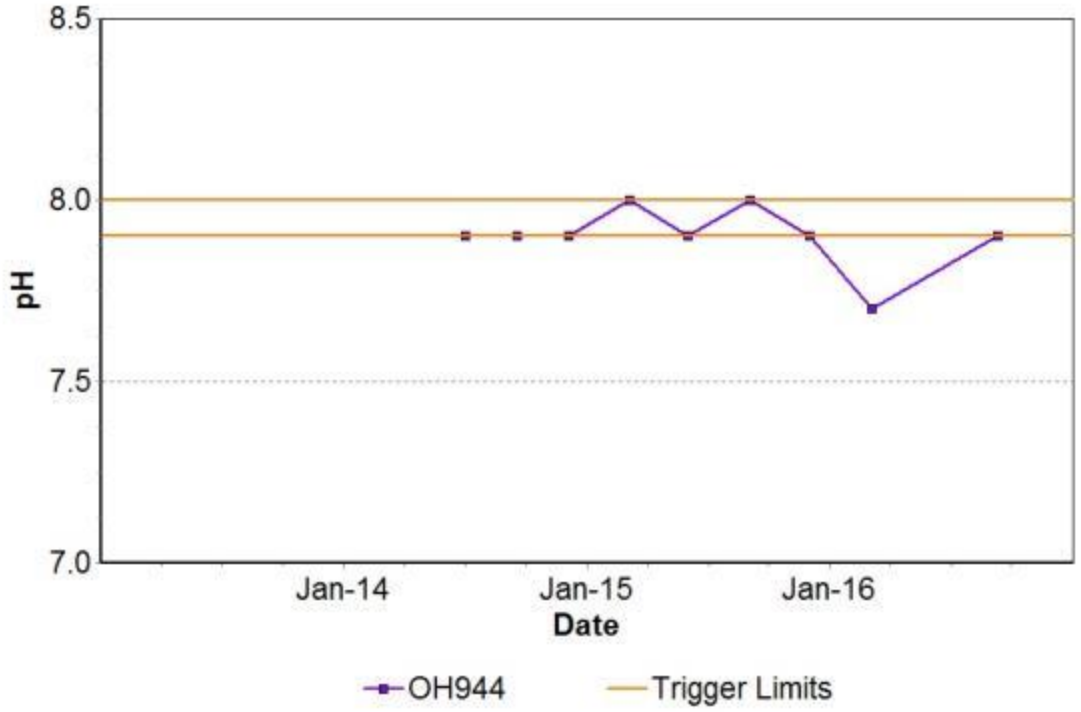

Figure 50: Hunter River Alluvium Bore OH944 pH Trend 2013 to 2016

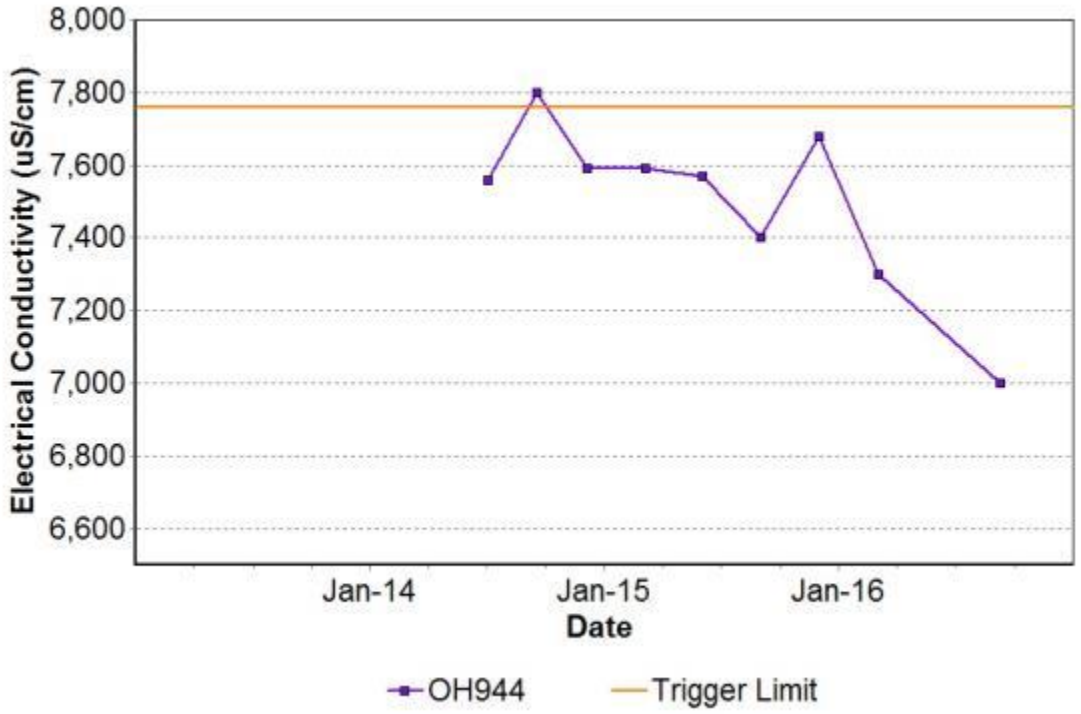

Figure 51: Hunter River Alluvium Bore OH944 EC Trend 2013 to 2016

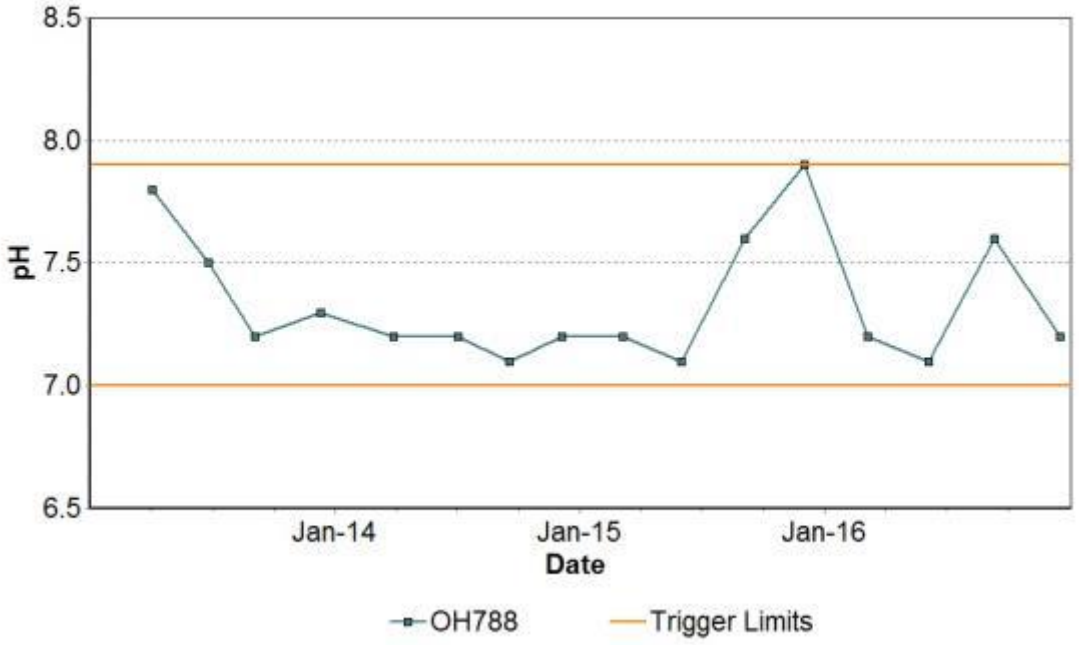

Figure 52: Hunter River Alluvium Bore OH788 pH Trend 2013 to 2016

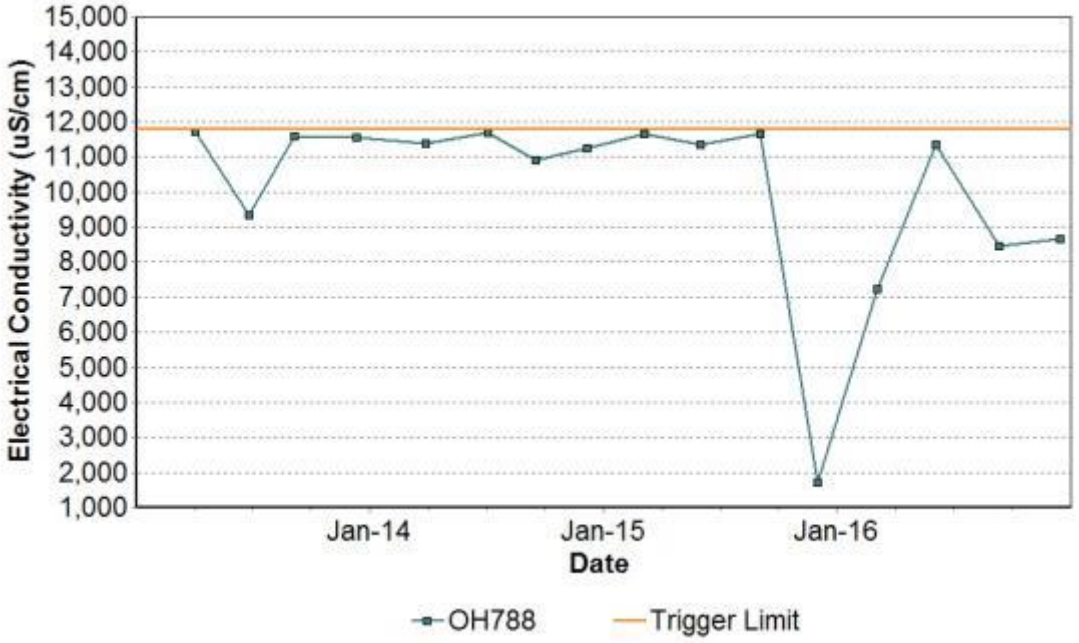

Figure 53: Hunter River Alluvium Bore OH788 EC Trend 2013 to 2016

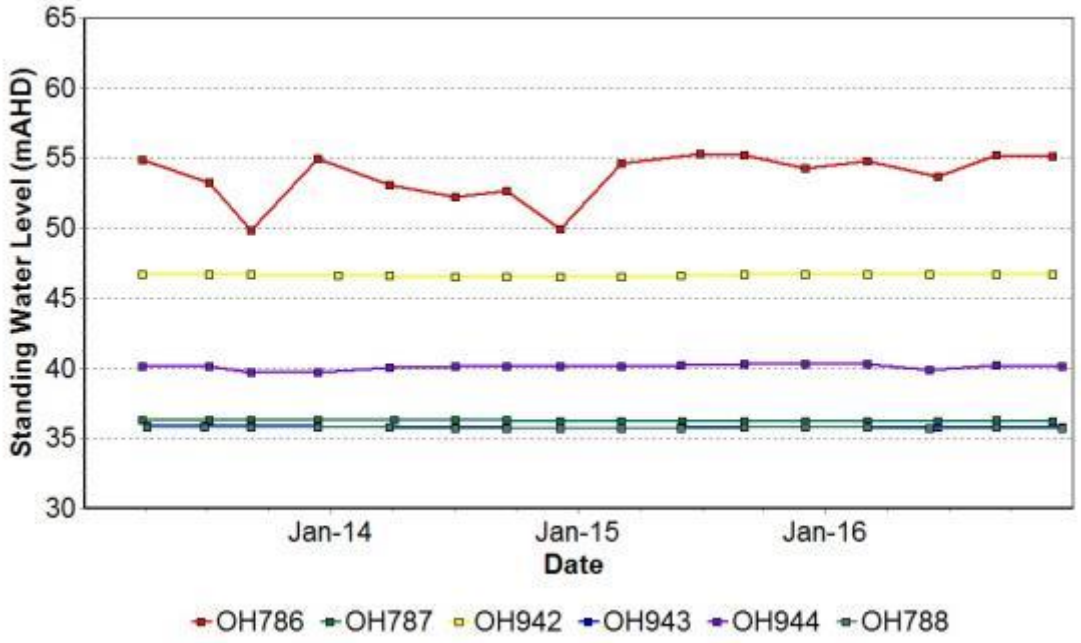

Figure 54: Hunter River Alluvium Groundwater SWL Trends 2013 to 2016

7.3.3.5. Redbank Bores

Groundwater monitoring in the Redbank seam was undertaken from four sites during 2016. A total of 16 samples were collected during the reporting period. The pH, EC and SWL trends for 2013 to 2016 for Redbank seam groundwater bores are shown in Figure 55, Figure 56 and Figure 57 respectively. Trigger tracking results are detailed in Table 31. A steady declining trend in water levels at all monitoring sites continued during the reporting period, as a result of coal seam depressurisation due to mining.

Table 31 : MTW Redbank Seam Groundwater 2016 internal trigger tracking

Location	Date	Trigger limit	Action taken in response
WOH2156A	04/03/2016	**pH - 5th percentile**	Low pH is likely the result of coal seam depressurisation, as evidenced by falling water level. This trend is consistent with effects of nearby mining. No further action required.
WOH2156A	14/06/2016		
WOH2156A	16/09/2016		
WOH2156A	02/12/2016		

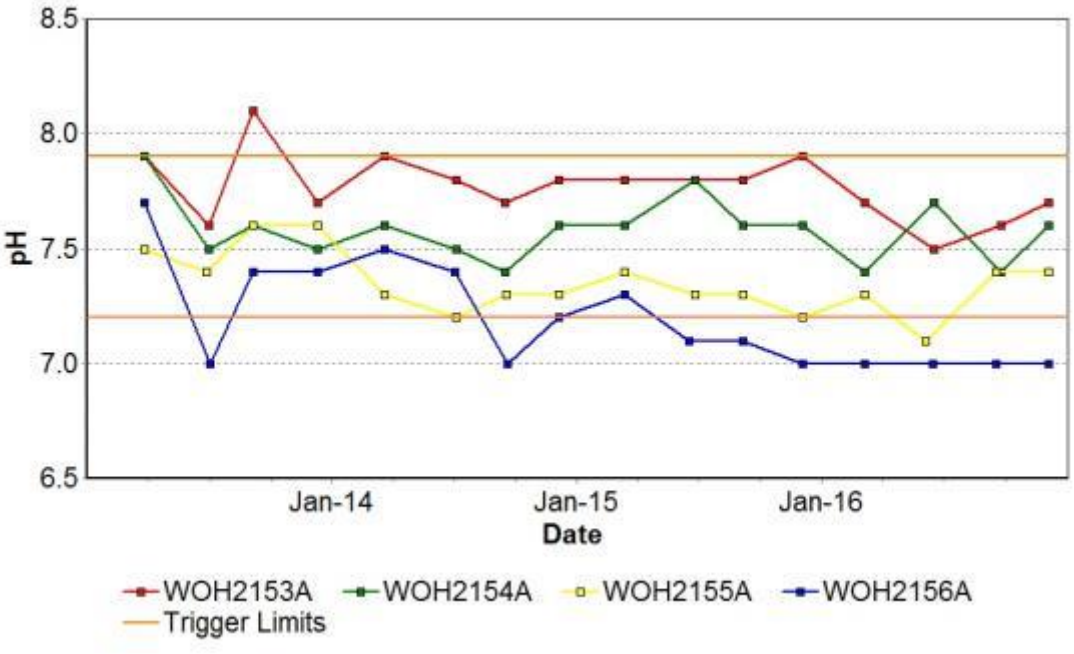

Figure 55: Redbank Seam Groundwater pH Trends 2013 to 2016

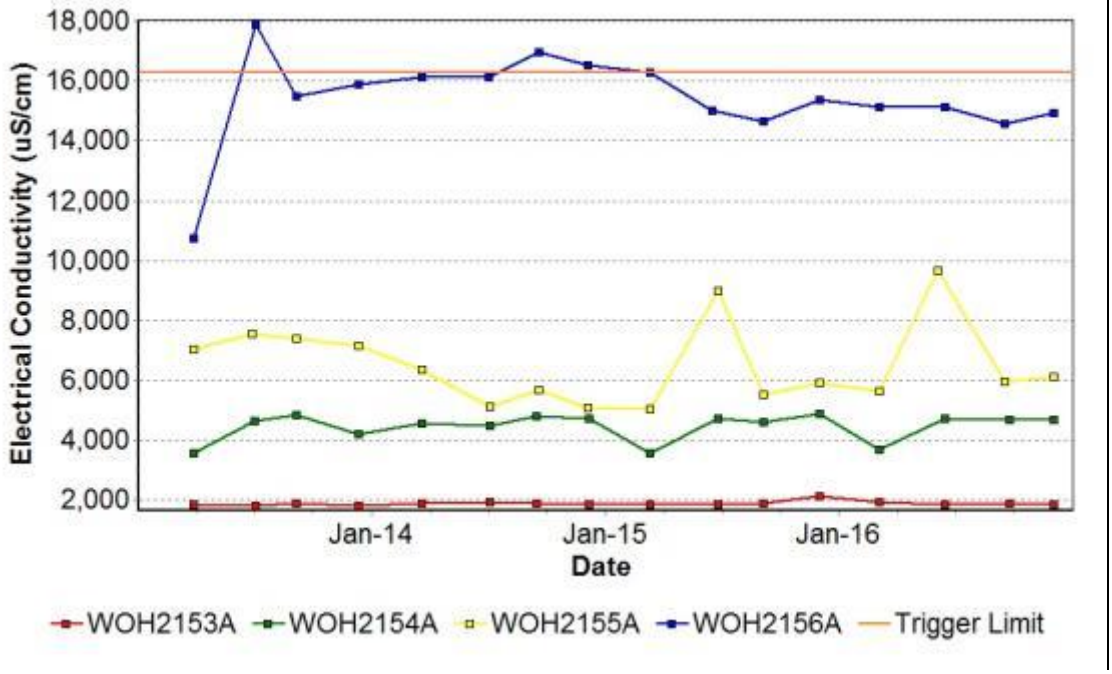

Figure 56: Redbank Seam Groundwater EC Trends 2013 to 2016

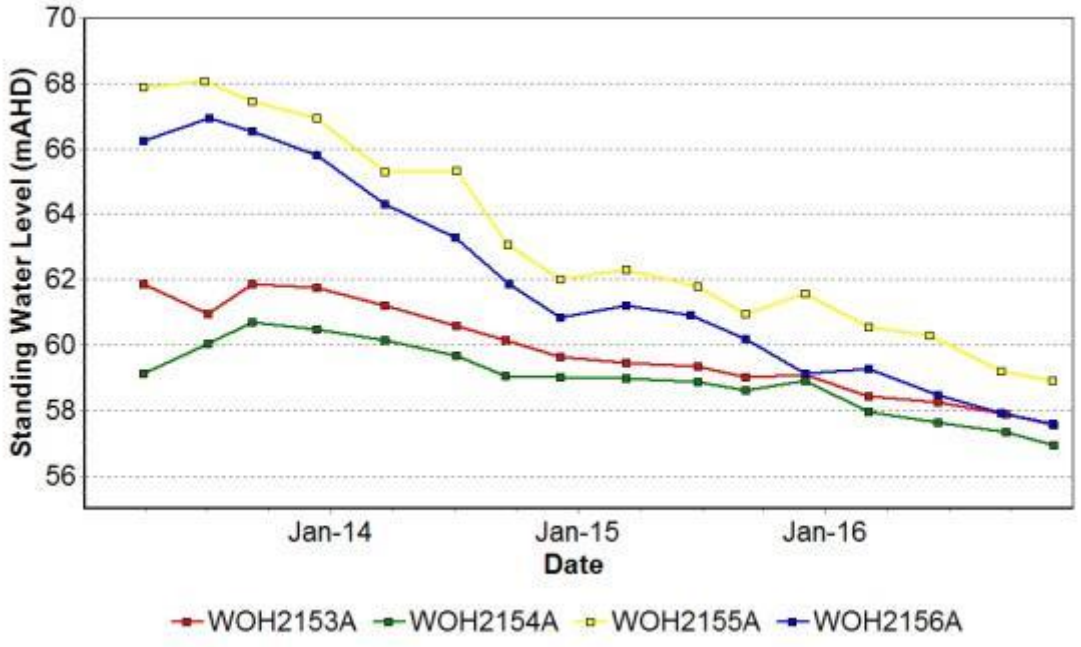

Figure 57: Redbank Seam Groundwater SWL Trends 2013 to 2016

7.3.3.6. Shallow Overburden Bores

Groundwater monitoring in the Shallow Overburden was undertaken from three sites during 2016. A total of 12 samples were collected during the reporting period. The pH, EC and SWL trends for 2013 to 2016 for Shallow Overburden groundwater bores are shown in Figure 58, Figure 59 and Figure 60 respectively. Water levels and water quality were steady in all bores during the reporting period.

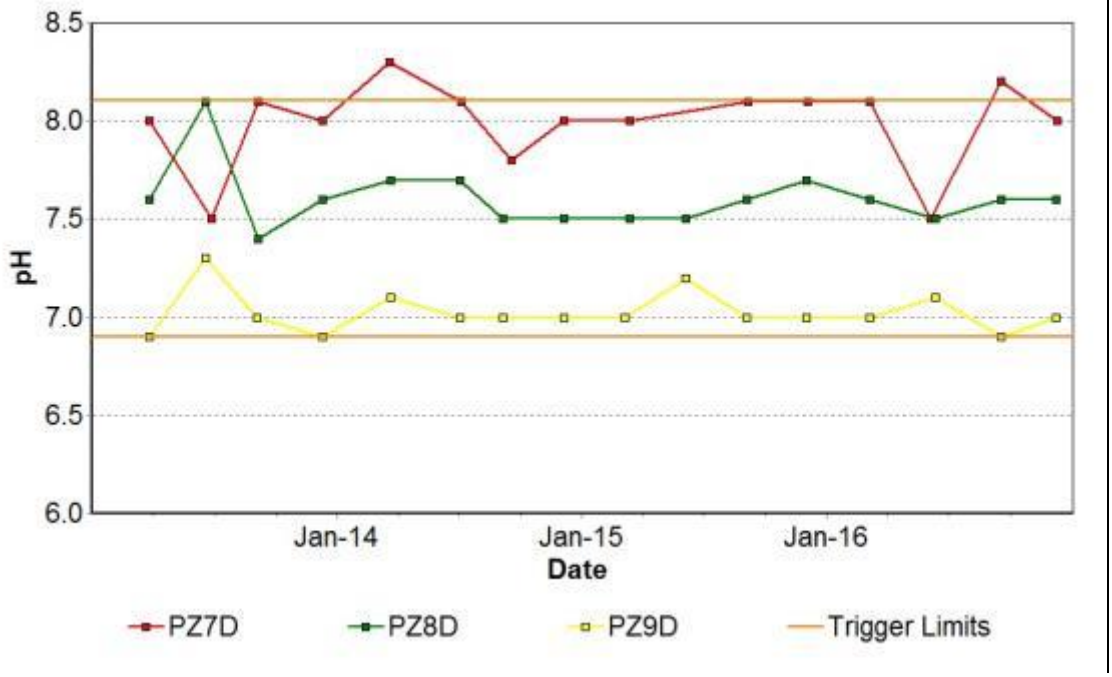

Figure 58 : Shallow Overburden Seam Groundwater pH Trends 2013 to 2016

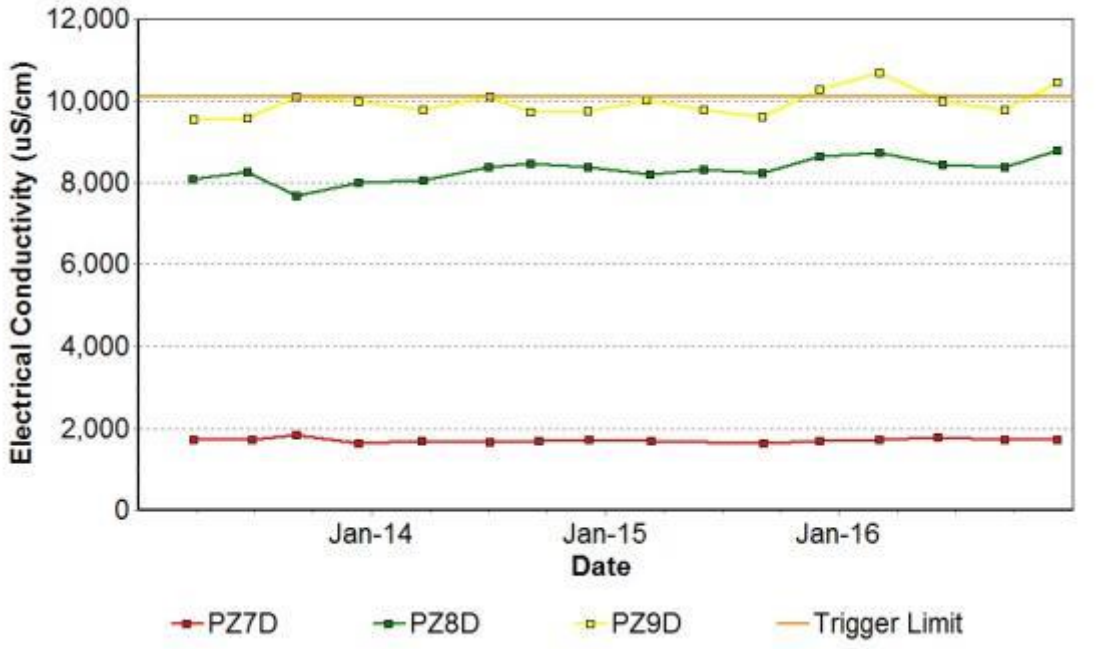

Figure 59: Shallow Overburden Seam Groundwater EC Trends 2013 to 2016

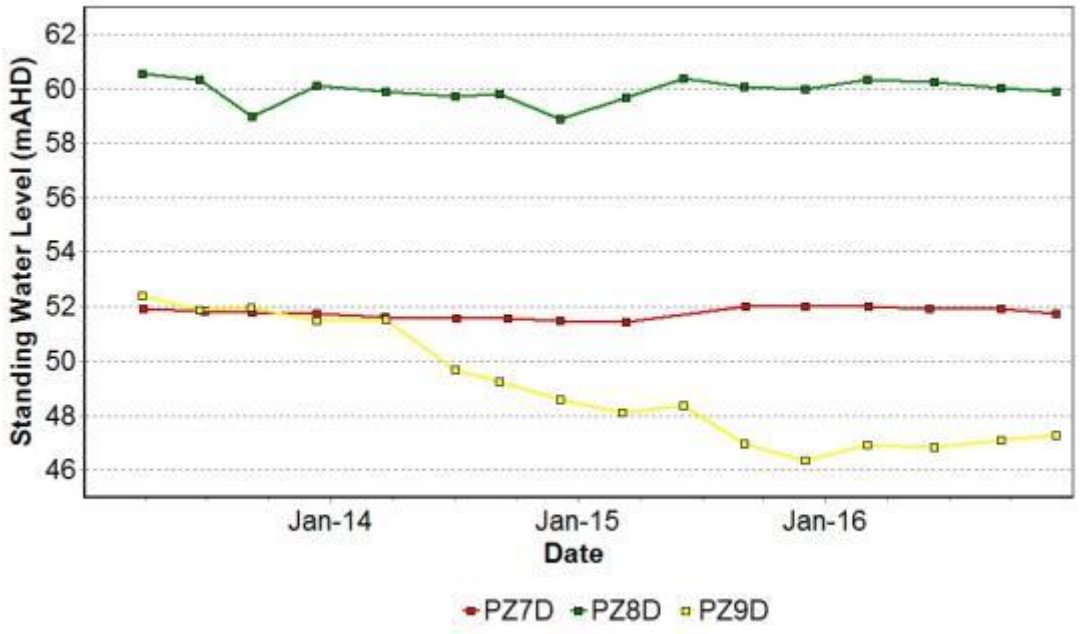

Figure 60: Shallow Overburden Seam Groundwater SWL Trends 2013 to 2016

7.3.3.7. Vaux Seam Bores

Groundwater monitoring in the Vaux seam was undertaken from three sites during 2016; a total of 12 samples were collected. The pH, EC and SWL trends for 2013 to 2016 for Vaux groundwater bores are shown in Figure 61, Figure 62 and Figure 63 respectively; results are consistent with historical trends. EC measurements for bore OH1121 recovered to the historical range following three low measurements in late 2015 to early 2016; the reason for these low measurements was not able to be identified.

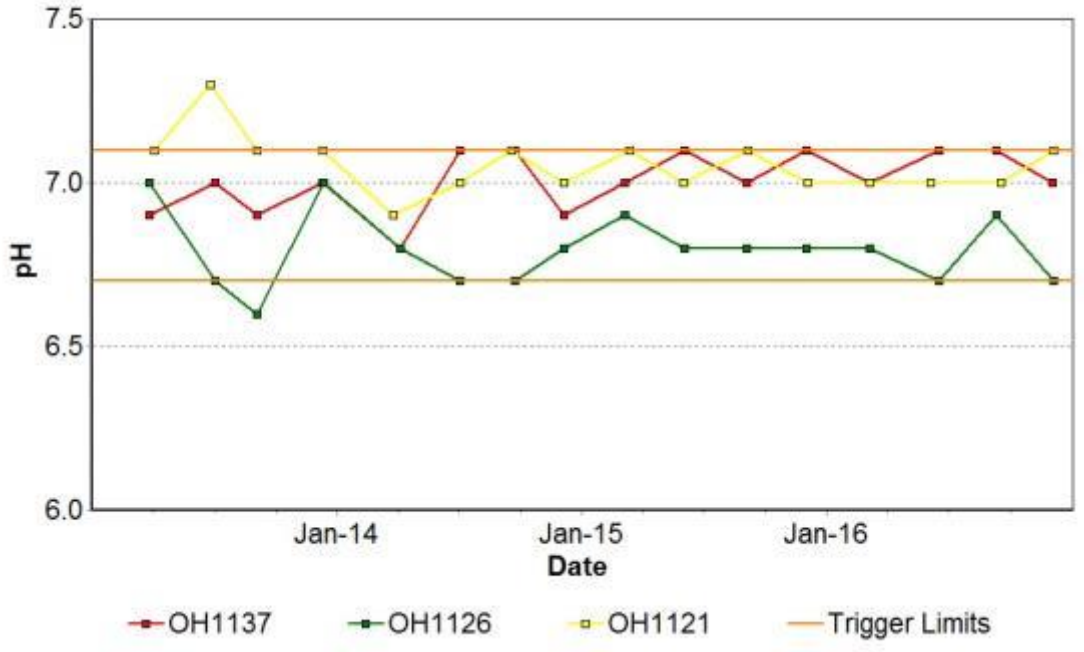

Figure 61: Vaux Seam Groundwater pH Trends 2013 to 2016

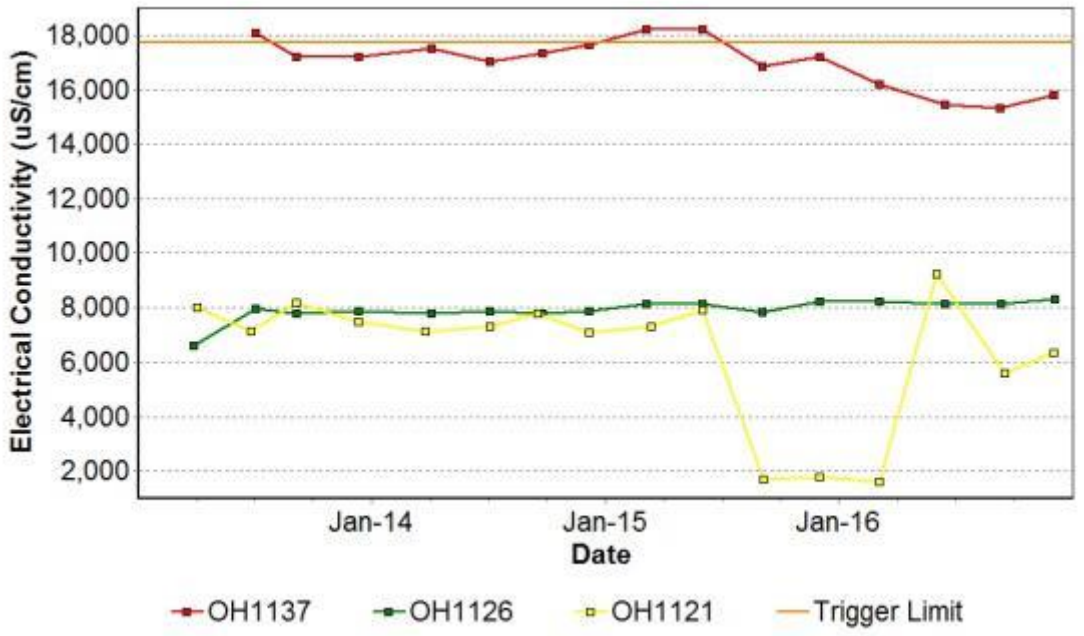

Figure 62: Vaux Seam Groundwater EC Trends 2013 to 2016

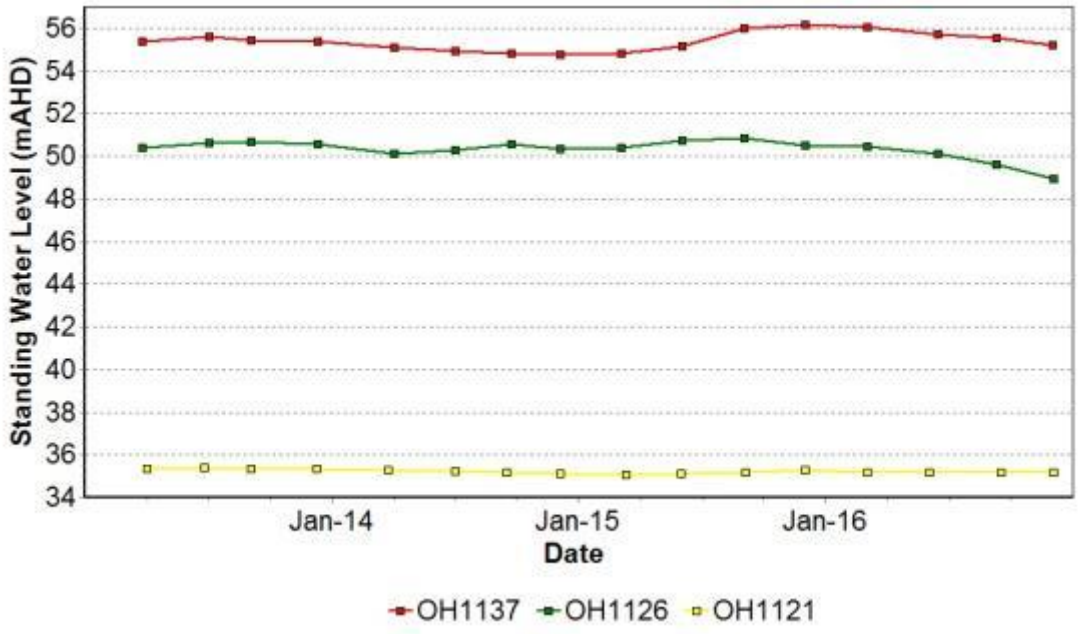

Figure 63: Vaux Seam Groundwater SWL Trends 2013 to 2016

7.3.3.8. Wambo Seam Bores

Groundwater monitoring in the Wambo seam bores were undertaken from five sites during 2016. A total of 19 samples were collected during the reporting period. The pH, EC and SWL trends for 2013 to 2016 for Wambo groundwater bores are shown in Figure 64, Figure 65 and Figure 66 respectively. Trigger tracking results are detailed in Table 32. Bore G3 collapsed during the reporting period and will be removed from the monitoring programme. Trends in all remaining bores were stable and consistent with historical data.

Table 32: MTW Wambo Seam Groundwater 2016 internal trigger tracking

Location	Date	Trigger limit	Action taken in response
G3	03/03/2016	pH – 5th percentile	Watching Brief. Large variance in Standing Water level indicates damage to the piezometer, currently under investigation
	16/06/2016		Investigation determined bore has partially collapsed to 65 m depth below ground. Bore will continue to be monitored and data assessed on a routine basis to identify if trend is deleterious.
	09/09/2016		pH stable; maintain watching brief.
	15/12/2016		Bore partially collapsed in early 2016 so data may not be representative of aquifer. Removal from monitoring programme has been recommended following review of data from nearby bores.

WOH2156B	04/03/2016 16/09/2016 02/12/2016	**EC – 95th percentile**	Elevated EC is likely the result of coal seam depressurisation, as evidenced by falling water level. This trend is consistent with effects of nearby mining. No further action required.

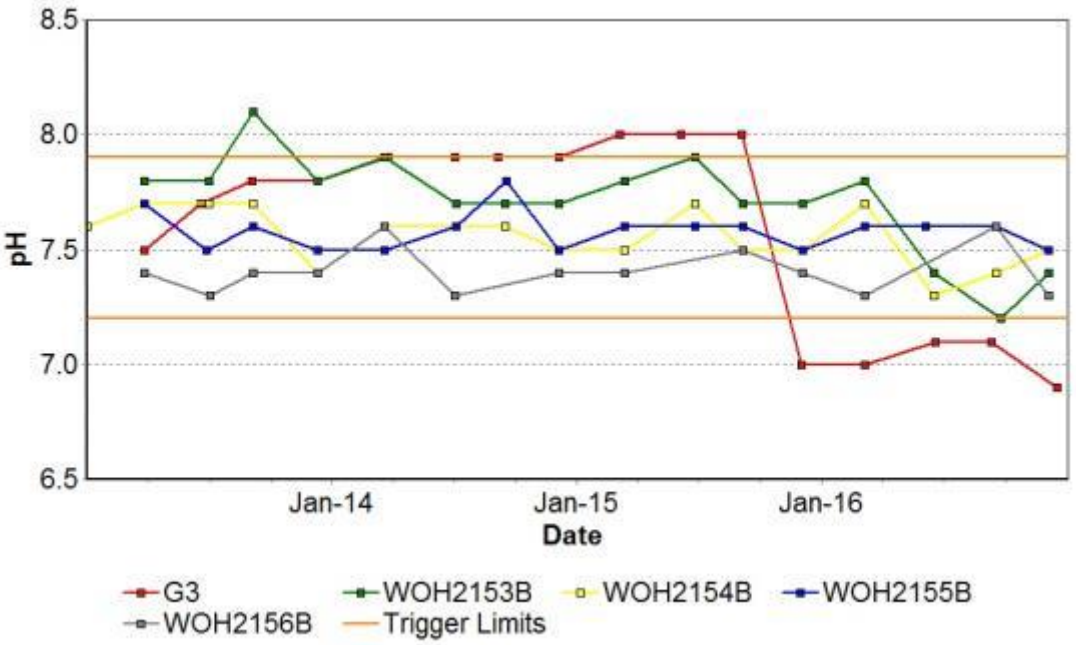

Figure 64: Wambo Seam Groundwater pH Trends 2013 to 2016

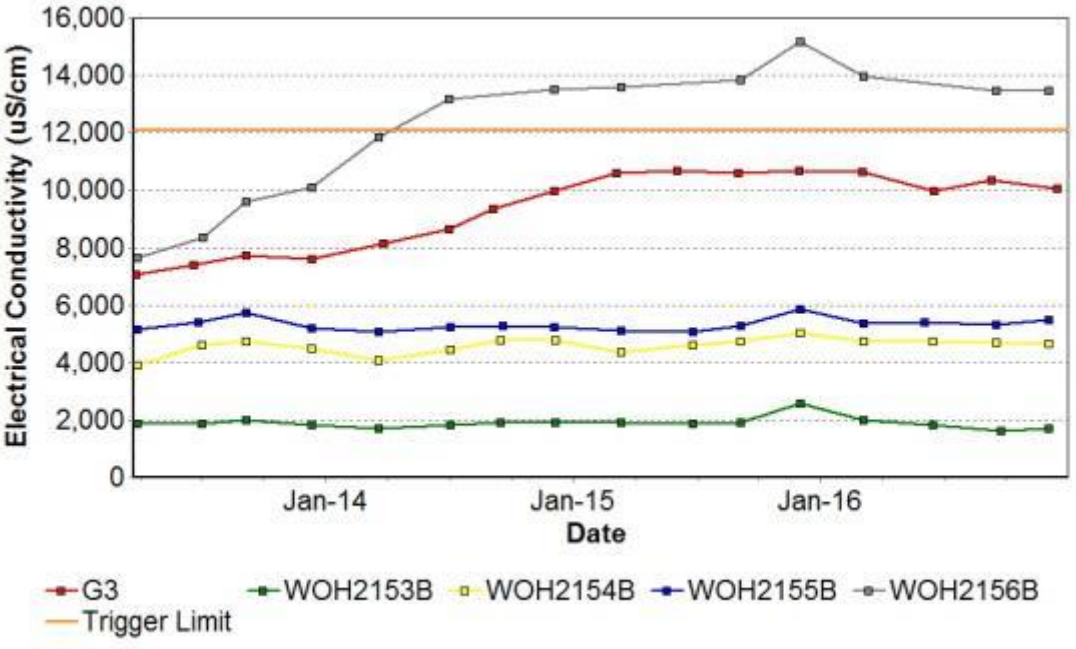

Figure 65: Wambo Seam Groundwater EC Trends 2013 to 2016

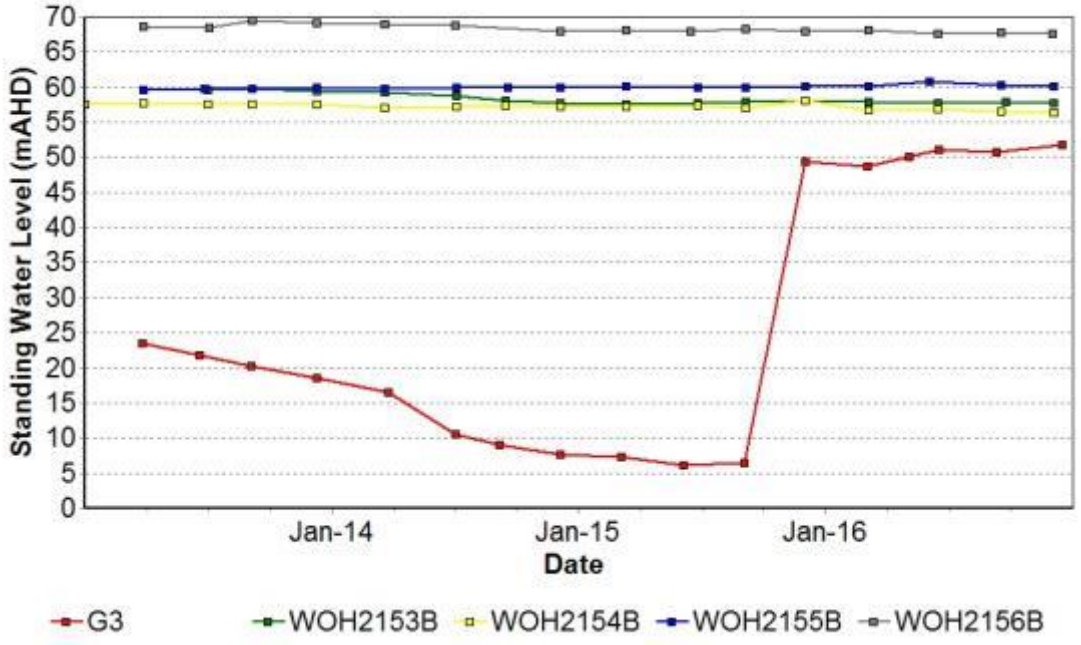

Figure 66: Wambo Seam Groundwater SWL Trends 2013 to 2016

7.3.3.9. Warkworth Seam Bores

Groundwater monitoring in the Warkworth seam area was undertaken from two sites during 2016; eight samples were collected. The pH, EC and SWL trends for 2013 to 2016 for Warkworth seam bores are shown in Figure 67, Figure 68 and Figure 69 respectively.

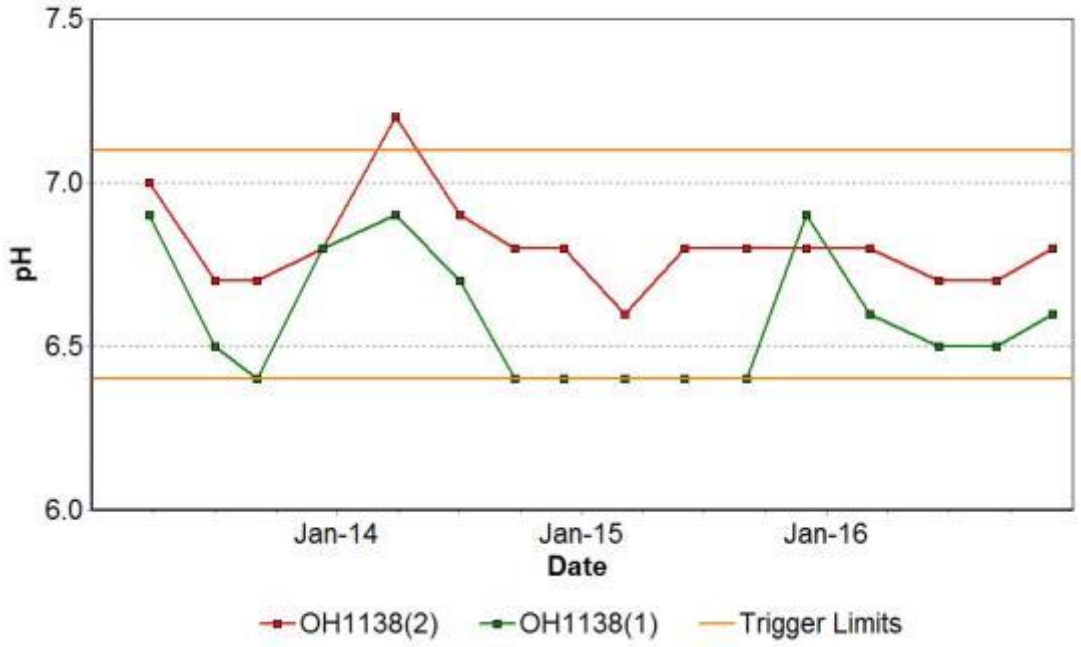

Figure 67: Warkworth Seam Groundwater pH Trends 2013 to 2016

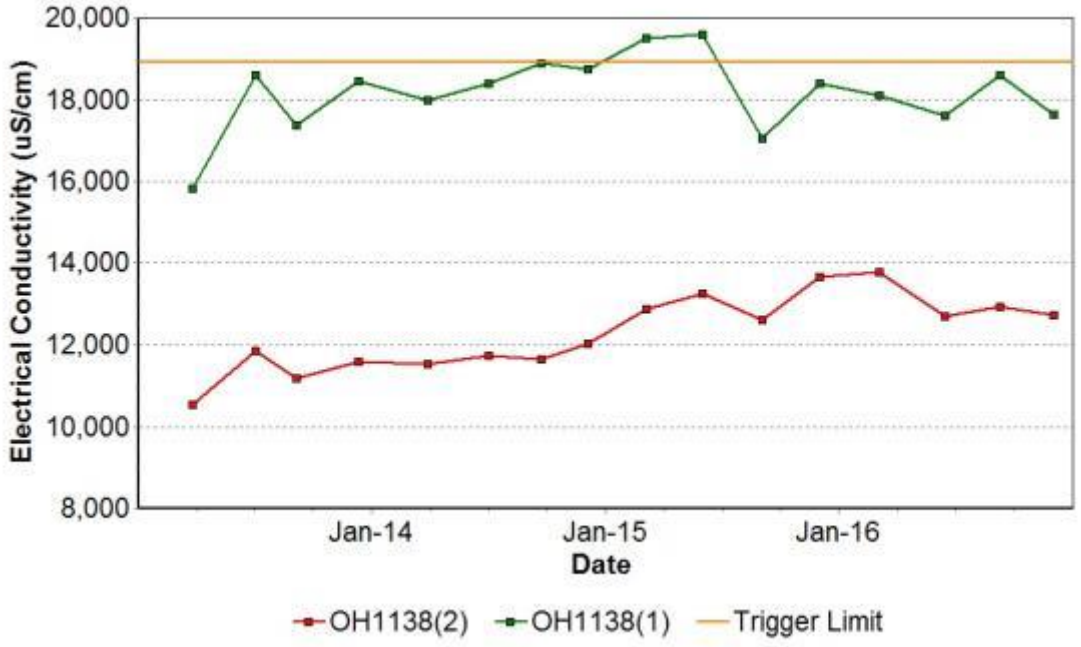

Figure 68: Warkworth Seam Groundwater EC Trends 2013 to 2016

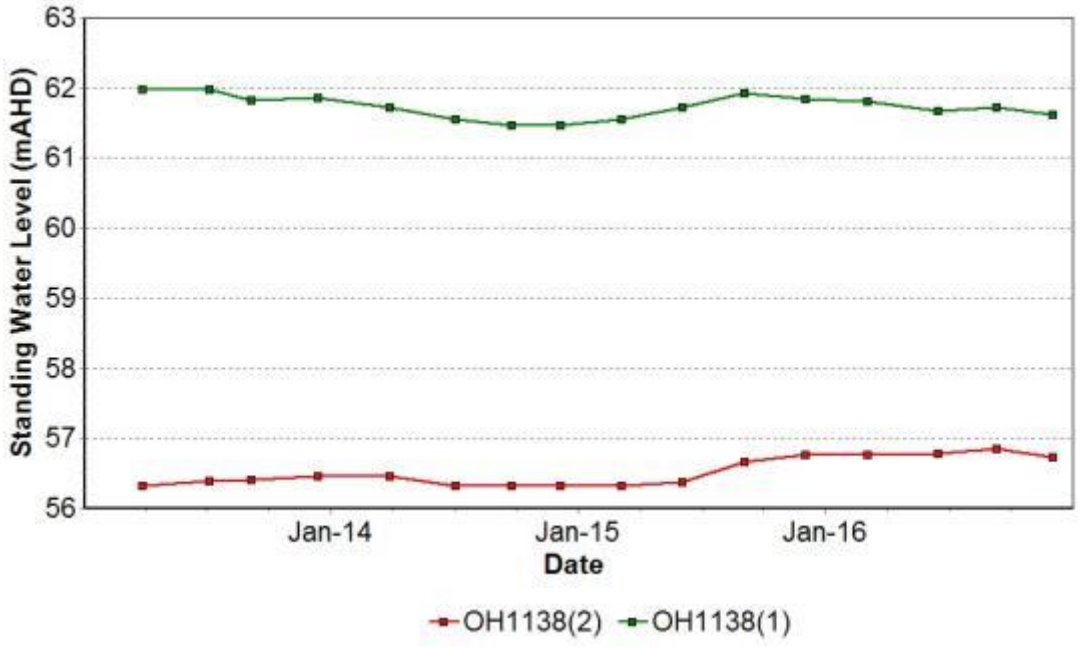

Figure 69: Warkworth Seam Groundwater SWL Trends 2013 to 2016

7.3.3.10. Wollombi Brook Alluvium Seam Bores

Groundwater monitoring in the Wollombi Brook Alluvium was undertaken from two sites during 2016; eight samples were collected. The pH, EC and SWL trends for 2013 to 2016 are shown in Figure 70, Figure 71 and Figure 72 respectively. Water levels in the bores show a slight recovery in March following rainfall, followed by a water level recession for the remainder of the reporting period likely reflecting lower rainfall. An abnormal EC measurement was recorded in bore PZ9S in September, with the follow up measurement in December returning to the historical range. A watching brief will be maintained.

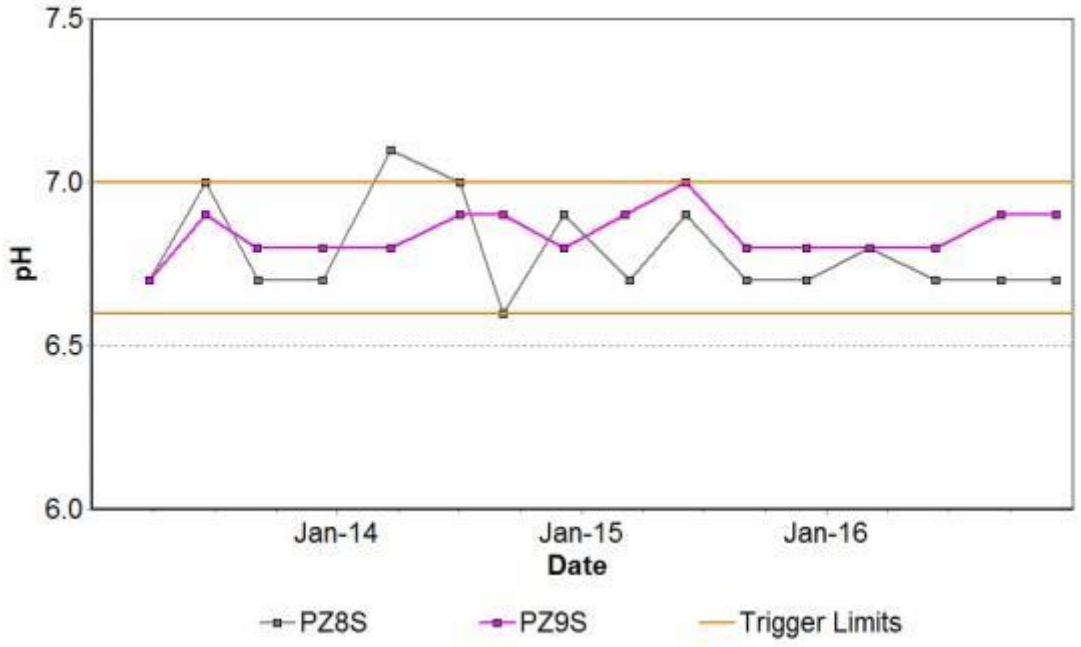

Figure 70: Wollombi Brook Alluvium Seam Groundwater pH Trends 2013 to 2016

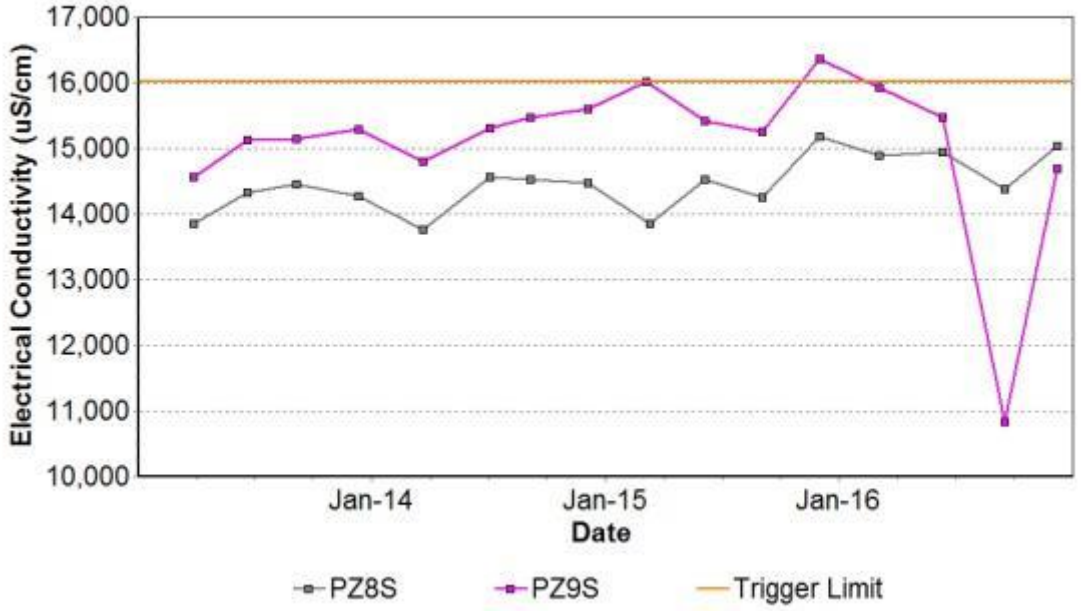

Figure 71: Wollombi Brook Alluvium Seam Groundwater EC Trends 2013 to 2016

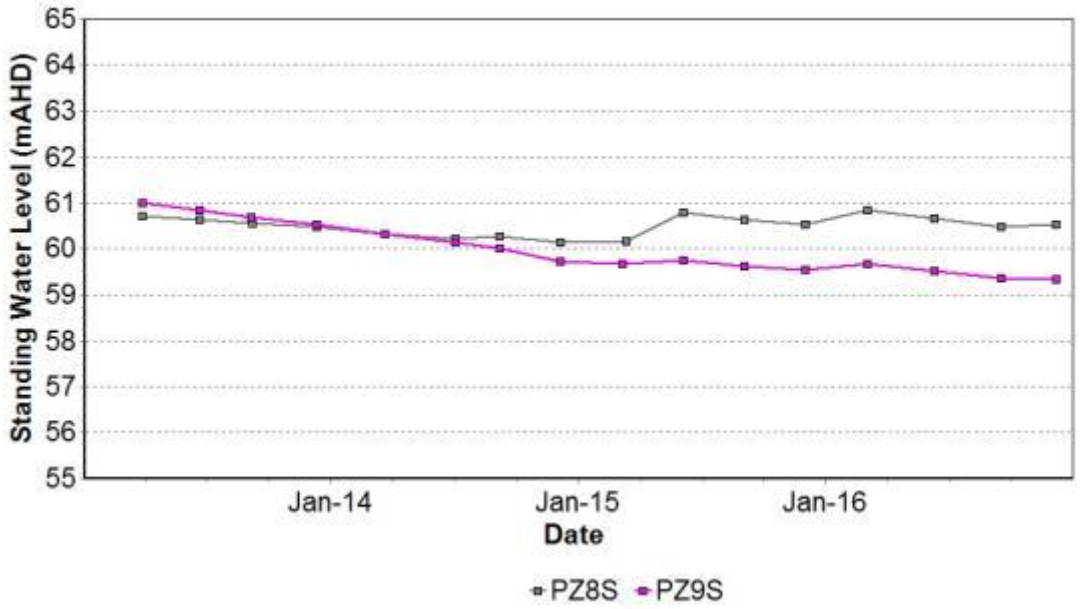

Figure 72: Wollombi Brook Alluvium Seam Groundwater SWL Trends 2013 to 2016

7.3.3.11. Aeolian Warkworth Sands

Groundwater monitoring in the Aeolian Warkworth Sands was undertaken from one site during 2016; a total of four samples were collected. The pH, EC and SWL trends for 2013 to 2016 are shown in Figure 73, Figure 74 and Figure 75 respectively. Monitoring results were consistent with historical data.

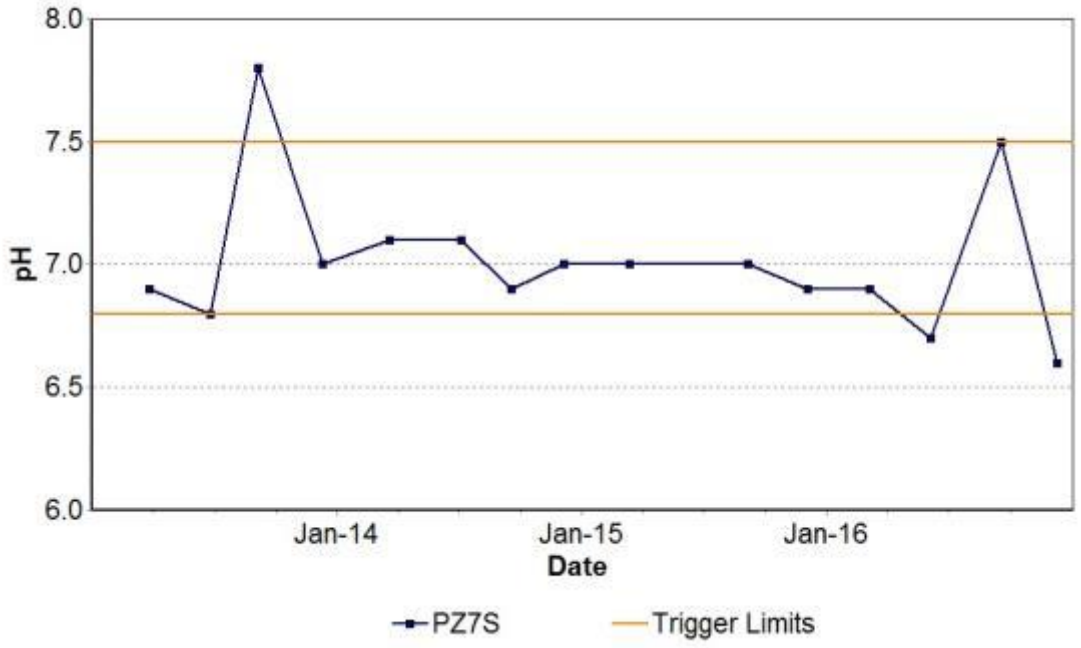

Figure 73 : Aeolian Warkworth Sands Groundwater pH Trends 2013 to 2016

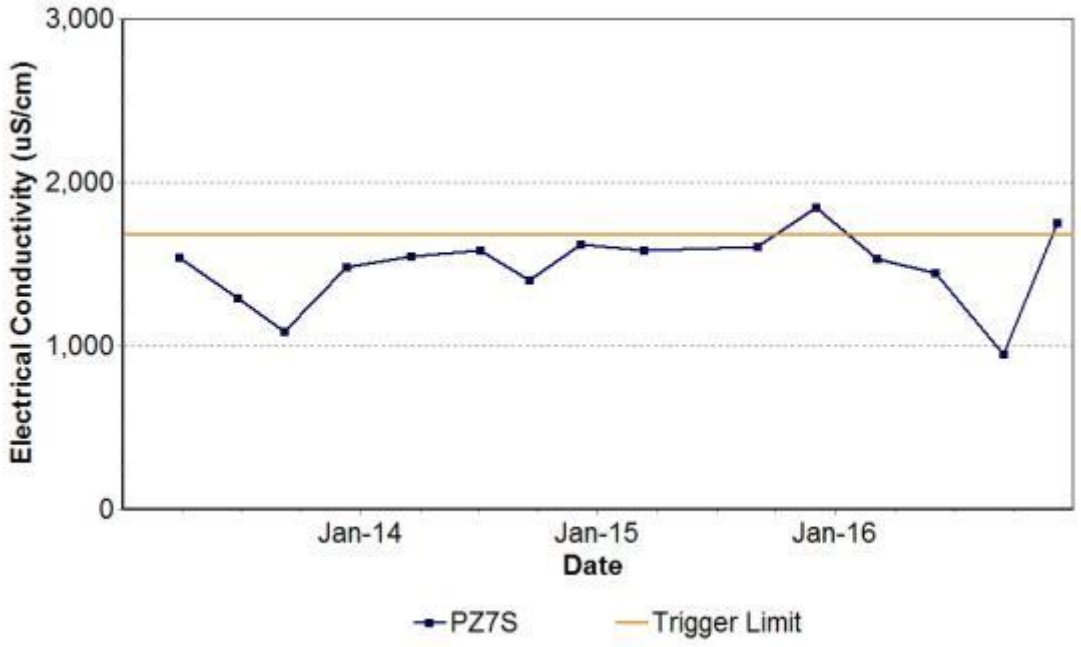

Figure 74: Aeolian Warkworth Sands Groundwater EC Trends 2013 to 2016

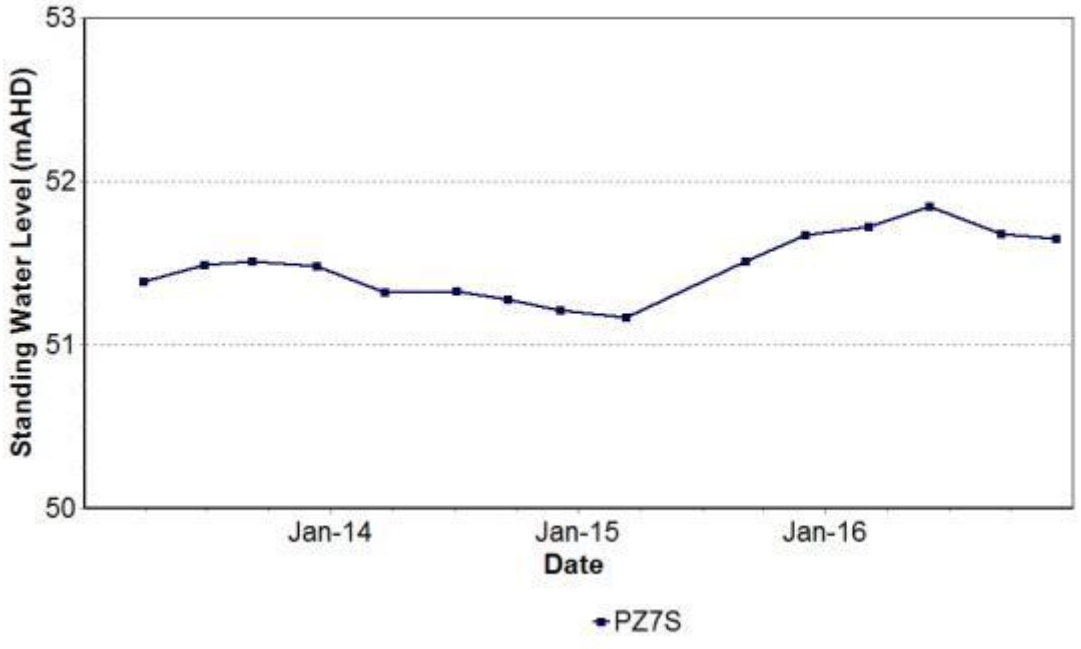

Figure 75: Aeolian Warkworth Sands Groundwater SWL Trends 2013 to 2016

7.3.4. Audits and Reviews

An independent environmental audit of the Mount Thorley Operations and Warkworth Mining Operations was undertaken in January 2016. There was one finding related to reporting of groundwater licence take, which is covered in Table 9 listing Water Access Licences. A full summary of findings is given in Chapter 10.

8. REHABILITATION

Rehabilitation progress has been compared to the MOP that was current at the end of the reporting period (MTW MOP 2015-2021 approved 5th February 2016).

8.1. Summary of Rehabilitation

A total of 84.9 ha rehabilitation was undertaken during 2016 against a MOP target of 82.6 ha. Total disturbance undertaken during 2016 was 120.2 ha, 28.9ha lower than the MOP projection of 149.1 ha. The disturbance during 2016 was made up of 91.1 ha of new disturbance and 29.1 ha of disturbance of previously rehabilitated area.

Table 33: Key Rehabilitation Performance Indicators

Mine Area Type	Previous Reporting Period (Actual) Year 2015 (ha)	This Reporting Period (Actual) 2016 (ha)	Next Reporting Period (Forecast) Year 2017 (ha)
A. Total mine footprint[1]	3,500.6	3,608.7	3,641.0
B. Total Active Disturbance[2]	2,466.3	2,499.5	2,476.8
C. Land being prepared for rehabilitation[3]	26.7	41.9	30.6
D. Land under active rehabilitation[4]	1,007.6	1,067.3	1,151.3
E. Completed rehabilitation[5]	0	0	0

[1] **Total mine footprint** includes all areas within a mining lease that either have at some point in time or continue to pose a rehabilitation liability due to mining and associated activities. As such it is the sum of total active disturbance, decommissioning, landform establishment, growth medium development, ecosystem establishment, ecosystem development and relinquished lands (as defined in DRE MOP/RMP Guidelines). Please note that subsidence remediation areas are excluded.

[2] **Total active disturbance** includes all areas ultimately requiring rehabilitation such as: on-lease exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpiles areas, access tracks and haul road, active mining areas, waste emplacements (active/unshaped/in or out-of-pit), and tailings dams (active/unshaped/uncapped).

[3] **Land being prepared for rehabilitation** – includes the sum of mine disturbed land that is under the following rehabilitation phases – decommissioning, landform establishment and growth medium development (as defined in DRE MOP/RMP Guidelines).

[4] **Land under active rehabilitation** – includes areas under rehabilitation and being managed to achieve relinquishment – includes the following rehabilitation phases as described in the DRE MOP/RMP Guidelines – "ecosystem and land use sustainability" (revegetation assessed as showing signs of trending towards relinquishment OR infrastructure development).

[5] **Completed rehabilitation** – requires formal sign off by DRE that the area has successfully met the rehabilitation land use objectives and completion criteria.

8.1.1 Management

Performance criteria for each rehabilitation phase have been detailed in the Mining Operations Plan (MOP) for MTW. These criteria have been developed so that the rehabilitation success can be quantitatively tracked as it progresses through the phases outlined below:

- Stage 1 – Decommissioning
- Stage 2 – Landform Establishment
- Stage 3 – Growing Media Development
- Stage 4 – Ecosystem and Land use Establishment
- Stage 5 – Ecosystem and Land use Sustainability
- Stage 6 – Rehabilitation Complete

The performance criteria are objective target levels or values that can be measured to quantitatively demonstrate the progress and ultimate success of a biophysical process. A monitoring methodology has been developed to measure the performance criteria outlined in the MOPs utilising a combination of tools that provide quantitative data to assess changes occurring over time.

The target levels or values have been based on monitoring results from reference sites and will be detailed in updated Mining Operations Plan to be submitted in April 2017. The results of the rehabilitation monitoring programme for native vegetation areas (presented in Appendix 5) have been compared against the target levels to determine if rehabilitation has been successful or if additional intervention is needed.

Monitoring of grazing sites has commenced for both reference sites and rehabilitation sites across HVO and MTW. AECOM prepared a report detailing the monitoring results and this was included in the 2014 Annual Environmental Review. Eight reference sites have been selected across Coal & Allied owned land adjacent to HVO and MTW. These sites were selected to cover the various oil types found in the area and to cover different Land Capability Classes (five sites on Land Capability Class IV to VI; and three sites on Land Capability Class I-III). Monitoring has also been conducted on four sites each at HVO and MTW on rehabilitated land returned to grazing.

Ecologists from Niche Environment and Heritage commenced monitoring of rehabilitated land returned to native vegetation in 2015. The results of monitoring conducted in early 2017 are presented in Appendix 4. Monitoring was conducted across 12 reference sites within the two target vegetation communities Central Hunter Grey Box-Ironbark Woodland EEC, and Ironbark-Spotted Gum-Grey Box Forest EEC. The 2017 monitoring program revisited 16 of the 17 sites monitored in 2016 to check the consistency of the monitoring results from successive years. Additional monitoring methods were incorporated into the 2017 program to measure the density, health and growth of canopy species. Sites were selected to include rehabilitation of varying ages and different rehabilitation methods.

8.2. Decommissioning

Capping and of the Interim Tailings Storage Facility continued during 2016 and is due for completion in 2017. The site will then be used as a ROM coal storage pad for the South CHPP, to facilitate progression of dumping and rehabilitation over the current ROM coal site on the western side of the Mt Thorley spoil dumps.

8.3 Rehabilitation Performance

Table 34 summarises rehabilitation completed during the reporting period compared with the rehabilitation commitments in the MTW MOP. Table 35 details the disturbance completed in 2016. Appendix 3 provides the Annual Rehabilitation Report Form, including rehabilitation progress for each domain through the rehabilitation phases.

The area of rehabilitation that was sown during the reporting period slightly exceeded the combined MOP target for Mt Thorley and Warkworth.

The amount of disturbance undertaken in 2016 was lower than the MOP projections mainly due to the clearing for the Rural Fire Service Road being delayed. This road will be used for emergency access by the RFS when Wallaby Scrub Road is closed. Clearing for construction of this road did not commence during 2016 as Council approval for the closure of Wallaby Scrub Road had not yet been obtained. This clearing is scheduled to occur in 2017 after approval is gained to close Wallaby Scrub Road.

The 2016 rehabilitation areas for MTW are shown in Appendix 4.

Table 34: Rehabilitation Completed in 2016

MOP	Pit Area	2016 Rehabilitation (ha)		Cumulative Rehabilitation During MOP Period* (ha)	
		Actual	MOP Commitment	Actual	MOP Commitment
MTW	Mt Thorley	36.5	18.3	36.5	18.3
	Warkworth	48.4	64.3	124.1	140.0
	MTW Total	84.9	82.6	160.6	158.3

Note: Rehabilitation areas relate to areas at or past the phase of Ecosystem and Landuse Establishment.
* MOP Period is 2015 - 2021

Table 35: Disturbance Completed in 2016

MOP	Pit Area	2016 Disturbance (ha)		Cumulative Disturbance During MOP Period* (ha)	
		Actual	MOP Commitment	Actual	MOP Commitment
MTW	Mt Thorley	5.8	1.4	6.6	4.9
	Warkworth	114.4	147.7	146.5	190.1
	MTW Total	120.2	149.1	153.1	195.0

* MOP Period is 2015 – 2021

Progressive rehabilitation commitments are outlined in the Warkworth Continuation 2014 and Mt Thorley Operations 2014 Environmental Impact Statements. These documents modelled a total of 767 ha of rehabilitation would be complete by 2014, and a further 336 ha would be completed in the period 2015 to 2017, making a modelled total at the end of 2017 of 1,103ha. At the end of the reporting period there had been 1,063 hectares of rehabilitation completed across MTW, consistent with the EIS forecasts.

The South Pit South Accelerated Rehabilitation Plan was prepared in 2014 to address lagging rehabilitation in the South pit area of Warkworth. The Plan details how rehabilitation in this area will progress between 2014 and 2018. For the period 2014 to 2016 the Plan committed to 110.9 ha of rehabilitation being completed. The actual rehabilitation amounts to 130.7 ha, which is 19.8 ha ahead of the planned progress.

8.3.1 Rehabilitation Programme Variations

There were no variations to the rehabilitation programme during the reporting period.

Management of rehabilitated areas is undertaken when required or when issues are identified through monitoring, auditing or inspections. During 2016, a maintenance fertiliser application was applied to 65 ha of established pasture rehabilitation in North Pit North. A licence agreement is in place for grazing 90 ha of Warkworth North Pit North rehabilitation area.

8.4 Rehabilitation Trials

A trial of various sowing methods was conducted on a spoil/compost site on Tailings Dam 1 using native seed mixes. The methods being compared were direct-drilling, hydroseeding and broadcast seeding. The non-flowable components of the seed mix (mainly native grasses) were coated with a clay-based mixture to allow them to flow through the broadcast seeding equipment. Monitoring of this trial site will be conducted.

8.5 Topsoil Management

Topsoil is managed according to Coal & Allied Ground Disturbance Permit and land management procedures. Table 36 outlines the topsoil used and stockpiled during 2016.

There were 84.7 ha of rehabilitation top soiled during 2016, using stockpiled and pre-stripped soil resources.

Table 36: Soil Management

Soil Used This Period (m^3)	Soil Prestripped This Period (m^3)	Soil Stockpiled to Date (m^3)	Soil Stockpiled Last Report (m^3)
84,700	**120,200**	**794,994**	**760,061**

8.6 Tailings Management

Capping of the Interim Tailings Storage Facility continued during 2016. Capping work on this facility is planned to be completed during 2017.

Minimising the amount of standing water on tailings storage facilities, by managing the decant water, is important during and post tailings deposition to assist with closure of these facilities. Effective removal of decant water enables better consolidation of the tailings material, which in turn facilitates earlier capping and rehabilitation of the storage facility. Table 37 below outlines the current state of decant water pumping infrastructure across the active and inactive TSF's at MTW.

Table 37: Tailings Management

Facility	Status	Decant System
Centre Ramp TSF	Active	Decant pumps in place, regular pumping
Abbey Green South	Active	Decant pumps installed as required due to infrequent filling regime.
TD2	Inactive	Diesel Pump in place
Interim TSF	Inactive	Floating solar pump installed
Ministrip TSF	Inactive	Diesel Pump in place, pumping as required

8.7 Weed Control

8.7.1 Weed Treatment

The weeds identified at MTW occur primarily in areas that have been disturbed such as post mining rehabilitation areas, previous civil works areas, soil stockpiles, water management structure surrounds, and general areas of minor ground disturbance. A total of 68 days of weed management work was undertaken on site at MTW during 2016, with 220 ha of land treated, including maintenance of access tracks and environmental monitoring points. The weeds targeted during the 2016 weed management programme were based on the results of the 2015 weed survey. Figure 76 illustrates the target species and weed treatment areas across MTW. Weed treatment areas are assessed following the completion of periods of work to determine the effectiveness of control works.

The species focussed on during treatment included:

- African Boxthorn *(Lycium ferocissimum)*
- Lantana *(Lantana Camara)*
- Fireweed *(Senecio madagascariensis)*
- Galenia *(Galenia pubescens)*
- Mother of Millions *(Bryophyllum delagoense)*
- Opuntia *(Pear) species (Tiger, Prickly and Creeping Pear)*
- St John's Wort *(Hypericum perforatum)*
- Thistles: Saffron Thistle *(Carthamus lanatus)*, Scotch Thistle *(Onopordum acanthium)* and Variegated Thistle *(Silybum marianum)*

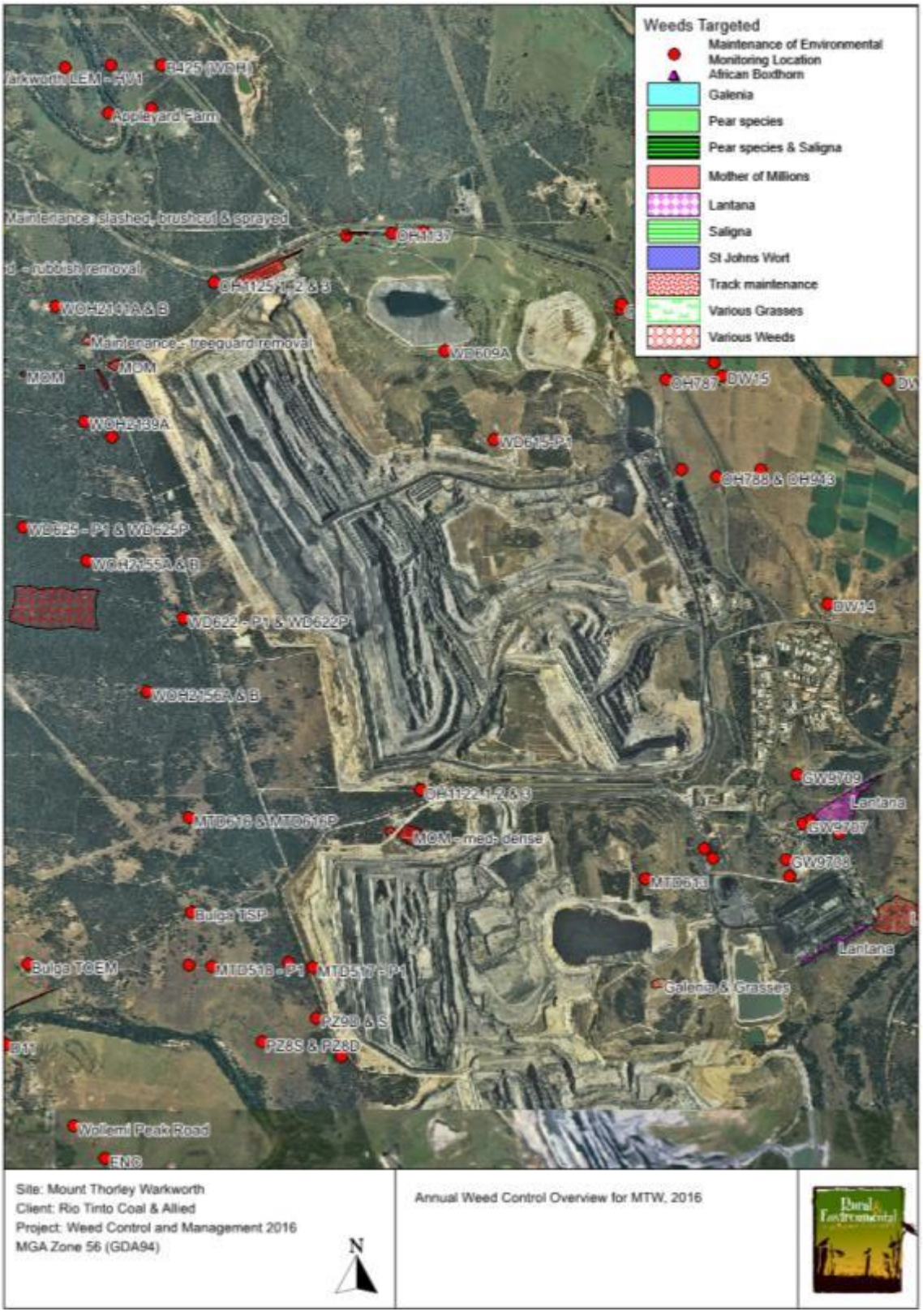

Figure 76: Annual Weed Control Overview for 2016

8.7.2 Annual Weed Survey

The management and control of weeds at MTW is governed by the Annual Weed Survey (AWS). The AWS lists Weeds of National Significance (WONS), noxious, environmental and other non-declared weed species identified across MTW, and provides a framework to allow for structured weed management and control across operational and non-operational areas of MTW. The following summarises the results of the weed survey undertaken during October 2016:

Six WONS were identified during the survey, they included:

- African Boxthorn (*Lycium ferocissimum)*
- Bitou bush (*Chrysanthemoides monilifera subspecies rotundata)*
- Lantana (*Lantana camara*)
- Pear Species,
    - Creeping Pear (Opuntia humifusa)
    - Prickly Pear Opuntia stricta)
    - Tiger Pear (Optunia aurantiaca)

Two other noxious weeds were identified at MTW during the survey, including:

- Mother of Millions *(Bryophyllum delagonese)*
- St Johns Wort *(Hypericum perforatum)*

Seven environmental weed species were identified at MTW during the survey, they included:

- African Olive *(Olea europea subspecies cuspidae)*
- Castor Oil Plant *(Ricinus communis)*
- Galenia (*Galenia pubescens)*
- Various Thistles
    - Scotch Thistle (*Onopordum acanthium),*
    - Saffron Thistle(Carthamus lanatus)
    - St Barnaby's Thistle (*Centaurea solstitialis*)
    - Variegated Thistle (Silybum marianum) (to a lesser degree)

Nine weeds that are not officially declared or listed were also recorded at MTW including:

- Aloe Vera (*Aloe vera*)
- Century plant (*Agave americana*)
- Fennel *(Foeniculum vulgare),* sparsely scattered over entire site
- Golden wreath wattle or Saligna (*Acacia saligna)* – sparsely scattered over entire site
- Inkweed (Phytolacca octandra)
- Narrow Leaved cotton bush (Gomphocarpus fructicosus)
- Spiny Rush (Juncas acutus)
- Tree Tobacco (Nicotiana glauca), and

- Wild Rose (Rosa species)

Species identified during the 2016 survey will form the basis of ongoing weed management works during 2017.

8.8 Vertebrate Pest Management

As part of MTW's Vertebrate Pest Action Plan a control programme is carried out quarterly and on a seasonal basis. Three 1080 ground baiting programmes consisting of 60 bait sites utilising meat baits and ejector baits were undertaken during summer, winter and spring, to target wild dogs and foxes. Baits were checked over a two to four week period and replaced each week when taken.

Additional pest management programmes included:

- Feral pig trapping was established where pig activity and sightings were evident: two traps set, no pigs trapped.
- Opportunistic shooting of vertebrate pests: 58 hares, 13 feral pigs, four rabbits, one fox and one feral cat shot.

MTW will continue to carry out quarterly vertebrate pest control programmes during 2017 to limit feral pest impacts on landholdings and surrounding neighbours.

Table 38 summarises the results from the 1080 ground baiting programmes and opportunistic shooting carried out at MTW during 2016. The baiting locations and results for the programmes are illustrated in Figure 77.

Table 38: Vertebrate Pest Control Summary

Season	1080 Baiting			Opportunistic Shooting				
	Total Lethal Baits Laid	Takes by Wild Dog	Takes by Fox	Feral Pigs	Feral Cats	Hares	Foxes	Rabbits
Summer	120	34	1		1	20		
Autumn - Winter	180	92	4					
Spring	180	81	4	13		38	1	4
Total	**480**	**207**	**9**	**13**	**1**	**58**	**1**	**4**

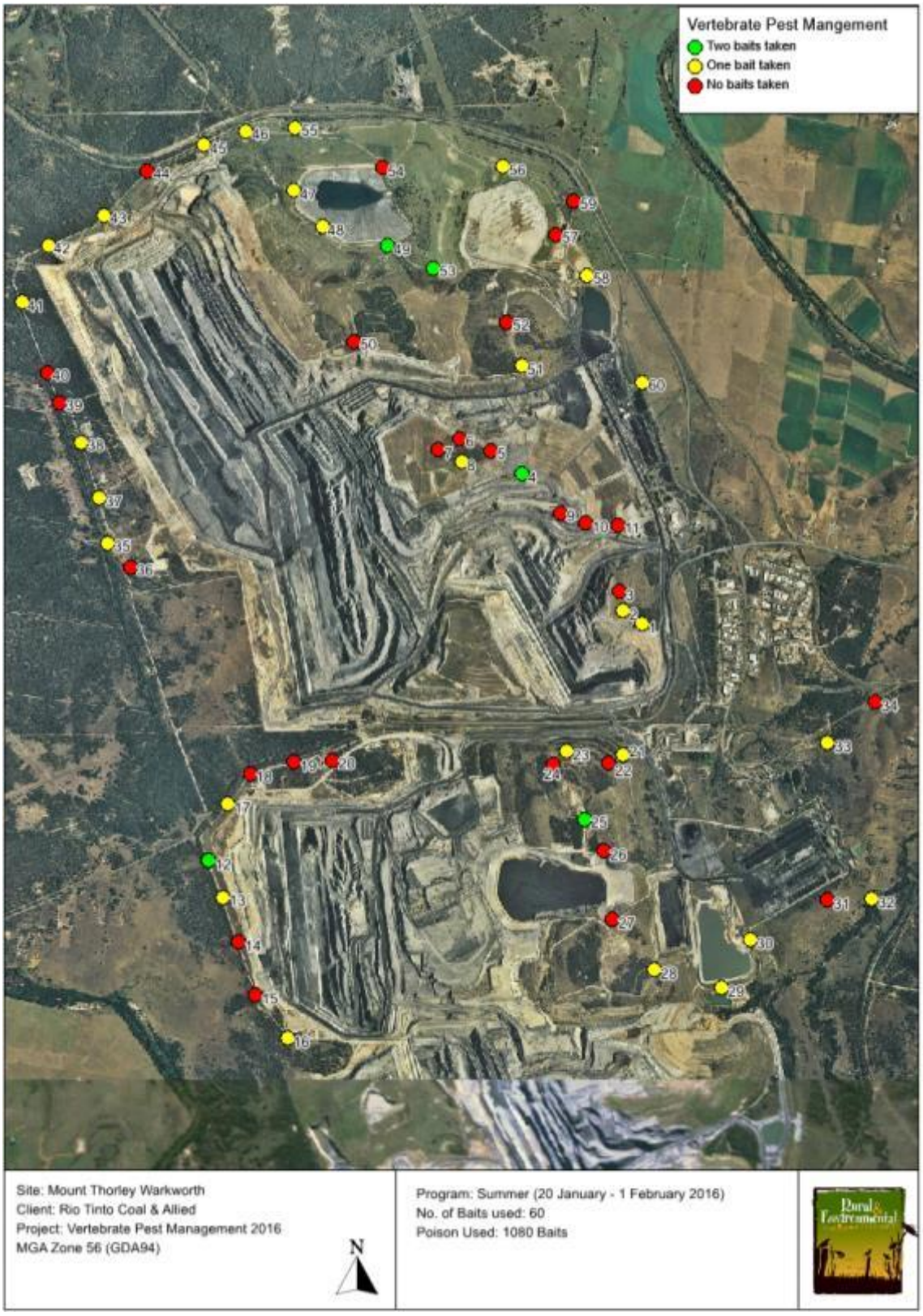

Figure 77: Baiting Station Locations and Results at MTW during the Summer 2016 Vertebrate Pest Management Programme

Figure 78: Baiting Station Locations and Results at MTW during the Winter 2016 Vertebrate Pest Management Programme

Figure 79: Baiting Station Locations and Results at MTW during the Spring 2016 Vertebrate Pest Management Programme

8.9 Biodiversity Offsets

8.9.1 Management

The Warkworth Mine's impacts on biodiversity values are offset through the protection and management of Biodiversity Areas (BAs) which are managed in accordance with the Local, Putty Road, and Regional Offset Management Plans (OMPs). These Offset Management Plans will be superseded with new site specific plans in 2017.

The OMPs provides the management framework for the entire BAs and their Offset Areas, as in some cases the entire BA is not an Offset Area, to enhance the biodiversity values through the implementation of conservation management strategies. All of the OMPs are available on the Rio Tinto website.

8.9.2 Biodiversity Area Management Activities

The OMPs describe the Conservation Management Strategies. The following are the key actions completed throughout 2016 across all the BAs:

Weed Control

Declared and environment weeds were sprayed by contractors within the Northern and Southern BAs, control targeted significant outbreaks of lantana, mother of millions and prickly pear. Regional BA weed control targeted Willows, Blackberry, St John's Wort, Varigated Thistle, Prickly Pear, Tree of Heaven and Nagoora Burr.

Infrastructure Management and Improvement

Track, fence and waste audits were undertaken within the Local and Regional BAs. A new section of boundary fence was constructed at the Seven Oaks BA and Bowditch BA. Fence repairs were undertaken on the Goulburn River BA and North Rothbury BA. Internal fences and waste were removed from the Southern BA and Seven Oaks BA. Monthly property inspections were undertaken at all Regional BAs.

Fire Management

The Regional Offset Bushfire Management Plan and the Warkworth Bushfire Management Plan were reviewed. Track upgrade work was undertaken and involved the reopening of the fire track between Seven Oaks at the Goulburn River BA.

Strategic Grazing

No strategic grazing was undertaken in the BAs in 2016.

Vertebrate Pest Management

Three 1080 ground baiting programmes consisting of 60 bait sites utilising meat baits and ejector baits were undertaken on the local BAs during summer, autumn-winter and spring in 2016 to target wild dogs and foxes. Baits were checked over a two to four week period and replaced each week when taken. In summer 59 baits were taken by dogs and two taken by

foxes. In winter, 46 baits were taken by dogs and two taken by foxes. In spring, 74 baits were taken by dogs and two taken by foxes.

Two 1080 ground baiting programmes consisting of 60 bait sites utilising meat baits and ejector baits were undertaken on the Goulburn River BA and Bowditch BA in autumn and spring also targeting wild dogs and foxes. Baits were checked over a three week period and replaced each week when taken. In autumn 51 baits were taken by dogs and 37 by foxes. In spring 20 baits were taken by dogs and 15 taken by foxes.

Additional pest management programmes included:

- Rabbit poisoning, 100g out of 4000g of 1080 poison carrot was consumed at Southern BA and 3550g out of 4000g of poison carrot was consumed at Northern BA.
- Opportunistic shooting at the Regional BAs: 19 feral pigs were shot.

Vertebrate pest management programmes will continue to be carried out on Local and Regional BAs during 2017 to limit feral pest impacts on landholdings and surrounding neighbours.

Seed Collection

Opportunistic seed collection was undertaken by contractors in the Northern and Southern BAs during 2016, focussing on the WSW and Ironbark vegetation community. Tube stock for future plantings is currently being propagated from the seed collected.

Revegetation

MTW has committed to restoring the Endangered Ecological Communities of Warkworth Sands Woodland and Central Hunter Grey Box – Ironbark Woodland in the Southern and Northern Biodiversity Areas. Work commenced in 2014 to restore over 80 hectares of Warkworth Sands Woodland, this involved the planting of seedlings and the relocation of sand salvaged ahead of mining activities. In 2016, planting works continued in the Northern Biodiversity Area, with over 8,000 seedlings planted between May and July. The team dug holes for each seedling, either by hand or auger, into 50x50m patches. All plants were watered, fertilised and protected with a tree guard. In total there were 20 patches established, half of these received the addition of topsoil from ahead of mining operations at MTW prior to planting and half received only weed control, to observe if the addition of topsoil improves survival. Within these patches the seedlings are planted at a close spacing to create “stepping stones” between existing remnant vegetation. When these patches grow they will create shelter to support natural regeneration in surrounding areas and over time all of these areas will connect together and create a better habitat for native plants and animals. Restoration activities also commenced in a small area of Ironbark Woodland in the Southern Biodiversity Area, with over 2,000 seedlings planted in July. The site preparation for this site included ripping by tractor and weed control. The team planted the seedlings into rip lines. To mimic nature the tree species were planted at a spacing of 5 -10m and shrubs species planted in clumps as commonly found with understory species within this

vegetation type. All plants were watered, fertilised and protected with a tree guard. The next round of planting is planned for Autumn 2017. Overall there is more than 500 hectares of grassland area to be planted and managed over 15 years to restore these Endangered Ecological Communities.

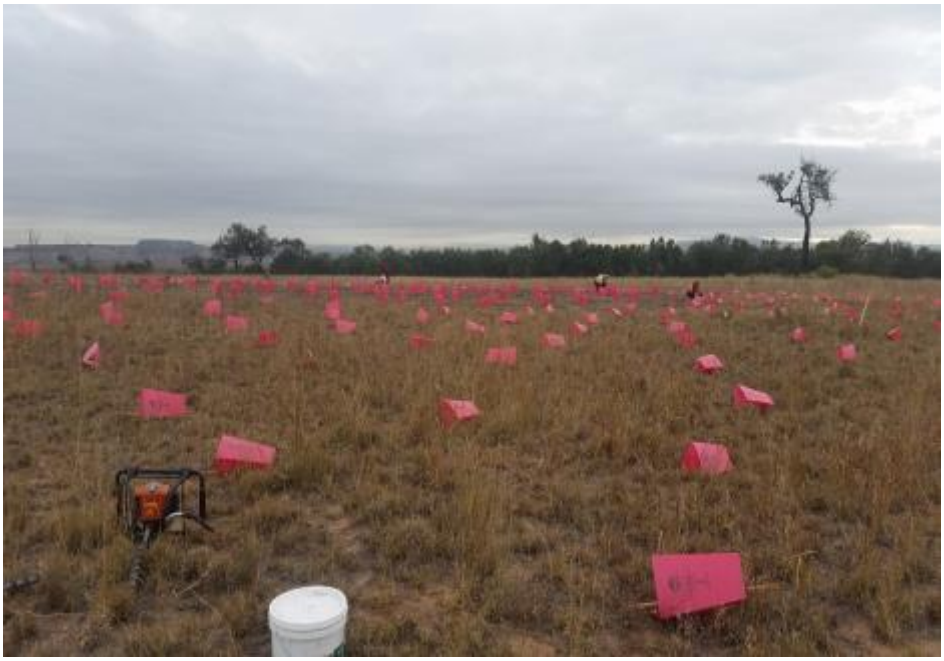

Figure 80: Installation of tube stock at one of the plots in the Northern Biodiversity Area by Toolijooa Environmental Restoration.

Figure 81: Installation of tube stock at the Southern Biodiversity Area Toolijooa Environmental Restoration.

8.9.3 Audits and Reviews

An independent environmental audit of the Mount Thorley Operations and Warkworth Mining Operations was undertaken in January 2016. There were no findings related to biodiversity areas. A full summary of findings is given in Chapter 10.

9. COMMUNITY

9.1. Complaints

A total of 463 complaints were recorded during the reporting period, down 29% compared to 2015. The 463 complaints were registered by 58 people, 61% were received from 10 individuals. Most complaints were received from Bulga residents, making up 83% of the complaints record. A breakdown of complaints by type is shown in Table 39. In summary:

- 39% in reduction in dust complaints;
- 34% reduction in noise complaints;
- 64% reduction in lighting complaints from 2015 returning to levels consistent with 2014 statistics;
- 20% increase in blast related complaints (65 in total). Most blasting complaints received were described as being related to vibration. There were no exceedances of vibration limits during 2016; and
- Complaints falling in the "other" category experienced a significant increase compared to the 2015 reporting period, primarily related to road closures. Most of these were due to prolonged road closures when protest activity was occurring in planned road closure areas.

The level of complaints received from Bulga residents remains elevated (despite improvements in noise management and a demonstrated high level of compliance in this area), confirming that noise remains of key concern for near neighbours. There has been a trending decrease (overall 60%) in noise complaints from 2014. The decrease is attributed to operational modifications such as equipment sound attenuation and continual improvement and development of the attended noise monitoring program resulting in improvements to operational control.

Table 39: Summary of Complaints by type for 2014 to 2016

Complaint type	2016	2015	2014
Noise	325	492	809
Blasting	65	54	52
Dust	38	62	27
Lighting	16	44	15
Water	0	0	0
Other	19	3	8
Total	**463**	**655**	**911**

A full summary of complaints recorded in 2016 is presented in Appendix 1

9.1.1. Community Response Officers

Since 2012 three community response officers have been working with the mining team at MTW to provide community members with a more direct line of communication to the mine, particularly during the night. In addition to providing a timely response to community

concerns during non-work hours their role includes on and off site inspections, capturing and communicating operational changes in response to alarms, weather conditions and community feedback and calls to MTW's Community Complaints Hotline. They also suggest continuous improvement ideas to further improve environmental performance.

9.2. Review of Community Engagement

9.2.1. Communication

Coal & Allied has previously distributed a Hunter Valley Community Newsletter, containing regular updates about MTW and its community activities, to businesses and residences in the Singleton and Muswellbrook Local Government Areas (LGAs). In 2016 Coal & Allied transitioned to full-page newspaper advertorials. Newspaper advertorials were published in The Singleton Argus, Muswellbrook Chronicle and The Scone Advocate in the months of June and December. The three publications have a combined readership of approximately 16,000 people. Coal & Allied intends to continue to place these full-page advertorials as another way to communicate about its operations.

Quarterly letters are sent to MTW's near neighbours to provide an overview of mining operations and other relevant activities, as well as inform residents about how impacts are being managed. In addition, Coal & Allied issues correspondence to specific near neighbours who may be affected by certain changes. In 2016, this included communication relating to:

- Voluntary Planning Agreement (with Singleton Council) community consultation
- Third Crossing of Putty Road project
- Near Neighbour Amenity Resource offer (for tank clean-outs)
- Lydes Lane closure
- Warkworth Sands Woodland tour

During August, Coal & Allied hosted a number of residents on a tour of the Warkworth Sands Woodlands restoration project areas. In November and December Coal & Allied and Singleton Council jointly hosted members of the Bulga, Milbrodale and Mt Thorley communities to discuss the $11 million Voluntary Planning Agreement. Topics discussed included geographical funding allocations, governance of funds and types of projects that may be considered once the Agreement is in place.

A range of consultation and engagement activities were also completed, including:

- Engagement and consultation with near neighbours to provide project updates at key project milestones and activities, and in response to concerns/queries raised by individual near neighbours
- Local Council briefings
- School engagement- working with teachers and students to assist and enhance learning outcomes and build relationships
- Participation in the Upper Hunter Mining Dialogue – a programme co-ordinated by the NSW Minerals Council to engage the community across the Hunter Valley

Coal & Allied's relationships with local communities were strengthened through involvement in events such as the Singleton Show and Coal & Allied's Singleton Professions Forum. The Professions Forum was a career expo-style event planned and organised by student leaders from Singleton High School, St Catherine's Catholic College and the Australian Christian College. The event aimed to support career options and diversity within the Singleton area.

9.2.2. Community Consultation Committee

The MTW CCC met on a quarterly basis to discuss our operations. The Committee is comprised of Coal & Allied representatives, community members and other key external stakeholders, including Council. The MTW CCC minutes are available on the Rio Tinto website (www.riotintocoalaustralia.com.au). The community is invited to visit the website to learn more about the MTW CCC, as well as other Coal & Allied operations and projects.

Following CCC Meetings a letter is mailed to near neighbours to update them about what was discussed at the meeting and provide any additional information about MTW's operations. In 2016 members included

- Dr Col Gelatley
- Cr Hollee Jenkins
- Mr Adrian Gallagher
- Mrs Christina Metlikovec
- Mr Graeme O'Brien
- Mr Ian Hedley
- Mr Stewart Mitchell
- MTW General Manager – Mr Colin Mackey
- Manager Environment & Community – Mr Andrew Speechly

9.3. Community Development

In 2016, Coal & Allied continued its focus on ensuring the long term sustainability of the communities in which it operates, through the facilitation of community development programmes such as:

- Coal & Allied Community Development Fund (CDF)
- Coal & Allied Aboriginal Community Development Fund (ACDF)
- Mount Thorley Warkworth Site Donations Committee
- Community partnerships

9.3.1. Community Development Funding Programs

In 2016, CDF programmes contributed a total of almost $700,000 to support capacity building and contribute to the long-term sustainability of surrounding communities.

Community Development Fund (CDF)

The year 2016 marked 18 years of operation of the CDF, which has invested over $14.5 million to support over 120 community projects in the Hunter Valley since its establishment in 1999, across the areas of health, education, environment and economic development.

In 2014, Coal & Allied announced that a further $3 million would be made available to the CDF over a three year period (2015 – 2017) for projects in the Singleton, Muswellbrook and Upper Hunter LGAs. Strategic priority areas were refined for the 2015-2017 funding cycle to enable a more targeted approach to addressing identified community need and to leverage other resources Coal and Allied may be able to offer to strengthen community partnerships.

Priority areas for the 2015-2017 funding cycle include:

- Economic Development: encouraging the diversity and competitiveness of the Upper Hunter economy
- Community Health: Supporting projects which target health, safety and social wellbeing of the community
- Education: Promoting the value of education and building skills within our community
- Environment and Land Management: Supporting projects that can make a difference on a greater scale. i.e. beyond C&A mining operations

In 2016, the CDF contributed almost $700,000 to 14 programmes aimed at delivering long term benefits for communities in the CDF catchment (Table 40), which include the Singleton, Muswellbrook and Upper Hunter LGAs (Figure 82). A further $500,000 is available for allocation in 2017.

Table 40: Coal & Allied Community Development Fund projects supported in 2016

Programme	Partner
Enterprise Facilitation	Sirolli Institute
Supporting Children's Developing Social Competence	Early Links Inclusion Support Service
Science and Enginnering Challenge, and SMART Program (2015-2017)	University of Newcastle
Upper Hunter Education Fund Scholarships (2015-2017)	Upper Hunter Education Fund
Business Development Officer	Singleton Business Chamber
Singleton High School Agricultural Course	Singleton High School
University of Newcastle Scholarships	University of Newcastle
Singleton Economic Development and Funding Coordinator	Singleton Council
Singleton Community College Strategic Plan	Singleton Community College
HSC Study Camps	Upper Hunter Education Fund

Ready 4 School Program	Jerrys Plains Public School
Youth Leadership Program	Outward Bound Australia
Tocal Steers Challenge	Tocal College
Early Learning Program	Milbrodale Public School

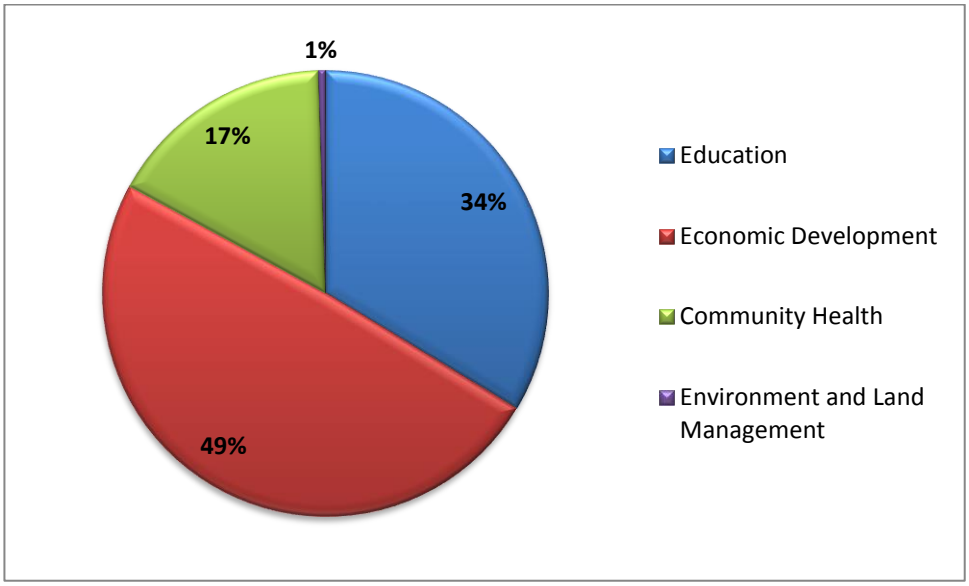

Figure 82: Distribution of Community Development Fund by category 2016

9.3.2. Site Donations

Coal & Allied considers applications for local donations and sponsorships that have a clear community benefit. In 2016, MTW provided $50,000 to 30 local projects and initiatives, including:

- Singleton Mayoral Scholarships
- Singleton Art Prize
- Invisible Wounds Mental Health workshop – Australian Families of the Military
- 2016 Production of The Wizard of Oz
- Group 21 2015-2017 Sponsorship
- Singleton Relay for Life – Cancer Council
- Beyond Blue community fundraiser
- 2016 Prime Stock competition
- Holes 4 Hospital Charity Golf Day
- Singleton Show
- Salvation Army Children's Christmas Party
- Singleton Hospital – Bed for palliative care room
- Hunter Valley Offroad Racing Association – Come and Try day (CANTEEN fundraiser)

- Cancer Council – Transport for Treatment program

9.3.3. Community Partnerships

Coal & Allied has retained an active partnership programme in 2016 with key organisations that provide a service valued by the community and have an approach to their business that is aligned with Coal & Allied principles. Partners include:

- Hunter Research Foundation
- Westpac Rescue Helicopter Service

10. INDEPENDENT AUDIT

As required under Mount Thorley Development Consent DA34/95, Schedule 5, Condition 9 and Warkworth Development Consent DA 300-9-2002-I, Schedule 6, Condition 9, an Independent Environmental Audit was undertaken in January 2016. The audit focused on the site's compliance with Environmental Protection Licences, Approvals and supporting documents including management plans, covering the period November 2010 to January 2016. On 26 November 2015, MTW had new approvals granted, although these new approvals were not assessed as part of this audit. The audit focused on compliance with the pre-existing approvals over the audit period.

The Independent Environmental Audit reviewed 61 approvals and environmental management documents in detail and other documents more generally, where relevant. A total of 1,030 conditions and commitments were assessed as part of this audit; 17 issues resulted in 41 non-compliances. No High risk findings were identified in the audit.

The reports for the environmental audit and MTW's response to recommendations are available in full on the Rio Tinto Coal Australia website (www.riotintocoalaustralia.com.au).

11. INCIDENTS AND NON-COMPLIANCES

11.1 Water

6 January 2016

A rain event of approximately 106mm was received on site over a four day period, from Sunday 3rd to Wednesday 6th January 2016. The rain was associated with a significant regional weather event which persisted over the Lower Hunter during this period.

During an inspection at approximately 07:15 on the 6th January 2016 water was observed to be flowing from a sediment dam located to the east of Wallaby Scrub Road, due to the development of piping through the dam embankment and subsequent slumping of a small section of the embankment. As a result, water and sediment flowed into the Wallaby Scrub Road Reserve and under the road via a culvert to land owned by Coal & Allied. The land owned by Coal & Allied is within the approved premises boundary for Environmental Protection Licence 1376 and is subject to a Development Consent to mine this land and the land on which Wallaby Scrub Road traverses. Due to wet ground conditions in this area vehicular access to Wollombi Brook was not possible hence Coal & Allied staff were unable to confirm whether water from the dam reached Wollombi Brook.

The dam was designed in accordance with the Blue Book guidelines Managing Urban Stormwater, Soils and Construction, Volume 1, 4th Edition (Landcom, 2005) for sizing type F+ D Sediment Basins. The adopted design criteria for this sediment dam was to adequately contain runoff from the reporting catchment up to a rainfall depth corresponding to the 85th percentile 5-day rainfall event as specified in the approved Water Management Plan for management of sediment laden water. In this case the 85th percentile 5-day rainfall depth is 31mm (Blue Book- Table 6.3a, Landcom 2005) which was exceeded by the rainfall event between the 3rd and 6th of January.

The exact duration of discharge from the dam embankment is unknown; however it would have been no greater than 18.5 hours. This is known because an inspection was completed between 20:30 and 21:00 on 5th January 2016 by mine personnel with no discharge noted and flow ceased at approximately 14:50 on 6th January 2016.

The investigation determined the most likely cause of dam wall failure was due to “piping” where water percolated through the dam wall entraining soil material, causing instability and slumping of the wall.

Sampling of the discharged water and receiving waters in Wollombi Brook was undertaken on 6th and 7th January 2016 respectively. The sampled water was analysed for Electrical Conductivity, pH and Total Suspended Solids.

The volume of water that discharged from the dam is unable to be determined exactly due to unknown duration of the event and dam water level at time of dam wall failure. Water slowed to a dribble at approximately 14:15 and ceased flowing from the dam at approximately 14:50 on 6th January 2016. A volume range of between 0.2 – 4.4 ML of water

has been estimated to have discharged from the dam. This estimate is based on maximum dam level volume, the dam volume below the piping failure in the wall, pump flowrate, rainfall and runoff.

A number of remediation works have been completed, including:

- Recovery of sediment from the Wallaby Scrub Road reserve;
- Excavation of the dam below ground level;
- Installation of an engineered spillway; and,
- Risk assessment undertaken for similar dams at MTW to ensure appropriate management controls are in place.

Both the Department of Planning & Environment and the Environment Protection Authority were notified of the event on 6 January 2016, with a follow up incident report prepared and sent to DP&E on the 21 January 2016 and a R3 Incident Report prepared and sent to EPA on 3 February 2016. The NSW EPA has conducted a regulatory investigation and the matter is now before the NSW Land & Environment Court.

11.2 Monitoring

8 June 2016

The Bulga Village blast monitor failed to capture the results of blast n33-gmc-pr5 initiated at 11:09 on the 8 June 2016.

A GPS fault on the Bulga Village blast monitor caused the monitor to assign the incorrect time to the event. As a consequence the blast data was not recorded for the event. As a result, the software has been updated so that an alert is now sent if the GPS co-ordinates of any unit change.

The blast results for Bulga Village were calculated by the MTW Drill and Blast Engineer using AS2187.2 and sonic decay laws.

Both the Department of Planning & Environment and the Environment Protection Authority were notified of the event on 10 August 2016.

12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

12.1 Noise

Noise management improvements identified for implementation in 2017 include:

- Maintain and continue sound power level testing of attenuated fleet;
- Continuation of daily public reporting, including information on noise management for the previous night shift (reporting undertaken on business days only); and
- Review and if necessary the revision of the MTW Noise Management Plan.

12.2 Blasting

Blasting management improvements identified for implementation in 2017 include:

- Review and if necessary the revision of the MTW Blast Management Plan; and
- Hardware upgrades to ground units to allow for longer storage of blast data. This will reduce the possibility of blast miss-capture, such as in the unlikely event that a small blast is not automatically picked up by the "beacon" monitor due to low levels of vibration and also not "manually triggered" by the Drill and Blast team who regularly review the data uploaded to the monitoring website.

12.3 Air Quality

Air Quality management improvements identified for implementation in 2017 includes:

- Review and if necessary the revision of the MTW Air Quality & Greenhouse Gas Management Plan; and
- Implementation of additional dust monitors into MTW's air quality monitoring network. The purpose of these monitors is to alert the Community Response Officer and the Shift Coordinator to elevated dust levels, which have the potential to cross the Putty Road.

12.4 Cultural Heritage

Aboriginal Cultural Heritage

Ongoing Aboriginal archaeological and cultural heritage management activities will occur in 2017 at MTW in accordance with current AHMPs, to inform ongoing land management and development planning. An MTW complex-wide AHMP was developed during 2016 in accordance with the conditions of the Warkworth & Mount Thorley Project Approvals, and was submitted to DP&E in January 2017. Condition monitoring of those sites peripheral to authorised disturbance areas will be conducted at regular intervals to ensure operational compliance with the ACHMPs. The AHIMS sites database audit will continue in 2017.

Historic Heritage

Conservation Management Plans (CMPs) have been prepared for a number of historic sites at MTW. Protective maintenance and stabilisation of these sites, in line with the

recommendations within the CMPs & the Project Approvals, will continue to be conducted throughout 2017, & an MTW complex-wide Historic HMP will be developed in accordance with the conditions of the Warkworth & Mount Thorley Project Approvals.

12.5 Water

Improvements to water management in 2017 will focus on the capture and diversion of clean water runoff from rehabilitated areas with the continuation of catchment separation works at MTO (Abbey Green Rehabilitation area).

The Water Management Plan will be updated in early 2017 to:

- Include channel stability and stream monitoring programmes for Loders Creek and Wollombi Brook;
- Add new monitoring bores constructed in the Wollombi Brook Alluvium, underlying overburden and Warkworth Sands to the groundwater monitoring programme; and
- Update water quality triggers incorporating 2016 data for the surface water and groundwater monitoring programmes.

12.6 Rehabilitation

Performance Criteria and Rehabilitation Monitoring

The rehabilitation monitoring programme will continue in 2017 for both grazing and native vegetation rehabilitation areas. Target levels for MOP performance criteria will be detailed in an updated MTW MOP to be submitted in April 2017.

Rehabilitation Maintenance

During 2017, maintenance activities are planned to result in approximately 68ha of rehabilitation, currently in the initial stage of cover cropping, being seeded with the full native seed mixes. Weed spraying (boom and spot spraying) and weed wiping will be conducted in establishing rehabilitation areas as required to control both noxious and environmental weeds that are likely to impact on successful rehabilitation being achieved.

Rehabilitation monitoring conducted in early 2017 has indicated that the density of canopy species in some rehabilitation areas is much higher than what would be required in mature vegetation communities. Sites with high numbers of canopy species will be thinned to reduce the risk of overcrowding causing understorey species to drop out.

Habitat Augmentation

Guidelines for fauna habitat augmentation in rehabilitation areas will be developed during 2017. Data on the number of trees containing hollows and length of logs on the ground has been collected for the native vegetation reference sites established during the recent rehabilitation monitoring programs. This information will be used to set targets for the habitat-related MOP performance criteria and detailed in the updated MOP to be submitted in April 2017. Habitat augmentation measures, such as the construction of habitat ponds and the placement of salvaged logs in rehabilitation areas, will be undertaken during 2017.

Native Grass Cover Crops

Trials were undertaken during 2016 using native grasses as a cover crop rather than using exotic cereal and legume crops. The current use of annual exotic cover crops results in regular spraying out and replacing through re-sowing. Alternatively, the use of a perennial native pasture as a cover crop is planned to reduce this requirement and will begin the establishment of a component of the desired vegetation community. The weed wiper provides a means of removing quick-growing exotic grasses from the native grass pasture during the early establishment phase. These trials will be further monitored during 2017 to determine if this is a useful alternative to the use of exotic cover crops.

Rehabilitation Trials

During 2016, a trial of various sowing methods was conducted on a spoil/compost site on Tailings Dam 1 using native seed mixes. The methods being compared were direct-drilling, hydroseeding and broadcast seeding. The non-flowable components of the seed mix (mainly native grasses) were coated with a clay-based mixture to allow them to flow through the broadcast seeding equipment. The trial will also provide information on whether coating the grass seed assists or hinders germination and early establishment. Monitoring of this trial site will be conducted during 2017 to compare the effectiveness of the various methods.

Further trials planned to be conducted across MTW and HVO during 2017 include:

Sowing Methods Trials

Replication of the sowing methods trials in topsoil. A component of this next trial will be to investigate the need for harrowing post-sowing to provide soil coverage. The disadvantage of harrowing using traditional chain-style harrows on sloping rehabilitation areas is that it tends to smooth the surface of the soil which can lead to increased water run-off and erosion. The planned trial will compare the use of aerators and chain harrows after sowing with a no harrow control. It is thought that the use of an aerator for harrowing would assist in providing the seed with soil coverage but leave a rough surface that would be more effective at harvesting water run-off and reducing erosion.

Substrate/Compost Trials

Trials will test the effect of different substrates (fresh topsoil, stockpiled topsoil, fresh spoil, leached spoil) and different compost types (mixed source compost, composted green waste) on the germination and establishment of native species. The application of smoke water to soil after sowing will also be part of these trials to test if the germination of native species can be stimulated by its addition.

Stage 2 Rehabilitation Methods Trials

Coal & Allied has experienced inconsistent results in relation to the germination of native species sown into areas that have been initially stabilised with cover crops. Various methods of soil preparation will be investigated to determine effective methods for transitioning areas from the initial clean-up stage, involving cover crops, to the

establishment of native vegetation. The use of inoculants containing soil-based bacteria and fungi will also be assessed as a stimulant for the germination and early establishment of native species.

Tailings Dam 2 Capping

Preparation work, including haul road construction, for the capping of Tailings Dam 2 commenced in 2016. Capping of this facility will progress during 2017 with the first areas ready for rehabilitation to be undertaken in 2018.

12.7 Biodiversity Management

In 2016, planting works to restore Warkworth Sands Woodland continued in the Northern Biodiversity Area, with over 8,000 seedlings planted between May and July. Restoration activities also commenced in a small area of Ironbark woodland in the Southern Biodiversity Area, with over 2,000 seedlings planted in July. Weed control, track and fence repairs and vertebrate pest management activities were conducted during 2016 in the Goulburn River Biodiversity Area in accordance with the Regional and Local Offsets Management Plans. Track upgrade work included re-opening the fire track between Seven Oaks and the Goulburn River BA. A new section of boundary fence was constructed at the Seven Oaks BA and Bowditch BA to improve stock exclusion from these properties. Three 1080 ground baiting programmes were undertaken on the local BA's during summer, autumn/winter and spring in 2016 to target wild dogs and foxes. Similarly, two 1080 ground baiting programmes were undertaken on the regional BA's in autumn and spring for the same target pest animals.

12.8 Community Engagement

In 2017 Coal & Allied will commence consultation with community members towards finalising the MTW Social Impact Management Plan.

One of the initiatives identified in the Social Impact Assessment for the Warkworth Continuation project was contribution towards a Near Neighbour Amenity Resource, with particular reference made to assisting with the cost of routine maintenance of water quality in rainwater tanks. As such, MTW Near Neighbour Amenity Resource projects will commence in 2017 with all MTW near Neighbours being offered free tank clean outs.

Amenity Resource project types/offers will be reviewed annually; therefore 2017 will also involve consultation on types of projects to be considered in 2018 and beyond.

12.9 Community Development

Priority areas for community development in 2016 included education, economic development, community health, environment and land management. Coal & Allied currently support numerous foundations, programmes and scholarships in relation to these priority areas with continuation and commencement of these into 2017.