

Mount Thorley Warkworth

2013 Annual Environmental Review

March 2014



Commencement of Tailings Dam 1 Capping, Mount Thorley Warkworth

Name of Mine	Mount Thorley Warkworth
Titles/Mining Leases	Contained within Section 1.3 of this report
AEMR Commencement Date	01/01/2013
AEMR End Date	31/12/2013
Name of Leaseholder	Mount Thorley Warkworth Operations Pty Ltd Warkworth Mining Limited
Name of Mine Operator	Coal & Allied Operations Pty Limited
Reporting Officer	Mr Cam Halfpenny
Title	General Manager
Signature:	
Date:	24 March 2014

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 Environmental Review (Annual Review) summarises the environmental performance of Mount Thorley Warkworth (MTW) for the period 1 January 2013 to 31 December 2013. It has been prepared to meet conditions of development consents and Mining Leases (ML) held by MTW that **require a report of the operation's environmental performance to be provided on an annual basis**. Recommended actions from the 2012 annual environmental inspection undertaken at MTW by officers of DRE and DP&I have also been addressed in the Annual Review. This document has been prepared to meet the requirements of an Annual Environmental Management Report (AEMR) described in *Guidelines to the Mining, Rehabilitation and Environmental Management Process* (NSW Department of Trade and Investment, 2012) and following the *Guideline for Preparation of Annual Environmental Management Review (Annual Review) December 2012 (Draft)* from the Department of Planning and Infrastructure (DP&I).

In April 2013, the Land & Environment Court (LEC) upheld the appeal to the Planning approval for the Warkworth Extension Project. Warkworth Mining Limited (WML) is appealing the decision of the LEC in the Supreme Court. The outcome of this appeal is not yet known. As a result of the disapproval, WML returned to operating pursuant to modification 5 of development consent DA-300-9-2002-i, along with EPBC approval 2002/629 and EPBC approval 2009/5081. Mount Thorley Operations continues to operate under its 2012 modified approval DA34/95.

MTW produced approximately 19.7 million tonnes of run-of-mine (ROM) coal during 2013, and 12.4 million tonnes of saleable coal, against an approved ROM coal production rate of 28 million tonnes per annum.

Aboriginal cultural heritage assessments

Two Aboriginal cultural heritage assessments were conducted at MTW in 2013. The first was conducted adjacent to the Mount Thorley Operations/Bulga Surface Operations boundary and the second was to the west of the current Warkworth Mine West Pit. No incidents involving the un-authorised disturbance of Aboriginal cultural heritage sites at MTW were recorded during 2013.

Historic cultural heritage assessments

In 2013, no historic archaeological survey studies were conducted. Reports from surveys completed in 2012, involving the former Bulga RAAF Base and a portion of the Great North Road that passes through the MTW lease were finalised and will be passed on to local history groups, council and other interested groups & community members.

Meteorological Data

Total rainfall recorded for 2013 was 665.3mm. Wind direction was predominantly from the North and North West and South and South East, typical of historical wind patterns in the Hunter Valley.

Noise

Four non-compliances were recorded from a total of 85 attended noise measurements during 2013. The non-compliant noise levels were measured at Wambo Road on the 30th January 2013 and at Wollemi Peak Road on the 13th, 20th and 27th of March 2013. In accordance with the reporting requirements of the Approvals, DP&I and affected landowners were notified of the non-compliances. Corrective action was taken following the non-compliances and a no subsequent non-compliances were recorded for the year.

During 2013 MTW received 633 noise complaints, compared to 800 in 2012. The majority of complaints came from the Bulga community. Noise complaints were also received from the Long Point and Gowrie areas.

A range of leading practice noise management initiatives were introduced or improved during 2013 including:

- Introduction of additional noise attenuated (sound suppressed) HME;
- Installation and commissioning of an additional three (3) directional real time noise monitors (Long Point, Inlet Road, Wollemi Peak Road);
- **Trialling of “Light Horns” on Loading units** to replace high frequency, audible horns;
- Increased number and frequency of targeted supplementary surveillance noise monitoring (conducted by MTW Community Response Officers);
- Initial trialling of a noise predictive modelling interface; and
- Installation of a first-of-class directional noise monitor (Environmental Noise Compass).

MTW have a number of improvement measures planned for implementation and continuation in 2014, including:

- Continuation of the Sound Attenuation Program for heavy mining equipment;
- Implementation of a proactive / predictive noise tool; and
- Commissioning and implementation of the Environmental Noise Compass technology in the Bulga area.

Blasting

410 blast events were initiated at MTW during the reporting period. One non-compliance was recorded against the 120 dB(L) airblast overpressure criteria on 27 August 2013 in Loders Pit of Mount Thorley Operations. The investigation into the blast event determined that the overpressure exceedance was caused by previously unmapped weathered ground in the area which promoted major cracking during the blast event. The non-compliance was reported to the EPA and DP&I on the day of occurrence, and to affected landowners in the vicinity of the non-compliant measurement. A Penalty Infringement Notice was received in relation to the non-compliance.

MTW complied with all other blasting related consent and licence conditions during the reporting period.

38 complaints relating to blasts were received during 2013 compared to 69 complaints in 2012.

The blast monitoring system achieved a data capture rate of 99.9% during the reporting period (3271 of a possible 3280 measurements).

Air Quality

Depositional dust rates and Total Suspended Particulate concentrations are generally consistent with those recorded in previous years, with some minor variations noted. All short term and annual average PM10 air quality monitoring results were below Development Consent criteria. During 2013 all annual average insoluble matter deposition rates recorded on privately owned land were compliant with the long term impact assessment and land acquisition criteria. Six of the 244 measurements of Total Suspended Particulates were not collected on the EPA scheduled sampling date due to power disruptions or sample damage in high winds. Supplementary measurements were undertaken as soon as possible after the scheduled date to ensure the required number of samples was collected and analysed.

During 2013 MTW received 48 dust complaints compared to 57 in 2012. Most complaints originated from the Bulga area.

Several dust management improvement projects were undertaken in 2013. These include:

- Commencing measurement and assessment against the requirements of the EPA Particulate Matter Control Best Practice Implementation programme (Dust Pollution Reduction Programme) for wheel generated dust.
- Commencing participation in a three month trial of an industry wide weather forecasting project
- Establishing and commissioning a new monitoring location in the Long Point area to collect air quality data representative of privately owned receptors in Long Point.
- Commencing utilisation of two dust cameras, installed on Charlton Ridge, and atop the WML Maintenance Workshop.
- **Installation of a supplementary 'early warning' real time** dust monitoring network, comprised of three monitors located close to active mining areas.

Improvements in 2014 will build on these measures with focus on implementation of predictive forecasting tools, monitoring system improvements and activities associated with **the EPA's** dust pollution reduction programme.

Surface Water

Approximately 6,117 Megalitres (ML) of water was used at MTW during 2013, most of this is recycled or harvested from site. Water sourced from the Hunter River was also a significant component of the water balance, totalling 1,854ML. MTW has entered into agreements to access surplus mine water supplies with neighbouring mines to supplement demand from the Hunter River going forward.

No water was discharged off site during 2013 via the Hunter River Salinity Trading Scheme (HRSTS).

Six non-compliances occurred in relation to unlicensed discharge of water as listed below. Where appropriate, these events were reported to the Department of Planning and Infrastructure and the Environmental Protection Agency.

29 January 2013

- Water overtopped CC5 tail-end sump and flowed to Doctors Creek,
- Water overtopped MTCL basin and flowed offsite

23 February 2013

- Water overtopped CC5 tail-end sump and flowed to Doctors Creek,
- Water overtopped MTCL basin and flowed offsite,
- Water overtopped Dam 1S and flowed to an unnamed tributary of Loders Creek

3 December 2013

- Minewater Dam 21N overtopped

No complaints were received in regards to water during 2013.

Groundwater

There were no non-compliances related to groundwater in 2013.

Visual amenity

No non-compliances related to lighting management occurred in 2013. There were 20 lighting complaints received during the reporting period, which is comparable to those received in 2012.

Rehabilitation and Land Management

61.6 hectares area of rehabilitation was sown during the reporting period against a MOP target of 54.5ha. Rehabilitation quality improvements were progressed including trialling the use of green waste compost to improve soil fertility, trialling methods for providing soil coverage of seed during broadcast sowing, increasing the diversity of understory plant species, direct drilling of native seed and setting up seed harvesting areas to facilitate use of locally sourced seed.

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List of Abbreviations

ACARP	Australian Coal Association Research Program	EEO Act	<i>Energy Efficiency Opportunities Act 2006</i>
AHCS	Aboriginal Heritage Conservation Strategy	EIS	Environmental Impact Statement
ADCC	Aboriginal Development Consultative Committee	EPA	Environmental Protection Agency
AEMR	Annual Environmental Management Report	EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
AHIMS	Aboriginal Heritage Information Management System	EPL	Environment Protection Licence
AS	Australian Standard	FFMP	Flora and Fauna Management Plan
CCC	Community Consultative Committee	GCCSI	Global Carbon Capture and Storage Institute
CCL	Consolidated Coal Lease	GDP	Ground Disturbance Permit
CHAG	Community Heritage Advisory Group	GIS	Geographic Information System
CHPP	Coal Handling Preparation Plant	HMA	Habitat Management Area
CHWG	Cultural Heritage Working Group	HMP	Heritage Management Plan
CL	Coal Lease	HRSTS	Hunter River Salinity Trading Scheme
CO2CRC	The Cooperative Research Centre for Greenhouse Gas Technologies	HSEQ MS	Health, Safety, Environment & Quality Management System
DA	Development Application	HVAS	High Volume Air Samplers
DC	Development Consent	HVO	Hunter Valley Operations
DECC	NSW Department of Environment and Climate Change	INP	NSW EPA Industrial Noise Policy
DPI	NSW Department of Primary Industries	ML	Mining Lease
DP&I	NSW Department of Planning & Infrastructure	MLA	Mining Lease Application
DRE	NSW Division of Resources and Energy	MOP	Mining Operations Plan
DSEWPac	Commonwealth Department of Sustainability, Environment, Water, Population and Communities	MTIE	Mount Thorley Industrial Estate
EA	Environmental Assessment	MTO	Mount Thorley Operations
EC	Electrical Conductivity	MTJV	Mount Thorley Joint Venture
EEC	Endangered Ecological	MTW	Mount Thorley Warkworth

Community

NCCSC	Australian National Carbon Capture and Storage Council	RL	Reduced Level
NSWCCC	New South Wales Clean Coal Council	ROM	Run of Mine
NDA	Non-Disturbance Area	RMS	NSW Department of Roads and Maritime Services
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007</i>	SCADA	Supervisory Control and Data Acquisition
NHMRC	National Health and Medical Research Council	TEOM	Tapered Element Oscillating Microbalance
NOW	NSW Office of Water	TSP	Total Suspended Particulates
NPWS	National Parks and Wildlife Service	TSS	Total Suspended Solids
OCE	Open Cut Examiner	UHAQMN	Upper Hunter Air Quality Monitoring Network
OEH	Office of Environment & Heritage	UNE	University of New England
PA	Project Approval	WAL	Water Access Licence
pH	Measure of the hydrogen ion concentration, [H ⁺]	WML	Warkworth Mining Limited
PM ₁₀	Particulate Matter < 10 micron units	WSW	Warkworth Sands Woodland

List of Symbols

<	Less than
>	Greater than
dB(A)	Decibels (“A” weighted)
dB (L)	Decibels (Linear)
g/m ²	grams per square metre
bcm	bank cubic meters
Kbcm	kilo bank cubic meters
kg	kilogram
t	tonne
kt	Kilotonnes
kL	Kilolitre
L/s	Litres per second
L/t	Litres per tonne
m	metre
μ	micron
μg	micrograms
mg	milligrams
mg/L	Milligrams per litre
μS/cm	microsiemens per centimetre
m	metre
m ²	square metre
m ³	cubic metre
mm	millimetres
mg/L	milligrams/litre
mm/s	millimetres/second
ML	Mega litre
t	tonnes
Mtpa	Million tonnes per annum
Ha	Hectares
MWh	Mega Watt hours
GJ	Giga Joules
tCO ₂ -e	Tonnes Carbon Dioxide equivalent

1. Introduction

Mount Thorley Warkworth Coal Mine (MTW) is an integrated operation of two open cut mines, Warkworth Mining Limited (WML) and Mount Thorley Operations (MTO). MTW is situated 14 km southwest of Singleton, in the Upper Hunter Valley region of NSW (Figure 1).

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 2). Other industry in the locality includes: the Mount Thorley Industrial Estate; the Dyno Nobel Facility; Steggles Quarantine Facility; and the Redbank Power Station. 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.

1.1 Document Purpose

This report summarises the environmental performance of MTW for the period 1 January 2013 to 31 December 2013 and has been prepared to meet conditions of 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. This document has been prepared to meet the requirements of an Annual Environmental Management Report (AEMR) described in *Guidelines to the Mining, Rehabilitation and Environmental Management Process* (NSW Department of Trade and Investment, 2012) and following the *Guideline for Preparation of Annual Environmental Management Review (Annual Review)* (Draft) from the Department of Planning and Infrastructure (DP&I).



RTCA - Environmental Services

Figure 1: MTW Regional Location map



Figure 2: MTW Mine Layout (December 2013)

1.2 Reference Table

Table 1: Reference Table

Environmental Performance Condition	Compliance with Consent Conditions and MOP	Compliance with EA/EIS Prediction
Meteorological monitoring	3.1	NA
Noise	3.2.2	3.2.5
Blasting	3.3.2	3.3.2.1
Air Quality	3.4.2.2	1.1.1.6
Greenhouse & energy efficiency	3.5.2	NA
Surface water	3.7.2	3.7.2.1
Ground water	3.8.2	3.8.2.2
Biodiversity	5.12.1	NA
Aboriginal heritage	2.1.5.1	NA
European heritage	2.1.5.6	NA
Visual amenity	3.11	NA
Waste management	3.13.2	NA
Community engagement	4.2	NA
Rehabilitation and Landscape	5.1.1	5.4*

* Substantially compliant, achieving 86% of rehabilitation against a rehabilitation forecast made in 2010.

Legend

Compliant	
Condition/Impact Criteria Non-compliance	
Administrative Non-compliance	

1.3 Approvals, Leases and Licences

1.3.1 Current Approvals

The status of MTO and WML development consents, licences and relevant approvals at 31 December 2013 are summarised in Tables 2 to 8.

Table 2: Operations Approvals – Warkworth

Approval Number	Description	Authority	Dates
PA 09_0202	Warkworth Extension Project	DP&I	Approved 03/02/2012 Disapproved 15/04/2013
DA 300-9-2002-i	Extension of Warkworth Coal Mine – Extend Mining to Wallaby Scrub Road	DP&I	20/5/2003
DA 300-9-2002-i Mod 1	Modification of DA 300-9-2002-i – Rejects and ROM Bins Modifications	DP&I	19/10/2004
DA 300-9-2002-i Mod 2	S96(1) modification of the original Lot and DP schedule in DA 300-9-2002-i	DP&I	2/2/2007
DA 300-9-2002-i Mod 3	S96(2) modification of DA 300-9- 2002-i for upgrades to the MTW electrical switchyard	DP&I	31/10/2007
DA 300-9-2002-i Mod 4	S75W modification of DA 300-9-2002- i for the coal bed methane pilot programme	DP&I	15/9/2008
DA 300-9-2002-i Mod 5	S96 (1A) modification of DA 300-9- 2002-i for the relocation of the Reload Facility and Light Vehicle Wash Bay	DP&I	28/10/2009
DA 292/2009	Demolition of buildings at 573 Wallaby Scrub Road, WARKWORTH (Lot 16 DP 755267) in Rural 1(a)	DP&I	8/10/2009 – 8/10/2014
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	DSEWP&C	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	DSEWP&C	18/2/2004 (varied on 6/4/2004, 24/5/2004, 19/11/2004 and 13/7/2012) – 25/2/2039

Table 3: Operations Approvals – Mount Thorley

Approval Number	Description	Authority	Dates
DA 34/95	Development Consent Conditions - Construction and Operation of Surface Coal Mine Extensions.	DP&I	22/6/1996
DA 34/95 Mod 3	Modification of DA 34/95 – Rejects and ROM Bins Modifications	DP&I	19/10/2004
DA 34/95 Mod 4	Section 96 (1A) Modification of DA 34/95 – Extension to Mine Water Dam 9S	DP&I	7/5/2009
DA 34/95 Mod 5	Section 96 (1A) Modification of DA 34/95 – Extension of the existing Abbey Green North Pit	DP&I	2/5/2012 – 2/5/2033

Table 4: Licences and Permits

Licence Number	Description	Authority	Expiry Date
Warkworth			
EPL1376	Environmental Protection Licence	EPA	NA
35/018727*	Dangerous Goods Licence	WorkCover NSW	24 October 2012
28725	Radiation Licence	EPA	15 August 2014
07-100160-004	Licence to Store – Explosives Act	WorkCover NSW	13 November 2013
Mount Thorley			
EPL24	Environmental Protection Licence	EPA	NA
EPL1976	Environmental Protection Licence	EPA	1 April (Anniversary date)
NDG018727*	Dangerous Goods Licence	WorkCover	NA
28618	Radiation Licence	OEH	15 July 2014

* Mount Thorley and Warkworth are now operating under the same Dangerous Goods License

Note: Environmental 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 5: Mining Tenements

Mining Tenement	Type	Purpose	Status	Dates
Warkworth				
CCL 753	Consolidated Coal Lease	Prospecting and Mining Coal	Granted	23/5/1990 - 17/2/2023
ML 1412	Mining Lease	Prospecting and Mining Coal	Granted	11/1/1997 - 10/1/2018
ML 1590	Mining Lease	Prospecting and Mining Coal	Granted	27/2/2007 - 26/2/2028
MLA 352	Mining Lease Application	Prospecting, Mining Coal and Purposes	Application Pending	Mining Lease Application Lodged 2 nd 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	<p>The part sublease area known as the “Bulga Mining Sublease” expires on 30 June 2015.</p> <p>The part sublease area known as the “Western Area Sublease” terminates on the later of 31 December 2015; or the completion of open-cut mining within the Bulga Mine.</p>
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 2 June 2010

Note: The authority for all mining tenements is Department of Trade and Investment, Regional Infrastructure and Services (Resources & Energy Division).

Table 6: 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 7: 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	Bore	Excavation - Mining	Part 5 Water Act 1912	Mount Thorley Excavation	26 November 2016
20BL170012	Bore	Excavation - Mining	Part 5 Water Act 1912	Warkworth Pit Excavation	26 November 2016
20BL171729	Bore	Monitoring Bore	Part 5 Water Act 1912	G3 Charlton Levee	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
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
20BL171864	Bore	Monitoring Bore	Part 5 Water Act 1912	Bores: OH786, OH942	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

Licence Number	Type	Purpose	Legislation	Description	Renewal Date
20BL171894	Bore	Monitoring Bore	Part 5 Water Act 1913	WOH2139 (PZ5)	Perpetuity
20BL172272	Bore	Monitoring Bore	Part 5 Water Act 1912	Warkworth Expansion Ground Water Alluvial Modelling	Perpetuity
20BL172273	Bore	Monitoring Bore	Part 5 Water Act 1912	Warkworth Expansion Ground Water Alluvial Modelling	Perpetuity
20CW802601	Controlled Work	Block Dam	Part 8 Water Act 1912	Charlton Rd Levee	24 August 2015
20WA209905 WAL - TBA (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 8: Surface Water Extraction Licences

Licence Number	Type	Purpose	Description	Renewal Date	Approved Extraction (ML)*	Actual Extraction 2013 (ML)
20AL201242 (see WAL963)	Water Access Licence	Water Access Licence	Warkworth Mining Limited Hunter River Pump (General Security)	Perpetuity	243	0
20AL209903 (Formerly - 20SL050187) (see WAL19022)	Diversion Works	Irrigation	Sandy Hollow Creek (Unregulated River – Singleton Water Source)	25 February 2023	60	0
20AL201254 (see WAL969)	Water Access Licence	Water Access Licence	Glennies Creek Pump (General Security)	Perpetuity	39	0
WAL10543	Water Access Licence	Certificate of Title	Refer 20AL201239 and 20WA201241	Perpetuity	2226 [#]	1854
WAL10544	Water Access Licence	Certificate of Title	Refer 20AL201240 and 20WA201241 (Hunter Regulated River)	Perpetuity	5	0

Licence Number	Type	Purpose	Description	Renewal Date	Approved Extraction (ML)*	Actual Extraction 2013 (ML)
– Domestic and Stock)						
WAL963	Water Access Licence	Certificate of Title	Refer 20AL201242 and 20AL201242	Perpetuity	243	0
WAL19022	Water Access Licence	Certificate of Title	Refer 20AL209903 and 20CA209904	25 February 2023	60	0
WAL969	Water Access Licence	Certificate of Title	Refer 20AL201254 and 20CA201255	Perpetuity	39	0

* Approved Abstraction limits are for a financial year

Permanent entitlements held is 1,012ML, however 1,214ML of temporary entitlements traded into WAL10543

1.3.2 Amendments to Approvals and Licences

1.3.2.1 Warkworth Extension

In April 2013, the Land & Environment Court (LEC) upheld the appeal to the Planning approval for the Warkworth Extension Project. Warkworth Mining Limited (WML) is appealing the decision of the LEC in the Supreme Court. The outcome of this appeal is not yet known. As a result of the disapproval, WML returned to operating pursuant to modification 5 of development consent DA-300-9-2002-1, along with EPBC approval 2002/629 and EPBC approval 2009/5081.

1.3.2.2 Environmental Protection Licences

Environment Protection Licences 1376 (Warkworth) and 1976 (Mount Thorley) were varied by way of Section 58(5) notice of variation twice each during the reporting period, on 21 March 2013 and 5 September 2013.

The licence variations of 21 March followed EPA review of the report *Coal Mine Particulate Matter Control Best Practice Management Determination*, introducing Pollution Reduction Programmes (PRP's) to licences 1376 and 1976 to address wheel-generated dust and the handling of overburden.

The licence variations of 5 September followed EPA review of the report *Mount Thorley Operations and Warkworth Mining Limited: Particulate Matter Control Best Practice Implementation (DUST PRP) Monitoring Programme*, requiring MTW to implement the monitoring programme outlined in that report.

1.3.2.3 Environmental Protection and Biodiversity Conservation Act 1999 Approval

During December 2013, WML applied for, and received, variations to the EPBC approval 2002/629 and EPBC approval 2009/5081.

Under EPBC 2002/629, the variation assigned the Bowditch Biodiversity Area to this approval along with the Goulburn Biodiversity Area. The combined offsets will achieve the required area of 1,586Ha of suitable habitat for the regent honeyeater and swift parrot, as per condition 1(a) of EPBC 2002/629 Approval.

The variation to EPBC approval 2009/5081 requested that:

1. the controlled action be divided into two phases that would be consistent with the **site's Planning approvals. The first phase** being the disturbance under the 350m extension to West Pit of approximately 31 ha of habitat and the second, being the balance of the 705Ha disturbance for any extension to the existing Warkworth Mine.
2. the offset requirements for Phase 1 be conditioned such that 94 ha of land within the WML-owned Southern Biodiversity Area be the approved offset area; and
3. the offset requirements for Phase 2 are conditioned such that the offsets may be determined at a later date, if State planning approval for the action has been secured.

1.3.2.4 Mining Operations Plan

A Mining Operations Plan (MOP) was developed to replace the previous MOP and cover the existing MTW operations, as well as the approved Warkworth and Abbey Green extensions. The MOP outlines the proposed operational and environmental management activities planned for MTW for the period from 30 April 2012 to 31 December 2016. The MOP was also developed to satisfy a requirement of the WML Project Approval which relates to the development of the Rehabilitation Management Plan. The MOP was submitted for approval in June 2012 and was approved with conditions in November 2012.

In April 2013, a decision of the Land and Environment Court of NSW resulted in the disapproval of Project Approval 09_0202 (3 February 2012) and the approval document for Warkworth reverting back to DA 300-09-0202. An Environmental Assessment for Warkworth Modification 6 was subsequently prepared in November 2013 with a view to amending Project Approval 300-09-0202 to allow access for open-cut mining in a 350m wide section of Non Disturbance Area 1.

A MOP Amendment was submitted in January 2014 as an interim measure to outline mining activities that will comply with the requirements of the amended Project Approval DA 300-9-2002-i. Mine planning and design will be undertaken to produce the final landform and rehabilitation progression resulting from the amended pit shape. This information will be provided in a new MOP to be submitted by 30 May 2014.

1.3.2.5 Management Plan Status

MTW submitted Environmental Management Plans to the DP&I during 2012, as required by the Warkworth Extension Project Approval (PA 06_0261) and the aligned May 2012 modification to the Mount Thorley Development Consent (DA 34/95). Following disapproval of the Warkworth Extension Project Approval, Management Plans and Strategies which were approved under the aligned conditions of the 2012 Approvals are considered to apply to Mount Thorley Operations only.

Where appropriate, key elements of the management plans have continued to be applied in practice for WML. Where this is not possible or appropriate, due to return to operation under the 2003 Warkworth Approval (DA 300_9_2002_i), MTW has returned to managing WML

operations in accordance with the Monitoring Programs and Management Plans which were previously in place under that Approval.

Table 9 details the Management Plans and strategies which have been submitted for Approval under the modified Mount Thorley consent (DA 34/95), while Table 10 details the Monitoring Programs and Management Plans applicable to Warkworth Mining Limited under the 2003 Approval.

Table 9: Status of Management Plans Required under Mount Thorley Approval

Management Plan	Date Required to be Submitted	Date Submitted	Approved
Noise	30/9/2012	29/06/2012	31/10/2012
Blast	30/9/2012	29/06/2012	31/10/2012
Air Quality and Greenhouse Gas	30/9/2012	29/06/2012	31/1/2013
Water	30/9/2012	26/09/2012	31/1/2013
Heritage Management Plan	30/9/2012 (unless agreed otherwise)	Requested approval for "staged" Plan on 5/3/2012. Stage 1 submitted 2/5/2012	2/7/2012 (Stage 1)
Rehabilitation Management Plan	30/9/2012	MOP satisfies this requirement, submitted June 2012	Nov 2012.
Environmental Management Strategy	30/9/2012	28/9/2012	31/1/2013
Mining Operations Plans			
Mount Thorley Warkworth MOP 2009 to 2015			1/8/2009
Mount Thorley Warkworth MOP 2012 to 31/12/2016	31/7/2015	June 2012	Nov 2012

Table 10: Status of Monitoring Programs and Management Plans required under Warkworth Approval

Plan / Program / Strategy	Current Version	Status
Flora and Fauna Management Plan	01/03/2013	Approved 28/3/08. Minor revision to include actions undertaken during 2012
Flora and Fauna Monitoring Program	01/03/2013	Approved
Air Quality Monitoring Program	05/04/2013	Approved
Noise Monitoring Program	28/01/2014	Approved
Blasting Monitoring Program	29/06/2012	Approved

Plan / Program / Strategy	Current Version	Status
Surface Water Monitoring Program	01/07/2009	Approved
Groundwater Monitoring Program	01/07/2009	Approved
Erosion and Sediment Control Plan	31/01/2013 (MTW Water Management Plan)	Approved
Archaeology and Cultural Heritage Management Plan	01/09/2003	Approved
Bushfire Management Plan	27/05/2003	Approved
Environmental Management Strategy	28/9/2012	31/1/2013
Mount Thorley Warkworth MOP Amendment A	2012-2016	Approved 30/01/2014

1.3.3 Audits and Reviews

No Independent Environmental Audits were undertaken during the reporting period.

1.4 Environmental Management System

Coal & Allied's Hunter Valley mining operations operate under the Rio Tinto Coal Australia Health, Safety, Environment and Quality Management System (HSEQMS). The Rio Tinto Coal Australia HSEQMS incorporates an Environmental Management System certified to ISO 14001:2004, aligns with the requirements of AS/NZ 4804:2001, section 25 of the *NSW Coal Mine Health and Safety Act 2002* and clause 22 of the *NSW Coal Mine Health and Safety Regulation 2006*. The HSEQMS forms the basis for rigorous and consistent environmental management and is designed on the principles of continuous improvement and follows the Plan, Do, Check, Act and Review cycle.

1.5 Mine Contacts

Contact details for the current MTW General Manager and Manager Environment NSW are provided below:

Cam Halfpenny General Manager - MTW
 Phone 02 6570 1501
 Email: Cam.Halfpenny@riotinto.com

Andrew Speechly Manager – Environmental Services NSW
 Phone 02 6570 0497
 Email: Andrew.Speechly@riotinto.com

For more information about Coal & Allied's operations or activities visit the shop front:

- 127 John Street, Singleton

Or call:

- Coal & Allied Information Line 1800 727 745 (free call)
- Community Complaints Hotline 1800 656 892 (free call)

1.6 Response to Actions Required at Previous Annual Review

An annual environmental inspection was undertaken at MTW by officers of DRE and DP&I on 6 June 2013.

The purpose of the inspection undertaken by officers of DRE was to review compliance with environmental requirements of relevant approval instruments including the ML, MOP and Annual Review. MTW received correspondence from DRE dated 10 July 2013 confirming that the 2012 AEMR had been reviewed and was acceptable, and that the annual environmental inspection found general compliance with the relevant statutory approval instruments administered by DRE. During the inspection DRE identified issues that required continued management, and recommended actions to be implemented. DRE requested progress of the actions be reported in the 2013 Annual Review (this document).

The purpose of the inspection undertaken by officers of DP&I was to clarify specific issues of concern and inspect various areas of interest, including rehabilitated areas. MTW received correspondence from DP&I dated 9 June 2013 confirming that the 2012 AEMR generally satisfies the requirements of the development consents for the Warkworth and Mount Thorley mines. DP&I identified some issues to be addressed and reported on in the 2013 Annual Review (this document).

Issues and actions identified by DRE and DP&I and required by these departments to be reported in this Annual Review are summarised in Table 11 & 12 respectively with the reference to the Annual Review section where each issue is addressed.

Table 11: Response to Actions Required from 2012 AEMR Review by DRE

Issue	Recommended Action	Annual Review section
Rehabilitation Performance	Consider incorporating a table that identifies the staged rehabilitation process in the 2013 AEMR	Appendix 4: Table 1 Annual Rehabilitation Form reports rehabilitation areas by stage i.e. Decommissioning, Landform Establishment, Growth Medium Development, Ecosystem Establishment, Ecosystem Development and Rehabilitation Complete.
Tailings Dam Management-Capping and rehabilitation of 'Dam 1'	DRE encourages the capping and rehabilitation of Dam 1.	Stage 1 capping of Tailings Dam 1 proceeding in accordance with the Stage 1 Design Report and Technical Specification prepared by Australian Tailings Consultants. Stage 1 capping progress estimated 25% complete.

Table 12: Response to Actions Required from 2011 AEMR Review by DP&I

Issue	Recommended Action	Annual Review section
RAAF Base and Great Northern Road Survey	Reports of these surveys should be completed and released to the public	2.1.5.6 Historical Archaeological Survey Studies
Horns	MTW should commence change over from horns to other quieter methods of in pit communication	3.2.1 Management
Air Quality Monitoring	MTW needs to explore all opportunities and implement measures to reduce dust generation	3.4.1 Air Quality Management in 2013
Water Management	MTW need to monitor water levels to ensure river water importation is kept to a minimum or a revision of the mine water storage infrastructure will be required.	3.6.2.2 External Water Supply History

2. Operations Summary

2.1 2013 Reporting Period

2.1.1 Exploration

During 2013 exploration drilling was undertaken on both CCL 753 and CL219 to support current mining operations and to assist in determining the underground mining potential at MTW. Drilling to support current mining operations provides information on structure and coal quality, with some geotechnical drilling being carried out. Drilling for underground definition provides more detailed information to determine the potential for underground mining at MTW and includes testing such as coal quality, gas, geotechnical, permeability, frictional ignition and spontaneous combustion.

A total of 3,081.25m drilling was undertaken within CCL 753 consisting of:

- 261.7m of cored drilling and 15m of non-cored drilling to support current mining operations; and
- 1,891.06m of cored drilling and 913.49m of non-cored drilling for underground definition.

A total of 9,809.84m of drilling was undertaken within CL 219 consisting of:

- 369.6m of cored drilling and 12m of non-cored drilling to support current mining operations; and
- 4,576.82m of cored drilling and 4,851.42m of non-cored drilling for underground definition.

Total exploration drilling undertaken at MTW during 2103 was 12,891.09m.

Stand pipe piezometers have been installed to assist in understanding the hydrogeology related to potential underground mining. This drilling was carried out ahead of mining operations, within active mining and dumping areas, and through rehabilitated areas. Some boreholes commenced in 2012 and were completed in 2013.

2.1.2 Summary of Mining Activities

Mining activities undertaken in 2013 are summarised below and in Figure 3:

- **West Pit:** Normal mining operations continued throughout 2013 with Truck and Shovel pre-strip on the upper and mid benches and Dragline operations on the lower two benches. MTW commenced a transition to an offset Dragline digging method during 2013 by taking a 120m wide strip on the BFA Dragline bench. The major constraint for West Pit mining going forward is the non- access to NDA1 in the middle/south of West Pit. The highwall is becoming noticeably stacked and 2014 coal production will be lower as a result. West Pit was the major coal mining area at MTW during 2013 with 36% of annual ROM coal production being mined from this area.
- **North Pit:** Normal mining operations continued throughout 2013 with Truck and Shovel pre-strip operations on the upper and mid benches and single bench Dragline operations at the basal seam. North Pit remains a steady state mining area with adequate highwall offsets in place resulting in good working room for mining equipment. Dumping areas are well structured with rehabilitation of the North dumps sitting directly behind the active waste dumps. North Pit contributed 26% of ROM coal production in 2013.
- **MTO / Loders Pit:** Normal mining operations continued throughout 2013 with Truck and Shovel pre-strip operations on the upper and mid benches and single bench Dragline operations at the basal seam. Loders Pit also remains in steady state with regard pit set up, however the strike length of the pit has become noticeably shorter during 2013 with the southern endwall alignment changing as the reserves of this pit are depleted over time. Loders Pit was the second largest contributor of ROM coal (behind West Pit) during 2013 with 28% of MTW's coal being mined from this area.
- **South Pit:** Normal mining operations continued throughout 2013 with Truck and Shovel pre-strip operations on the upper and mid benches and double bench Dragline operations on the lower 2 seams. As no coal exists within the pre-strip benches in South Pit, the advancing Highwall remains in a very stacked configuration. Each advancing strip to the

west is dug entirely from top to bottom resulting in the absolute minimum amount of pre-strip material being moved in any given strip or year. During 2013 an extension to the southern endwall of South Pit was commenced. South Pit remains and will always remain a small “swing pit” at MTW, with only 9% of the 2013 ROM coal being mined from this area.

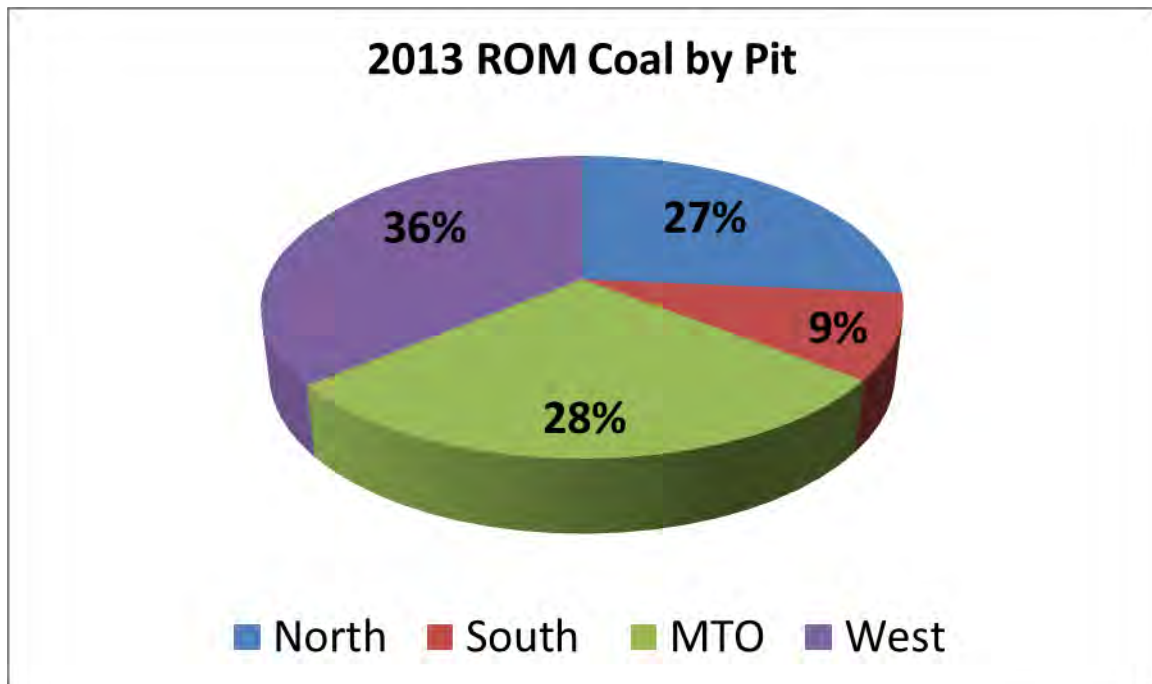


Figure 3: ROM Coal by Pit

- **Visual Bunding:** Work commenced on dumping, shaping and final rehabilitation of the South Pit North area during 2013. This area of the operation is highly visible to our neighbours to the east of MTW. This work will assist in managing noise and dust from mining operations as well as improve the visual aesthetics of the site.
- **Tailings Dam1:** MTW commenced work on the closure of Tailings Dam 1 during 2013. This project is expected to take approximately 12 months to complete and will be the first closure and rehabilitation of a tailings storage facility undertaken at MTW.

During adverse weather conditions (particularly on hot, dry or exceedingly windy days), MTW has suspended operations in various pits as an internal proactive measure to reduce potential impacts on neighbours and the general public.

From January to December 2013, there were a total of 17,978 instances of equipment delays (20,611 hours) for environmental reasons. These delays were instigated by Open Cut Examiners (OCE's) and equipment operators for each pit as a proactive measure to prevent potential dust and noise impacts on MTW's immediate neighbours. Detailed delay times for 2012 and 2013 are summarised in Table 13.

Table 13: Equipment Delays for 2013

Equipment Type	Number of Delays (2012)	Hours (2012)	Number of Delays (2013)	Hours (2013)
Truck	6022	5780	10342	13158
Dragline	1752	810	3867	1603
Shovel	374	399	1982	2222
Loader	265	370	34	56
Drill	538	1142	340	660
Excavator	463	475	14	80
Bladed Equipment	79	118	225	502
Dozers	374	578	1067	2123
RT Dozer	21	34	107	207
Total	9888	9706	17978	20611

All mining activities undertaken in 2013 were consistent with the approved MOP and no changes were made to the mining method during the reporting period.

2.1.2.1 Sound Power Control

MTW has implemented processes to monitor and maintain noise levels from the heavy equipment in accordance with equipment specifications. The process includes:

- a sound power level testing regime;
- routine maintenance schedule; and
- daily pre-start inspections

Regular maintenance of the heavy equipment fleet onsite ensures adequacy of sound suppression equipment. Prior to commencement of work activities on shift, each piece of equipment is visually inspected by the equipment operator, including visual assessment of any sound attenuation equipment installed. Where identified, defects are reported and repaired via the maintenance schedule. In 2013, routine maintenance was completed as per the schedule and at rebuild numerous panels were replaced and repaired to keep attenuation levels consistent. Eight haul trucks underwent sound power level screening in 2013.

2.1.3 Summary of Processing Activities

All processing and rejects/tailings disposal activities undertaken in 2013 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, Abbey Green South Tailings Storage Facility and Tailings Dam 2 (for Redbank Power Station ash only). During 2013 an embankment lift to 120mRL was completed on the Centre Ramp Tailings Storage Facility to increase storage capacity. Work also commenced on the capping of Tailings Dam 1 with permission from the NSW Dam Safety Committee and the Department of Trade & Investment. This capping activity will continue in 2014.

2.1.4 Production Statistics

Project Approvals allow for extraction of up to 28 million tonnes of ROM coal from MTW in a calendar year, comprising up to 18 million tonnes of ROM coal from the Warkworth Mine and up to 10 million tonnes of ROM coal from the Mount Thorley Mine. MTW production statistics for the period 2009 to 2013 are summarised in Table 14.

Coal from each plant is transported via conveyor to the Mount Thorley Coal Loader to be railed to the port. In 2013, 649.1 kt of coal was transported to Redbank Power Station and 11,911kt product coal was railed to the port.

Table 14: Production Statistics 2009-2013

	Units	2013	2012	2011	2010	2009
ROM coal production	kt	18,709	16,787	13,751	12,806	12,231
Prime Overburden excavated	kbcm	108,361	108,518	108,805	109,024	96,289
Rejects and tailings	kt	6,228	5,935	4,441	3,943	3,727
Saleable production	kt	12,481	10,852	9,311	8,914	8,553
Sales tonnes	kt	12,540	10,507	9,481	8,789	8,577

2.1.5 Aboriginal Heritage

2.1.5.1 Archaeological and Cultural Heritage Management

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 Aboriginal parties/stakeholders from Upper Hunter Valley Aboriginal community groups, corporations and individuals. The CHWG met on three occasions in 2013 - 7 March, 22 August and 5 December.

In 2002 Coal & Allied developed and implemented two Archaeological and Cultural Heritage Management Plans in fulfilment of conditions of development consents held by WML and MTO. As these Plans were developed pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EPA Act), cultural heritage management activities for MTW are regulated through these Plans and under Part 6 of the *National Parks and Wildlife Act 1974* (NPW Act).

Archaeology and cultural heritage at MTW are managed in consultation with the Aboriginal community through the CHWG in accordance with the Rio Tinto Cultural Heritage Management Standard, RTCA Cultural Heritage Management System (CHMS) Work Procedures, Aboriginal Cultural Heritage Management Plans, Development Consent conditions, the NPW Act (including the OEH Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010) and the EPA Act. The RTCA CHMS combines several elements to protect, manage and mitigate cultural heritage at MTW, including:

- Ongoing consultation and involvement of the local Aboriginal community in all matters pertaining to Aboriginal cultural heritage management;
- Compliance with **existing Aboriginal CHMP's and Development Consent conditions;**
- A cultural heritage Geographic Information System (GIS) and Cultural Heritage Zone Plan (CHZP) incorporating cultural heritage spatial and aspatial data (site location, description, assessments, date recorded, associated reports, management provisions and various other details to assist with the management of sites);
- A Ground Disturbance Permit (GDP) system for the assessment and approval of ground disturbing activities to ensure these activities do not disturb cultural heritage places;
- Limit of Disturbance Boundary (LODB) procedures to demarcate approved disturbance areas and delineate areas not to be disturbed;
- Ongoing cultural heritage site inspections, monitoring and auditing along with regular compliance inspections of development works;
- Protective management measures such as fencing/barricading sites to avoid disturbance, protective buffer zones, cultural heritage off-set areas; and
- Communicating cultural heritage issues and site awareness to personnel via the Coal & Allied intranet and tool box training sessions.

2.1.5.2 Aboriginal Archaeological and Cultural Heritage Investigations

Two Aboriginal cultural heritage assessments were conducted at MTW in 2013 in accordance with the Office of Environment & Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. The first of these assessments was conducted adjacent to the Mount Thorley Operations/Bulga Surface Operations boundary. This work occurred in July & September 2013. The purpose of this assessment was to assist with and inform the development of an Aboriginal Heritage Impact Permit (AHIP) application for a proposed sedimentation dam to be constructed in the area. Approximately 6.8ha was subject to a full coverage assessment survey involving 1.5 km of 100 m wide pedestrian transects. The fieldwork was conducted over three days with a field team of up to six Aboriginal cultural heritage field officers, two technical advisors, a Coal & Allied data management officer and site supervisor. The study recorded (or relocated) 39 Aboriginal artefact sites.

The second assessment occurred in November 2013 and was conducted to the west of the current Warkworth Mine West Pit. This assessment served as a supplementary investigation to confirm the nature and location of Aboriginal cultural heritage sites in the area, to inform the development of an Aboriginal Heritage Impact Permit (AHIP) application for a proposed minor extension to the Warkworth Mine West Pit. Approximately 100ha was subject to a full coverage assessment survey involving 12 km of 100 m wide pedestrian transects. The fieldwork was conducted over two days with a field team of six Aboriginal cultural heritage field officers, a technical advisor, a Coal & Allied data management officer and site supervisor. The study recorded (or relocated) 19 Aboriginal artefact sites.

2.1.5.3 Audits and Incidents

Coal & Allied has continued a comprehensive desk top review and ground-truthing audit of all Aboriginal cultural heritage sites located on Coal & Allied lands, including MTW leases. The purpose of the process is to confirm or revise and update the Aboriginal sites data held in the OEH Aboriginal Heritage Information Management System (AHIMS) sites database. Coal & Allied and OEH agree that there are inconsistencies between the AHIMS data and ground truthed data verified by Coal & Allied. These inconsistencies generally relate to errors in site location recording conducted over the last 20 years resulting in incorrect information being recorded in the AHIMS database. OEH have agreed that upon the completion of the sites auditing process, and subject to OEH auditing **Coal & Allied's results, Coal & Allied's audited** sites data will be provided to OEH to update the AHIMS sites database for Coal & Allied lands. This audit process will continue in 2014 before being submitted to OEH for review.

During 2013 there were 29 Ground Disturbance Permit (GDP) applications submitted for disturbance activities at MTW. All ground disturbance works were conducted on an Aboriginal cultural heritage avoidance basis so that no extant cultural sites were impacted by these activities. Routine GDP compliance inspections and heritage site condition monitoring inspections were conducted adjacent to active mining areas throughout MTW and others more generally around the MTW mining leases. No incidents involving the un-authorised disturbance of Aboriginal cultural heritage sites at MTW were reported to the Rio Tinto Coal Australia Cultural Heritage Unit during 2013.

2.1.5.4 Historic Heritage

2.1.5.5 Management

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 in August 2013 to discuss the results and recommendations arising from historic heritage surveys conducted over the former Bulga RAAF Base and a portion of the Great North Road alignment.

2.1.5.6 Historical Archaeological Survey Studies

No historic archaeological survey studies were conducted in 2013, however the reports arising from surveys completed in 2012 of the former Bulga RAAF Base & a portion of the Great North Road that passes through the MTW lease were finalised. These reports will provide a valuable local historic record for the community and will be passed on to local history groups, council and other interested groups & community members.

2.2 2014 Reporting Period

2.2.1 Exploration

2014 plans for exploration drilling include open cut pre-production drilling within CCL 753 only. These plans include 1,284.7m of core drilling and 6,173.8m of non-core drilling. Drilling to support current mining operations in 2014 provides information on structure and coal quality. All holes will be geophysically logged and sealed at the completion of works.

2.2.2 Summary of Proposed Activities

Mining activities will continue to advance to the west at Mount Thorley and Warkworth, in line with the current MOP. No additional or replacement heavy equipment is planned for purchase in 2014. Sound attenuation of the existing truck fleet will continue in 2014.

2.2.3 Production Statistics

The planned 2014 production and waste schedule for MTW is summarised below:

- 16,720 kt ROM coal;
- 11,240 kt product coal;
- 108,930 kbcm overburden; and
- 5,480 kt rejects and tailings.

The planned ROM coal production for 2014 represents approximately 60 per cent of the approved maximum ROM coal production for MTW. The average strip ratio in 2014, based on planned saleable coal production and overburden excavation, will be approximately 9.7:1.

Coal will continue to be transported via conveyor to Mount Thorley Coal Loader and railed to the port, with some coal being transported by conveyor to Redbank Power Station.

2.2.4 Aboriginal Archaeological and Cultural Heritage Activities Planned for 2014

Further Aboriginal archaeological and cultural heritage assessments and management activities will occur in 2014 at MTW in accordance with the ACHMP, to inform ongoing land management and development planning. Pending the approval of the AHIP for the Bulga boundary sediment dam mentioned above, management works arising from the conditions of this permit will be carried out in 2014. The AHIMS sites database audit will continue in 2014.

3. Environmental Management and Performance

3.1 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 is available in Appendix 2.

Meteorological data capture rate for 2013 was 98.9 percent. A fault with the Charlton Ridge rainfall gauge prevented onsite data collection during April / May 2013. Data has been sourced from nearby meteorological stations during this time.

3.1.1 Rainfall

Total rainfall recorded in 2013 was 665.3mm. Table 15 details the monthly breakdown of rainfall. A comparison on rainfall data for the last three years can be seen in Figure 4.

Table 15: Rainfall summary 2013

2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	126.6	166.2	72.0	20.8	21.5	45.4	8.4	7.0	38.4	14.8	127.0	17.2
Cumulative Rainfall (mm)	126.6	292.8	364.8	385.6	407.1	452.5	460.9	467.9	506.3	521.1	648.1	665.3
Wet Days*	9	10	8	5	6	9	5	1	4	4	14	4

* Wet days are classified as days receiving rainfall greater than 0.2 mm

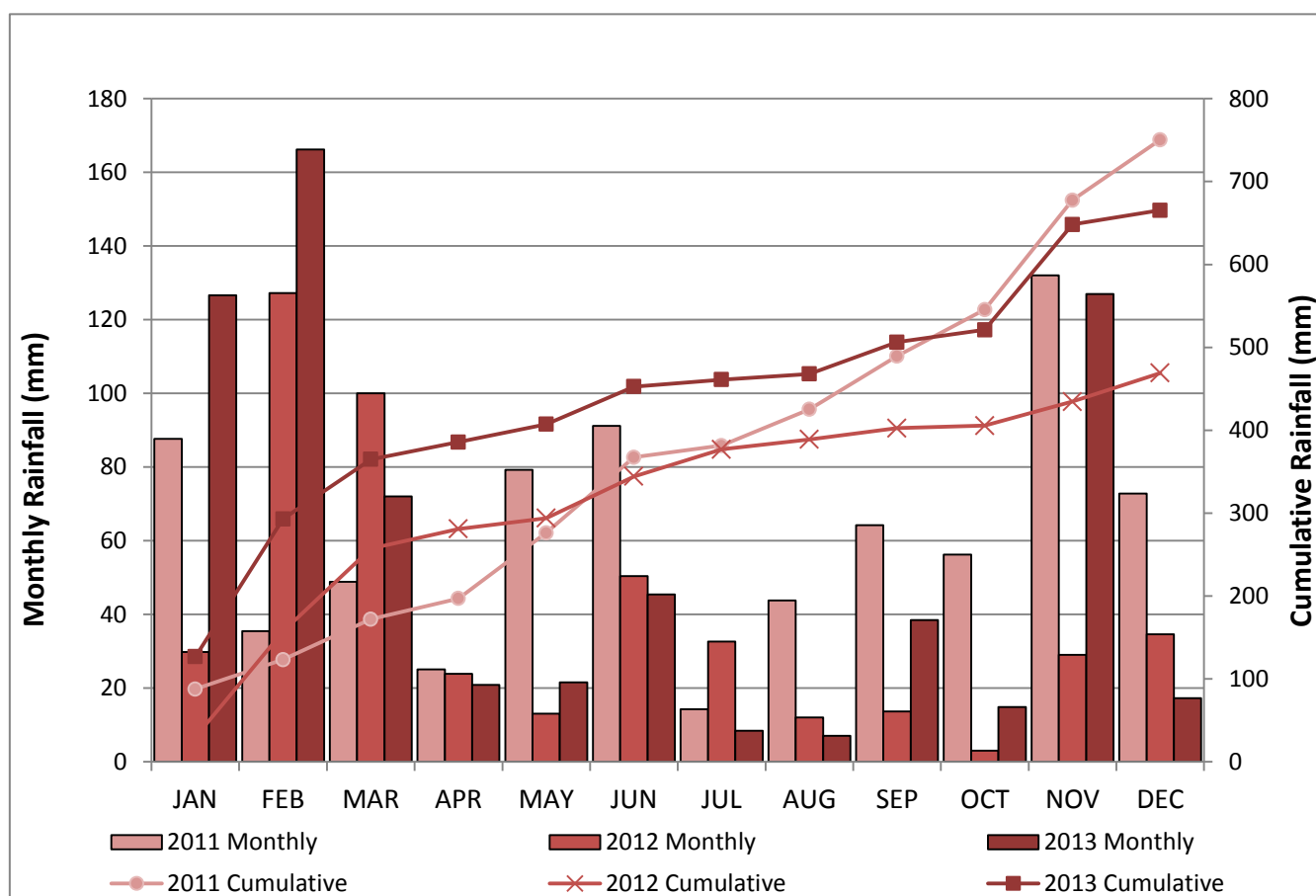


Figure 4: Monthly and Cumulative Rainfall, 2011 to 2013

3.1.2 Temperature

Maximum and Minimum temperatures recorded at the Charlton Ridge Meteorological station for 2013 are presented in Figure 5.

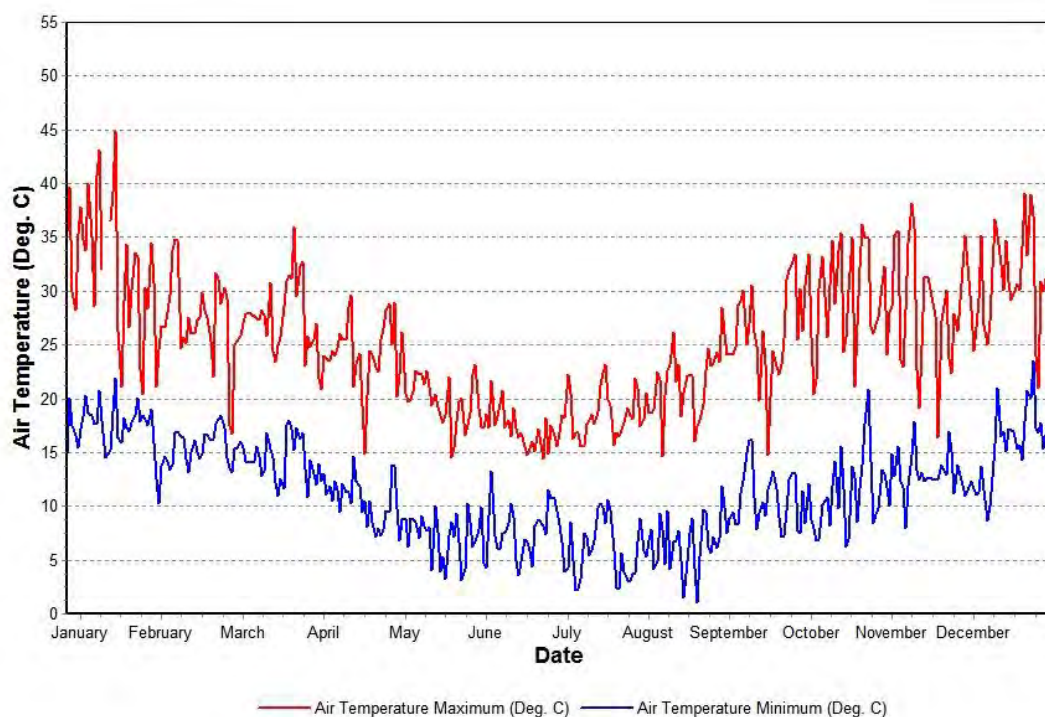


Figure 5: Maximum and Minimum Air Temperatures 2013

3.1.3 Meteorological Summary

A summary of monthly temperature, relative humidity, wind speed and solar radiation data recorded at the Charlton Ridge meteorological station is presented in Table 16. The 2013 annual wind rose is presented in Figure 6.

Table 16: Meteorological Data Summary for 2013

	Max. temp (°C)	Min. temp (°C)	Max. relative humidity (%)	Min. relative humidity (%)	Max. wind speed (m/s)	Max. solar radiation (W/m²)
Jan	44.9	14.5	95.5	11.6	26.8	1536.0
Feb	34.8	10.2	95.0	24.6	20.6	1540.0
Mar	36.0	10.8	94.9	21.5	16.6	1498.0
Apr	29.7	7.2	94.4	16.8	13.3	1334.0
May	29.0	3.1	95.9	19.9	16.3	929.0
Jun	23.2	3.6	96.1	35.9	15.9	936.0
Jul	23.2	2.1	96.7	26.8	19.9	896.0
Aug	28.5	1.0	95.2	14.2	18.5	1026.0
Sep	33.5	7.1	95.3	6.4	21.7	1228.0
Oct	36.2	6.3	97.2	3.6	24.9	1246.0
Nov	38.2	7.9	99.8	3.2	19.2	1613.0
Dec	39.1	8.7	99.4	10.0	23.2	1526.0

3.1.4 Wind Speed and Direction

During 2013 the predominant wind direction at the Charlton Ridge Meteorological Station was from the North and North West (approximately 30% of the time) and from South and South East (approximately 30% of the time). Wind Speeds were strongest (>8.8m/s) from the North. The annual wind rose is shown in Figure 6 and quarterly wind roses for the 2013 reporting period can be seen in Figure 7 to Figure 10.

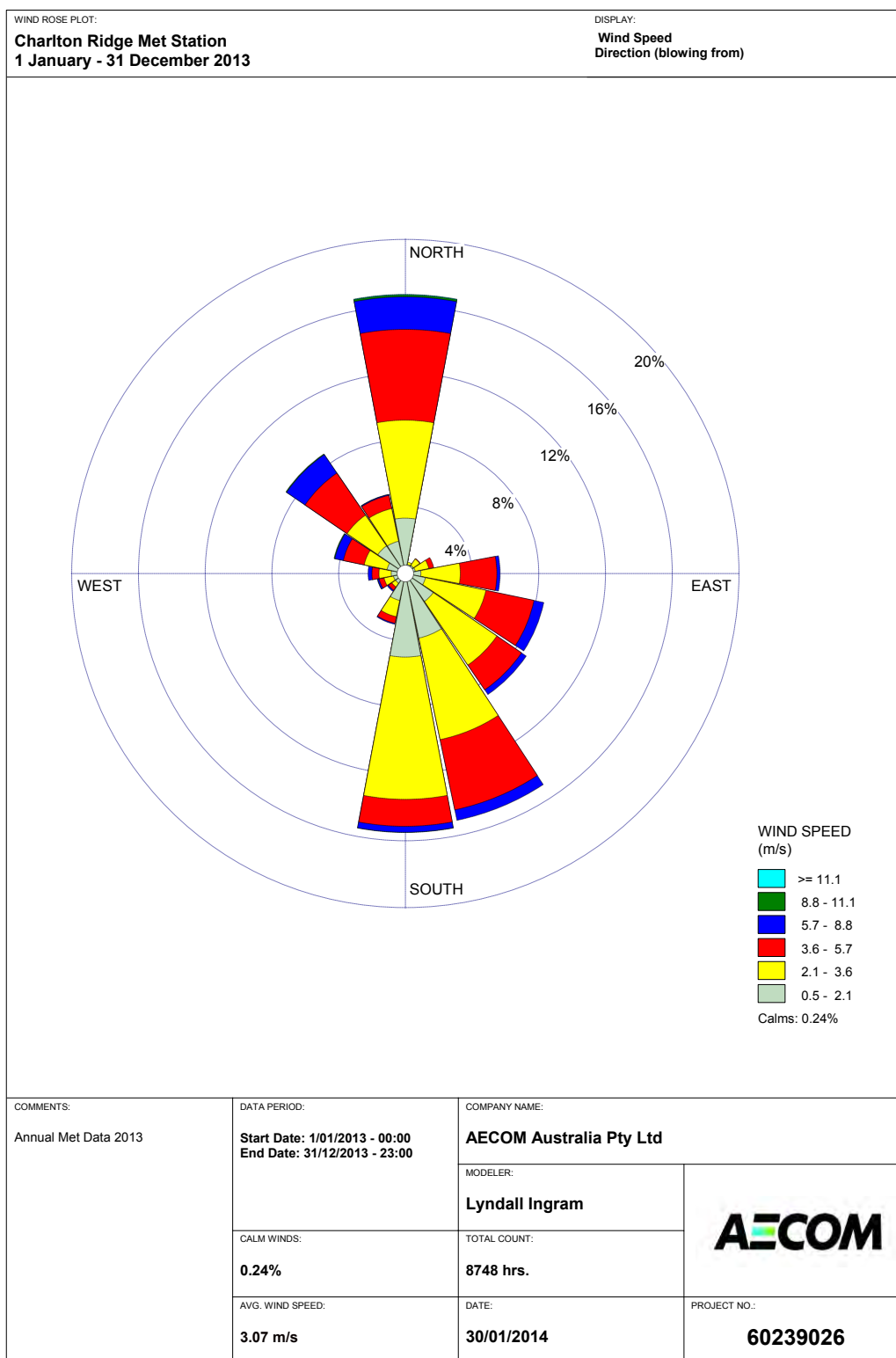
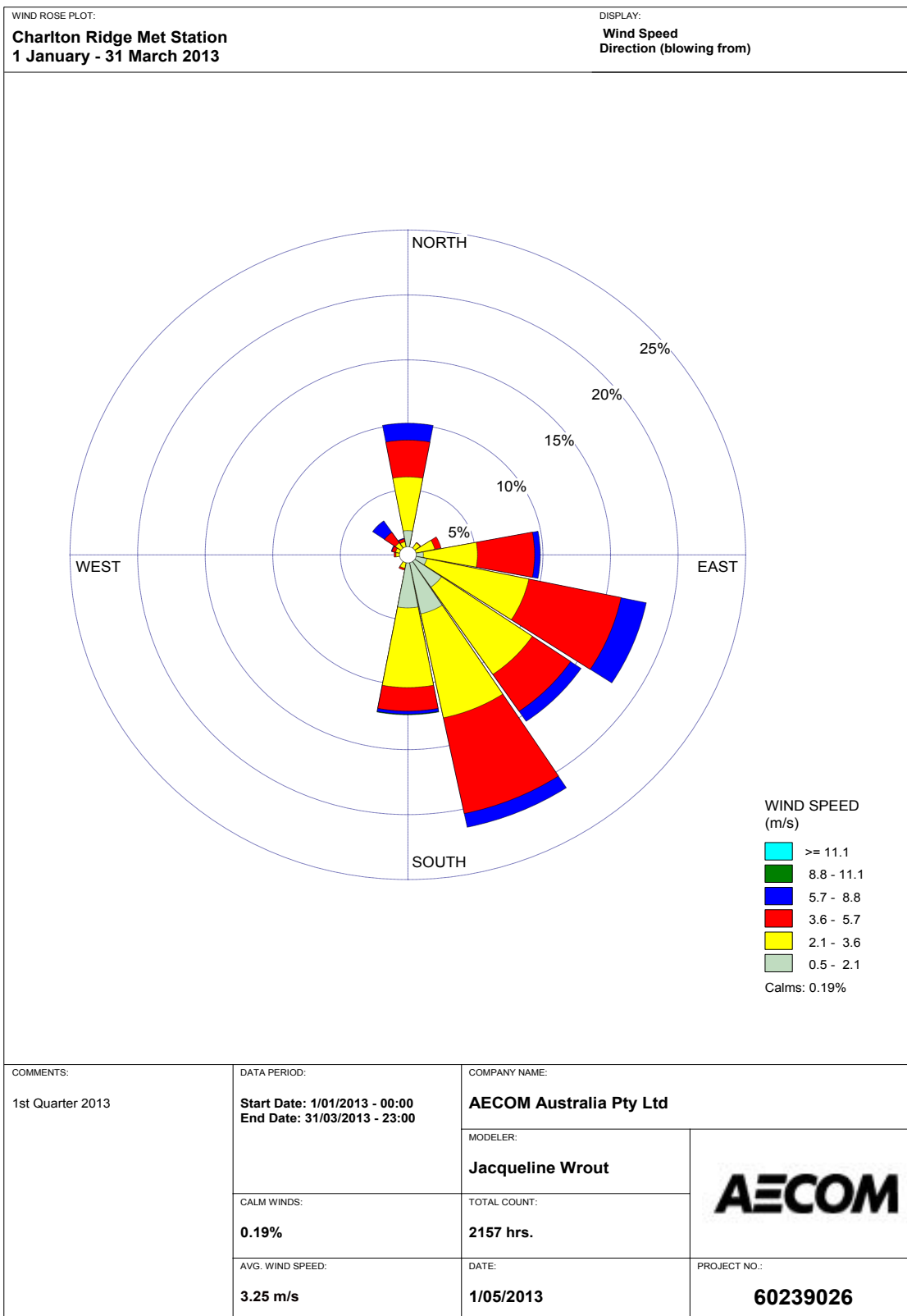
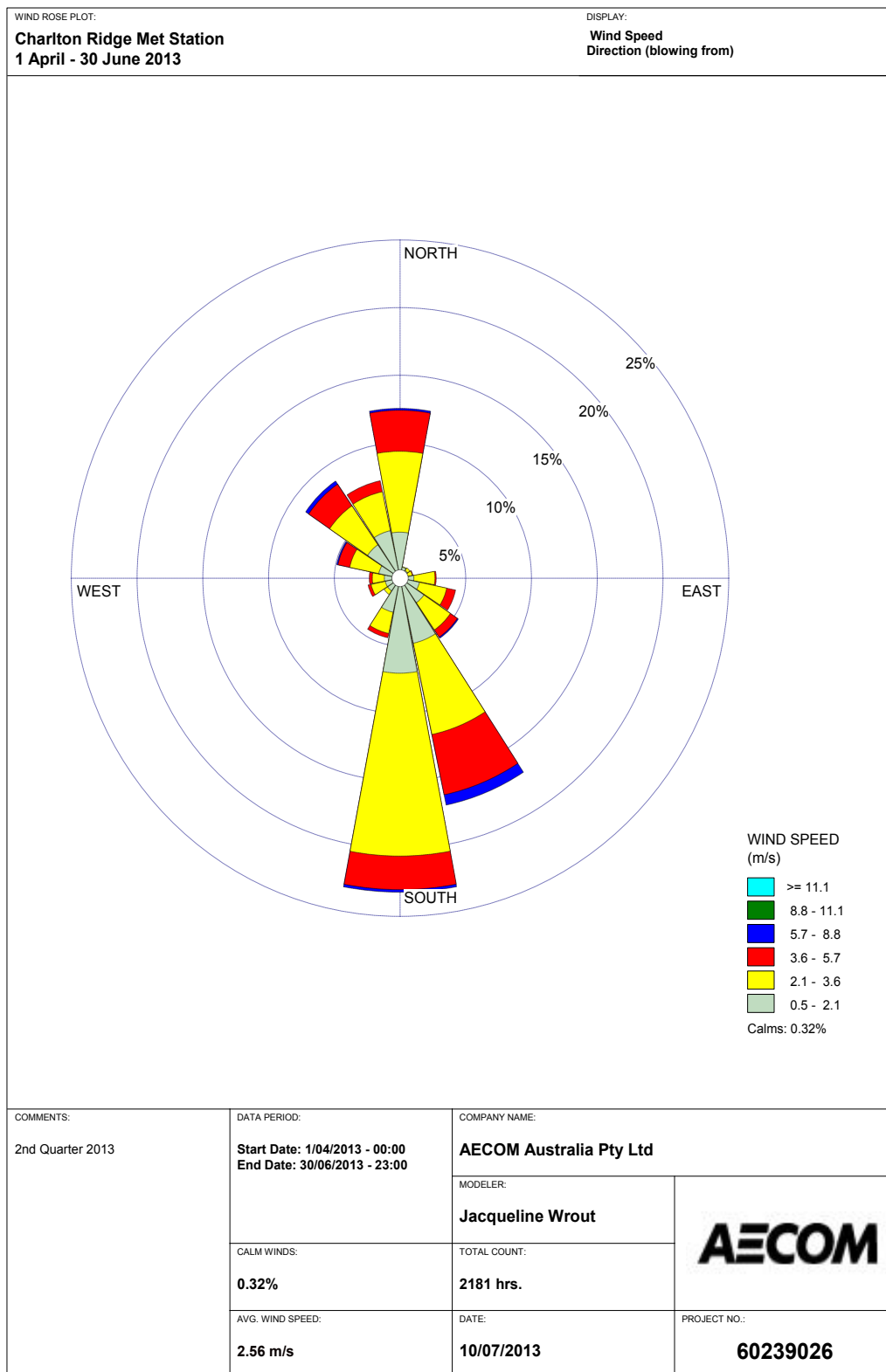


Figure 6: 2013 Annual Wind Rose



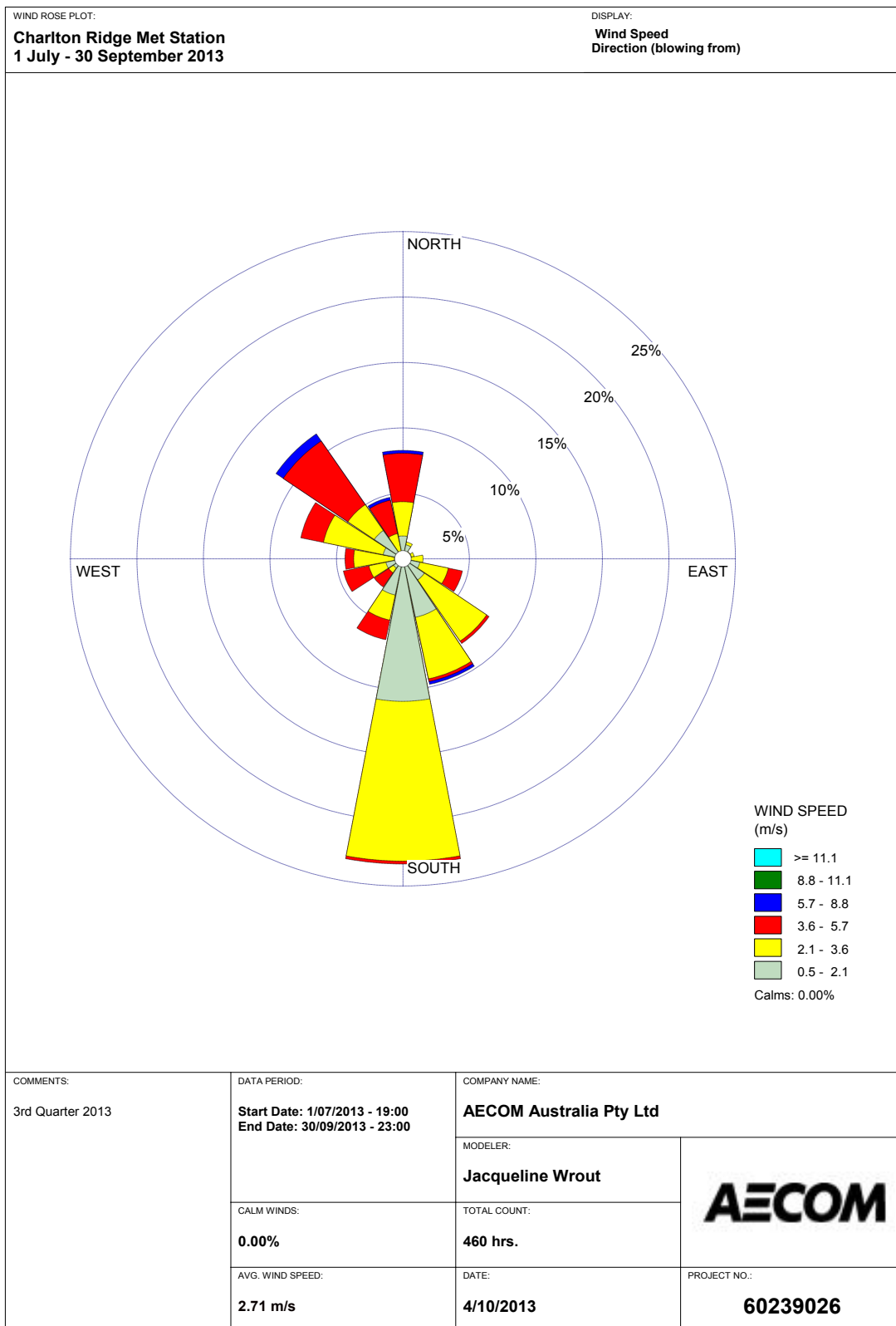
WRPLOT View - Lakes Environmental Software

Figure 7: Quarter 1 Average Wind Roses January to March 2013



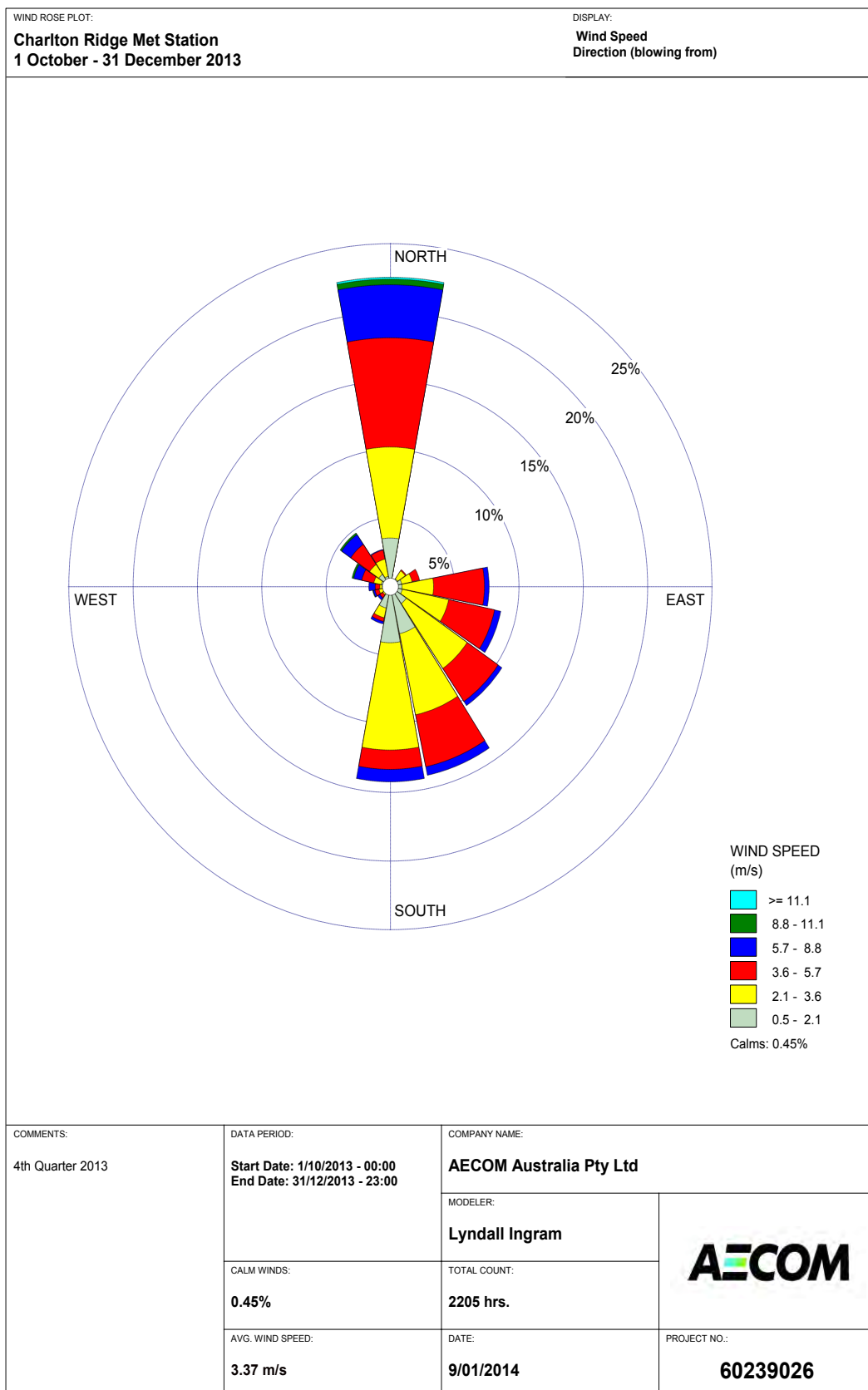
WRPLOT View - Lakes Environmental Software

Figure 8: Quarter 2 Average Wind Roses April to June 2013



WRPLOT View - Lakes Environmental Software

Figure 9: Quarter 3 Average Wind Roses July to September 2013



WRPLOT View - Lakes Environmental Software

Figure 10: Quarter 4 Average Wind Roses October to December 2013

3.2 Operational Noise

3.2.1 Management

Noise management activities are undertaken at MTW to minimise adverse impacts and 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 on the Rio Tinto Coal Australia website www.riotintocoalaustralia.com.au).

A number of noise management initiatives were introduced or improved during 2013 to assist in maintaining noise emissions below the relevant noise criteria across all sensitive receiver areas, including:

- Introduction of additional noise attenuated (sound suppressed) HME;
- Installation and commissioning of an additional three (3) directional real time noise monitors (Long Point, Inlet Road, Wollemi Peak Road);
- **Trialling of “Light Horns” on Loading units to replace high frequency, audible horns**
- Increased number and frequency of targeted supplementary surveillance noise monitoring (conducted by MTW Community Response Officers);
- Initial trialling of a noise predictive modelling interface (PMI); and
- Installation of a first-of-class directional noise monitor (Environmental Noise Compass).

3.2.1.1 Sound Attenuation Program

During 2013, MTW continued to introduce Sound Attenuated (suppressed) units into the mining fleet to reduce the overall noise footprint of the operation. As at December 2013, MTW operates the following sound suppressed units:

- 43 Trucks
- 10 Dozers
- 2 Excavators
- 2 Drills

During 2013, MTW partnered with a number of selected businesses to investigate additional opportunities for retrofitting of sound attenuation packages to the existing haul truck fleet. This partnership has designed, manufactured, fitted and tested a robust sound attenuation package to two haul trucks in the MTW fleet. The MTW designed system targets sound reductions in a number of areas, incorporating an exhaust system, cooling fan silencer, engine bay enclosure, body pads, and an air duct silencer, see figure 11.



Figure 11: MTW engineered sound attenuation package. Clockwise from left: Exhaust system, Cooling fan silencer, body panels and; air duct silencer.

3.2.1.2 Real Time Directional Monitoring Network Expansion

Three additional directional, real-time noise monitors were installed during 2013 to augment MTW's existing sophisticated network of noise monitors in surrounding community areas. MTW now has four (4) directional monitors in place in the Bulga Village area and a new directional noise monitor in the Long Point area. The location of these monitors can be seen in Figure 12 and 13.



Figure 12: Long Point Directional Noise Monitor - established Q4 2013

**Mount Thorley Warkworth
Real Time Noise Monitoring Locations**

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Figure 13: Real Time Directional Noise Monitoring Network

A key component of MTW's reactive noise management system is the prompt introduction of modifications to operating conditions in response to a trigger. During 2013, 762 noise alarms were triggered by the real time monitoring network. These alerts were received by MTW personnel for verification, follow-up and action see figure 14. Receipt of a valid alarm prompts an inspection from the Community Response Officer, who initiates the appropriate action to manage noise below criteria. Where noise levels are measured in excess of the relevant criteria, MTW is required to take decisive action to ensure noise is reduced to or below criteria within 75 minutes.

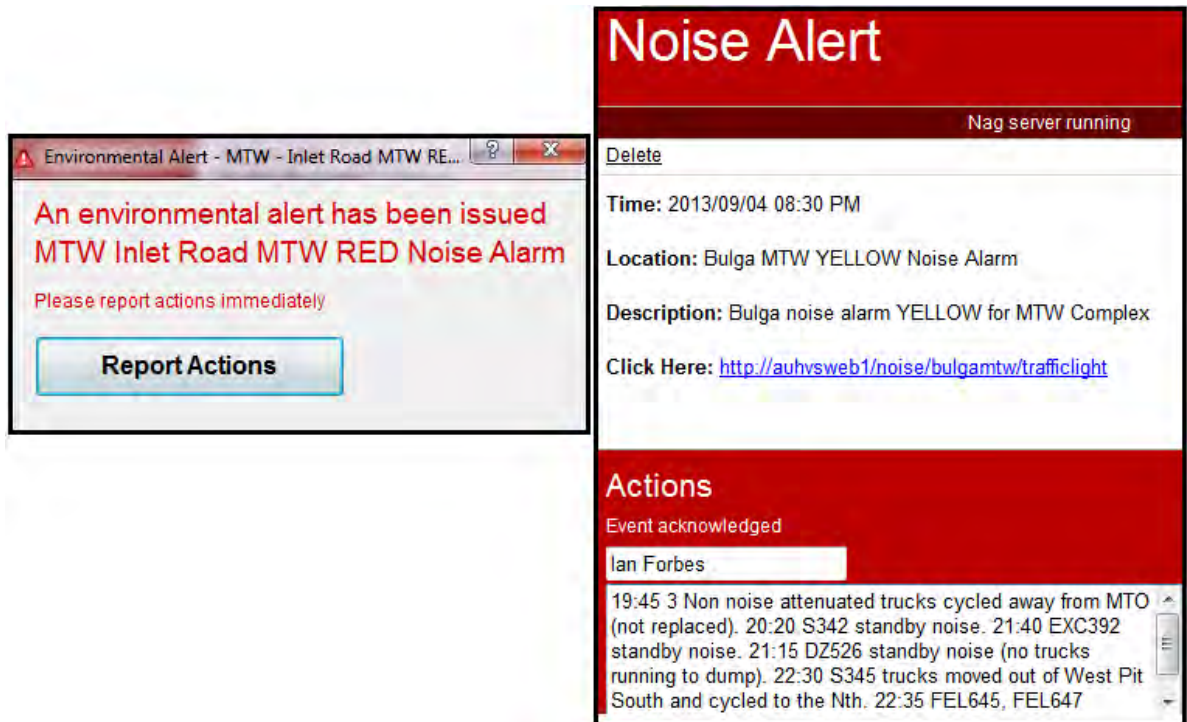


Figure 14: Example of a noise alarm, received 4 September 2013

3.2.1.3 Operational Downtime

Following receipt of a noise trigger (the first step in the MTW Noise Trigger Action Response Plan – TARP), modification to operating conditions is the most effective method of reducing noise levels. Operational modifications are generally undertaken according to the hierarchy of control, and include

- Change fleet type (introduce sound attenuated fleet)
- Change haul route
- Change dump location
- Reduce fleet numbers
- Shut down task

The Community Response Officer supports the real time monitoring network via the supplementary surveillance program, providing a validation step to the real time data. The Community Response Officer assists operations by liaising with community members and advising the Mine Shift Coordinator on the appropriate steps to rectify any noise issues in real time when they arise.

Where equipment is stood down in response to a noise event, the stoppage is recorded in the mine monitoring system.

During 2013, 8,866 hours of equipment stoppage were assigned as delays due to noise. Figure 15 lists the delays by month and equipment type. A significant increase in the number of equipment delays is evident from June 2013. This increase aligns with a change in reactive management practices employed at MTW following the non-compliant noise events recorded during March 2013. In response to those events, greater reliance is placed on handheld assessments and field observations from the Community Response Officers, supporting the real time monitoring network. MTW will continue to report equipment stoppages due to noise in future Annual Reviews.

Figure 15 shows the breakdown of noise delays per month by equipment type.

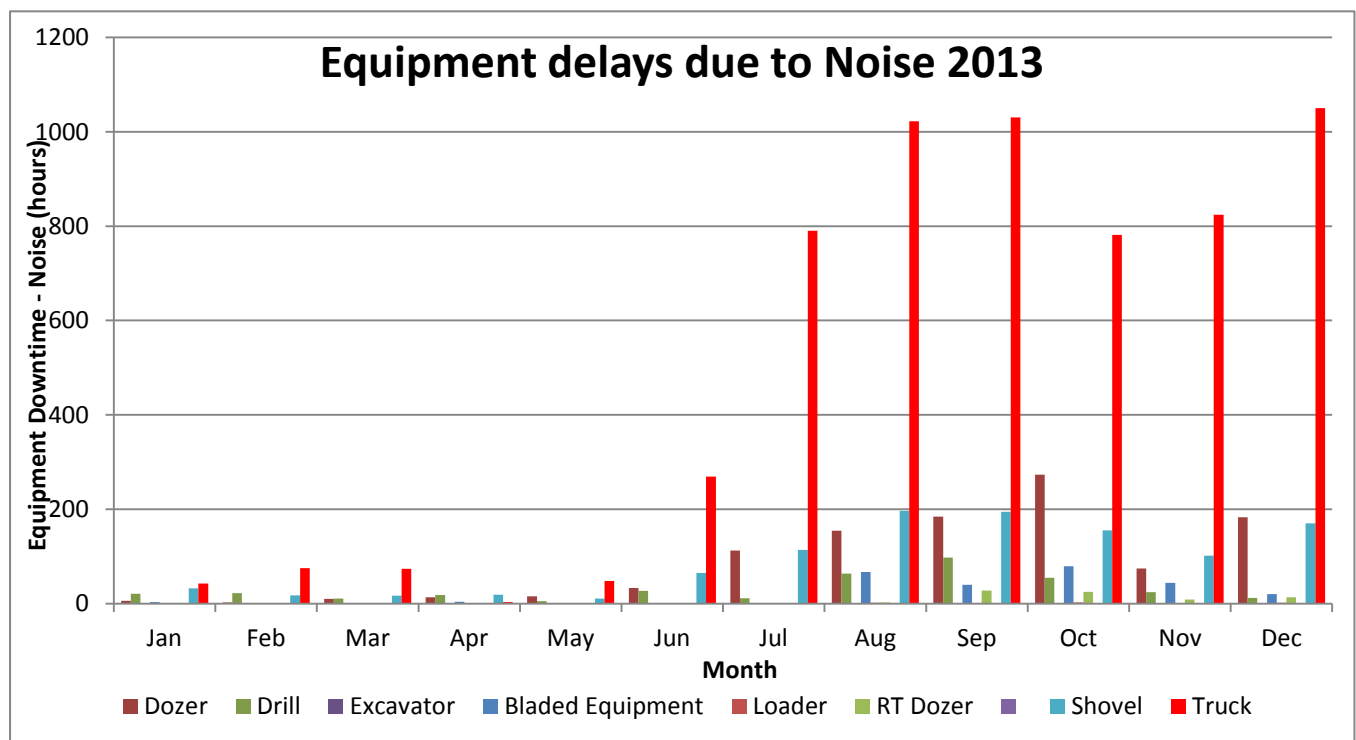


Figure 15: Equipment Delays due to Noise 2013

3.2.1.4 Environmental Noise Compass

In the development of the 2012 Noise Management Plan subsequent to the approval of the Warkworth Extension, MTW invited a group of interested community members to review the proposed noise management measures listed in the (then draft) plan. MTW received queries from the invited delegation regarding the adequacy of existing real time noise monitoring equipment, and asked that MTW investigate alternate monitoring technologies.

Following this feedback MTW, in conjunction with Global Acoustics and Acoustic Research Labs (ARL), commenced a project to expand on a conceptual directional real time noise monitor. With significant capital investment from MTW, the project has culminated in the installation of a first of class directional noise monitoring system known as the Environmental Noise Compass (ENC), see figure 16. This was installed in the Bulga area during December

2013. Developed by ARL, the ENC utilises a 26 microphone array and conventional beamforming techniques (borrowed from military / submarine applications) to resolve the source direction of measured noise in real time. The system will undergo further commissioning and testing during 2014 ahead of integration into the existing real time noise management system at MTW.



Figure 16: Environmental Noise Compass installation occurring during December 2013.

3.2.1.5 Predictive Modelling Interface

During the reporting period, MTW took delivery of a Predictive Modelling Interface (PMI) for Noise, a management measure outlined in the MTW Noise Management Plan. The PMI aims to predict noise emissions produced by the mine for the upcoming shift, and identifies time periods within the shift where adverse noise conditions are likely. Figures 17 and 18 show the online interface and output of the PMI. To produce the predictions, the PMI combines the following input data:

- Industry accepted noise modelling software
- WRF meteorological forecast data
- Updated site operating conditions (topography, mine plan)
- HME fleet details (number and sound power)

The initial testing of the tool has proved challenging. The level of agreement between predicted noise levels and measured levels to date has been poor. This is expected to improve as development and validation continues, however the tool will not be considered fit for full integration into the site noise management system until a greater level of confidence in the predicted outputs is achieved. MTW will continue to validate the tool, and report on development in future Annual Reviews.

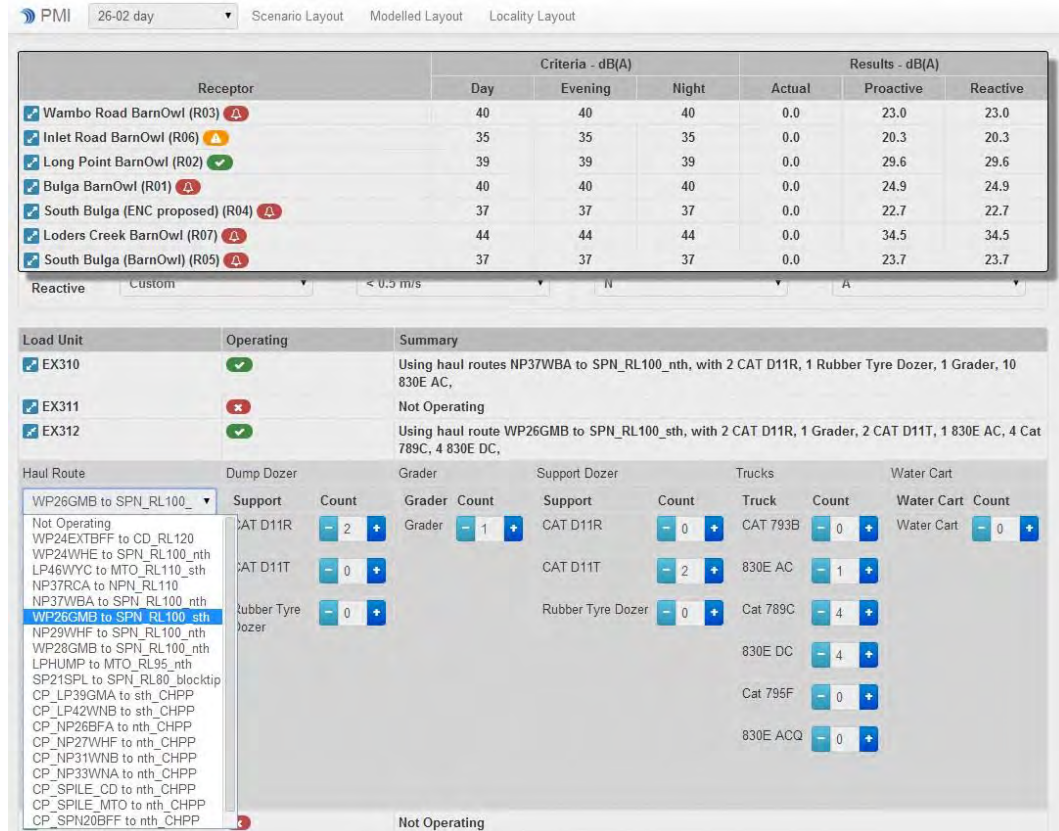


Figure 17: MTW predictive modelling interface



Figure 18: an example of noise predictions from the PMI

3.2.1.6 Compliance Monitoring

To assess compliance with the relevant noise criteria, MTW undertakes compliance noise monitoring at nearby private residences in accordance with an approved Noise Monitoring Programme.

In consultation with the Department of Planning and Infrastructure (DPoI), MTW continued to operate and monitor noise emissions in accordance with the conditions of the Noise Monitoring Programme (as approved 2012) with measured levels compared against the noise criteria listed in Conditions 3 to 6 of Schedule 3 of the Project Approval (PA_09_0202) during Quarter 1 2013. As described in that programme, monitoring was undertaken on the basis of likely noise risk, targeting nights where noise enhancing conditions were forecast. Consequently, three separate nights of compliance assessment was undertaken during March 2013, focussing on noise conditions in the Bulga community.

Significant complexity was introduced to the noise management and compliance assessment process following the NSW Land and Environment Court Judgment of 15 April 2013. The disapproval of the Warkworth Extension Project in the NSW Land and Environment Court subsequently led to the cancellation of the existing approved Noise Monitoring Programme. Accordingly, compliance monitoring was placed on hold until a resolution with the DP&I could be agreed upon. As such, there are no noise compliance monitoring results for Quarter 2 2013, April to June (inclusive).

An Interim Noise Monitoring Programme was developed so as to allow for compliance monitoring re-commencing in July 2013. The Programme was developed in consultation with the DP&I, and provided for separate assessment of the WML and MTO consent areas against the relevant criteria of each consent. Compliance monitoring from July 2013 to December 2013 was undertaken in accordance with the Interim Noise Monitoring Programme. Attended noise monitoring results are shown in Appendix 3.

During Quarter 1 2013 attended monitoring was undertaken from a selection of thirteen locations (based on prevailing meteorological conditions) selected to represent groups of receivers surrounding MTW (shown in Figure 19). There were nine attended noise monitoring locations routinely surveyed at least once per month from July to December 2013, see figure 20.

**Mount Thorley Warkworth
Attended Noise Monitoring Locations
(MTW Attended Noise Programme as approved 2012)**

Date: 140220

Plan By: DS

Version: 1.0



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Figure 19: Attended Noise Monitoring Locations, Quarter 1

**Mount Thorley Warkworth
Attended Noise Monitoring Locations
(MTW Interim Attended Noise Programme)**

Date: 140220

Plan By: DS

Version: 1.0



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Figure 20: Attended Noise Monitoring Locations, Quarter 3 & 4 – Interim Noise Monitoring Programme

3.2.2 Performance

A total of 456 attended noise measurements were undertaken during the 2013 compliance monitoring program, and the results of these assessments are presented in Appendix 3.

3.2.3 Non-Compliances

Four non-compliance events were recorded in 2013. Thirteen attended noise measurements undertaken during 2013 exceeded the relevant criteria during applicable meteorological conditions. Seven of these measurements were classified as significant in accordance with the NSW EPA Industrial Noise Policy (INP). On two occasions multiple exceedances were measured at the same location whilst implementation of noise management measures was occurring. Each occasion is considered a single non-compliance as described in the MTW Noise Monitoring Programme. As such, four non-compliance events were recorded. In accordance with the reporting requirements in the Approvals, all non-compliant measurements were reported to DP&I and affected landowners. Details of non-compliant measurements are shown in Table 17.

Table 17: Attended Noise Measurements Non-Compliant With Consent Conditions

Location	Date/Time	Relevant Criteria	Criterion (dB)	L _{Aeq, 15 minute} (dB)	Exceeds Level (dB)
Wambo Road	30/01/2013 23:07	Warkworth Extension (PA 09_0202) L _{A1, 1min} Impact Assessment Criteria	48	52(L _{A1, 1min})	4
Wollemi Peak Rd	13/03/2013 01:16	Warkworth Extension (PA 09_0202) L _{Aeq, 15 minute} Impact Assessment Criteria	37	42	5
	13/03/2013 02:27	Warkworth Extension (PA 09_0202) L _{Aeq, 15 minute} Impact Assessment Criteria	37	40	3
	20/03/2013 00:27	Warkworth Extension (PA 09_0202) L _{Aeq, 15 minute} Impact Assessment Criteria	37	43	6
Wollemi Peak Rd	20/03/2013 2:02	Warkworth Extension (PA 09_0202) L _{Aeq, 15 minute} Impact Assessment Criteria	37	43	6
	20/03/2013 3:11	Warkworth Extension (PA 09_0202) L _{Aeq, 15 minute} Impact Assessment Criteria	37	42	5
Wollemi Peak Rd	27/03/2013 23:39	Warkworth Extension (PA 09_0202) L _{Aeq, 15 minute} Impact Assessment Criteria	37	40	3

30 January 2013

On 30 January 2013 at the Wambo Road monitoring location, the $L_{A1, 1min}$ Impact Assessment Criterion was exceeded by 4dB. The measurement commenced at 23:07. A surge in engine/exhaust noise was responsible for the exceedance. Actions were taken to reduce noise including relocation of non-attenuated trucks on the haul cycle in the Warkworth area.

A follow up measurement at the same location commenced on 31 January 2013 at 01:59. This measurement recorded compliant noise levels.

13 March 2013

On 13 March 2013 at the Wollemi Peak Road (formerly Noses Peak Road) monitoring location, the $L_{Aeq, 15 minute}$ Impact Assessment Criterion was exceeded twice.

The initial measurement commenced at 01:16 and exceeded the criterion by 5dB. A continuum of exhaust, engine and fan noise along with dozer tracking was responsible for the exceedance. Actions taken to reduce noise were implemented and included:

- Shutdown of Front End Loader 648 (WML Area);
- Shutdown of 2x Haul trucks(WML Area);;
- Shut down of 2x Dozers(WML Area);
- Shut down of Excavator 392 (MTO Area);
- Shut down of 6x Haul Trucks; and
- Shut down of an additional Dozer.

A follow up measurement was undertaken commencing at 02:27 and exceeded the criterion by 3dB. A continuum of exhaust, engine and fan noise along with dozer tracking was responsible for the exceedance. Actions taken to reduce noise were implemented and included:

- Shutdown of 102 Dragline.

At the time of the assessment, the noise monitoring contractor provided incorrect advice to MTW regarding the severity of the non-compliance, stating that the initial exceedance was 1dB over the statutory limit (rather than 5dB). Following the modifications to operations, the monitoring contractor advised MTW that the noise levels were compliant (equal to the criteria), and thus no further significant changes were introduced.

20 March 2013

On 20 March 2013 at the Wollemi Peak Road (formerly Noses Peak Road) monitoring location, the $L_{Aeq, 15 minute}$ Impact Assessment Criterion was exceeded on three occasions.

The initial measurement commenced at 00:27. A continuum from MTW was audible throughout the measurement and generated the site only L_{Aeq} of 43dB. The acoustic specialist notified MTW of the measured levels. Operational changes were implemented to reduce noise (shutdown of Front End Load unit 647 and haul trucks operating to this unit).

The second measurement (follow-up measurement) commenced at 02:02am. A continuum from MTW was audible throughout the measurement and generated the site only L_{Aeq} of 43

dB. A surge in engine noise generated the site only $L_{A1,1\text{minute}}$ of 50 dB. Dozer tracks (once), a digging unit horn (once) and impact noise (four times) were also noted. The acoustic specialist notified MTW of the measured levels. Additional changes to operations were implemented following notification of measured levels (Shutdown of Shovel 342, Excavator 392, Front End Load unit 649, Trucks operating to these Digging units, and Drills 229 and 230).

A third measurement was conducted at 03:11am. A continuum from MTW was audible throughout the measurement and generated the site only L_{Aeq} of 42 dB. Impact noise was responsible for the site only $L_{A1,1\text{minute}}$ of 49 dB. Dozer tracks, dragline fan noise, transmission noise, engine surges and various impact noises were also audible. The acoustic specialist noted changes in meteorological conditions throughout the night, which impacted on the effectiveness of operational modifications in reducing noise levels. Measured levels during the third measurement were determined to be originating primarily from the Warkworth area, in contrast to earlier advice indicating that Warkworth was inaudible. Operational modifications implemented on the night were focussed in the Mount Thorley Pit area on advice of the Acoustic Specialist. Following the measurement at 3:11am, fatigue management requirements prevented additional noise measurements from being undertaken by the Acoustic Specialist.

27 March 2013

On 27 March 2013 at the Wollemi Peak Road (formerly Noses Peak Road) monitoring location, the $L_{Aeq, 15 \text{ minute}}$ Impact Assessment Criterion was exceeded by 3dB. The measurement commenced at 23:39. An engine and exhaust continuum from MTW generated the exceedance. Excavator Horn and dozer tacking was also audible during the measurement. Actions taken to reduce noise were implemented, including:

- Shut Down RL126 Dump (MTO Area);
- Swap out non-attenuated for attenuated trucks; and
- Shut down Dozer working in exposed area.

A follow up measurement at the same location commenced on 28 March 2013 at 00:12. This measurement recorded compliant noise levels.

3.2.3.1 Modifying Factors – Low Frequency Noise

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 low frequency penalty was applied to 46 assessments during 2013 (refer Table 18), resulting in an additional 24 exceedances of applicable noise criteria (refer Table 19).

MTW reports these measurements for full disclosure. However, we are of the understanding 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. Due the reasons described above Coal & Allied do not consider exceedance of criteria following application of the low-frequency penalty alone, to constitute non-compliance with the conditions of the Project Approvals. However, they are notified to the DP&I.

The “Broner” method (outlined in the paper ‘*A simple outdoor criterion for assessment of low frequency noise emission*’ (April 2011) is understood to be a more suitable methodology for determining low frequency noise impacts for this application and is currently under consideration by the regulatory authority.

Coal & Allied looks forward to the NSW EPA review of the NSW Industrial Noise Policy, and the implementation of an appropriate methodology for assessing low frequency affectation for open cut mines in the Hunter Valley.

Table 18: Summary of Attended Noise Measurements where Low Frequency Penalty is Applicable

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of Measurements	31	NA	27	27
Number of measurements where criterion applies	25	NA	11	20
Number of measurements where MTW is audible and criterion applies	22	NA	10	14
Number of measurements where low frequency penalty is applicable	13	NA	4	6

Table 19: Attended Noise Measurements Exceeding Consent Conditions – Low Frequency Penalty Applied

Location	Date/Time	Relevant Criteria	Criterion (dB)*	L _{Aeq} (dB)	Revised L _{Aeq} (dB)	Exceeds by (dB)
Wollemi Peak Rd	31/01/2013 00:23	MTW L _{Aeq} Impact Assessment Criteria	37	39	44	7
		MTW L _{Aeq} Land Acquisition Criteria	43	39	44	1
Inlet Road	31/01/2013 01:20	MTW L _{Aeq} Impact Assessment Criteria	38	39	44	6
		MTW L _{Aeq} Land Acquisition Criteria	43	39	44	1
Inlet Road	31/01/2013 02:49	MTW L _{Aeq} Impact Assessment Criteria	38	37	42	4
		MTW L _{Aeq} Land Acquisition Criteria	43	37	42	NA
Wollemi Peak Rd	13/03/2013 01:16	MTW L _{Aeq} Impact Assessment Criteria	37	42	47	10

Location	Date/Time	Relevant Criteria	Criterion (dB)*	L _{Aeq} (dB)	Revised L _{Aeq} (dB)	Exceeds by (dB)
Wollemi Peak Rd	13/03/2013 02:27	MTW L _{Aeq} Land Acquisition Criteria	43	42	47	4
		MTW L _{Aeq} Impact Assessment Criteria	37	40	47	10
		MTW L _{Aeq} Land Acquisition Criteria	43	40	47	4
Wollemi Peak Rd	20/03/2013 00:27	MTW L _{Aeq} Impact Assessment Criteria	37	43	48	11
		MTW L _{Aeq} Land Acquisition Criteria	43	43	48	5
Inlet Road West	20/03/2013 00:57	MTW L _{Aeq} Impact Assessment Criteria	35	30	35	NA
		MTW L _{Aeq} Land Acquisition Criteria	43	30	35	NA
Inlet Road	20/03/2013 01:28	MTW L _{Aeq} Impact Assessment Criteria	38	38	43	5
		MTW L _{Aeq} Land Acquisition Criteria	43	38	43	NA
Wollemi Peak Rd	20/03/2013 02:02	MTW L _{Aeq} Impact Assessment Criteria	37	43	48	11
		MTW L _{Aeq} Land Acquisition Criteria	43	43	48	5
Wollemi Peak Rd	20/03/2013 03:11	MTW L _{Aeq} Impact Assessment Criteria	37	42	47	10
		MTW L _{Aeq} Land Acquisition Criteria	43	42	47	4
Wollemi Peak Rd	27/03/2013 23:39	MTW L _{Aeq} Impact Assessment Criteria	37	40	45	8
		MTW L _{Aeq} Land Acquisition Criteria	43	40	45	2

Location	Date/Time	Relevant Criteria	Criterion (dB)*	L _{Aeq} (dB)	Revised L _{Aeq} (dB)	Exceeds by (dB)
Inlet Road	28/03/2013 00:12	MTW L _{Aeq} Impact Assessment Criteria	38	38	43	5
		MTW L _{Aeq} Land Acquisition Criteria	43	38	43	NA
Bulga Village	28/03/2013 01:18	MTW L _{Aeq} Impact Assessment Criteria	38	37	42	4
		MTW L _{Aeq} Land Acquisition Criteria	43	37	42	NA
Long Point	31/07/2013 22:01	WML L _{Aeq} Impact Assessment Criteria	37	32	37	NA
		WML L _{Aeq} Land Acquisition Criteria	40	32	37	NA
Wambo Road	31/07/2013 23:59	MTO L _{Aeq} Impact Assessment Criteria	40	25	30	NA
		MTO L _{Aeq} Land Acquisition Criteria	43	25	30	NA
Inlet Road West	1/08/2013 00:27	MTO L _{Aeq} Impact Assessment Criteria	35	27	32	NA
		MTO L _{Aeq} Land Acquisition Criteria	43	27	32	NA
Long Point	8/08/2013 22:00	WML L _{Aeq} Impact Assessment Criteria	37	36	41	4
		WML L _{Aeq} Land Acquisition Criteria	40	36	41	1
Long Point	9/10/2013 22:00	WML L _{Aeq} Impact Assessment Criteria	37	34	39	2
		WML L _{Aeq} Land Acquisition Criteria	40	34	39	NA
Bulga Village	9/10/2013 23:23	WML L _{Aeq} Impact Assessment Criteria	38	28	32	NA

Location	Date/Time	Relevant Criteria	Criterion (dB)*	L _{Aeq} (dB)	Revised L _{Aeq} (dB)	Exceeds by (dB)
Wollemi Peak Road	10/10/2013 01:11	WML L _{Aeq} Land Acquisition Criteria	43	28	32	NA
		MTO L _{Aeq} Impact Assessment Criteria	38	30	35	NA
		MTO L _{Aeq} Land Acquisition Criteria	43	30	35	NA
Inlet Road West	21/11/2013 0:21	WML L _{Aeq} Impact Assessment Criteria	35	31	36	1
		WML L _{Aeq} Land Acquisition Criteria	40	31	36	NA
Wollemi Peak Road	13/12/2013 01:15	MTO L _{Aeq} Impact Assessment Criteria	38	32	37	NA
		MTO L _{Aeq} Land Acquisition Criteria	43	32	37	NA
South Bulga	13/12/2013 00:41	MTO L _{Aeq} Impact Assessment Criteria	37	31	36	NA
		MTO L _{Aeq} Land Acquisition Criteria	43	31	36	NA

* Criterion (dB) listed is the lowest noise limit (Table 3 in Schedule 3, Condition 3 of the Project Approvals).

3.2.4 Cumulative Noise Assessment

During Quarter 1 2013 cumulative noise from MTW and surrounding mining operations was assessed against the criteria of the Warkworth Extension Project Approval (PA_09_0202). During Quarter 3 and 4 cumulative noise from MTO and surrounding mining operations was assessed against the criteria of Mount Thorley development consent (DA 34/95 Mod 5). Throughout 2013, MTW complied with the cumulative noise impact assessment criteria. These monitoring results are presented in Appendix 3.

3.2.5 Comparison against EA Prediction

Table 20 shows comparisons between 2013 L_{Aeq} (15 minute) attended noise monitoring results for Quarter 1 against the predictions made in the Warkworth Extension Preferred Project Report (EMGA Mitchell McLennan, 2011). Comparisons have been made against the worst case predicted Night time L_{Aeq} (15 minute) values for year 2 of the development (nominally 2012 – although mining activity in the extension area did not commence in 2013 due to the disapproval of the Extension Project in the Land and Environment Court), under INP applicable weather. The comparison data has been sourced from the modelled noise levels at the nearest residential receivers to the current monitoring locations. The residential receivers are as described in the Proposed Warkworth Extension Environmental Assessment (EMGA

Mitchell McLennan, 2010). Reported 2013 data is the calculated average of estimated MTW contribution to measured L_{Aeq} (15 minute) results obtained during INP applicable weather conditions.

Table 20: Predicted Night Time L_{Aeq} (15 minute) Noise Levels and 2013 Monitoring Results (Q1)

Monitoring Location	Receiver Number*	Year 2 modelled noise levels (prevailing met)	Q1 2013 measured levels
		L_{Aeq} (15 minute) (dB)	L_{Aeq} (15 minute) (dB)
Knodlers Lane	121	37	Not Assessed
Long Point	174	38	<25
Gouldsville Road	128	42	<25
Warkworth Village	77	46	Not Assessed
Abbey Green	188	41	Not Assessed
Wambo Road	37	39	36.5
Inlet Road West	1	32	29.1
Inlet Road	38	38	37.5
Bulga Village	72	41	37.0
Wollemi Peak Road	82	41	42.7

*Source: EMGA Mitchell McLennan, 2010

Measured levels during Quarter 1 2013 were generally lower than predicted from the Warkworth Extension Preferred Project Report (2011) with the exception of the Wollemi Peak Road monitoring location (formerly Noses Peak Road), where measured results exceeded the predictions by 1.7dB. **These results reflect MTW's performance during Q1 2013, where non-compliant measurements were recorded at this location on three separate occasions.**

Table 21 shows Quarter 3 and Quarter 4 2013 measurements compared to the predicted noise levels modelled in the 2002 Warkworth EIS. Comparison has been made against the modelled worst case noise levels for Year 10 and Year 15 of the development (nominally 2012 and 2017). The comparison data has been sourced from the modelled noise levels at the nearest residential receivers to the current monitoring locations. Reported 2013 data is the calculated average of estimated WML contribution to measured L_{Aeq} (15 minute) results obtained during INP applicable weather conditions. It should be noted that these results are often represented by only one monitoring event with applicable INP met conditions and not necessarily representative of the entire period.

Table 21: Predicted Night Time WML (EIS 2002) L_{Aeq} (15 minute) Noise Levels and 2013 Monitoring Results (Q3, Q4)

Monitoring Location	Closest Receiver Number	Year 10 Modelled Noise L_{Aeq} (15 minute) (dB)	Year 15 Modelled Noise L_{Aeq} (15 minute) (dB)	Quarter 3 2013 L_{Aeq} (15 minute) (dB)	Quarter 4 2013 L_{Aeq} (15 minute) (dB)
Mount Thorley Industrial Estate	10	44.5	43.6	NA	NM
Bulga Village	18	27.9	27.8	NM	34.2
Gouldsville Road	3	36.6	35.5	NA	31.0
Inlet Road West*	NA	<35	<35	NM	31.0
Long Point*	NA	35-40	35-40	34.4	34.0
Wollemi Peak Road*	NA	<35	<35	NM	30.0
South Bulga	14	24.5	23.8	NM	NM
Wambo Road	22	29.7	30.1	NM	32.0
Warkworth	27	33.6	36.5	38.0	NM

*Denotes – No nearby receiver location modelled

NA = No measurements taken during applicable INP weather conditions

NM = Not Measureable under applicable INP weather conditions

3.2.6 Complaints

During 2013 MTW received 633 noise complaints compared to 800 in 2012 and 136 in 2011. The majority of complaints came from Bulga, with a smaller percentage from Long Point and Gowrie. The reduction in complaint volume from the Bulga community is considered to be an indicator of improved noise performance with respect to private residences to the West of MTW. With the exception of the non-compliant measurements recorded during Q1 2013, the compliance monitoring program also indicates improved performance in this area.

Given that operating and meteorological conditions were largely identical from 2012 to 2013, the following could be considered key reasons behind the reduction in complaints witnessed in 2013:

- Operation of an additional 3 real time noise monitors in Bulga
- Maturation of the supplementary monitoring regime undertaken through the community response officers;
- Increased focus on contingency planning (availability of alternate operating areas which can be utilised under adverse noise conditions);
- Swift implementation of effective reactive controls, learnt through previous experience during similar conditions;
- Increased understanding of risk locations and activities; and
- Continued transition toward proactive management, rather than reliance on reactive controls;
- Continued noise attenuation of mining fleet.

3.2.7 Further Improvements

MTW will be preparing and submitting an updated Noise Management Plan during March 2014 as required by the recent Warkworth modification. The updated plan will list all management measures and strategies which will be employed to ensure best practice management is maintained at MTW. These measures include:

- Continuation of the Sound Attenuation Program for heavy mining equipment;
- Continued development and implementation of a proactive / predictive noise tool; and
- Commissioning and implementation of the Environmental Noise Compass technology in the Bulga area.

3.3 Blasting

3.3.1 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 vibration and overpressure. Procedures to ensure compliance with conditions of the Project Approvals relating to blasting impacts are described in the MTW Blast Management Plan which is available on the Rio Tinto Coal Australia website. The MTW Blast Management Plan also provides a mechanism for assessing blast monitoring results against the relevant blast impact assessment criteria. The MTW Road Closure Management Plan and MTW Post Blast Fume Generation Mitigation and Management Plan are included in the Blast Management Plan.

3.3.1.1 Monitoring Locations

During 2013, MTW operated a network of eight Ecotech Dynamate DV6 R4 blast monitors. These monitors are generally located at nearby privately owned residences and function as regulatory compliance monitors. These monitors are located at the following locations (refer Figure 21):

- Abbey Green (Abbey Green Station, Putty Road, Glennridding);
- Bulga Village (Wambo Road, Bulga);
- Police Station (Putty Road, Bulga);
- Putty Road, Bulga (Putty Road, Bulga);
- Putty Road, Mount Thorley,
- South Bulga (Putty Road, Bulga);
- Wambo Road, Bulga (Wambo Road, Bulga); and
- Warkworth Village (former Warkworth Public School, Warkworth).

The Putty Road Bulga Monitor was relocated in October 2013 due to changes in property ownership. The monitor was relocated approximately 500m to the south-west, to the (now) nearest privately owned residence.



Figure 21: Blast Monitoring Locations

3.3.2 Performance

Statutory limits for ground vibration and airblast over pressure generated by blasts initiated at MTW must not be exceeded at any privately owned residence. These statutory limits are prescribed as follows:

- Airblast overpressure shall not exceed 120dB((L) Linear Peak) at any time;
- Airblast over pressure shall not exceed 115dB((L) Linear Peak) for more than 5 per cent of the total number of blasts over a 12 month period;
- Ground vibration shall not exceed 10mm/s at any time; and
- Ground vibration shall not exceed 5mm/s for more than 5 per cent of the total number of blasts over a 12 month period.

During the reporting period, 410 blasts were initiated at MTW. Results of ground vibration and air overpressure recorded during 2013 are presented in the following figures.

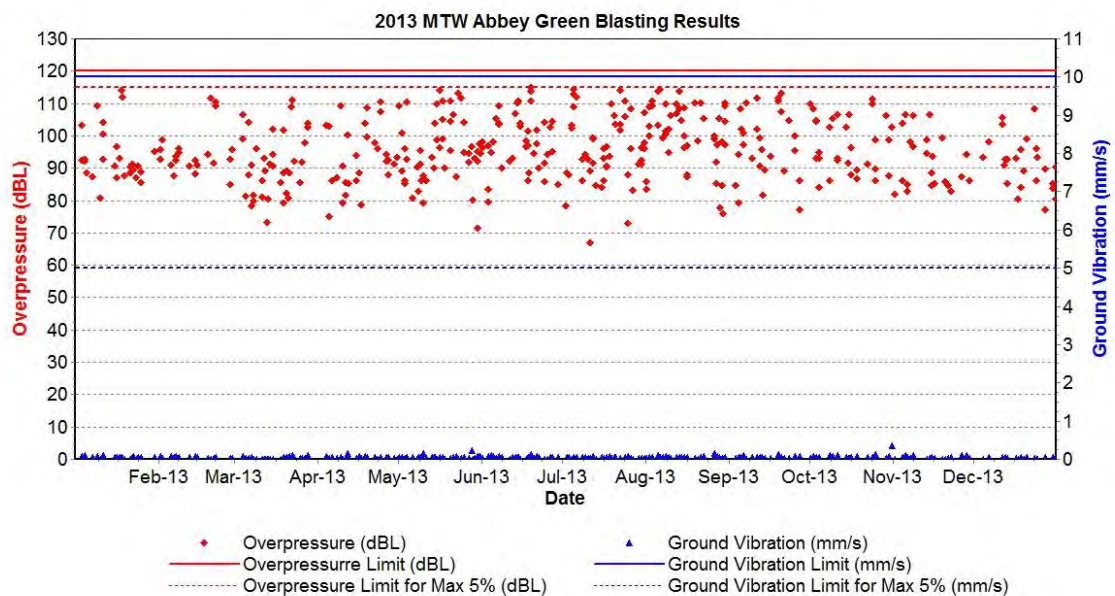


Figure 22: Blasting Results – Abbey Green

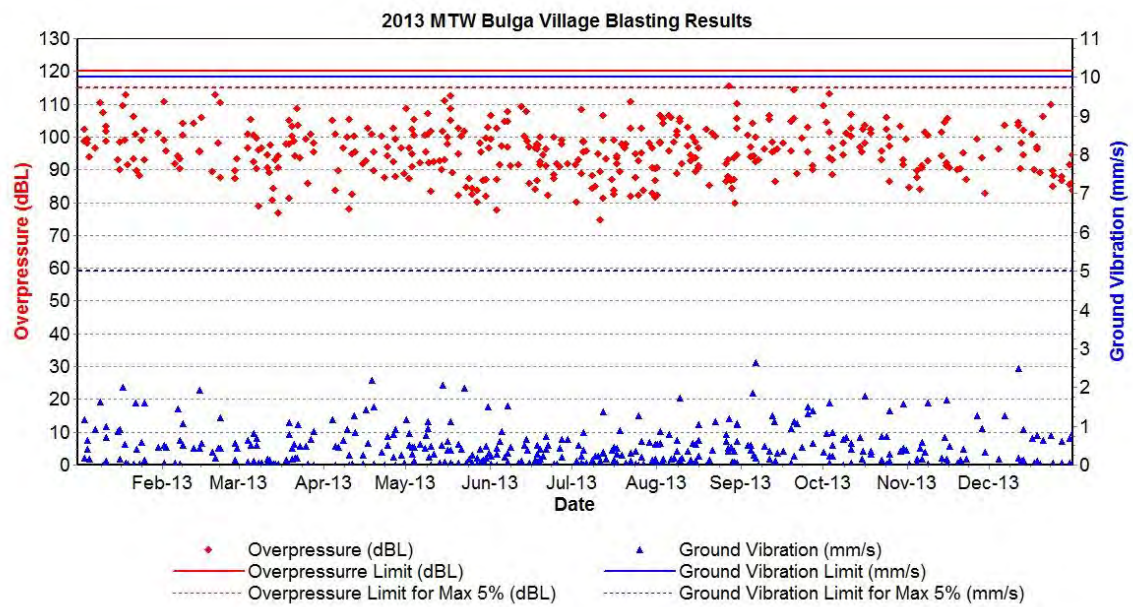


Figure 23: Blasting Results – Bulga Village

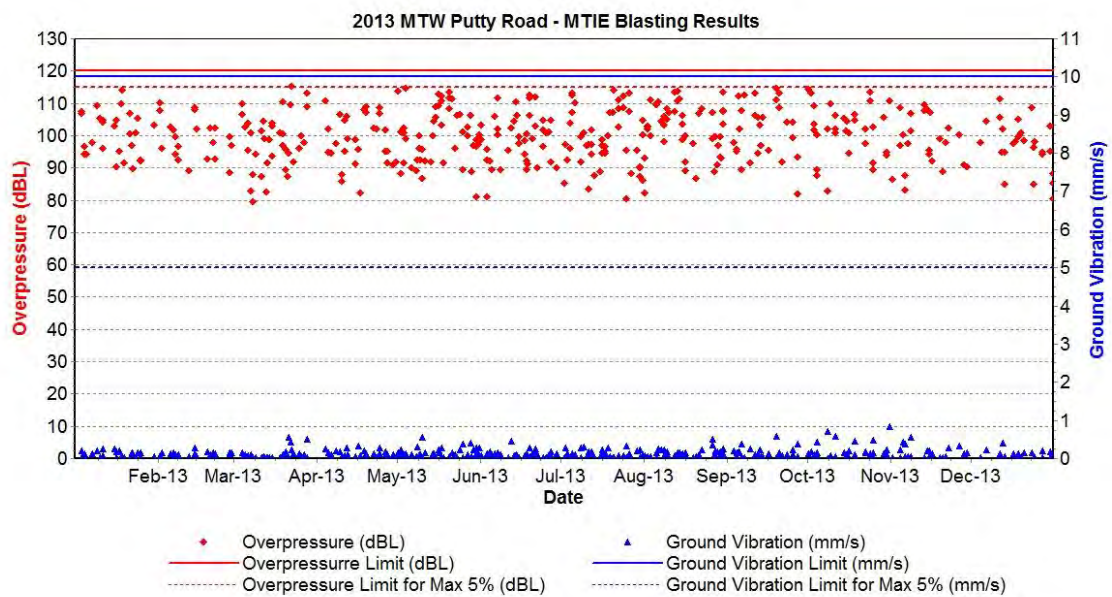


Figure 24: Blasting Results – Mount Thorley Industrial Estate

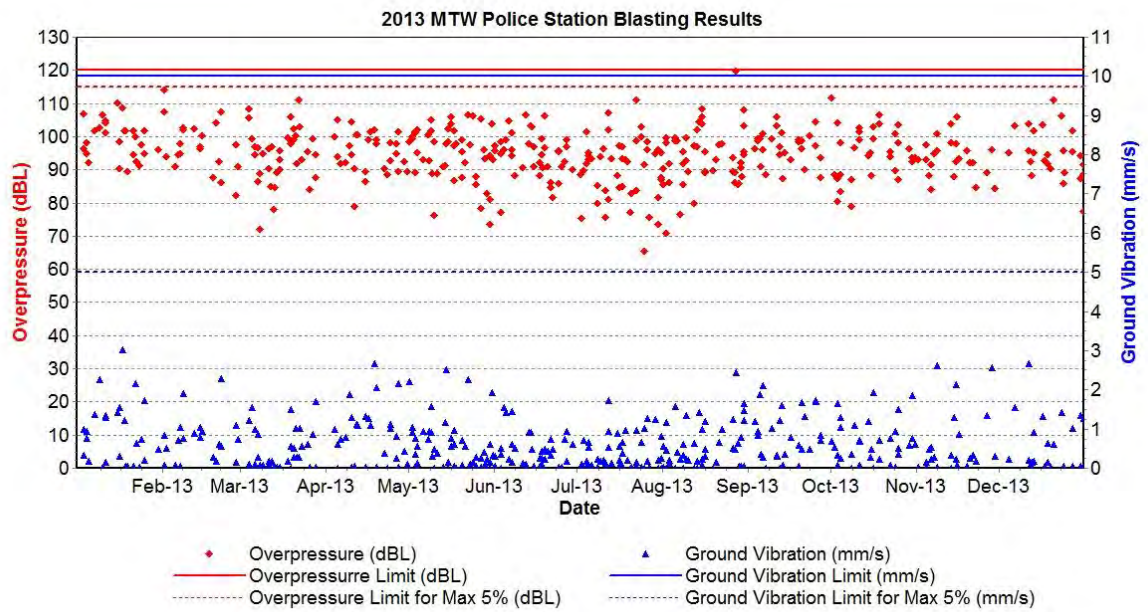


Figure 25: Blasting Results – Police Station

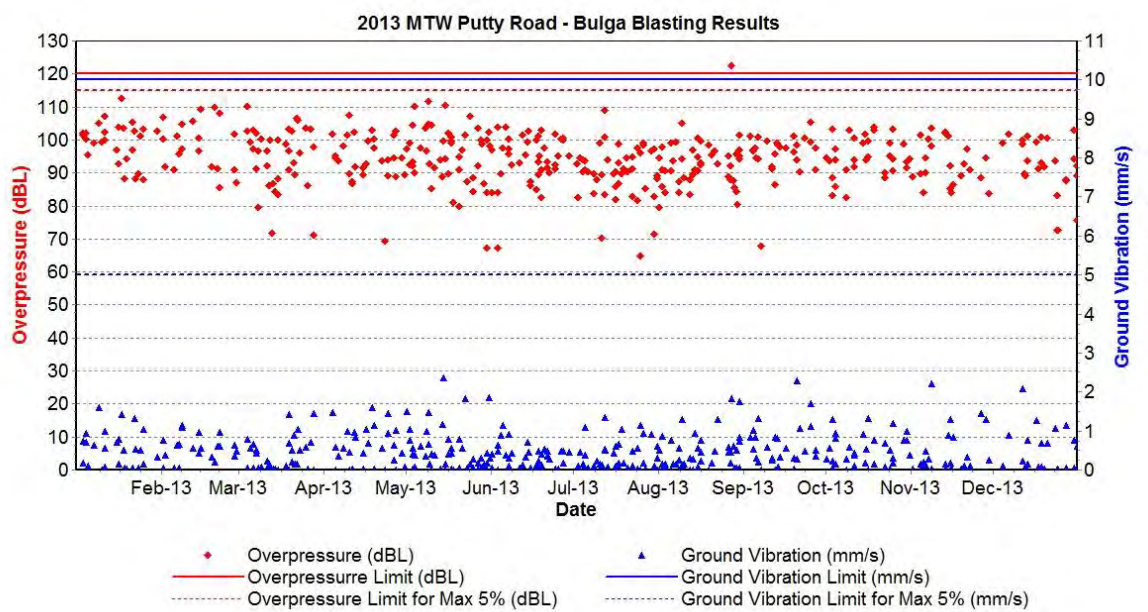


Figure 26: Blasting Results – Putty Road Bulga

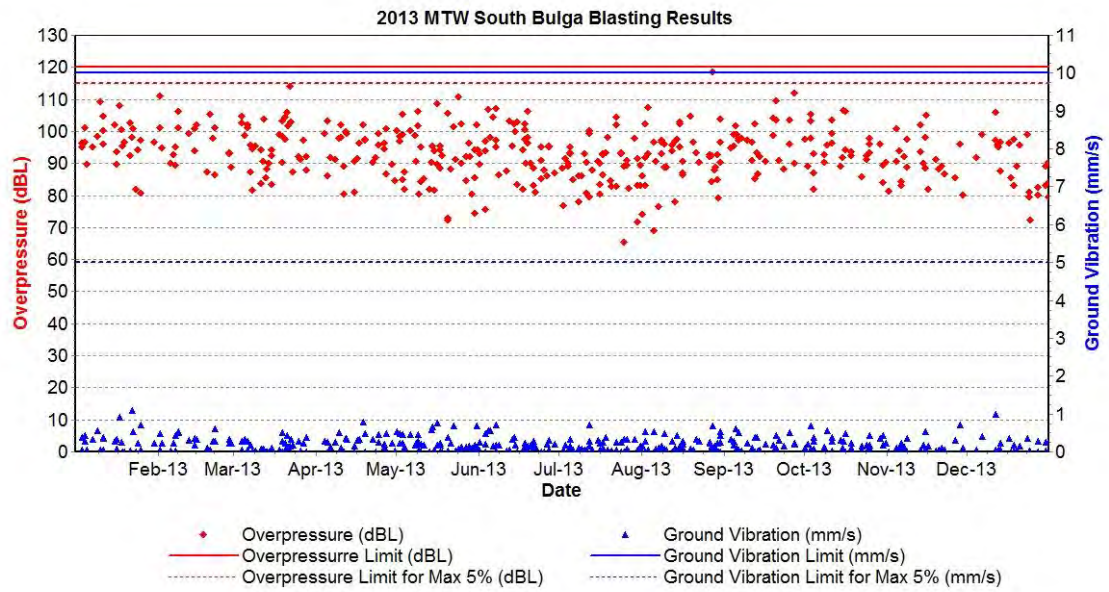


Figure 27: Blasting Results – South Bulga

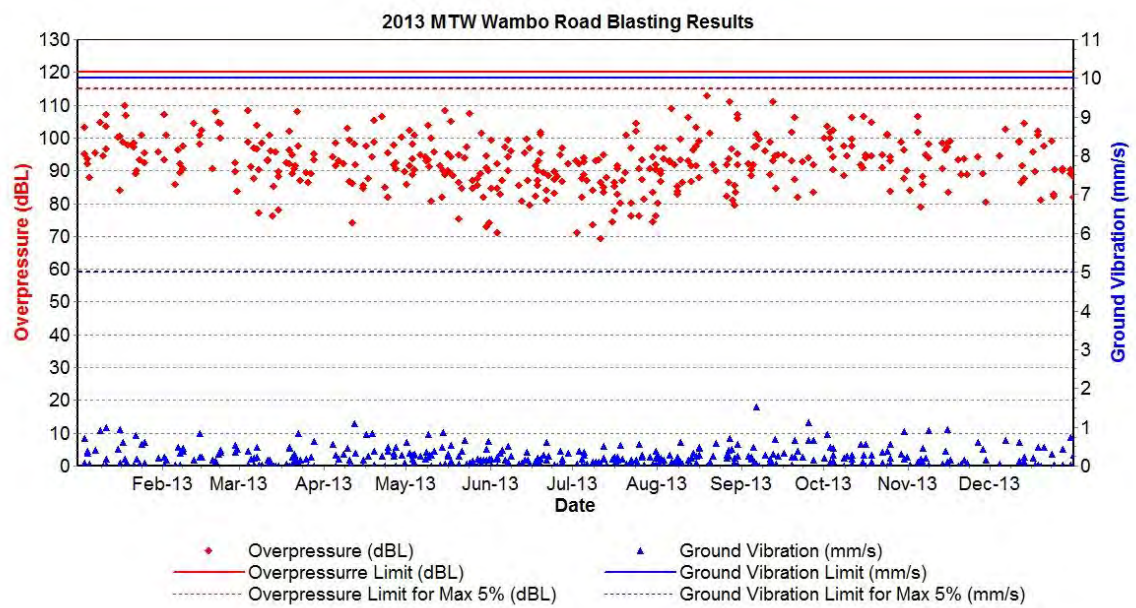


Figure 28: Blasting Results – Wambo Road

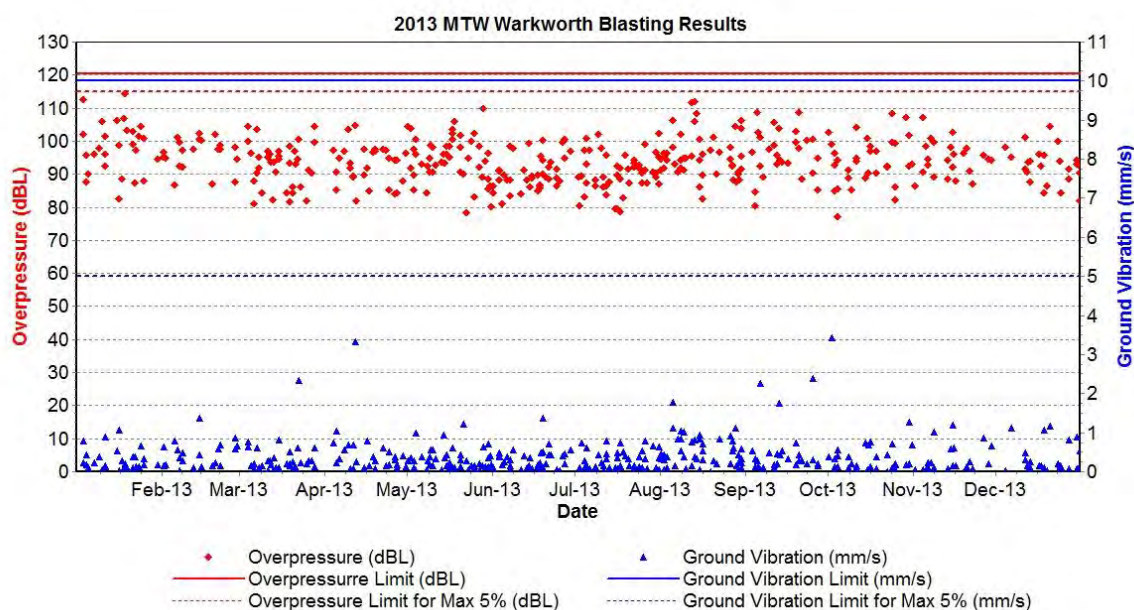


Figure 29: Blasting Results – Warkworth

One recorded blast exceeded the 120 dB(L) airblast overpressure criteria and 0.73 percent of recorded blasts exceeded 115dB(L) overpressure. No recorded blasts had a ground vibration greater than 5mm/s.

Road closures occurred for all blasts within 500 metres of a public road. Public roads were closed on occasions to mitigate potential impact upon road users from dust or as a precautionary measure when production of blast fume was possible. There were no instances of impact upon a public road from flyrock or associated delay in reopening of a road due to flyrock impact.

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

MTW's blasting results for 2011 to 2013 are summarised in Table 22. Results recorded in 2013 are similar to results recorded during 2011 and 2012 and are generally consistent with EA predictions.

Table 22: 2011-2013 Blast Results and Statutory Limits

	Number of Blasts over 120dB(L) Overpressure	Percentage of blasts over 115dB(L) Overpressure	Number of Blasts over 10mm/s ground vibration	Percentage of Blasts over 5mm/s Ground vibration
2013	1	0.73	0	0
2012	1	1.88	0	0
2011	0	0.22	0	0

3.3.3 Non-Compliances

One blast recorded a non-compliance with the maximum allowable air blast over pressure criterion (120dB(L)). At 13:39 on 27 August 2013 a blast in Loders Pit of Mount Thorley Operations resulted in a peak airblast overpressure of 122.4dB(L) to be recorded at the Putty Road Bulga monitoring location. An external review determined that the overpressure exceedance was caused by previously unmapped weathered ground in the area of the blast in the form of old drainage lines and surface ponds which promoted major cracking during the

blast event. In accordance with reporting protocols, the exceedance was reported to EPA and DP&I on the day of occurrence, and affected landowners in the vicinity of the monitoring location were notified in writing. Three community complaints were received in relation to the event. Following submission of the investigative report to DP&I, a Penalty Infringement Notice was received in relation to the non-compliance.

A review of future blasting areas was undertaken to highlight other areas with similar conditions so that drill and blast operations can be modified accordingly to prevent reoccurrence.

MTW achieved 99.9% data capture from the blast monitoring network, successfully capturing 3271 out of 3280 measurements. The vast improvement in data capture witnessed from 2011 – 2013 is the result of a monitor replacement project, and additional administrative processes in place to ensure data integrity. One blast event during August 2013 was not recorded as the vibration associated with the blast were insufficient to trigger the event, and MTW staff subsequently failed to identify the missed capture in time to manually trigger the event. Additionally, one measurement was missed at the Police Station monitor during June 2013 due to a short term, unexpected monitor outage.

One Category three blast fume event was notified to the DP&I 12 June 2013 in accordance with notification requirements specified in the MTW Blast Management Plan.

3.3.4 Complaints

There were 38 complaints relating to blasts during 2013 compared to 69 complaints in 2012.

3.3.5 Audits and Reviews

There were no audits or reviews undertaken during 2013.

3.3.6 Further Improvements

MTW will be preparing and submitting an updated Blast Management Plan as required by the recently approved Warkworth Modification (Modification 6). The updated plan will outline all management and mitigation measures which MTW will employ to ensure best practice blast management continues.

3.4 Air Quality

3.4.1 Management

The objectives of air quality management at MTW are:

- to minimise air quality impacts on surrounding residents;
- to comply with all statutory requirements; and
- to keep the local community and regulators informed and respond quickly and effectively to issues and complaints.

Proactive controls employed during 2013 include:

- Review / use of meteorological forecast data in short term mine planning, as well as identification of alternate dig / dump locations which can be utilised under adverse weather conditions;

- Use of a predictive blast plume / NOx dispersion tool in blast planning to reduce the likelihood of an offsite blast dust / fume event;
- Ensuring watercart availability on days when difficult dust conditions are forecast, and application of additional water on at risk haul roads and dumps ahead of forecast adverse conditions;
- **Proactive closure of 'at-risk' roads and dump locations ahead of forecast adverse conditions;**
- Minimisation of clearing ahead of mining to ensure there is no excess surface disturbance;
- Use of mulched vegetation as ground cover to reduce exposed ground;
- Progressive rehabilitation and use of temporary cover crops to rapidly stabilise the soil (sown in favourable sowing conditions in Autumn / Spring); and
- Temporary stabilisation programs such as aerial seeding to reduce dust exposures on inactive mine areas

Reactive controls employed during 2013 include:

- Modification or cessation of mining activity during adverse conditions (see section 3.4.2.1 for information on operational downtime due to environmental conditions);
- Monitoring of wind and dust conditions via the real time environmental monitoring network; and
- Routine and triggered inspections of operational areas to identify nuisance dust sources;

MTW seeks to continually improve air quality performance, commensurate with the principles and guidelines of Rio Tinto Coal Australia's certified Health, Safety, Environment, and Quality Management System.

3.4.2 Monitoring Locations

Air quality monitoring at MTW involves monitoring dust deposition, Total Suspended Particulate matter (TSP), particulate matter with an equivalent spherical diameter less than 10 microns (PM₁₀) and meteorological conditions, according to relevant Australian Standards. The objective of the air quality monitoring is to provide relevant site personnel with data to assist minimise dust generation. Air quality monitoring locations are shown in Figure 30, and the air quality monitoring network is summarised below:

- Eight depositional dust gauges are located across private and mine owned land. Depositional dust was monitored in accordance with AS 3580.10.1 (2003). Samples from these gauges were analysed to determine the fallout rate of total insoluble matter, combustible matter and ash.
- Four High Volume Air Samplers (HVAS) fitted with standard inlets measure TSP. These monitors were sampled and analysed in accordance with AS 3580.9.3 (2003). During 2013 HVAS monitor WML HV1 TSP was relocated to the Loders Creek TSP monitoring location to provide monitoring of TSP levels in this area with reduced influence from local agricultural sources.
- Four HVAS fitted with size-selective inlets measure concentrations of PM₁₀. The HVAS monitors were sampled and analysed in accordance with AS 3580.9.6 (2003). During 2013 HVAS monitor MTIE PM10 was relocated to the Loders Creek PM10 monitoring

location to provide monitoring of TSP levels in this area with reduced influence from local agricultural sources. Each HVAS was run for 24 hours on a six-day cycle in accordance with OEH requirements. When equipment malfunctioned a make-up run was performed. HVAS machines were calibrated every two months.

- MTW maintains a series of real time air quality monitors including DustTrak and Tapered Element Oscillating Microbalance (TEOM) monitors. The real time system transmits live data to site personnel via the SCADA system. Alarms, based on data from the real time PM10 monitoring units, are used to inform the operation of potentially adverse conditions. Following receipt of an alarm the shift coordinator will undertake or delegate a site inspection and implement additional controls as required. Indication of MTW contribution to measured PM₁₀ levels will be calculated in real time by subtracting upwind levels from downwind levels. Currently the real time air quality monitors are used as a management tool rather than a measure of compliance.

Mount Thorley Warkworth Air Quality Monitoring Locations

Date: 140219

Plan By: DS

Version: 1.0



RTCA - NSW Environmental Services

Figure 30: Air and Meteorological Monitoring Locations MTW 2013

3.4.3 Air Quality Performance

3.4.3.1 Air Quality Management in 2013

Operational Downtime

In response to alarms from the real time monitoring system and from in pit inspections by supervisors and operators, various equipment and tasks are often shut down to effectively manage particulate emissions. Delays and stoppages for dust are recorded in the mine monitoring system, allowing for accurate tracking **of the mines' response to adverse weather conditions**. Figure 31 shows trucks pulled up for dust in October 2013.



Figure 31: Trucks on stand-down during dust event of 29 October 2013

During 2013, a total of 11,744 equipment operating hours were recorded as lost due to dust management, see figure 32. 75% of the stoppages were recorded during the spring months, associated with elevated winds and warmer conditions. Haul truck stoppages accounted for approximately 60% of the downtime due to dust, followed by Dragline stoppages (13%). Excavators, Shovels and Front End Load units combined account for approximately 10% of stoppages due to dust or elevated wind conditions. The recorded delays attributed to dust in 2013 significantly increased from 2012 records (4,606 hours of equipment delays).

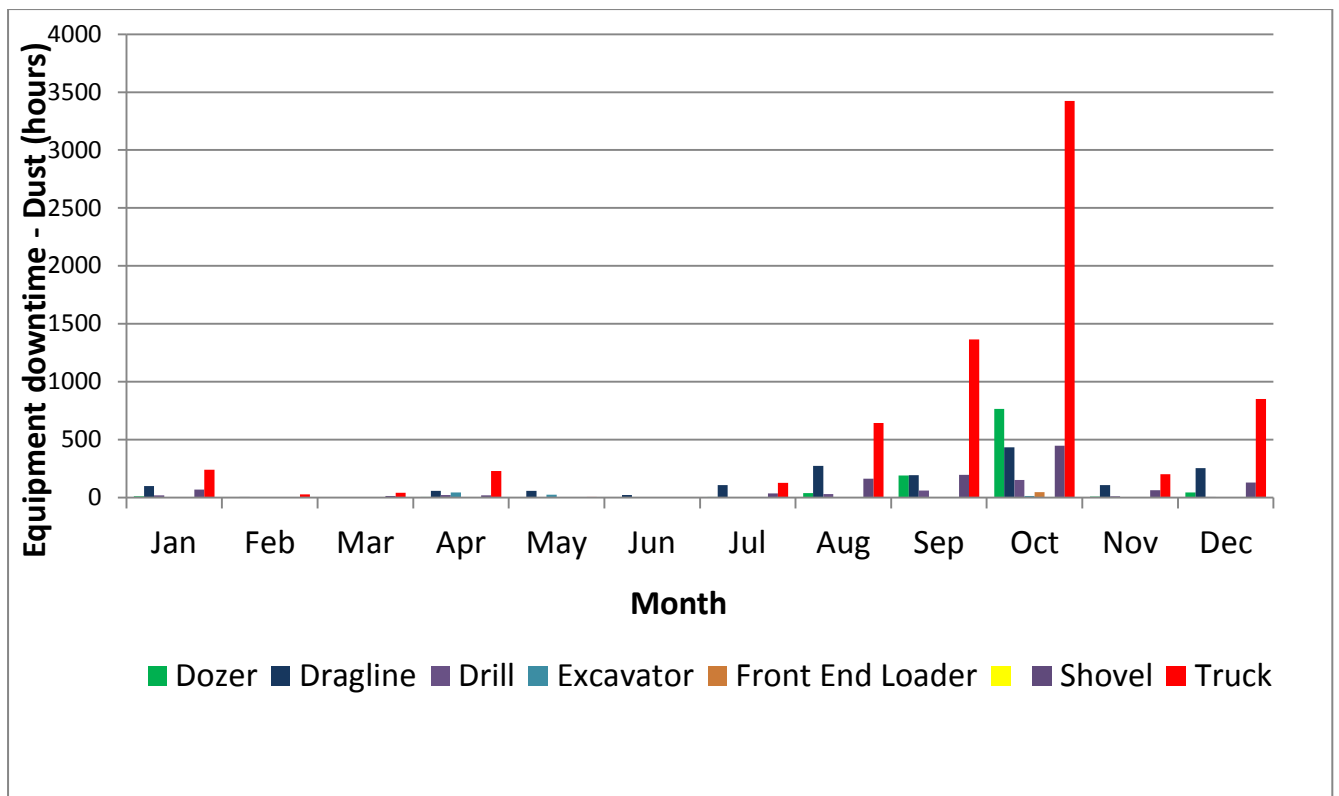


Figure 32: Equipment downtime for dust management by month, 2013

Real Time Air Quality Monitoring

Throughout 2013, Mount Thorley Warkworth continued to operate and maintain a network of real time PM₁₀ monitors surrounding MTW on both private and mine owned land. The 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. During 2013, the air quality triggers were refined to align with the criteria defined for adverse conditions in accordance with the NSW EPA Pollution Reduction Programme (Materials handling / adverse conditions), including introduction of refined alarms which generate when wind speeds exceed 8m/sec. Air quality alarms are received by Environmental Services and Mining personnel who validate the alarm and conduct an initial inspection of a related work area upwind of the alarming monitor, see figure 33. Following this, alterations to operations are made as required including but not limited to additional watering and cessation of particular tasks that are assessed as generating excessive dust.

During 2013, MTW personnel responded to 812 alarms relating to air quality generated by the real time monitoring network.



Figure 33: example of MTW's real time air quality monitoring tools

Temporary Stabilisation

Aerial Seeding was undertaken in early May 2013 by a fixed wing aircraft to provide a temporary cover to areas exposed to wind generated dust and erosion at MTW. Refer to section 5.7 for further information.

Supplementary Real Time Air Quality Monitoring

As committed in the Mount Thorley Warkworth Air Quality and Greenhouse Gas Management Plan, MTW purchased and installed a network of supplementary real time monitors to augment the existing network of real time instruments surrounding the mine. Designed to be operated as near-field monitors and an 'early warning' of periods when offsite dust generation is likely, the DustTrak II 8530 units have been deployed in key dust risk areas just outside the active mining area and adjacent to public roads (Putty Road and Golden Highway). Figure 34 shows the Putty Road DustTrak unit. During 2014 MTW will refine the triggers assigned to the units following assessment of the initial 12 months data and comparison against far-field TEOM and regional PM₁₀ monitors.



Figure 34: DustTrak II8530 unit deployed at WML, adjacent to the Putty Road

Long Point Air Quality Monitoring

During 2013 a new monitoring location was established and commissioned in the Long Point area to collect air quality and noise monitoring data representative of privately owned receptors in Long Point. The Long Point monitoring compound is shown in Figure 35. Air Quality monitoring data from the newly installed Total Suspended Particulate (TSP) and PM₁₀ High Volume Air Samplers (HVAS) will continue to be collected through 2014 and will be reported in the 2014 Annual Review.



Figure 35: Long Point Environmental Monitoring compound

Dust Cameras

MTW commenced utilisation of two dust cameras during 2013, installed on Charlton Ridge, and atop the WML Maintenance Workshop, see figure 36.. Able to be rotated 360°, the cameras provide an additional vantage and operational inspection tool for Mining and Environmental personnel, assisting in decision making when additional controls such as ceasing or modifying tasks are required.



Figure 36: Vantage from MTW Dust camera (taken 10:46am, 23 December 2013)

Predictive forecasting

During Quarter 4 2013, MTW commenced participation in a three month trial of an industry wide weather forecasting project. The project, borne through the Emissions and Health Working Group of the Upper Hunter Mining Dialogue (A NSW Mineral Council initiative) aims to ensure that all mines in the Upper Hunter have access to similar weather forecast information, allowing consistent implementation of reactive controls to adverse weather conditions to improve dust management.

The daily forecast information outlines hourly dust risk for the current day and proceeding two days, based on predicted occurrence of meteorological conditions which align with past instances of elevated PM₁₀ as measured through the Upper Hunter Air Quality Monitoring Network (Environ, 2013). An example of the daily forecast report is shown below in Figure 37. MTW will continue to participate in this important industry wide trial during 2014.

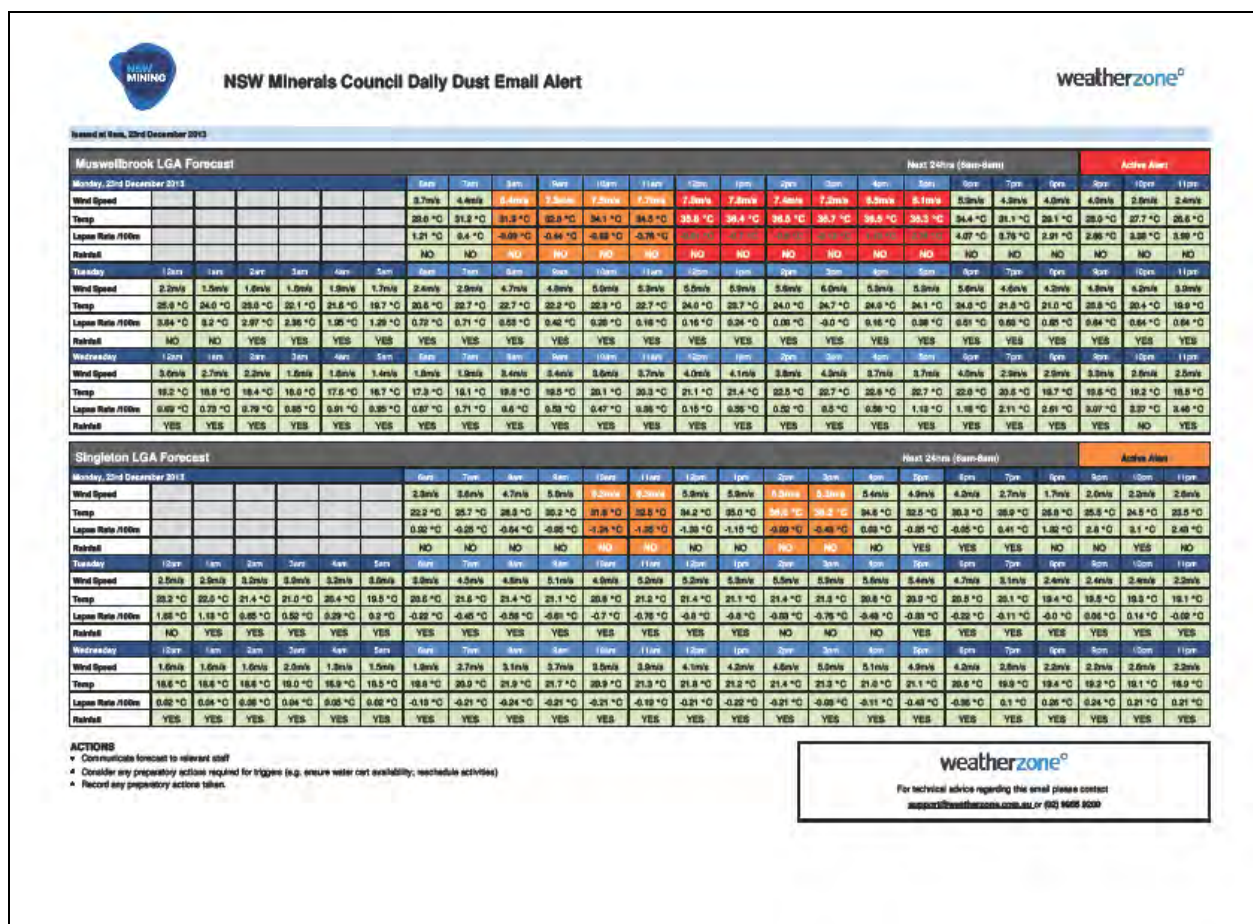


Figure 37: Example of the daily weather forecast report

Wheel Generated Dust Monitoring

During the reporting period, MTW commenced measurement and assessment against the requirements of the EPA Particulate Matter Control Best Practice Implementation programme (Dust Pollution Reduction Programme) for wheel generated dust. The program requires MTW to monitor and report on the effectiveness (%) of its' haul road dust control regime against a licenced target of 80%. This is done by way of comparing the dust control efficiency of two sections of road (one controlled and the other uncontrolled). Results of the monitoring programme will be reported to the EPA in August 2014. Figure 38 shows the two types of monitors (fixed and mobile) used in this programme.



Figure 38: Wheel generated dust monitoring (fixed and mobile monitors)

3.4.3.2 Air Quality Monitoring and Performance

Air quality monitoring at MTW is undertaken in accordance with the MTW Air Quality Monitoring Programme (http://www.riotintocoalaustralia.com.au/ouoperations/5090_management_plans.asp), and is comprised of an extensive **network of monitoring equipment** which is utilised to assess MTW's air quality performance against the relevant conditions of the approvals. Air quality monitoring locations are shown in Figure 30.

Air quality compliance criteria are shown in Table 23 and 24, **along with a summary of MTW's performance** against the criteria. MTW currently operates under two separate Planning Approvals (DA 300_9_2002_i – WML, and DA 34/95 - MTO). With the exception of the percentile frequency of short term PM₁₀ non-compliance allowable under the WML Approval (Table 7 in Schedule 4, Condition 19 of DA 300_9_2002_i), the air quality criteria are identical in both approvals. As such it should be noted that 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.

Table 53: Air quality impact assessment criteria and 2013 compliance assessment (WML DA 300_9_2002_i and MTO DA 34/95)

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 24: Air quality land acquisition criteria and 2013 compliance assessment (WML DA 300_9_2002_i and MTO DA 34/95)

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 PM₁₀ concentrations due to all other sources plus the incremental increase in PM₁₀ concentrations due to the mine alone

b – Incremental increase in PM₁₀ concentrations due to the mine alone

3.4.3.3 Deposited Dust

Deposited dust is monitored at eight locations situated on, or representative of privately-owned land, in accordance with AS3580.10.1 (2003). The 2013 annual average insoluble matter deposition rates compared **with the depositional dust impact assessment criterion and previous years' data, are shown in** Figure 39. During 2013 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 40).

During 2013 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.**

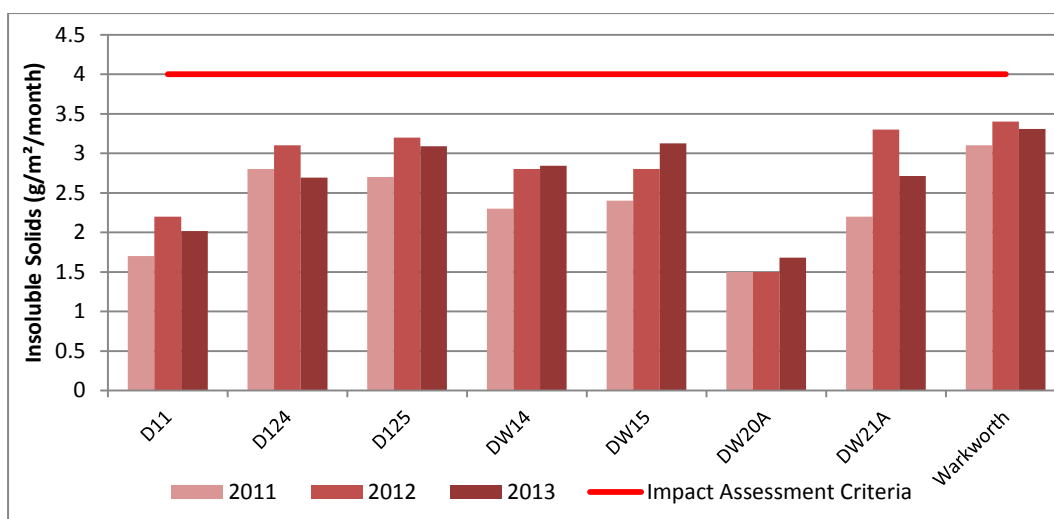


Figure 39:1 2013 Depositional Dust results compared against the impact assessment criteria and previous years' results

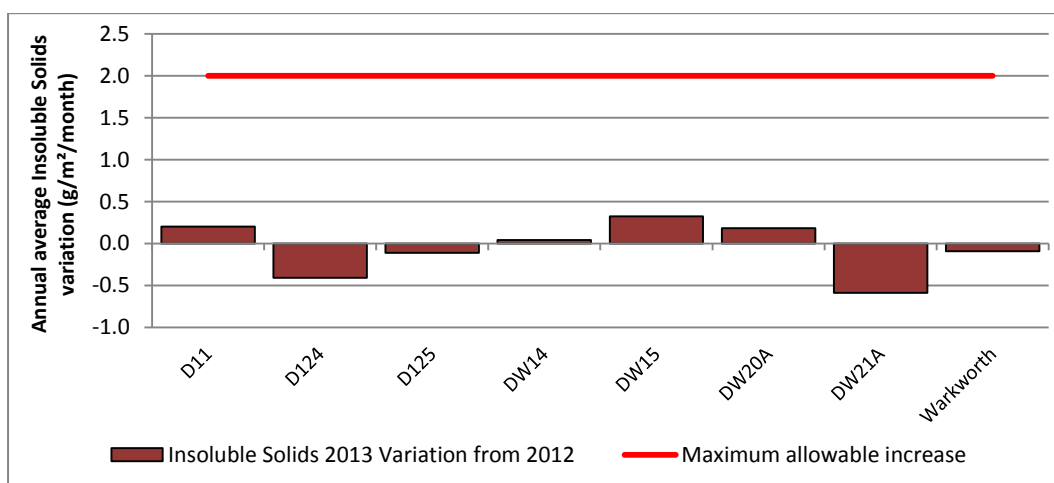


Figure 40: Variation in insoluble solids deposition rate from 2012 to 2013 compared against the impact assessment criteria

3.4.3.4 Total Suspended Particulates (TSP)

Total Suspended Particulates (TSP) is measured at four locations situated on or representative of privately owned land in accordance with AS3580.9.3(2003). Annual average TSP concentrations recorded in 2013 compared with the long term impact assessment criterion and previous years' data, are shown Figure 41. During 2013 all annual average results were compliant with the impact assessment and land acquisition criteria. Figure 42 also shows 24 hour TSP results compared against rainfall on HVAS run days.

During the reporting period, 6 out of 244 TSP measurements were not able to be collected on the scheduled sampling date (based on a sampling frequency of every six days). However for each of these missed measurements, samples were collected as soon as possible afterwards to ensure the required number of samples was collected and analysed.

The annual average TSP concentrations recorded in 2013 are generally consistent with those recorded during previous years, though a slight increase ($5\mu\text{g}/\text{m}^3$) was recorded at the Warkworth monitoring location. The primary difference in monitoring results between 2012 and 2013 was seen during February, where the monthly average TSP increased from $32.0\mu\text{g}/\text{m}^3$ to $50.0\mu\text{g}/\text{m}^3$. Analysis of rainfall data during this period identifies more rain during 2013 (173.2mm compared to 134.0mm in 2012), however the timing

of the TSP monitoring events compared to the timing of rainfall events explains the variation. During 2012, >1.0mm of rain fell on the designated sampling day during 3 of the 5 monitoring events, while a fourth monitoring event occurred on the day following another significant fall. Analysis of the 2013 rainfall data however identifies that three of the five TSP monitoring events in February occurred on days of zero rainfall, and followed prolonged periods (>3 days) without rain.

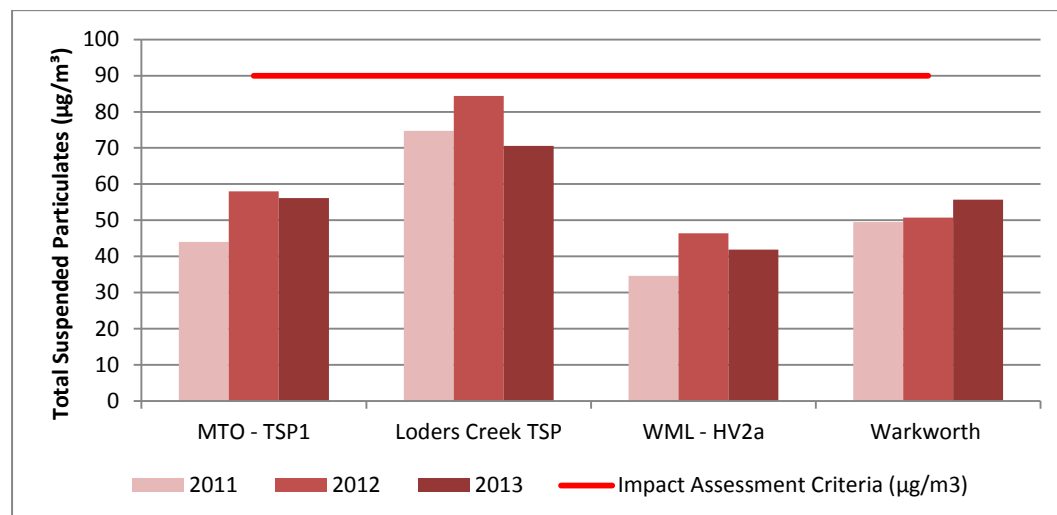


Figure 41: 2013 TSP Annual Average compared against the impact assessment criteria and previous years' results

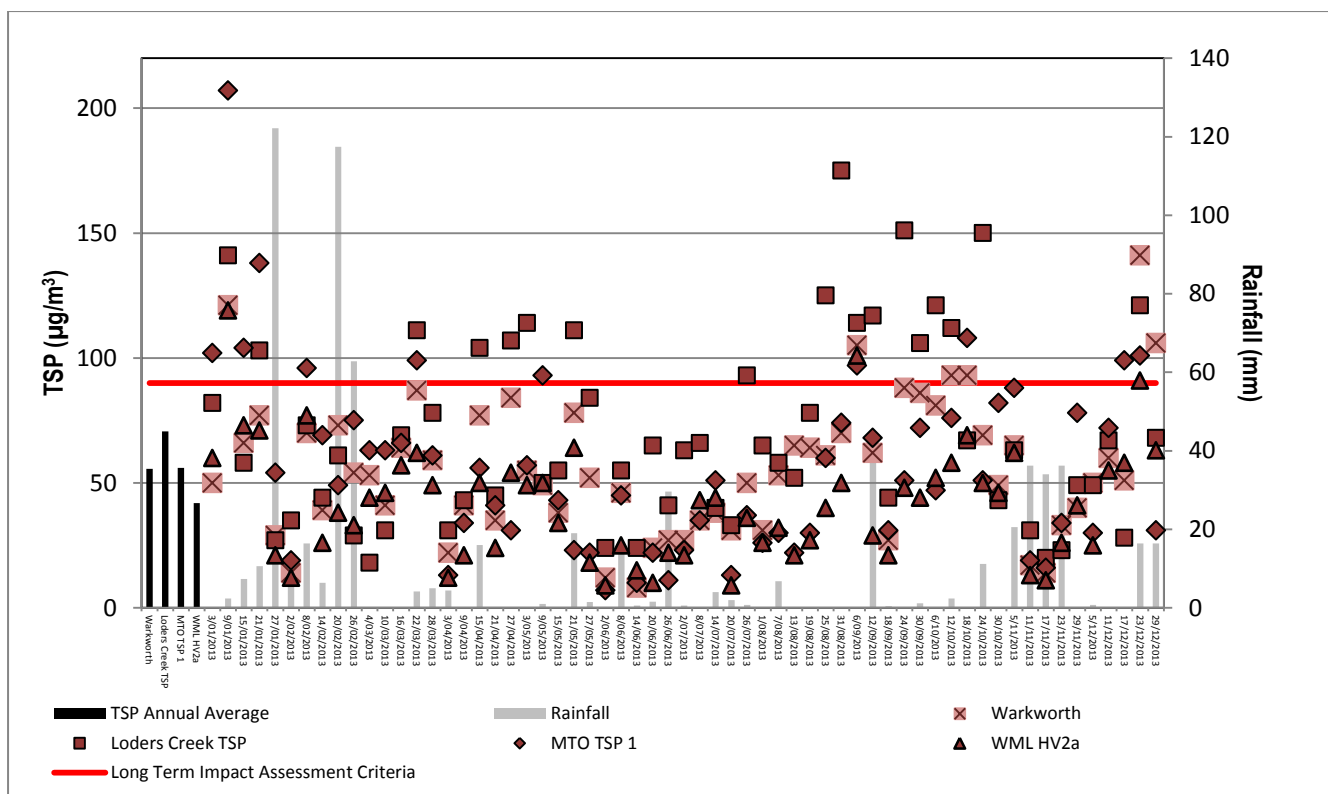


Figure 42: 2013 TSP monitoring results vs rainfall

3.4.3.5 Total Particulate Matter $<10\mu\text{m}$ (PM_{10})

Compliance assessment for Particulate Matter $<10\mu\text{m}$ (PM_{10}) is measured at four locations on privately owned land in accordance with AS3580.9.6(2003).

3.4.3.6 Short term PM_{10} impact assessment criteria

Monitoring results for 2013 PM_{10} (24 hour) compared against the short term impact assessment criteria and rainfall are shown in Figure 43.

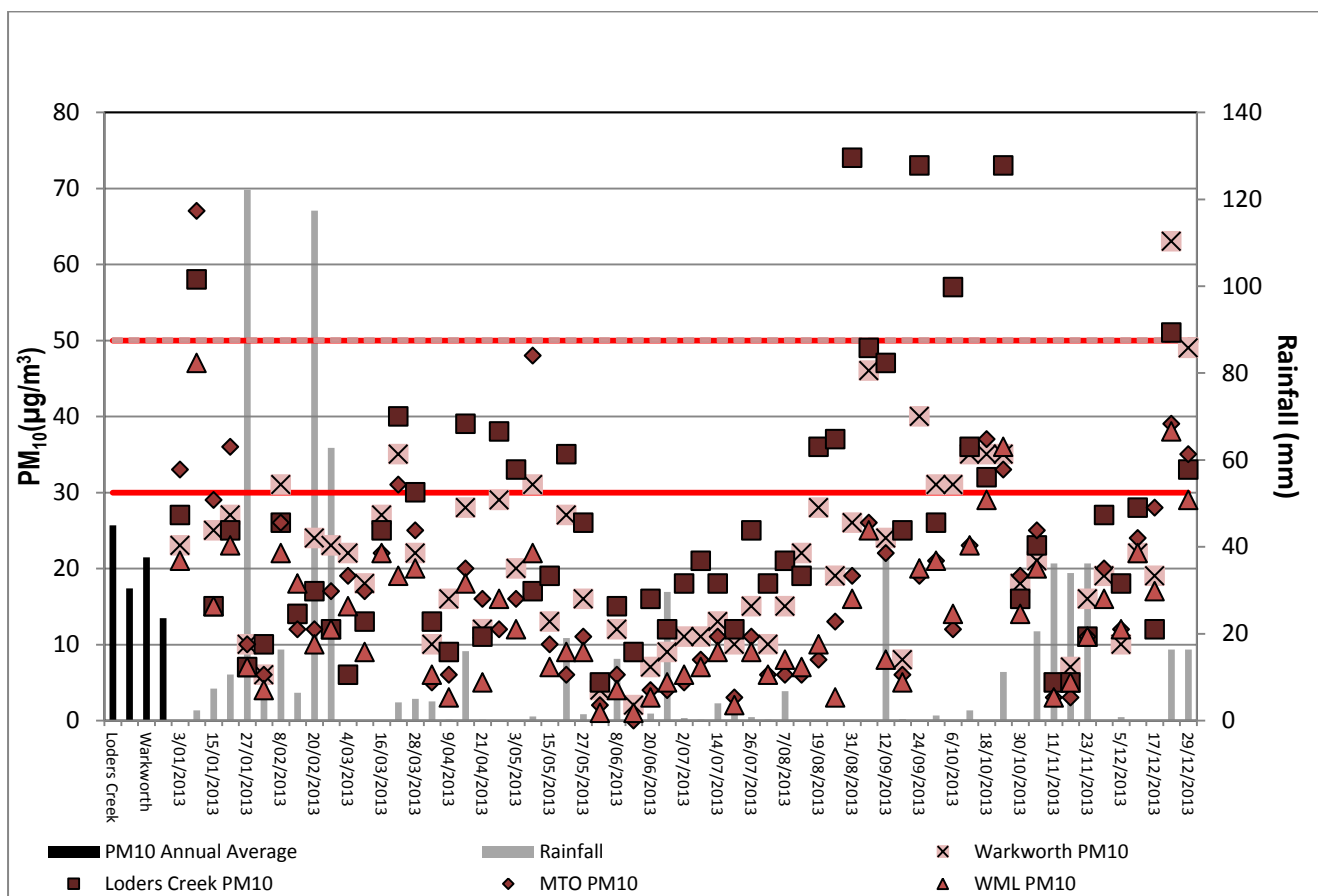


Figure 43: PM10 24hr monitoring results vs. rainfall

Ten measurements exceeded the short term impact assessment criteria during the reporting period however none were found to be due to a predominant contribution from MTW. Each exceedance was investigated to determine the level of contribution from MTW activities to the elevated result. The outcomes of each investigation are summarised in Table 25.

Table 25: 24 hour PM10 investigations - 2013

Date	Site	Result ($\mu\text{g}/\text{m}^3$ (PM₁₀ 24 hour))	Estimated contribution from MTW ($\mu\text{g}/\text{m}^3$)	Discussion
9/1/13	MTIE PM ₁₀	58	<8 $\mu\text{g}/\text{m}^3$	External investigation estimates MTW contributions between 10 and 20% of measured levels on the day. Upwind monitoring locations (data sourced from the Upper Hunter Air Quality Monitoring network) indicate elevated regional PM ₁₀ levels on the day.
	MTO PM ₁₀	67	13.0 $\mu\text{g}/\text{m}^3$	
	Warkworth	58	<5.7 $\mu\text{g}/\text{m}^3$	
31/8/13	Loders Creek	74	-	It is likely that MTW contributed to measured levels during the first half of the day, however localised farming activity was responsible for elevated levels in the afternoon. Overall, the contribution of the MTW mine to the 24hr average is likely to be relatively small, but cannot be accurately estimated due to the variability of the winds and the presence of a localised source. The dominant source contributing to levels at the Loders Creek HVAS is likely to be a localised source.
24/9/13	Loders Creek	73	49.7	During the first half of the day, the MTW mine is likely to have contributed to the dust levels recorded. Between 11am and 4pm, the monitor was affected by a regional dust storm, and MTW would not have contributed any significant dust to the measured levels (instead MTW shut down dragline and digger operations and took extensive mitigation actions). MTW's maximum contribution has been conservatively calculated and may include more than dust from the mine alone.
6/10/13	Loders Creek	57	-	MTW could not have been the major contributor to elevated levels as monitoring data from the closer, MTIE TEOM monitor recorded a result of 41.5 $\mu\text{g}/\text{m}^3$ on the day.
24/10/13	Loders Creek	73	<39.7 $\mu\text{g}/\text{m}^3$	Given the wind direction on 24 October, and the significant influences of bushfire smoke, it is unlikely that MTW could have significantly affected the levels at MTIE and Loders Creek during these periods.
23/12/13	Warkworth	63	9.8 $\mu\text{g}/\text{m}^3$	External investigation estimates MTW contributions between 15 and 20% of measured levels on the day. Upwind monitoring locations (data sourced from the Upper Hunter Air Quality Monitoring network) indicate elevated regional PM ₁₀ levels on
	Loders Creek	51	18.4 $\mu\text{g}/\text{m}^3$	

Date	Site	Result ($\mu\text{g}/\text{m}^3$ (PM_{10} 24 hour))	Estimated contribution from MTW ($\mu\text{g}/\text{m}^3$)	Discussion
				the day.

3.4.3.7 Long term PM_{10} impact assessment criteria

Annual average PM_{10} concentrations recorded at the four monitoring locations in 2013, compared with the long term PM_{10} impact assessment criterion and previous years' data, are shown on Figure 44. During 2013 all annual average PM_{10} concentrations recorded on privately owned land were compliant with the assessment criterion. The annual average PM_{10} concentrations recorded in 2013 are generally consistent with those recorded during previous years, though a slight increase ($2.2\mu\text{g}/\text{m}^3$) was recorded at the Warkworth monitoring location. As with TSP, the primary difference in monitoring results between 2012 and 2013 was seen during February, where the monthly average PM_{10} increased from $13.0\mu\text{g}/\text{m}^3$ in 2012 to $20.0\mu\text{g}/\text{m}^3$ in 2013. Analysis of rainfall data during this period identifies more rain during 2013 (173.2mm compared to 134.0mm in 2012), however the timing of the PM_{10} monitoring events compared to the timing of rainfall events explains the variation. During 2012, $>1.0\text{mm}$ of rain fell on the designated sampling day during 3 of the 5 monitoring events, while a fourth monitoring event occurred on the day following another significant fall. Analysis of the 2013 rainfall data however identifies that three of the five PM_{10} monitoring events in February occurred on days of zero rainfall, and followed prolonged periods (>3 days) without rain.

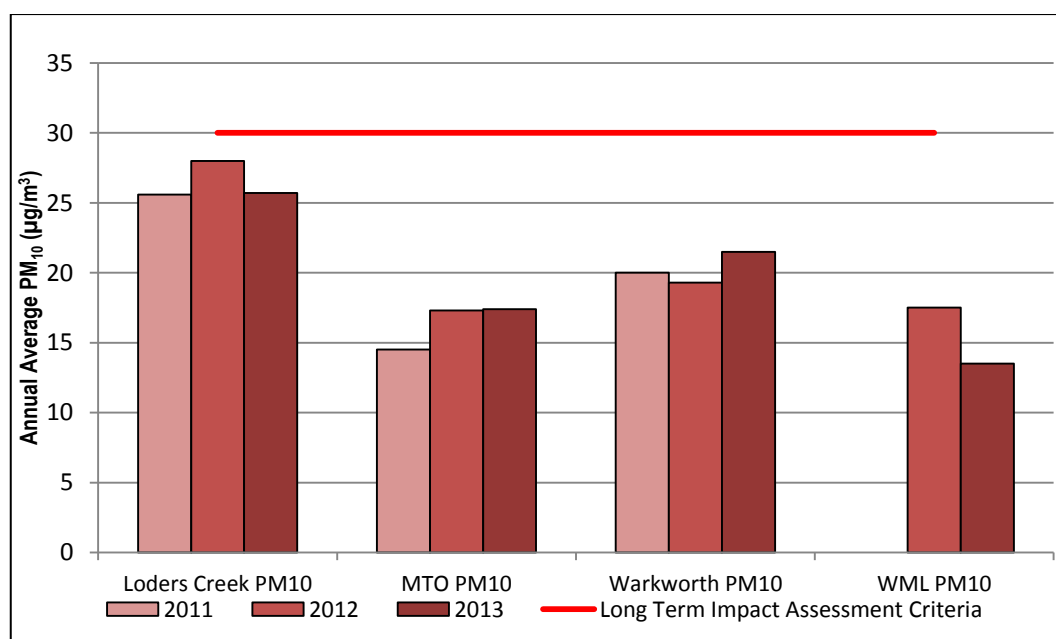


Figure 44: Annual average HVAS PM_{10} results 2011 to 2013

3.4.3.8 Comparison of 2013 Air Quality data against EA predictions

Table 26 and 27 show a comparison between 2013 air quality data and the predictions made in the 2002 Warkworth Environmental Impact Statement (EIS). Comparisons have been made against the predictions listed in the EIS for the Year 10 (2012) and Year 15 (2017) the nearest private residence to each monitoring location.

Particulate matter (PM₁₀) annual averages for 2013 were below Year 10 and Year 15 predictions with the exception of Warkworth which recorded a slightly higher annual average for both years and Loders Creek which recorded a higher than predicted value for Year 17 predictions. Taking into account regional events and source local to these monitoring locations, annual averages calculated with amended results return annual averages much closer to predicted levels. The measured results contain particulate matter contributions from a range of sources including neighbouring mines, and other non-mining sources such as agriculture and road traffic. Also of note, the model does not account for unpredictable events such as bushfires, which were witnessed in the Hunter Valley and surrounds during Quarters 3 and 4 2013, and would have impacted significantly on short term (24hr) PM₁₀ results.

TSP annual averages at all monitoring locations were higher than modelled predictions for both Year 10 and Year 15 scenarios, but generally consistent with years' previous. 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, bushfires, stock movement, dust from local roads and driveways and agricultural activity.

Table 26: 2013 PM10 Annual Average results compared against Cumulative Predictions for 2012 and 2017 Warkworth EIS (2002).

Site (EA receptor)	Long Term (annual average) PM10 criteria		
	Year 10 (µg/m ³)	Year 15 (µg/m ³)	2013 Annual Average (µg/m ³)
MTO PM10	20-30	20-30	17.4
Loders Creek PM10	20-30	15-20	25.7
WML PM10	10-20	15-20	13.5
Warkworth	10-20	15-20	21.5

Table 27: 2013 TSP Annual Average results compared against Cumulative Predictions for 2012 and 2017 Warkworth EIS (2002).

Site (EA receptor)	Long Term (annual average) TSP criteria		
	Year 10 (µg/m ³)	Year 15 (µg/m ³)	2013 Annual Average (µg/m ³)
MTO TSP1	30-50	30-50	56.1
Loders Creek TSP	20-30	20-30	70.6
WML- HV2a	20-30	20-30	41.9
Warkworth	20-30	20-30	55.7

3.4.3.9 Air Quality Non-Compliances during reporting period

MTW complied with all air quality compliance obligations in 2013.

3.4.3.10 Complaints

During 2013 MTW received 48 dust complaints compared to 57 in 2012. The majority of dust complaints originated from the Bulga area, with a smaller number received from Long Point and Mount Thorley Industrial Estate.

3.4.3.11 Further Improvements

Improvements in 2014 will continue focus on proactive measures such as implementation of **predictive forecasting tools and activities associated with the EPA's dust pollution reduction** programme. MTW will be preparing and submitting an updated Air Quality and Greenhouse Gas Management Plan as required by the recent Modification to the Warkworth Approval (Modification 6). The updated plan will detail all the management and mitigation measures which will be employed to ensure best practice air quality management is maintained.

3.5 Greenhouse Gas and Energy Management

3.5.1 Climate Change

A key sustainable development issue for RTCA is climate change and focus has been given to ensure this issue is considered in business decisions. During 2013, MTW continued to improve business systems to ensure continued compliance with Australian Government legislation. Work progressed on the second five-year cycle required under the *Energy Efficiency Opportunities Act 2006* (EEO), and continued to report under the *National Greenhouse and Energy Reporting Act 2007* (NGER). This reporting provides the data used for the carbon pricing mechanism introduced in July 2012 under the *Clean Energy Act 2011(CEA)*, under which MTW is a covered facility.

Under NGER, Rio Tinto is required to report its annual greenhouse gas emissions, energy use and energy production. In 2013, MTW implemented a new industry methodology to more accurately estimate its fugitive coal seam gas emissions from coal extraction. MTW purchased and surrendered the required number of carbon units as required under the CEA.

In accordance with EEO, MTW is required by the Rio Tinto Group to assess its energy usage, identify and evaluate improvement opportunities, and publicly report on the assessments undertaken. EEO aims to improve the identification and evaluation of energy efficiency **opportunities and is an important part of RTCA's approach to reducing greenhouse gas emissions through energy efficiency**. Assessments undertaken in 2013 identified various opportunities relating to reducing fuel use by haul trucks, earthmoving equipment and light vehicles.

RTCA continues to invest in research and development initiatives (Table 28), to find ways to reduce greenhouse gas emissions throughout the coal chain, with focus on;

- Research to identify new technologies;
- Technology upgrades to improve the way coal is burned; and
- Supporting a policy environment to enable the deployment of low emissions coal technologies.

Table 28: Product Stewardship programs

Programme	Outcomes
COAL21	<p>Australian black coal producers contribute a voluntary levy to the Coal21 Fund to support the development of low emission coal technology in Australia.</p> <p>Rio Tinto Coal Australia committed \$2.3 million in 2013 and has committed \$54.75 million to this fund since 2007.</p>
Australian Coal Association Research Programme (ACARP)	<p>Australian black coal producers contribute five cents per tonne of product coal to fund research and the development of technologies that lead to the safe, sustainable production and utilisation of coal. During 2013 this contribution was around \$2.7 million.</p> <p>ACARP is currently coordinating work to develop improved methods for estimating fugitive emissions from underground coal mining. There is also considerable research activity on the reduction of dust emissions from coal during transport to and storage at the major export terminals in Australia and to understand opportunities to reduce fugitive greenhouse gas emissions from mines.</p>
The Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC)	<p>Rio Tinto Coal Australia is represented on the board of the CO2CRC, which conducts research and development into carbon capture and storage technologies. It operates the Otway Project in Victoria, Australia's first demonstration of the deep geological storage, or geosequestration, of carbon dioxide. The project has successfully demonstrated the injection and storage of 65,000 tonnes of carbon dioxide.</p> <p>In addition to its \$250,000 annual membership contribution, Rio Tinto Coal Australia is providing the CO2CRC with \$6 million in funding over 3 years. The funding supports operations at the Otway Project and the Peter Cook Centre for CCS Research at the University of Melbourne.</p>
Global Carbon Capture and Storage Institute (GCCSI)	<p>The mission of the GCCSI is to accelerate the global adoption of CCS. Rio Tinto is a foundation member of the GCCSI.</p>
Australian National Carbon Capture and Storage Council (NCCSC); Australian National Low Emission Coal Research and Development Ltd (ANLECRD).	<p>NCCSC developed the National Low Emission Coal Strategy for the Australian Government. ANLECRD delivers a research program to support low emission coal technology development. Rio Tinto is represented on the NCCSC and the board of ANLECRD.</p>

Coal Industry Advisory Board (CIAB) to the International Energy Agency (IEA)	The CIAB advises the IEA on issues related to coal including opportunities to reduce emissions from the use of coal. The CEO of Rio Tinto Energy is a member of the CIAB and Rio Tinto Energy actively contributes to the work of the CIAB.
Energy Exchange Series	Rio Tinto Energy, the University of Queensland and the Energy Policy Institute of Australia ran a series of three breakfasts (the Energy Exchange Series) during 2013. Each Breakfast featured an internationally recognised speaker on an issue relevant to energy and was attended by up to 300 people. The purpose of the series is to make the highest quality information on the global energy issues available to the Australian debate. The breakfasts raised \$6000 which was donated to the Queensland Institute of Medical Research to support cancer research.

3.5.2 Greenhouse Gas and Energy Use Performance

During 2013, MTW obtained energy from two main sources: (1) electricity supplied through the state electricity grid, and (2) diesel and other fuels. The total energy use for MTW is displayed in Table 29 and the total GHG emissions for MTW including fugitive coal seam gas emissions, and land management emissions are displayed in Table 30. Data includes Mount Thorley Operations, Warkworth Mining Limited and Mount Thorley Coal Loader.

Table 29: Energy Consumption

Mount Thorley Warkworth Energy Consumption	2010	2011	2012	2013
Electricity (GJ)	574,339	574,082	655,856	681,203
Diesel and other fuels (GJ)	3,169,733	3,444,792	4,625,440	4,722,010
Total Site (GJ)	3,744,073	4,018,874	5,281,296	5,403,213

Table 30: Greenhouse Gas Emissions

Mount Thorley Warkworth Greenhouse Gas Emissions	2010	2011	2012	2013
Electricity (tCO ₂ -e)	142,847	142,707	161,244	165,570
Diesel and other fuels (tCO ₂ -e)	215,477	234,366	317,751	326,934
Coal Seam Gas (tCO ₂ -e)	576,325	615,510	452,560	213,524
Land Management (tCO ₂ -e)	21,920	12,090	8,230	1,210

Total Site (tCO ₂ -e)	956,569	1,004,673	939,785	707,239
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During 2013 there were no methane drainage/ventilation occurrences at MTW

3.5.3 Non-Compliances During the Reporting Period

There were no non-compliances or complaints relating to greenhouse gas or energy usage in 2013.

3.5.4 Further Improvements

The principles of the software, Fuel Economy Optimised Engine Calibration, were successfully trialled in more than 130 Komatsu 830E trucks across Rio Tinto Coal Australia sites in 2013, including MTW. The software alters the way diesel is introduced to the engine so fuel is burnt at a higher combustion temperature and is used more efficiently.

There are a number of fuel saving initiatives scheduled for 2014 which aim to further increase the fuel efficiency of and reduce the greenhouse gas emissions from MTW's equipment and vehicle fleet.

3.6 Water Balance

3.6.1 Water Usage Management

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

- Preferential re-use of poor quality mine water over clean water;
- Minimise the use of fresh water; and
- Protect clean water systems.

This is achieved by:

- Preferentially using mine water for coal preparation and dust suppression;
- 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
- Disposing of water to the environment in accordance with statutory requirements.

The water management system, water use operating strategies and operational controls for surface and groundwater management are described in the MTW Water Management Plan.

The MTW Water Management Plan is available on Rio Tinto Coal Australia's website.

Improvements to water management in 2013 have focused on future water supply security, seeking to supplement abstraction from the Hunter River by sourcing water from neighbouring mines during peak demand periods. This includes:

- Securing of a mine water transfer agreement with Glencore Bulga Coal mine, to supply surplus mine water to MTW where available; and
- Securing a groundwater licence and commissioning the Lemington Underground Void (LUG) Bore, to draw mine water from the old Lemington Underground mine workings.

3.6.2 Performance

3.6.2.1 2013 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 2013 static water balance for MTW is presented in Table 31 and a simplified schematic of this balance is included as Figure 45. A salt flux schematic is shown in Figure 46. Ongoing water balance modelling will be undertaken to enable the identification of water sharing efficiencies at MTW and HVO.

Table 31: Static Model Results – 2013 Annual Water Balance

Water Stream	Volume (ML) (% Total)
Inputs	
Rainfall Runoff	2,852 (42%)
Hunter River (MTJV supply scheme)	1,854 (27%)
Potable (from Singleton Shire Council potable water supply)	31 (<2%)
Groundwater	79 (<2%)
Recycled to CHPP from tailings (not included in total)	3,603
Imported (Bulga)	65 (<2%)
Imported (HVO, including LUG bore)	580 (9%)
Water from ROM Coal	1,148 (17%)
Diverted water	181 (3%)
Total Inputs	6,790
Outputs	
Dust Suppression	1,950 (32%)
Evaporation – mine water dams	523 (9%)
Entrained in process waste	1,650 (27%)
Discharged (HRSTS)	0
Diverted water	181 (3%)
Water in coarse reject	672 (11%)
Water in product coal	1,031 (17%)
Misc. industrial use (inc. vehicle washdown)	110 (<2%)
Total Outputs	6,117
Change in storage (increased)	670

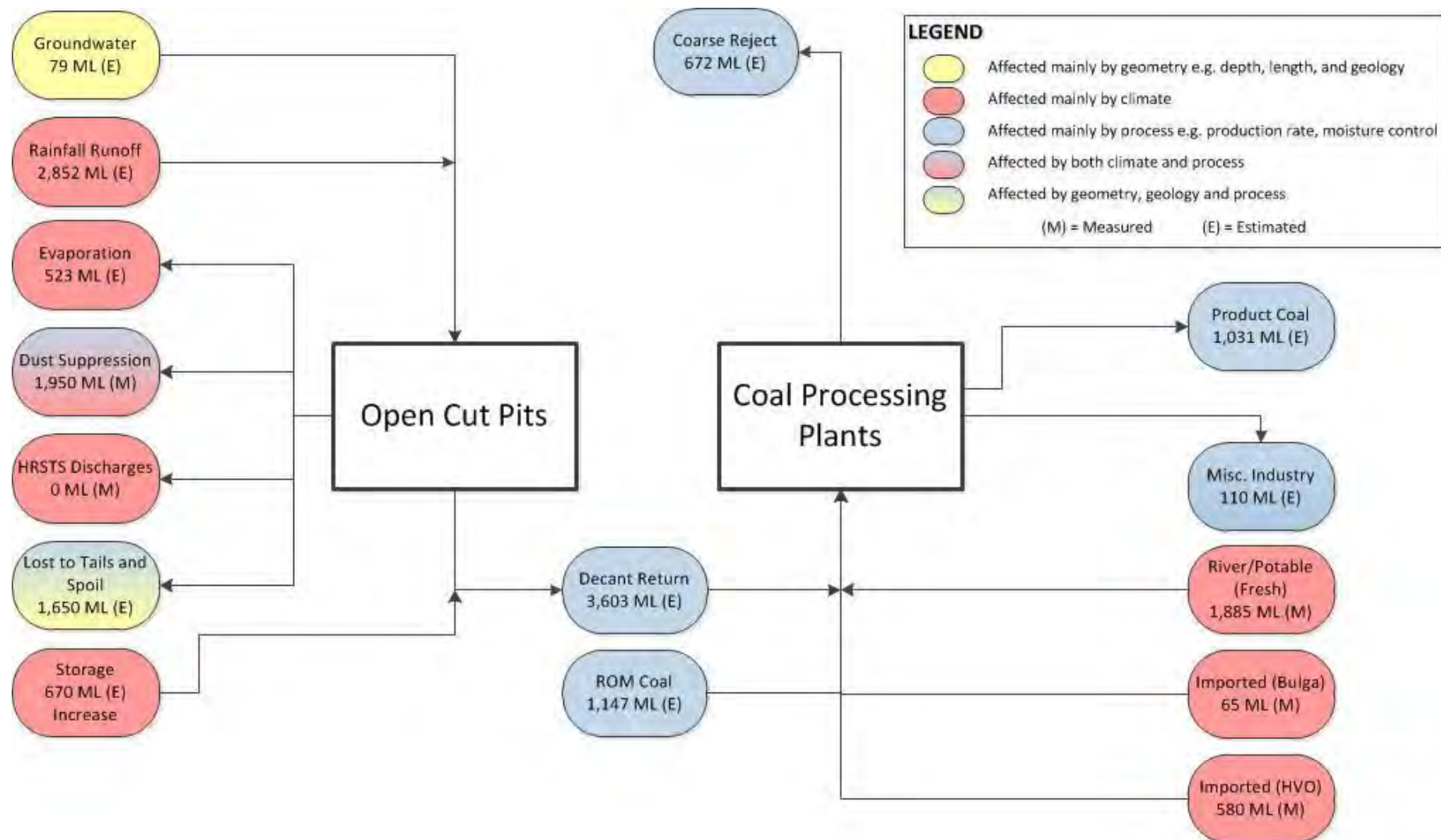


Figure 45: MTW water balance schematic diagram

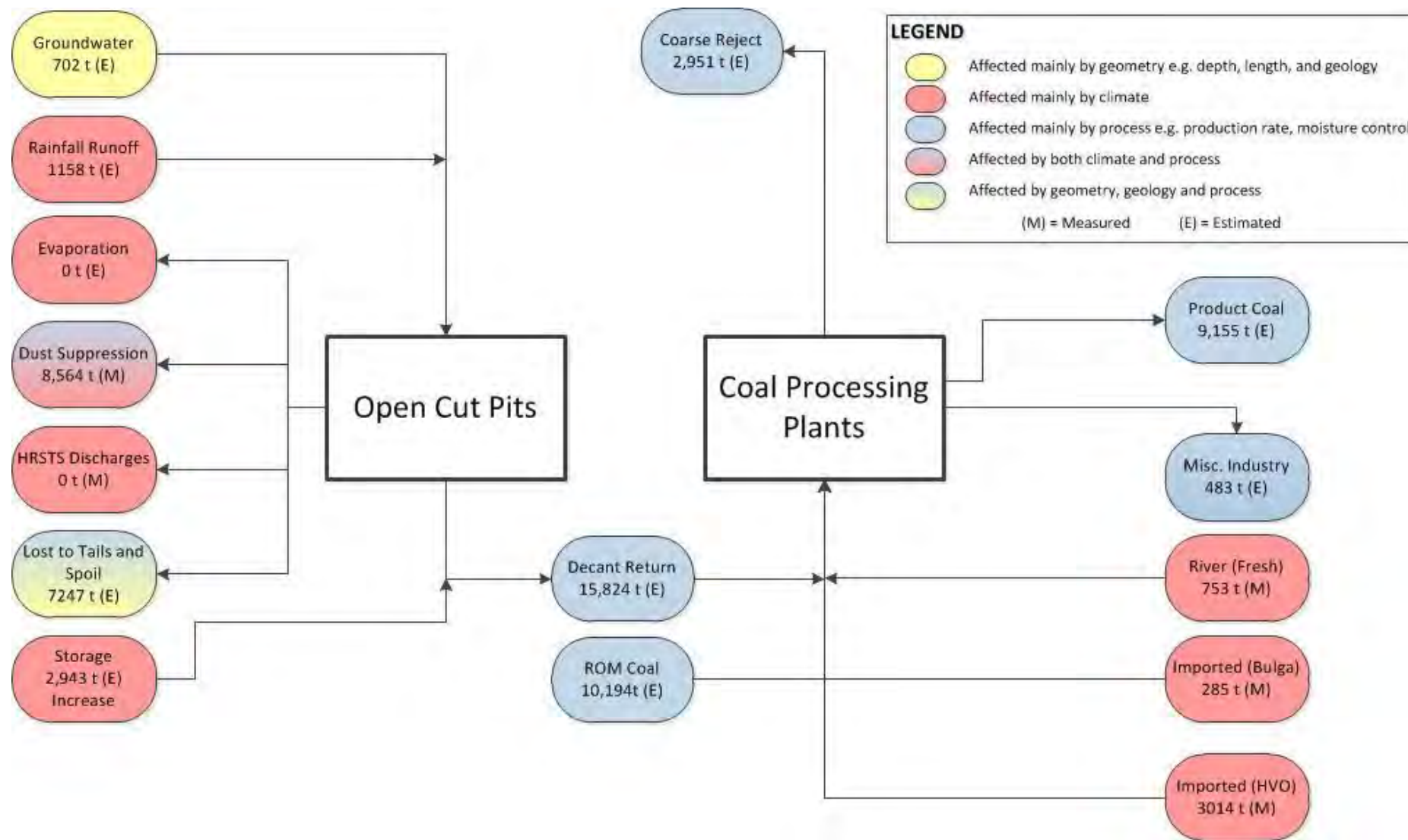


Figure 46: MTW salt balance schematic diagram

3.6.2.2 External Water Supply History

If site water stocks are low or not available, fresh water has historically been sourced 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, **Xstrata'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.**

The usage of Hunter River water in 2012 is 829 ML greater than for 2012. This increase is primarily a result of reduced rainfall runoff due to dry conditions in early and late 2013. In 2013 most of the water from the Hunter River under the MTJV supply scheme was used to meet demands at the WML CHPP.

Abstraction of water from the Hunter River via the MTJV water supply scheme in 2013 and previous years is summarised in Table 32. To supplement river water abstraction MTW also gained access to surplus poorer-quality mine water from neighbouring mines in 2013. A total of 580 ML of mine water was transferred from Hunter Valley Operations to MTW, commencing April 2013. Subsequently, a mine water transfer agreement was finalised with the Glencore Bulga mine in early December, with 65ML transferred to the end of 2013. MTW will continue to work with neighbouring mines in 2014 to preferentially source additional mine water supplies.

Table 32: MTW Supply History from the Mount Thorley Joint Venture Supply Scheme

Year (financial)	Warkworth Usage (ML)	Mount Thorley Usage (ML)	Total (ML)
2010	33	70	103
2011	42	68	161
2012	524	501	1,025
2013	1,226	628	1,854

3.6.2.3 Water Discharges

No water was discharged off site during 2013 via the Hunter River Salinity Trading Scheme (HRSTS).

3.6.2.4 Review of Site Water Balance Against EA Predictions

The site water balance predicted in the 2010 EA (EMGA Mitchell McLennan, 2010) has been compared to the actual site water balance in 2013.

Table 33 provides a summary of comments regarding the comparison. The main divergence from the predicted water balance was the imported water requirement, which was significantly more than predicted, due to a number of factors. From a water use perspective, the predicted use for dust suppression is significantly higher, owing to increased site and regulatory focus on dust management and warm, dry meteorological conditions prevailing for most of 2013. In addition, CHPP consumption is slightly higher than predicted in the EA. Apart from above-average rainfall in the first quarter of 2013, rainfall was well below average in the remaining three quarters, compounded by below average rainfall in 2012, which meant site water storage was already low. This is evidenced by no water being discharged under HRSTS during the reporting period.

Table 33: Comparison of 2010 Predicted and 2013 Actual Water Balance

Prediction	Review comment
"Surface water runoff represents the predominant inflow to the system, accounting for more than 50% of all water inflows".	The rainfall runoff contribution estimated in the water balance indicates that actual was slightly below predicted in 2013. Surface runoff represented 42% of all water inflows in 2013.
"An average imported water requirement of 450ML per year is predicted over the mine life".	The 2013 draw from external supplies was 2,530 ML. The 2013 annual rainfall of 673mm was consistent with average (660mm), although fell mostly in the first half of the year and did not sustain site requirements.
"Storage risk profiles for in-pit storage all demonstrate storage levels less than 500ML for more than 95% of the time. All pits are generally maintained in a dewatered state at least 85% of the time".	Minutes of the fortnightly Water Management Team Meetings indicate that this was the case in 2013.
"Acceptable management of mine water should be achievable without the need for additional salinity credits under the HRSTS".	MTW did not discharge water during 2013.

3.7 Surface Water

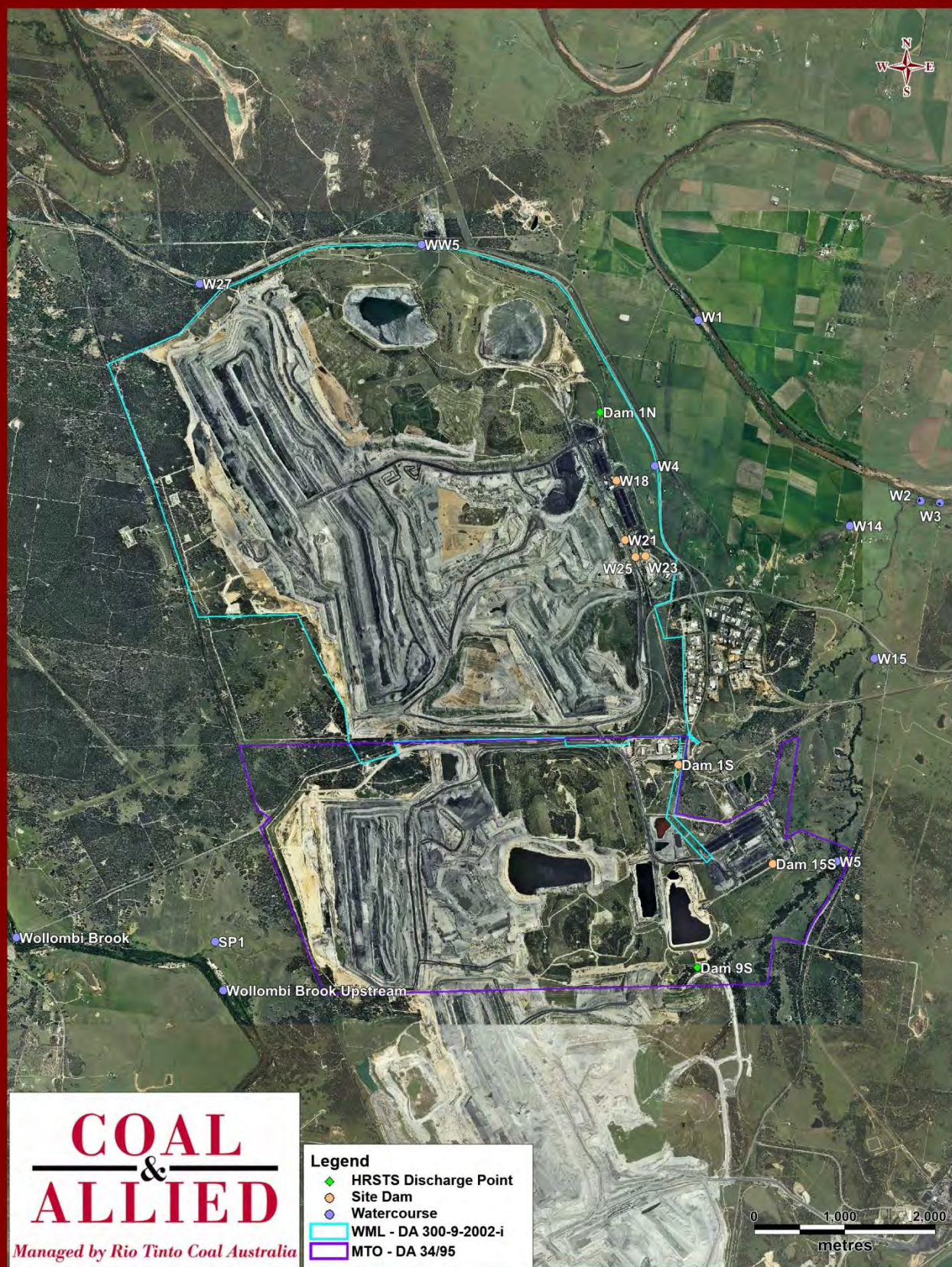
3.7.1 Management

MTW surface water management is detailed in the MTW Water Management Plan, and includes:

- Detailed plans of mine water infrastructure including tailings dams and final voids, as well as rehabilitation of drainage lines in the final landform;
- Erosion and sediment controls; and
- Performance criteria for the water management system, surface water quality, and stream and riparian vegetation health; and.
- Water quality and water flow triggers requiring action.

3.7.1.1 Monitoring and Discharge Locations

The Surface Water Monitoring Program is also described in the MTW Water Management Plan. MTW maintains a network of surface water monitoring sites located at site dams and surrounding natural watercourses (Figure 47). 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. Mine site 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.



RTCA - NSW Environmental Services

Figure 47: MTW Surface Water Monitoring Network – 2013

Routine surface water monitoring was undertaken from 22 key sites. All sampling of surface waters was carried out in accordance with AS/NZS 5667.6 (1998). All 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). Pertinent surface water sites were also sampled for comprehensive analysis annually.

3.7.2 Performance

All required sampling and analysis was undertaken, except for the following:

- Sampling location SP1 was recorded as dry during the January 2013 monitoring event and no sample was collected;
- Sampling location W14 Doctors Creek was recorded as dry during the June 2013 monitoring event and no sample was collected;
- Sample collected from Dam 1S in June 2013 was not analysed for Total Suspended Solids;
- **Sampling location W4 Doctors Creek, W14 Doctors Creek and WW5 Dight's Creek** were recorded as dry during the September monitoring event and no samples were collected; and
- Sampling location W14 Doctors Creek was recorded as dry during the December 2013 monitoring event and no sample was collected;

A summary of all surface water monitoring results for 2013 is provided in Appendix 4.

3.7.2.1 Comparison with Previous Years' Data

Figures 48 to 53, show long term water quality trends for the Hunter River, Wollombi Brook, other surrounding tributaries and site dams.

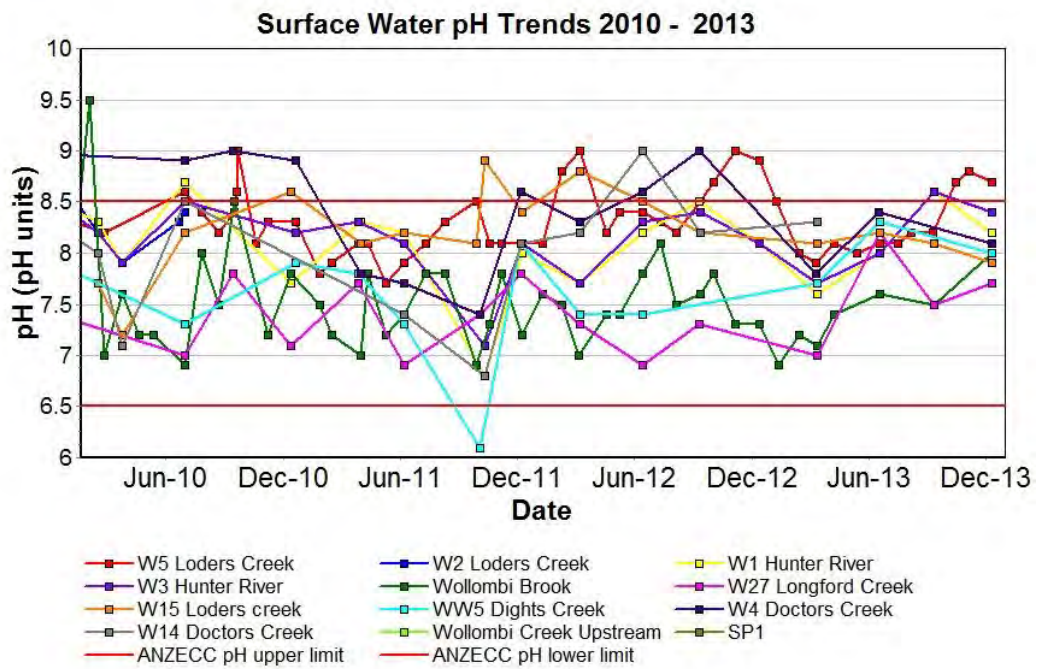


Figure 48: Watercourse pH Trends 2010 to 2013

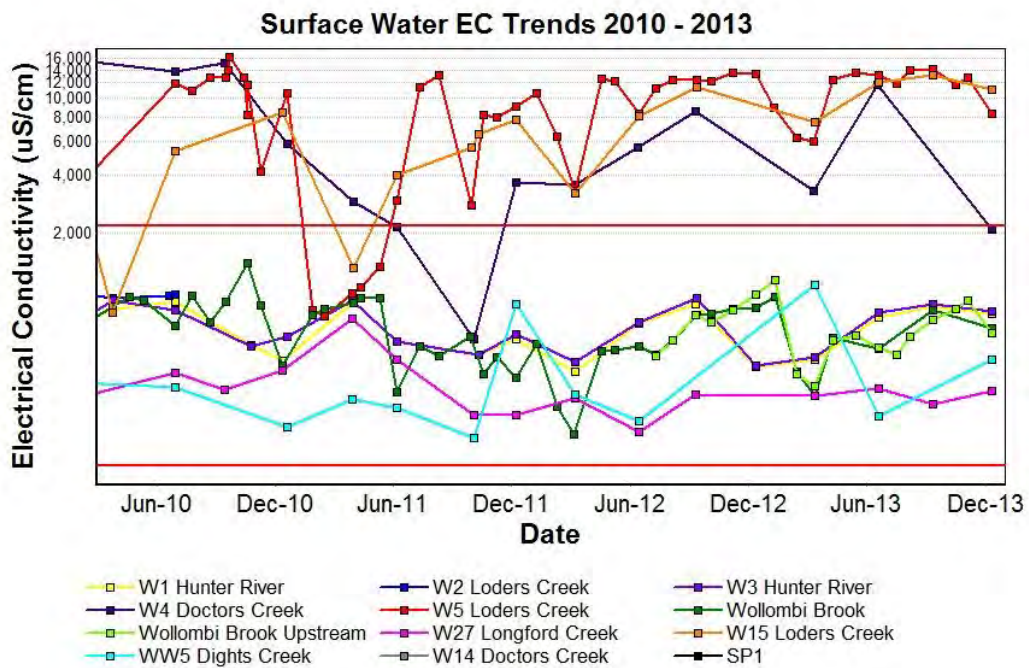


Figure 49: Watercourse EC Trends 2010 to 2013

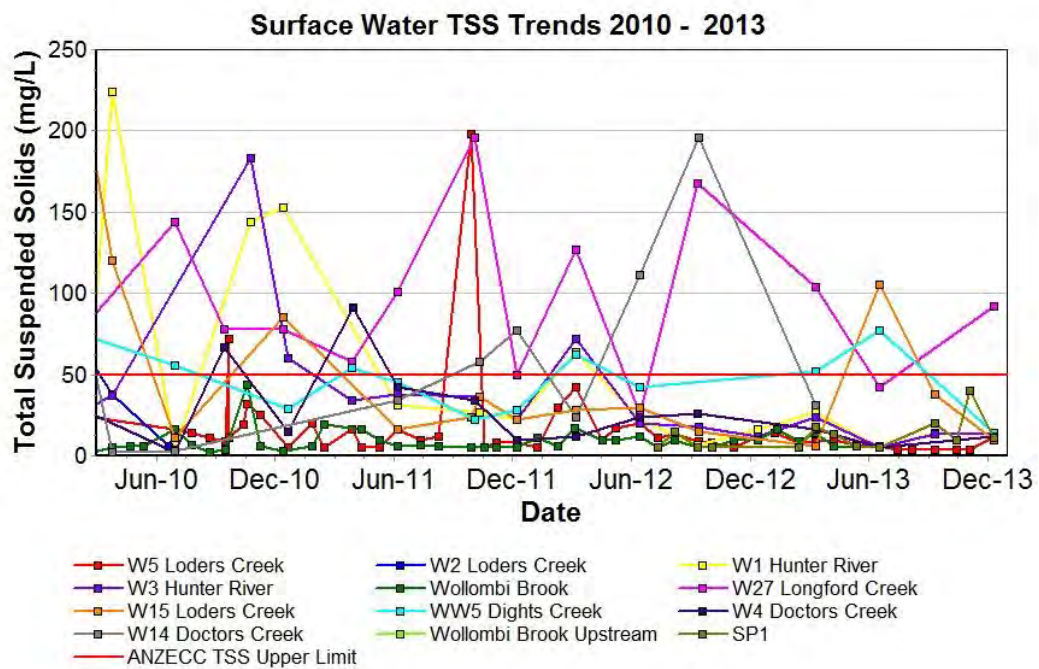


Figure 50: Watercourse TSS trends 2010 to 2013

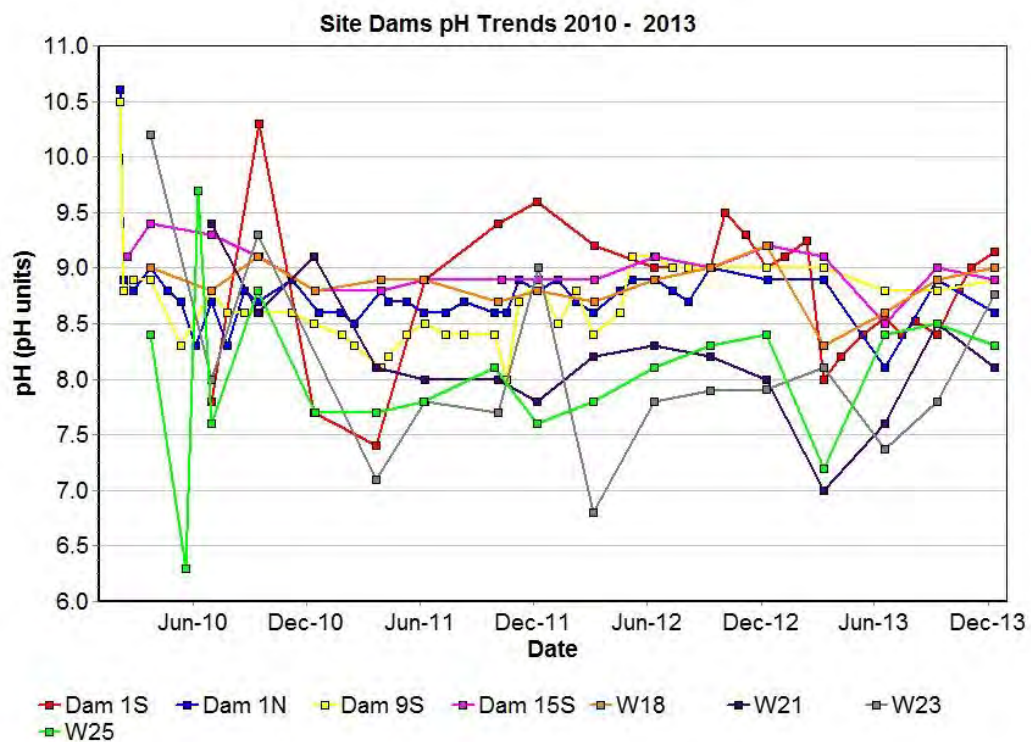


Figure 51: Site Dams pH trends 2010 to 2013

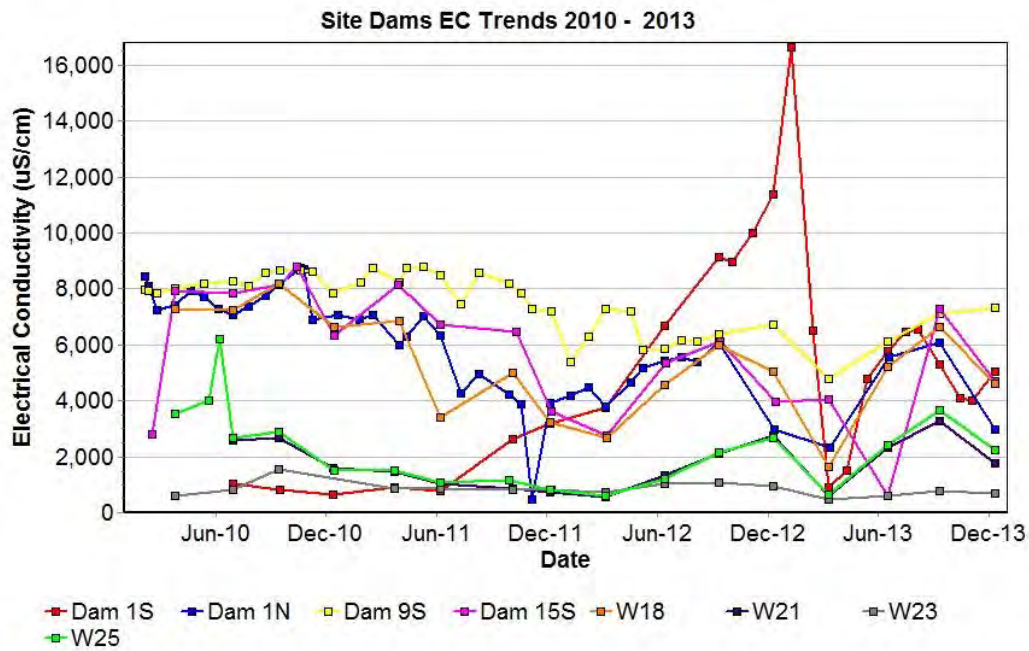


Figure 52: Site Dams EC trends 2010 to 2013

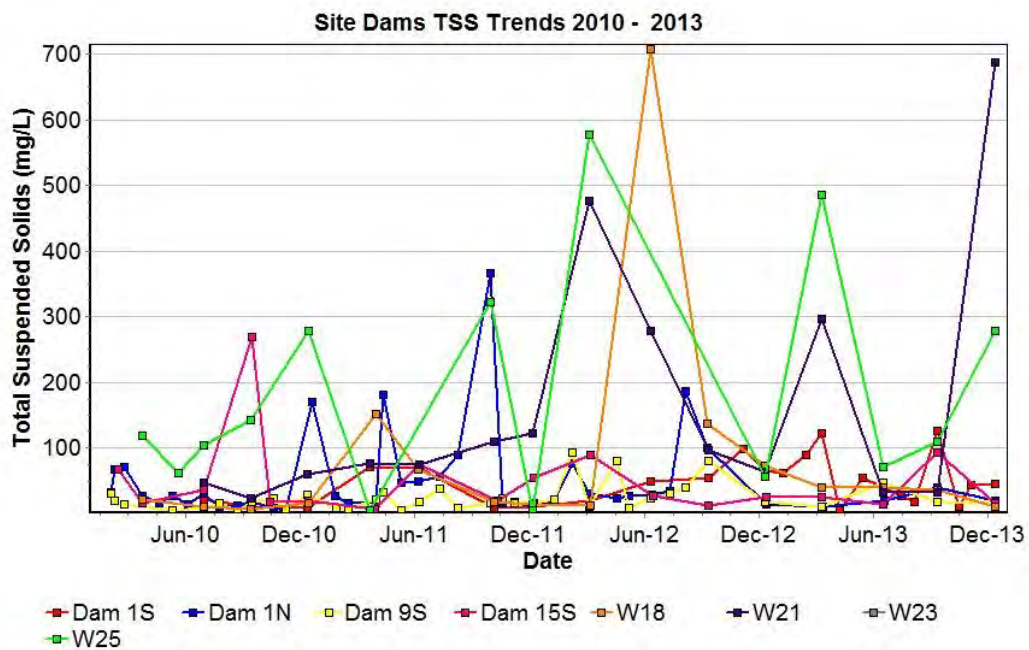


Figure 53: Site Dams TSS trends 2010 to 2013

Measurements of EC and pH were variable during the reporting period, however consistent with 2012 trends. A short term decrease in EC and pH were measured across most monitoring locations in March and December, associated with rainfall recharge events. Water quality for watercourses remained generally within historical trends and acceptable ranges, indicating no adverse impacts on surrounding tributaries during 2013. The ephemeral nature of these monitoring locations is primary reason for the considerable variation field water quality values. Water quality for dams remained generally within historical trends and acceptable ranges.

Surface water monitoring data review involves a comparison of measured pH, EC and TSS results against internal statistical trigger values which have been derived from the historical data set. A two-stage trigger system is in place for assessing variances in water quality data, utilising both 5th and 95th percentile values to highlight data points which are not consistent with historical norms. The response to measured excursions outside the trigger limits is detailed in the MTW Water Management Plan. Where review of monitoring data has identified results outside of the internal statistical water quality triggers, these are described in Table 34.

Table 34: Surface Water Monitoring - Internal Water Quality Trigger Exceedances

Location	Date	Parameter	Trigger limit breached	Action taken in response
W18	8/1/2013	EC	1st Stage Lower EC	No action*
W23	11/3/2013	EC	1st Stage Lower EC	No action*
W25	11/3/2013	EC	1st Stage Lower EC	No action*
WW5	12/3/2013	EC	1st Stage Upper EC	No action*
W18	11/3/2013	pH	1st Stage Lower pH	No action*
W25	11/3/2013	pH	1st Stage Lower pH	No action*
Wollombi Brook	11/1/2013	pH	1st Stage Lower pH	No action*
W21	11/3/2013	TSS	1st Stage Upper TSS	No action*
W25	11/3/2013	TSS	1st Stage Upper TSS	No action*
W5	14/5/2013	EC	1st Stage Upper EC	No action*
W5	18/6/2013	EC	1st Stage Upper EC	No action*
W15	18/6/2013	EC	1st Stage Upper EC	No action*
W27	18/6/2013	pH	1st Stage Upper pH	No action*
WW5	18/6/2013	pH	1st Stage Upper pH	No action*
W5	6/8/2013	EC	1st Stage Upper EC	No action*
W5	10/9/2013	EC	1st Stage Upper EC	No action*
W15	11/9/2013	EC	1st Stage Upper EC	No action*
W21	10/9/2013	EC	1st Stage Upper EC	No action*
W1	11/9/2013	pH	1st Stage Upper pH	No action*
W3	11/9/2013	pH	1st Stage Upper pH	No action*
W15	11/12/13	EC	1st Stage Upper EC	No action*
W5	4/11/13	EC	1st Stage Upper EC	No action*
W18	11/12/13	pH	1st Stage Upper pH	No action*
W3	11/12/13	pH	1st Stage Upper pH	No action*
W5	4/11/13	pH	1st Stage Upper pH	No action*
W25	11/12/13	TSS	1st Stage Upper TSS	No action*

Location	Date	Parameter	Trigger limit breached	Action taken in response
WW5	11/12/13	TSS	1st Stage Lower TSS	No action*
W21	11/12/13	TSS	2nd Stage Upper TSS	No action*; not associated with a rainfall (runoff event). Establish watching brief.

*Note: No Action = 1st / 2nd breach of the internal trigger. No specific action required. Watching brief established, pending outcomes of subsequent monitoring event.

While routine surface water monitoring undertaken in 2013 identified a number of internal statistical trigger breaches there were no reportable non-compliances related to results of routine water quality monitoring.

3.7.3 Non-Compliances and Complaints During Reporting Period

29 January 2013

Water overtopped CC5 tail-end sump and flowed to Doctors Creek

Runoff waters from the catchment reporting to CC5 tail-end sump overtopped a section of the sump and flowed to Doctors Creek located adjacent to the sump. A short duration high intensity period of rainfall during the later stages of a 48 hour rainfall event generated catchment runoff which overwhelmed the capacity of the sump and the associated pumping system. The overtopping was identified after occurrence when evidence of the overtopping was observed during an inspection (high water debris).

Mitigation actions did not occur as the overtopping event was not identified until approximately 12 hours after occurrence. Characterisation sampling of sump water was not undertaken as remnant water in the sump had been pumped out prior to identification of the overtopping.

No adverse effects were identified due to the trivial nature of the incident.

The event was notified to the Team Leader Compliance (Mining), Department of Planning and Infrastructure in accordance with the MTW Water Management Plan (2012). The area was subsequently inspected by the Team Leader Compliance (Mining) on Friday 8 February 2013. **The Team Leader Compliance concurred with MTW's assessment of the incident and did not request an incident report be provided due to its trivial nature.**

Water overtopped MTCL basin and flowed offsite

Approximately 106mm of rain fell on the site between 27 January 2013 and 29 January 2013 including approximately 31mm from midnight until 08:00 on the morning of 29 January. Water was observed overtopping a roadside basin (the East Basin) at approximately 06:30 on the morning of 29 January however was observed not be spilling at 06:15 and 07:30 respectively. It is estimated that not more than 0.07ML of water overtopped the basin over a period of not more than 75 minutes.

The catchment reporting to the East Basin was primarily clean water catchment with a minority of the total catchment area comprised of a disused coal stockpile pad which is

currently used for stockpiling mixed waste compost. A sediment sump sized according to the Blue Book (5 day, 90th percentile event) was sited to protect the compost stockpile area. The sediment sump reported to a sediment dam which subsequently spilled to the wider clean catchment.

The rainfall event exceeded the design capacity (42.8mm) of the sized sediment sump on the compost stockpile and the additional available buffer capacity (~0.75ML) of the downstream sediment dam. Water spilling from the sediment dam mixed with clean water runoff from the remainder of the catchment and, in due course, reported to the East Basin at the base of catchment.

Water spilled from the East Basin when the pump located on the basin experienced an electrical trip and ceased to work for a period. If the pump had not malfunctioned it is unlikely that any waters would have spilled. The cause of the electrical trip was not identified.

Analysis of waters sampled from the catchment and tributary on 29 January 2013 indicated that the stockpiled compost material did not impact tributary water quality and that electrical conductivity measurements in the tributary were consistent with historical concentrations. Material harm to the environment did not occur.

The following actions were taken with respect to the event:

- The MTCL water pumping system has been added to the operational monitoring in a site control room and fault alarms have been assigned to the pump.
- Review of the catchment water management has been undertaken.
- Improvements to the operating protocol for the compost stockpile sediment sump and the sediment dam have been implemented, including installation of upgraded dewatering infrastructure to the sediment dam. Subsequently Rehabilitation of the disused coal stock pad was completed in late 2013.

23 February 2013

Water overtopped CC5 tail-end sump and flowed to Doctors Creek

At approximately 14:00 on 23rd February 2013 water was observed overflowing from a collection sump (CC5 tail-end sump) into Doctors Creek. At approximately 14:30 mine water Dam 31N which reports to CC5 Tail-end Sump commenced spilling with these waters also flowing to the sump and subsequently to Doctors Creek. Water ceased flowing from the sump at approximately 10:00 on 24th February 2013 with the volume of water which may have flowed from the sump estimated to be 8.5ML.

Water spilled from the CC5 Tail-End Sump to Doctors Creek due to rainfall intensity in the sump catchment exceeding the sump pump-out rate. Water spilled from Dam 31N due to failure of the dam dewatering pump (Pump PP502) at approximately 13:55. The cause of the failing during the storm was not identified at the time or subsequently. Attempts were made to restart Pump PP502 following identification of the failure however the pump failed to run. If pump PP502 had not malfunctioned it is possible that waters may not have spilled from Dam 31N during the period of heavy rain and probable that any spill duration would have been limited.

Water quality sampling events were undertaken on catchment and tributary waters to characterise potential impact upon receiving waters. Sampling did not indicate evidence of impact upon the environment by the overtopping waters. The incident was reported to the DP&I and EPA on the day of the incident, with written reports subsequently submitted.

The following actions were taken following the repeat event:

- A temporary pump was installed onto Dam 31N and prioritised maintenance occurred to repair Pump PP502.
- Pump PP502 was reinstated following repair.
- Operating protocols for PP502 and dam and sump areas have been reviewed. Level control alarms have been revised and located to critical circuit monitoring pages.
- The CC5 tailend sump catchment was modified to reduce the area of the small catchment by diverting waters into Dam 31N via a concrete drainage channel.

Water overtopped MTCL basin and flowed offsite

Approximately 95mm of rain fell on the site over a 24 hour period on 23 February 2013 (midnight to midnight), including up to 80mm between 11:00 and 19:00 in association with periods of brief high intensity rainfall up to 64mm/hour.

Water was observed overtopping a roadside basin (the East Basin) at approximately 16:00 on 23 February with subsequent periodic observations of flow from the basin until approximately 07:30 on 24 February. The basin was not overtopping when inspected at 14:00 on 23 February indicating that water may have flowed from the basin for up to 17.5 hours. The volume of water which flowed from the basin is not known.

The catchment reporting to the East Basin was primarily clean water catchment with a minority of the total catchment area comprised of a disused coal stockpile pad which is currently used for stockpiling mixed waste compost. A sediment sump sized according to the Blue Book (5 day, 90th percentile event) was sited to protect the compost stockpile area. The sediment sump reported to a sediment dam which subsequently spilled to the wider clean catchment.

The rainfall event exceeded the design capacity (42.8mm) of the sized sediment sump on the compost stockpile and the additional available buffer capacity (~1.1ML) of the downstream sediment dam. Water spilling from the sediment dam mixed with clean water runoff from the remainder of the catchment and, in due course, reported to the East Basin at the base of catchment.

The pump located on the East Basin experienced an electrical trip and ceased to work for a period prior to 14:00 on 23 February. After the pump was restarted waters reporting to the basin exceeded the dewatering rate of the pump and water subsequently overtopped the basin. Water continued to overtop the basin in association with the high intensity rainfall during the afternoon with continuous pumping occurring until at least 19:30. The pump re-tripped at some time after 19:00 and was restarted at 07:00 on 24 February.

Analysis of waters sampled from the catchment and tributary on 23 February 2013 indicated that the stockpiled compost material did not impact tributary or downstream receiving water quality and that electrical conductivity concentrations in the tributary were below historical

trends and consistent with runoff from a clean catchment (less than 400µs/cm). Harm to the environment was trivial, if having occurred at all.

The following actions were taken following the repeat event:

- Water sampling and active ongoing monitoring was undertaken to characterise potential impact upon receiving waters.
- The MTCL water pumping system has been added to the operational monitoring in a site control room and fault alarms have been assigned to the pump.
- Review of the catchment water management has been undertaken. Modifications to the catchment to divert waters from the relict stockpile / compost area to an industrial catchment have been commissioned.
- Improvements to the operating protocol for the compost stockpile sediment sump and the sediment dam have been implemented, including installation of upgraded dewatering infrastructure to the sediment dam.

Water overtopped Dam 1S and flowed to an unnamed tributary of Loders Creek

On 23 February 2013 a 24 hour rain event of approximately 96mm was received, including approximately 70mm from midday to 18:00 (80mm between 11:00 and 19:00). In association with the event the water level in Dam 1S rose rapidly during the evening of 23 February and overtopped between 19:00 and 19:45. Water ceased overtopping the dam between 14:00 and 16:30 on 24 February. It is estimated that up to 7.4ML of water flowed from site during the overtopping event.

The Dam 1S level rose rapidly due to a significant volume of water reporting to Dam 1S from Dam 2S located immediately upstream, and from other upper catchment areas which report to Dam 2S. Catchment for Dam 2S comprises infrastructure areas and a section of mine haul road at the mine entrance and areas of clean catchment from sealed carparks and landscaped surrounds. Dam 1S is a turkeys nest sediment dam without catchment.

In preparation for the predicted rain event Dam 1S was drawn down over the preceding week. Inspection at approximately 16:30 on 23 February validated standing water at approximately 20% of MOL. Water quality sampling was undertaken on Dam 1S and receiving waters on 24 February. Sampling indicated no material impact upon receiving waters in Loders Creek.

A review of drainage in the area was undertaken. Subsequent works included the clean out of drains and culvert upgrade near the MTO workshop and desilting of Dam 2S to gain additional buffer storage capacity.

3 December 2013

Minewater Dam 21N overtopped

On 3 December 2013 at approximately 09:00 the water level in Dam 21N was observed to be elevated. A further inspection found a low flow of water was occurring through the gabion spillway to the Doctors Creek stream diversion which runs through the premises. Works were initiated to block and recover any spilled water to prevent it leaving the premises. Dam 21N was pumped down and the spilling of water ceased. The event was reported to the EPA and DP&I, with no formal reporting required.

The following actions were taken following the event:

- Commissioned a catchment review study to confirm operating and spillway levels
- Establishment of level markers following catchment review to ensure the level in the dam is managed appropriately
- Commissioned a review of maintenance protocols for high risk dams on site

3.7.4 Performance relating to HRSTS Discharges

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 2012/13 financial year. No HRSTS discharges were completed during the 2012/13 reporting year or in the second half of 2013.

3.7.5 Complaints

No complaints were received in regards to water during 2013.

3.7.6 Audits and Reviews

No independent audits were undertaken at MTW in 2013.

3.7.7 Further Improvements

Automation of the Dam 9S HRSTS discharge point infrastructure is being undertaken, to improve compliance against licence criteria. Upgrades to the infrastructure will allow licensed discharges to automatically cease should water quality criteria approach licensed limits for total salt discharged, pH and TSS. This upgrade is expected to be completed in early 2014.

3.8 Groundwater

3.8.1 Management

Groundwater monitoring activities continued throughout 2013, 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. On a periodic basis (nominally once per annum), a comprehensive suite of analytes are measured, including major anions, cations and metals. Prior to sampling for comprehensive analysis, bore purging is undertaken using either high flow or low flow purging techniques.

The monitoring locations are shown in Figure 54.

Mount Thorley Warkworth Groundwater Monitoring Locations

Date: 140220

Plan By: DS

Version: 1.0



Figure 54: Groundwater Monitoring Network at MTW in 2013

3.8.2 Performance - MTW Bores

Sampling of ground waters was carried out on 139 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:

- Bores OH1122 (2), OH1125 (2), OH944, WOH2141A were recorded as containing insufficient water for sampling during all monitoring events;
- Bore OH943 was recorded as containing insufficient water for sampling during the June 2013 monitoring event.

A summary of the monitoring results for MTW Groundwater Sites is provided in Appendix 5.

3.8.2.1 Comparison With Previous Years' Performance

Figure 55 to 60 summarise long term groundwater quality trends for pH, EC and standing water level adjacent to the mine and in the Green Offset areas respectively.

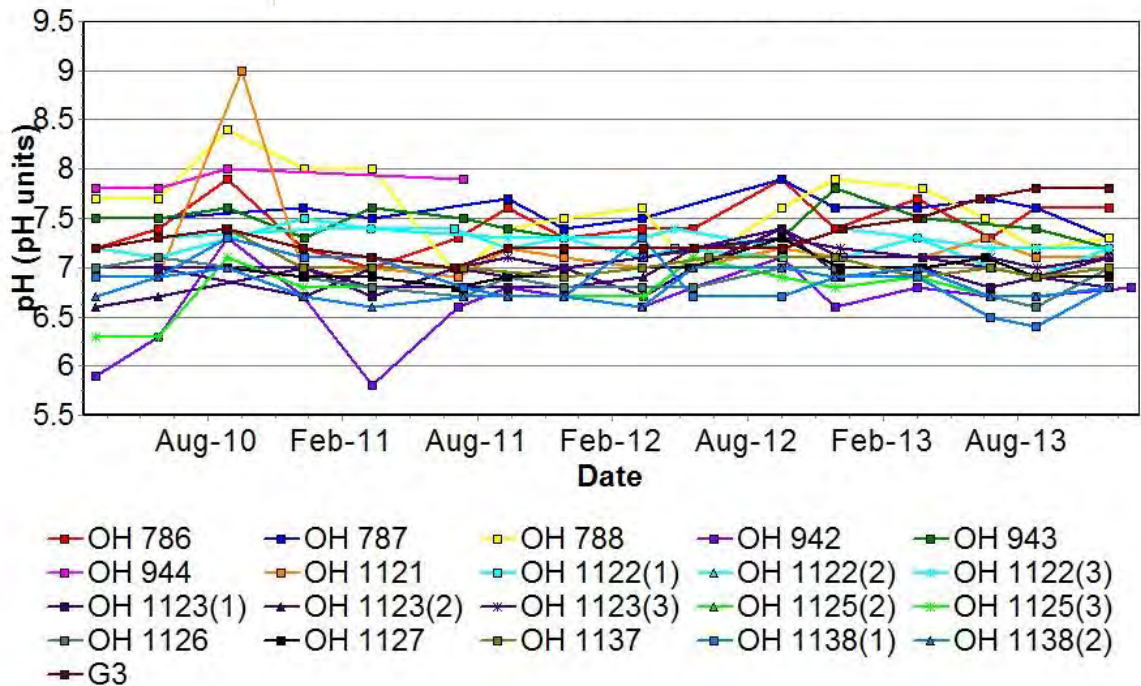


Figure 55: MTW groundwater pH trends 2010 to 2013

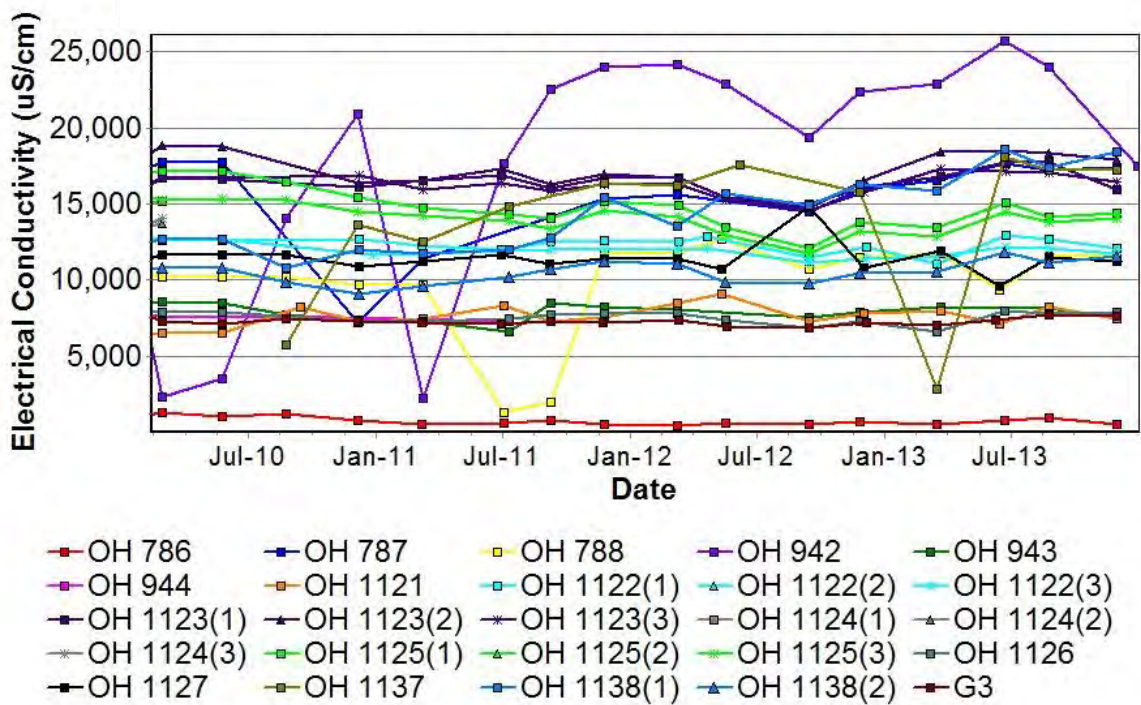


Figure 56: MTW groundwater EC trends 2010 to 2013

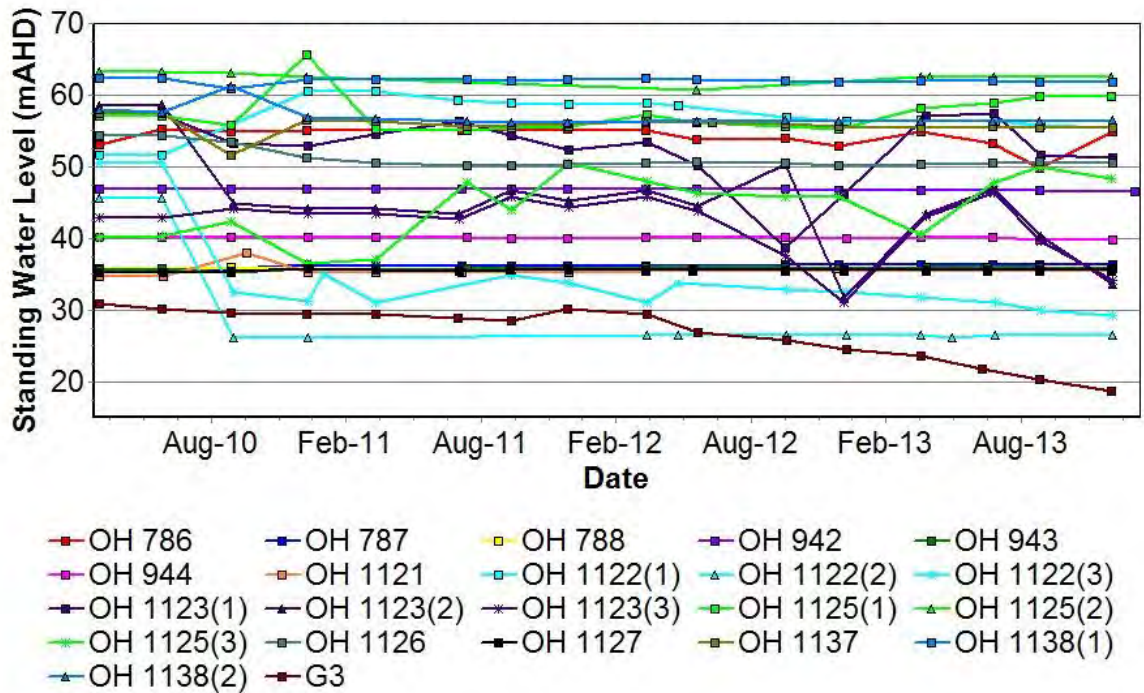


Figure 57: MTW groundwater SWL trends 2010 to 2013

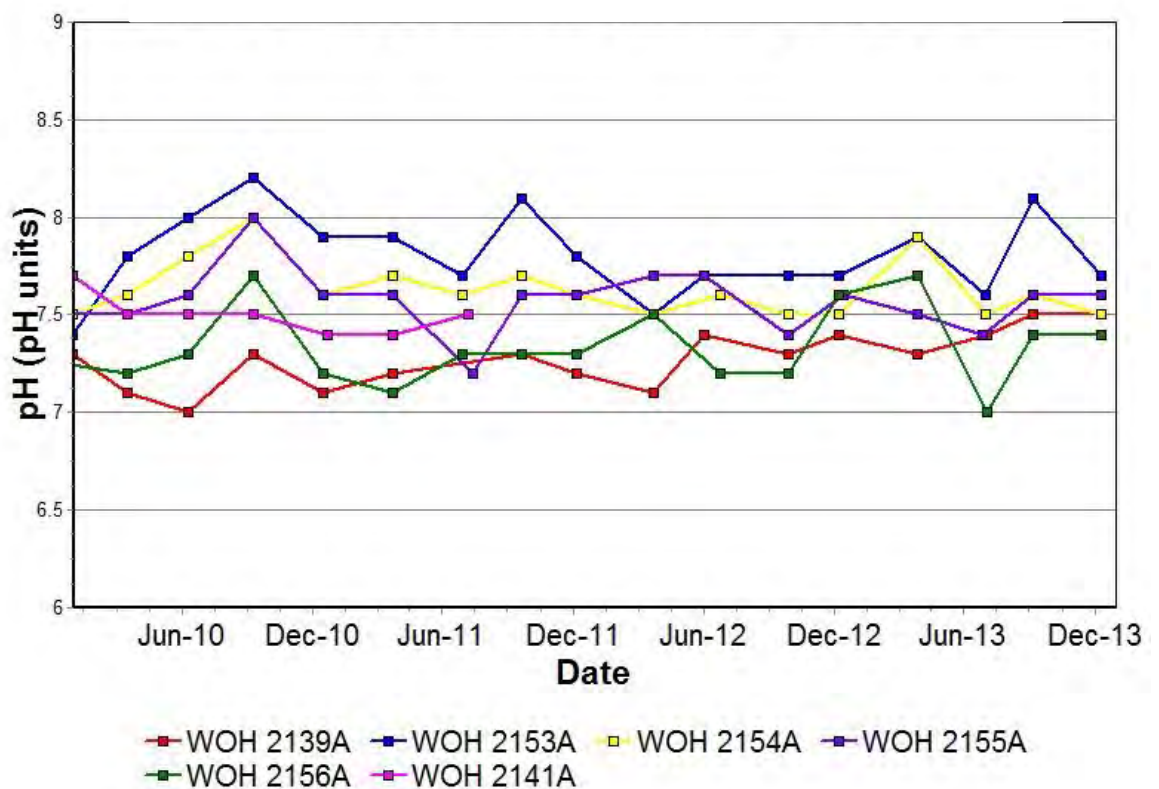


Figure 58: Green Offsets Groundwater pH Trends 2010 to 2013

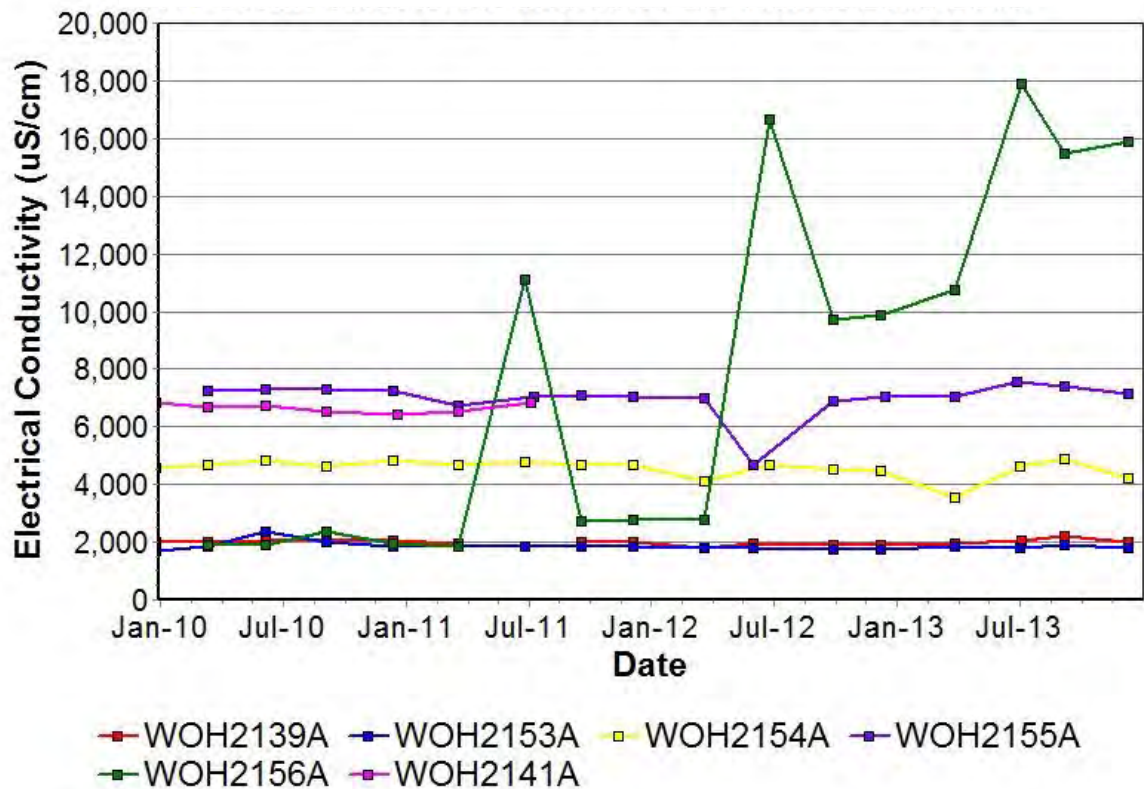


Figure 59: Green Offsets Groundwater EC Trends 2010 to 2013

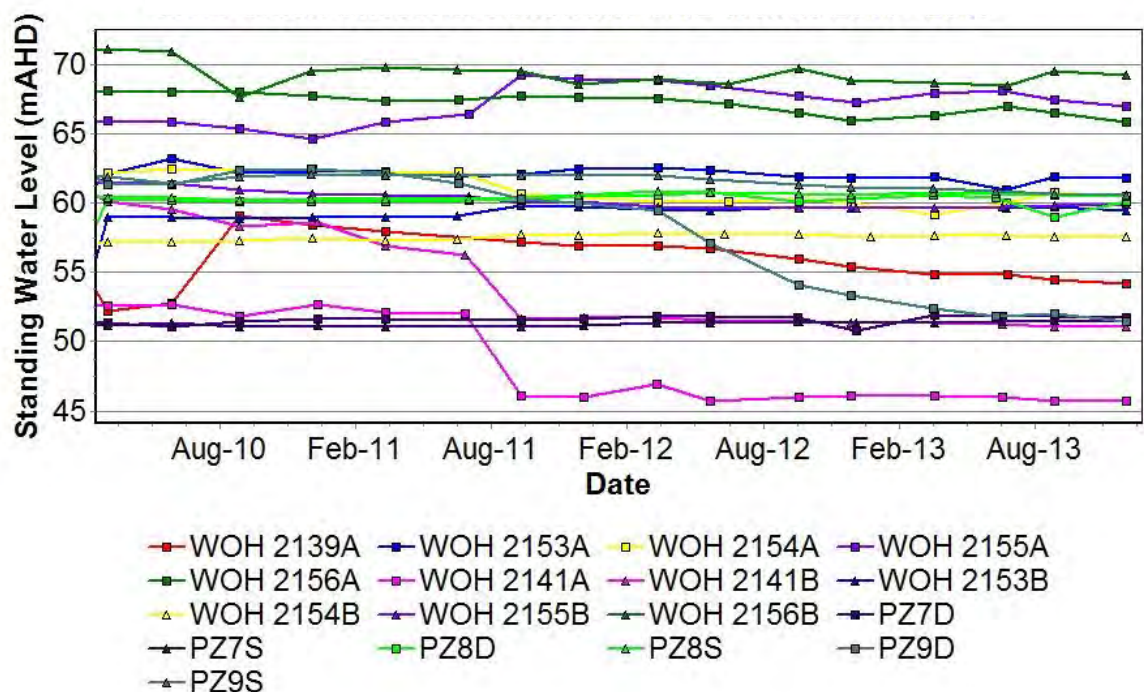


Figure 60: Green Offsets Groundwater SWL Trends 2010 to 2013

Groundwater monitoring data is reviewed on a quarterly basis. The review involves a comparison of measured pH and EC results against internal statistical trigger values which have been derived from the historical data set. A two-stage trigger system is in place for assessing variances in water quality data, utilising both 5th and 95th percentile values to highlight data points which are not consistent with historical norms. The response to measured excursions outside the trigger limits is detailed in the MTW Water Management Plan.

During 2013, a number of monitoring results outside of the internal statistical trigger limits were recorded. As required by the MTW Water Management Plan, these were investigated based on the nature of the measured result. Outcomes of the monitoring data review process are summarised in Table 35. All remaining monitoring results from 2013 were within the historical range and met internal thresholds.

Table 35: Groundwater monitoring - Internal Water Quality Trigger Exceedances

Location	Date	Parameter	Trigger limit breached	Action taken in response
OH1121(1)	27/3/2013	EC	1 st Stage Lower EC	None required (1 st breach)
OH1125(1)	27/03/2013	EC	1 st Stage Lower EC	None required (1 st breach)
OH1125(3)	27/03/2013	EC	1 st Stage Lower EC	None required (1 st breach)
OH1126	27/03/2013	EC	1 st Stage Lower EC	None required (1 st breach)
OH786	27/03/2013	EC	1 st Stage Lower EC	None required (1 st breach)
G3	27/03/2013	pH	1 st Stage Upper pH	None required (1 st breach)
OH1138(1)	27/03/2013	EC	1 st Stage Upper EC	None required (2 nd breach)
OH1137	27/03/2013	EC	2 nd Stage Lower EC	None required (1 st breach)
OH1127	3/04/2013	EC	1 st Stage Upper EC	None required (1 st breach)
OH1127	26/06/2013	EC	1 st Stage Lower EC	None required (1 st breach)
G3	19/06/2013	pH	1 st Stage Upper pH	None required (2 nd breach)
OH1121	26/06/2013	pH	1 st Stage Upper pH	None required (1 st breach)
G3	4/09/2013	EC	1 st Stage Upper EC	None required (1 st breach)
OH1137	3/07/2013	EC	1 st Stage Upper EC	None required (1 st breach)
OH1138(2)	3/07/2013	EC	1 st Stage Upper EC	None required (1 st breach)
OH1126	3/07/2013	pH	1 st Stage Lower pH	None required (1 st breach)
OH1138(1)	3/07/2013	pH	1 st Stage Lower pH	None required (1 st breach)
OH1125(3)	5/07/2013	EC	1 st Stage Lower EC	None required (2 nd breach)
OH1126	4/09/2013	pH	1 st Stage Lower pH	None required (2 nd breach)
OH1138(1)	4/09/2013	pH	1 st Stage Lower pH	None required (2 nd breach)
G3	4/09/2013	pH	1 st Stage Upper pH	Watching brief (3 rd breach). Increasing water quality and falling water level trends likely due to depressurisation of coal seam
OH1138(1)	3/07/2013	EC	1 st Stage Upper EC	3 rd breach- Level

				consistent with nearby bore OH1137. Water level steady. Maintain watching brief.
OH1138(1)	4/09/2013		1 st Stage Upper EC	4 th breach- Level consistent with nearby bore OH1137. Water level steady. Maintain watching brief.
		EC		
WOH2154A	28/3/2013	EC	1 st Stage Lower EC	None required (1 st breach)
WOH2153A	28/03/2013	pH	1 st Stage Upper pH	None required (1 st breach)
WOH2139A	5/09/2013	EC	1 st Stage Upper EC	None required (1 st breach)
WOH2139A	4/07/2013	pH	1 st Stage Upper pH	None required (1 st breach)
WOH2139A	5/09/2013	pH	1 st Stage Upper pH	None required (2 nd breach)
G3	10/12/13	EC	1 st Stage Upper EC	None required (2 nd breach). Increasing water quality and falling water level trends likely due to depressurisation of coal seam
OH1138(2)	11/12/13	EC	1 st Stage Upper EC	None required (1 st breach)
OH1138(1)	11/12/13	EC	1 st Stage Upper EC	5 th breach- Level consistent with nearby bore OH1137. Water level steady. Maintain watching brief.
OH787	11/12/13	pH	1 st Stage Lower pH	None required (1 st breach)
WOH2154A	10/12/13	pH	1 st Stage Lower pH	None required (1 st breach)
G3	10/12/13	pH	1 st Stage Upper pH	Watching brief (4 th breach). Increasing water quality and falling water level trends likely due to depressurisation of coal seam.
WOH2139A	10/12/13	pH	1 st Stage Upper pH	Watching brief (3 rd breach). Measurements are consistent with regional bores.

3.8.2.2 Comparison of Water Quality Data with EA Predictions

The 2002 Warkworth Coal Mine EIS (ERM, 2002) indicated that the quality of groundwater entering the pits at MTW would continue to reflect an average of water quality for the coal measures spoils and contributions from the surrounding coal measures. An EC for water ranging from 4,000 to 6,500 µS/cm, based on measured data from Dam 1N (as the central repository for mine dewatering), was given. As Dam 1N received water abstracted from the

Hunter River Dam 9S has been used for analogous comparison. The average EC measured in Dam 9S during the reporting period was 6328 µS/cm, consistent with the predicted range. Some caution should be exercised in this comparison, given a significant component of water inputs during the reporting period were from external sources, including: Hunter River, Lemington Underground Bore, South Lemington Void and Bulga Mine.

3.8.3 Non-compliances and Complaints During Reporting Period

There were no non-compliances related to groundwater in 2013. While routine ground water monitoring undertaken in 2013 identified a number of internal statistical trigger breaches, there were no reportable non-compliances related to results of routine groundwater monitoring.

No complaints were received in regards to water during 2013.

3.8.4 Audits and Reviews

No independent audits were undertaken at MTW in 2013.

3.9 Contaminated Land

Control strategies are in place at MTW to mitigate risk to the environment from contaminated land. Controls include infrastructure such as bunding and segregation systems, procedures for waste management, prevention control and remediation of site contamination. There are two bioremediation areas used by the mine to treat hydrocarbon contaminated material, both of which are maintained by regular maintenance and monitoring. A Contaminated Sites Register is used to record and ensure follow up of any contamination that occurs on site.

3.10 Dangerous Goods

Dangerous goods are regulated under the *Work Health and Safety Act 2011* (NSW) and *Explosives Act 2003* (NSW). MTW ensures that all regulatory requirements in relation to dangerous goods management are met. The storage of explosives or explosive precursors are **managed in accordance with MTW's Major** Hazard Management Plan - Explosives and SSDS security plan. These are internal documents which are regularly updated.

3.11 Visual Amenity and Lighting

3.11.1 Management

Coal & Allied 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, Warkworth Village, Long Point, Gouldsville, Scott's Flats, 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 2013 to manage visual amenity and lighting impacts include:

- Regular inspections conducted by Community Response Officers to observe operating practices and to ensure lights are not shining towards or affecting public roads. Lights are checked each shift when operating near roads and, if they are believed to adversely impact public roads methods of control are identified and implemented.
- Yellow and white lights are distributed based on risk and external exposure
- Bunds were built on the western edge of major haul roads to reduce visual and lighting impacts

- Alternate sheltered dumps are operated or work areas are shut down if lighting or visual amenity issues arise and cannot be sufficiently managed.

3.11.2 Non-compliances and Complaints

There were no non-compliances related to lighting management in 2013. Community complaints with respect to lighting are recorded and responded to in accordance with the Coal & Allied Community Complaints Procedure. There were 20 lighting complaints from 8 complainants received during the reporting period.

3.11.3 Further Improvements

Opportunities to improve management of lighting issues and reduction in impact will continue to be investigated.

3.12 Bushfire Management

During 2013, a Grazing and Fire protection plan covering both MTW and HVO properties was developed by the Land and Property Department in conjunction with the Projects and Emergency Response teams. Fire break slashing was undertaken along the boundary of the Archerfield Offset property to reduce bushfire risk to surrounding farms and properties. The MTW Emergency Response Team commenced liaisons with the Rural Fire Service around conducting training for the ERT officers in 2014.

There were no bushfires within MTW landholdings in 2013.

3.13 Waste

3.13.1 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 facility. Co-mingled recyclable non-hazardous wastes are removed by a licensed contractor to a materials recycling facility at Thornton 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. The remaining effluent from some septic systems that cannot be treated on site is removed via licensed contractor to approved facilities for disposal.

All waste management contractors working at MTW are licensed by OEH.

3.13.2 Performance

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

In 2013 around 14 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 2013.

3.14 Public Safety

Public safety at MTW is managed primarily through the implementation of HSE standards, procedures and daily security inspections. Fencing, signposting, restricted access areas and locked external gates form part of the safety measures to ensure the safety of the public. In addition, there is no public access from the mine entrance to pit areas as part of the constraint on public access.

4. Stakeholder Relations

4.1 Complaints

A summary of complaints recorded in 2013 is presented in Appendix 6. A total of 741 complaints were recorded during the reporting period with the primary source of complaint related to noise (633 complaints), followed by dust (48), blasting (38) and lighting (20) (refer Table 36). The number of complaints was reduced by 215 when compared to 2012 data.

Table 36: Summary of Complaints by type for 2011 to 2013

Complaint type	2013	2012	2011
Noise	633	800	136
Blasting	38	69	20
Dust	48	57	32
Lighting	20	22	27
Water	0	1	0
Other	2	7	0
Total	741	956	215

MTW values community feedback as a means to assist in continual improvement of its impacts and relationship with the community.

4.1.1.1 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 weather conditions and community feedback and calls to MTW's Community Complaints Hotline. They also suggest continuous improvement ideas to further improve environmental performance.

4.2 Review of Community Engagement

4.2.1 Community Relations

Local community relations activities undertaken in Singleton by Coal & Allied in 2013 are described in the following sections.

4.2.2 Communities Knowledge Base

In partnership with the Hunter Valley Research Foundation Coal & Allied has prepared the 2013 Hunter Valley Community Baseline Study. The study utilises results from the 2011 Census data and is used to inform planning and decision making across the business.

4.2.3 Communication, Consultation and Engagement Activities

Members of the community are encouraged to engage in ways that suit them. A number of potential points of contact have been established. The Coal & Allied shopfronts in Muswellbrook (77 Bridge Street) and Singleton (127 John Street) continue to ensure that Coal & Allied is an active and accessible member of the community.

Coal & Allied operates a free call Community Information Line (1800 727 745). This information line provides an avenue for members of the community to seek information regarding Mount Thorley Warkworth, or other Coal & Allied operations or activities. This number is advertised regularly in local newspapers and community newsletters.

In addition, Coal & Allied operates a free call 24-hour Community Complaints Hotline (1800 656 892) that allows community members to lodge an official enquiry 24 hours a day, 7 days per week. This number is advertised in the local newspaper, phonebook and Coal & Allied community newsletters and website.

In 2013, the Singleton Community Newsletter was combined with the Muswellbrook Community Newsletter to provide a more regional approach that features articles from Singleton, Muswellbrook and the Upper Hunter. Four editions of the Hunter Valley Community newsletter were distributed to businesses and residences in the Singleton and Muswellbrook local government areas in 2013, providing regular updates on Mount Thorley Warkworth operations and other community activities.

The community are also invited to find out more about MTW operations and projects online, and can view copies of newsletters, public reports and information about the Community Consultative Committee at www.riotintocoalaustralia.com.au.

The Singleton Community Relations team engages in regular consultation and ongoing communication with stakeholders around MTW. Feedback from neighbours and local communities is used to inform future decision-making. In 2013 Coal & Allied has undertaken a range of consultation activities, including:

- A community dinner hosted at Bulga Hall to provide a forum for near neighbours to meet key MTW staff, discuss current operations and future plans.
- Near neighbour engagement, consultation with near neighbours to provide project updates at key project milestones and activities;
- MTW Community Consultative Committee (CCC) meetings
- Updates for business community, including the Singleton Chamber of Commerce lunch held at Singleton Diggers in April 2013.

- 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 coordinated by the NSW Minerals Council to engage the community across the Hunter Valley
- Participation in the NSW Minerals Council Hunter Valley Aboriginal Community Working Group.

Across the Hunter Valley, Coal & Allied has a continued focus to build the capacity of local Aboriginal businesses and community organisations. We worked directly with these groups to build their capacity to bid for and win small to medium contracts in the mining industry; this involved Procurement and Projects teams, site visits and support for the development of teaming agreements with mainstream contractors.

4.2.4 Community Consultative Committee

The MTW Community Consultative Committee (CCC) met regularly to provide a forum for discussion between the community, the Council and Coal & Allied representatives. The CCC is an important communication and engagement tool, as the group acts as the point of contact to provide feedback between the mine and the community.

In 2013, meetings were held in February, April, July (AEMR review) and October. At each meeting, presentations provided members with operational updates; environmental monitoring data; land management; and external relations.

In accordance with Project Approval conditions, a new MTW CCC was established with the first meeting taking place in February 2013.

In accordance with the Project Approvals, copies of the MTW CCC minutes are available on the Rio Tinto Coal Australia website.

4.2.5 Community Development

In 2013 Coal & Allied continued our focus on the long term sustainability of the communities where we operate, through our community development programmes:

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

Key areas of focus for community development in 2013 have included education, economic, environment and social/cultural, with 22 new and 39 ongoing programmes supported by our CDF and ACDF. Together these Funds contributed more than \$1.6 million over during 2013 to supporting capacity building and contribute to the long term sustainability of our surrounding communities.

For more information about our community funding programmes visit www.riotintocoalaustralia.com.au.

In addition to the Community Development Funds, Coal & Allied considers applications for local donations and sponsorships that have a clear community benefit. In 2013 MTW provided

more than \$96, 000 towards 37 local projects and initiatives including Singleton Town Band uniforms, Singleton Youth Venue Tutoring programme, Book Week 2013, Singleton Relay for Life, Bulga Family and friends United; Caring for Courtney Fundraising Event, Singleton Cancer Appeal; medical equipment for the Singleton Hospital, Rural Fire Service Secondary School Cadet programme, Singleton Red Cross 100 years Celebrations, and Repainting the Singleton CWA hall.

In 2013, Coal & Allied also continued to implement our SD&Me programme, which engages employees in all aspects of sustainability, including community, environment, knowledge about coal and its use, and wellbeing. As part of this programme, Coal & Allied recognised a number of Mount Thorley Warkworth **employees' regular volunteering efforts by providing a \$250 grant to a local not-for-profit organisation or group where the employee had volunteered more than 50 hours of their time over a 12 month period.**

4.2.6 Employment Status and Demography

MTW employs 1033 permanent employees. Occupational, gender and demographic statistics are provided in Table 37 and 38.

Local companies are contracted at MTW to undertake cleaning, electrical maintenance, mechanical maintenance, rehabilitation and land management works and earthmoving. Local contracting companies are the preferred contractors and are always used when possible.

Coal & Allied has continued to focus on the Coal & Allied Aboriginal Employment Strategy. Each site has continued to progress towards the Rio Tinto Coal Australia target of 5 per cent Aboriginal employment with MTW achieving 2.3 per cent by the end of December 2013, representing 30 employees and contractors. Coal and Allied continued its partnership with Novaskill and the Conserving Country Training Program in 2013, with nine indigenous participants performing work across a variety of areas including: rehabilitation, cultural heritage, offsets and seed harvesting.

Table 37: Occupational and Gender Breakdown at MTW in 2013

	Male	Female
Operators and Maintainers	730	59
Staff	206	38
Total	936	97

Table 38: Demographic Breakdown at MTW in 2013

Council Area	Postcodes	Employees
Newcastle Council	2287, 2289, 2291-2300, 2302-2305, 2322	7%
Maitland Shire	2320, 2321, 2323, 2324, 2334, 2421	30%
Cessnock Shire	2325, 2326, 2327	17%
Singleton Shire	2330, 2335	36%
Muswellbrook Shire	2328, 2333, 2336	3%
Upper Hunter	2337, 2340	0.3%
NSW other		6%

5. Rehabilitation

Rehabilitation progress has been compared to the MOP that was current during the reporting period (MTW MOP 2012-2016 approved 12th November 2012). The primary rehabilitation objectives for areas of post mined lands include:

- Re-creating approximately 2,114 ha of Endangered Ecological Community (EEC) woodland communities to a standard comparable to similar reference EEC communities;
- Establishing approximately 305 ha of trees over grassland areas, but not necessarily conforming to any particular vegetation community;
- Recreating 928 ha grassland communities with a native component on the residual disturbed mining areas;
- Establishing a network of tree corridors to ensure connectivity of woodland community areas;
- Provide additional habitat for threatened species; and
- Create an additional north/south wildlife corridor providing connectivity to other habitat.

The woodland and trees over grassland component of the rehabilitation will form a north/south connecting corridor of vegetation between the existing vegetation to the north of the proposed Warkworth extension through the rehabilitation areas of Mount Thorley Mine and Bulga Mine and in the future will connect to the large tract of intact vegetation at Singleton Military Training Area. The proposed rehabilitation corridor will reduce the impacts of edge effects by forming one large linear block of vegetation rather than numerous scattered patches allowing for easier management due to reduced weed invasion and similar edge effects.

5.1 Summary of Rehabilitation

A total of 61.6 ha rehabilitation was undertaken during 2013 against a MOP target of 55 ha. The additional rehabilitation completed during 2013 made up a 2.8ha shortfall in rehabilitation progress against the MOP target in 2012. Total disturbance undertaken during 2013 was 90.8ha which was 73ha lower than the MOP projection. The disturbance during 2013 was made up of 7.8ha of new disturbance; and 83ha of disturbance of previously rehabilitated area. Rehabilitation disturbance conducted during 2013 was mainly in Warkworth - South Pit North and along the boundary between Bulga Surface Operations and Mt Thorley.

Design work for the Common boundary landform between MTO and Bulga Mine was finalised in the first half of 2013. The Common Boundary Rehabilitation Plan has been prepared to summarise the proposed activities within the Common Boundary area and incorporated as an appendix in the MOP for both MTW and Bulga Surface Operations. Environmental management responsibilities and actions associated with operational activities and rehabilitation works within the Common Boundary area have been documented in the Plan, including erosion and sediment control requirements.

5.1.1 Results of Monitoring Against KPIs

Performance criteria for each rehabilitation phase have been detailed in the MOP for MTW (2012-2016). 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 Landuse Establishment
Stage 5 – Ecosystem and Landuse 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 overall monitoring methodology comprises the following tools:

- Accredited soil analyses;
- Ecosystem Function Analysis;
- Assessment of Land Capability;
- Various measures of ecosystem diversity and habitat values;
- BioBanking Assessment Methodology – Site Value Score; and
- Assessment of pasture productivity, carrying capacity and stocking rates.

Although the criteria have been set, the target levels or values will be based on monitoring results from reference sites and therefore not determined until the end of 2014. After this the results of the rehabilitation monitoring program will be able to be compared against the targets levels to determine if rehabilitation has been successful or if additional intervention is needed.

The timeline for implementation of the monitoring program and setting of target values was outlined in Section 7.1 of the MTW MOP.

Activities conducted in 2013 included;

- development of details on the methodology;
- collaborative approach with neighbouring and regional mines in establishment of analogue and reference sites;

- definition of transect and plot density and location in context of vegetation communities and the requirements of the various monitoring methodologies;
- review of benchmark values, for each site attribute, as defined in the Biobanking Vegetation Benchmark Database for vegetation types or classes; and
- definition of timing in terms of seasonality and frequency for the components of the monitoring program.

Activities planned for 2014 include:

- implementation of the monitoring program;
- resultant data provides baseline information; and
- amendment of monitoring program in terms of timing of works, methodology used and density of transects (if required).

5.1.2 Discrepancies in Rehabilitation and Action Taken

Sowing in 2011 of rehabilitation areas to native vegetation included the use of seed mixes with a diverse native understorey (approximately 25 to 30 species of native grasses and other herbaceous plants). In some areas the results have been very good with good initial establishment of native grasses followed by establishment of trees and shrubs. However, in other areas the establishment of native species has been poor due to competition from *Galenia* and non-native perennial grasses i.e. *Chloris gayana* (rhodes grass) and *Pennisetum clandestinum* (kikuyu grass). These observations confirmed early theories that weed competition would be the biggest threat to the establishment of a diverse native understorey. In response to these observations trials have been conducted during 2012 and 2013 using an initial cover/clean-up crop phase in topsoil areas to allow control of weeds prior to sowing the native seed mixes.

The growth of cover crops in areas planted during 2012 was poor at MTW compared to the results achieved at HVO through the use of mixed source compost as a soil ameliorant. This result at MTW was despite chemical fertilisers being added at sowing time to provide nutrients. It appears that the compost provides other structural and microbial benefits to the soil which contribute to better growth. Compost was applied to remediate the poor performing cover crop areas from 2012 (Swan lake and Woodlands) and compost was used as a soil ameliorant in all of the rehabilitation areas completed in 2013. Weeds were found to be germinating during the cover crop phase of the rehabilitation process, which is not unexpected and part of the design for the clean-up phase of early rehabilitation. Germination of weed seeds during growth of the annual cover crop is, in fact, desirable because it exhausts weed seeds in the topsoil and the weeds can be targeted with herbicide when the crop has run its course. An additional benefit that has been observed is that shading of the weeds by the cover crop has meant that low-residual herbicide can be used to control weeds. Residual herbicides such as Grazon are required to provide an effective kill of mature *Galenia pubescens* plants but because weeds are being kept small by the shading effect of cover crops therefore non-residual herbicides are proving effective in killing the emerging *G. pubescens*. The use of non-residual herbicides is beneficial because it avoids lengthy delays in sowing areas to final seed mixes containing sensitive species.

The weed dominance in topsoiled rehabilitation has also highlighted the need for improved control of weeds, particularly *Galenia*, on topsoil stockpiles. Weed control of topsoil stockpiles across MTW was increased during 2013 and will continue in 2014. Re-sowing of topsoil stockpiles will also be undertaken to establish a vegetative cover of desirable species.

Sowing natives into a growth medium of spoil mixed with compost will be trialled at MTW during 2014. This is on the back of good results at HVO in 2012. . It was found that the natives established very well in this growth medium without weed competition that would normally result in topsoiled areas from the weed seed load in the topsoil.

5.1.3 Maintenance of Existing Rehabilitation

Remedial compost application and additional weed control was undertaken in 2012 rehabilitation areas including Swan Lake and Woodlands to improve soil properties and target galenia. These areas will be sown to cover crop to provide additional weed control opportunities prior to sowing to long-term seed mixes.

Spot spraying of broadleaf weeds and perennial exotic grasses was conducted in areas sown to diverse native seed mixes in 2011. Both North Pit North and CD Dump rehabilitation areas are demonstrating good levels of diversity in the native understorey but there is evidence of weed incursions. Spot spraying in these areas allows emerging weeds to be controlled while maintaining the desired native understorey.

5.2 Decommissioning

Capping of Tailings Dam 1 (TD1) commenced during the reporting period. This tailings storage facility had remained open because it was expected that reclamation and reprocessing of tailings from TD1 would supply up to 20% of the total contracted Redbank Power Station energy requirement. However, various methods trialled over 10 years failed to establish a feasible method for recovery and treatment of tailings from TD1. A decision was therefore made to cap the storage facility and Australian Tailings Consultants were engaged to prepare a rehabilitation plan for the facility. A Section 101 Approval (ministerial approval to discontinue use of an emplacement area) was granted under the Coal Mine Health and Safety Act and capping works and monitoring are progressing in accordance with the rehabilitation plan.

5.3 Rehabilitation Progression – in accordance with MOP Commitments

Table 39 summarises rehabilitation completed during the reporting period compared with the rehabilitation commitments in the MTW MOP. Table 40 details disturbance completed in 2013. Appendix 7 provides the Annual Rehabilitation Report Form, including rehabilitation progress for each domain through the rehabilitation phases.

Table 39: Rehabilitation Completed in 2013

MOP	Pit Area	2013 Rehabilitation (ha)		Cumulative Rehabilitation During MOP Period (ha)	
		Actual	MOP Commitment	Actual	MOP Commitment
MTW	Mt Thorley	0	0	10.1	9.1
	Warkworth	61.6	54.5	116.1	112.8
	MTW Total	61.6	54.5	126.2	121.9

Note: Rehabilitation areas relate to areas at or past the phase of Ecosystem and Landuse Establishment.

Table 40: Disturbance Completed in 2013

MOP	Pit Area	2013 Disturbance (ha)		Cumulative Disturbance During MOP Period (ha)	
		Actual	MOP Commitment	Actual	MOP Commitment
MTW	Mt Thorley	26.9	104.4	108.1	174.9
	Warkworth	63.9	59.4	138.4	202.0
	MTW Total	90.8	163.8	246.5	376.9

The area of rehabilitation that was sown during the reporting period slightly exceeded the MOP target for Warkworth. The MTW MOP had no rehabilitation planned on the Mt Thorley site during 2013.

The 2013 rehabilitation areas for MTO and WML are shown in Appendix 8.

5.4 Rehabilitation Progression – in Accordance with EA Commitments

Progressive rehabilitation commitments are outlined in Environmental Assessments. The 2002 Extension of Warkworth Coal Mine Environmental Impact Statement (ERM, 2002) modelled a total of 678 hectares of rehabilitation would be complete by 2013. There has been 528 hectares of rehabilitation completed at Warkworth, 78 per cent of the area modelled in the 2002 Warkworth EIS. Actual rehabilitation progress in comparison to EIS predictions is ahead in the North Pit area of Warkworth but is lagging in the South Pit area. Tailings Dam 2 was rehabilitated by 2013 in Figure EIS-14 of the 2002 EIS, however it is expected that TD2 will be used for Redbank ash disposal until 2030 and hence not able to be rehabilitated until after this date. Conversely Tailings Dam 1 will be rehabilitated in 2014, however this is not shown to be rehabilitated in the term of the development.

The Abbey Green Projects Alterations Statement of Environmental Effects (SEE, January 2010) is the most recent modification to the development approval. The SEE states that rehabilitation will be undertaken in accordance with the MOP. In 2013 no rehabilitation was undertaken in Mount Thorley which is consistent with the last approved MOP.

5.5 Rehabilitation Relinquishment

Monitoring data from reference sites will be needed to set target levels for the performance criteria detailed in the MTW MOP. Target levels will be determined and detailed in the MOP by the end of 2014. Monitoring results from rehabilitation areas will then be able to be compared against the performance criteria to identify areas that are suitable for relinquishment.

5.6 Rehabilitation Trials and Research

5.6.1 Compost Application and Incorporation

The benefits of adding compost material to soils have been well researched and are widely accepted including: improved soil structure, increased water holding capacity, addition of slow release nutrients, increased cation exchange capacities and re-introduction of beneficial soil microorganisms.

The techniques developed at HVO during 2012 for spreading and incorporating compost material on rehabilitation areas were applied at MTW to improve the nutritional and physical

properties of the growth mediums. Compost material was spread onto new rehabilitation areas during 2013 and onto the Swan Lake and Woodlands areas rehabilitated during 2012 that had poor cover crop establishment and growth.

Two agricultural implements have been used to incorporate the compost through the top layer of growth medium. The first of these is a rock windrower (Figure 61) which is typically used to sweep rocks into a windrow for removal from cropping paddocks. A rock picker is then used to pick up the windrowed rocks. The benefit of using the rock windrower and rock picker is that the soil surface is then free of rocks that would cause difficulties for the direct-drill seeder.



Figure 61: Rock windrower incorporating compost in rehabilitation, Cheshunt Pit

The second implement is an aerator (Figure 62) which is typically used in minimal tillage cropping operations to aerate soil that has been compacted due to equipment or grazing. Because the compost is typically being added to freshly spread topsoil the aerating function is not required but this implement was found to incorporate the compost while minimising the breakdown of soil structure that can be caused by traditional cultivation equipment. Where compost is being added to soil that has already formed a surface crust, the aerator is also useful for breaking up the surface crust and providing a suitable seed bed for sowing. The aerator is suited to mined land rehabilitation work as it does not pull rocks to the surface, which is typical of tyne-style equipment.



Figure 62: Aerator showing tyne arrangement

The outcome of trialling these two implements is that they were both useful for incorporating the compost and are used depending on the situation. The rock windrower and rock picker are used in areas containing surface rock that will cause problems for the direct-drill but it was found that the smooth surface left by the rock windrower was not suited to slopes. On slopes, the aerator is used after the rock windrower to leave a surface pattern that slows surface runoff and improves water harvesting. In areas without surface rock the aerator alone provides suitable incorporation of the compost

5.6.2 Methods for Providing Soil Coverage of Seed during Broadcast Sowing

The direct-drill is used for the majority of sowing on rehabilitation areas due to its ability to correctly position the seed; and provide soil cover and soil/seed contact. The direct-drill will be prioritised on sowing of the more expensive native seed mixes so broadcast spreading of cover crop seed will still be used if the direct-drill is over-scheduled.

Broadcast spreading of cover crop seed onto a freshly-prepared aerated surface has been found to be most effective in establishing initial cover on slopes. Seedlings that establish in the holes left by the aerator can survive dry conditions because of the improved water harvesting ability of the aerator pattern (see Figure 63). Harrows are not used to provide soil coverage after sowing because the seed that falls in the aerator holes is sufficiently buried by the movement of the fresh topsoil by rain and wind. Avoiding the use of harrows is important because they have been found to smooth out the aerator pattern and produce a slick surface less able to harvest water and more prone to erosion (see Figure 64).



Figure 63 & 64: Photo (on left) comparing area harrowed, demonstrating poorer crop establishment and rill erosion, with the aerated surface (not harrowed), showing healthy cover crop establishment in the aerator pattern (photo on right).

5.6.3 Direct-drill Sowing of Native Seed

A direct-drill seeding machine has been sourced from an agricultural contractor for the purpose of seeding rehabilitation areas. The advantages of the direct-drill style machine over conventional broadcast seeding equipment are:

1. Better placement of seed to enhance germination with lower seeding rates. Ability to get high germination levels with reduced seeding rates is particularly important for expensive/hard to source native seed;
2. Minimal soil disturbance during sowing. Broadcast seeding requires a moderate amount of soil disturbance to prepare a fresh seed bed which can bring a new load of weed seed to the surface for germination. Use of cover crops and direct-drill seeder allows weed seeds to be depleted from the top soil layer and seed to be placed with minimal soil disturbance.
3. Maintenance of mulch layer during seeding. Triple-disc configuration on direct-drill seeder allows seed to be planted through surface stubble. Stability and water holding capacity of the soil is maintained by leaving the mulch layer in place.

The direct-drill seeder in use across HVO and MTW has three seed boxes which allows for different depth of seed burial depending on seed size. Smaller seeds prefer shallower seed burial than large seeds and this can be accommodated by splitting the seed mix by seed size and allocating the various sizes to different seed boxes.

The seed mixes sown in 2013 using the direct-drill were split into three components: non-flowable, large-flowable and small-flowable. The non-flowable component is mainly made up of the native grass component which tends to be quite a bulky amount of seed compared to the other two components. The direct-drill was not able to be calibrated to meter out both the small amount of small-flowable and large-flowable seed with the bulky quantity of non-flowable seed. To make this possible, additional “bulking” material needed to be added to the flowable components. Vermiculite was trialled first as the bulking material but it caused blockages in the metering system. Additional bulking seed, in the form of Barley, Lucerne and Millet, was subsequently trialled which was successful from a seed metering viewpoint but additional seed introduces more potential germinants which compete with the species being sown.

Seed used as bulking material was chosen with the following attributes to counter the problem of introducing additional competition:

1. Use of out-of-season species – for example millet sown in autumn/winter should either not germinate or be killed off by frost;
2. Use of low viability seed – seed that has been stored incorrectly or actively treated to reduce viability of seed will result in less germinants.

In the trials that have been undertaken there appeared to still be excessive levels of germination of seed used as bulking material. It is unclear at this stage if the additional competition will negatively affect the germination of native species over the medium term but germination of natives appears to be delayed. Further investigation of bulking materials will be undertaken to further reduce the risk of competition effects.

The native grass seed box on the direct-drill is equipped with agitators (Figure 65) to keep the seed mix from bridging and pick-wheels to help pull seed down into metering points. Despite this the initial trials showed the native grass seed was still causing some blockages during seeding. Further processing of the native grass seed mix, by putting it through a garden style mulcher, was needed to reduce blockages. A commercial thresher will be used for processing seed in 2014. This machine will use stiff brushes and sieves to process the seed in order to improve the flowability of the seed mix through the direct-drill. The use of the thresher rather than the garden mulcher will reduce potential damage to seed caused by spinning mulcher blades.



Figure 65: Native grass seed box on the direct-drill showing native grass seed (after processing through a garden mulcher) and agitator configuration.

5.6.4 Native Seed Collection

The species composition of the native vegetation seed mixes has been based on the species present in the Endangered Ecological Communities existing in the HVO/MTW area, namely the Central Hunter Box-Ironbark Woodland and Central Hunter Ironbark-Spotted Gum-Grey Box Forest communities. Diversity targets have been set for the various functional groups to ensure sufficient levels of species diversity are included in the native vegetation seed mixes to cover the progression of rehabilitation through the various phases. The species composition will change as the rehabilitation areas progress from bare areas to mature woodland communities so the seed mixes have been designed to include representatives of species from primary colonisers through to long term shade tolerant species.

In order to consistently achieve the high level of diversity required to construct a native ecosystem, Coal & Allied has engaged the services of native seed specialists. Coal & Allied owned properties have been surveyed to identify suitable areas for the wild collection of native species and to identify gaps in seed supply.

During 2013 seed from native species was collected in the local area from both Coal & Allied owned properties and other properties (see Figure 66 and Figure 67). Native pastures on Coal & Allied owned properties were managed to improve the yield and quality of native grass seed harvests. The amount of native under-storey seed collected by Coal & Allied during 2013 was approximately 2,000kg (consisting of about 25 native grass species). Tree and shrub seed was collected in the Hunter Valley area for approximately 17 native species while smaller quantities of an additional 9 species were collected for the purpose of setting up seed production areas. **An additional ten polytunnels were built at Watt's (Coal & Allied owned property located near MTP)** to provide a weather proof area to dry grass and other native seed. The elevated temperature inside the polytunnel causes the vegetation to dry out quicker and release the seed for collection on weed mats.



Figure 66: Native grass seed harvesting at a Coal & Allied owned property near Muswellbrook.



Figure 67: Harvested native grass seed material being dried before storage.

5.7 Temporary Stabilisation

Aerial Seeding was undertaken in early May 2013 by a fixed wing aircraft to provide a 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 350 hectares of area seeded included waste dumps and two tailings dams (Figure 68). All areas were seeded using an exotic pasture grass and legume mix suitable for an autumn sowing. The seed mix was revised slightly from previous years to reduce the number of species to those which were most successful from previous years. A starter fertiliser was mixed with the seed prior to loading to provide sufficient nutrients for plant growth.



Figure 68: 2013 Aerial Seeding Areas

5.8 Spontaneous Combustion

MTW manage and control spontaneous combustion on site in accordance with an internal procedure, which outlines techniques employed to control, monitor and prevent spontaneous combustion. The spontaneous combustion procedure also details the physical characteristics pertaining to spontaneous combustion, methods used in the prevention and outlines research being undertaken to study spontaneous combustion.

The objectives of the spontaneous combustion procedure are to:

- ensure that spontaneous combustion outbreaks are minimised;
- identify potential areas that may be prone to spontaneous combustion before an outbreak occurs;
- ensure that all carbonaceous material is placed in such a manner that reduces the possible occurrence of spontaneous combustion;
- instigate a management plan for areas with longer term spontaneous combustion outbreaks; and
- ensure final rehabilitation is free from spontaneous combustion.

During the reporting period no spontaneous combustion was observed at MTW.

5.9 Green Offsets

5.9.1 Management

In 2012, Warkworth Mining Limited (WML) was granted approval for the Warkworth Coal Mine Extension Project (Nsw 2012 09_0202). On the 15 April 2013 an appeal against this approval was upheld, resulting in its disapproval and the reinstatement of the 2003 Warkworth Mine Development Consent (DA 300-9-2002i). Consequentially, this resulted in the reinstatement of the Green Offset Strategy and Green Offsets Fauna and Flora Management Plan (FFMP).

The management of the Non Disturbance Areas (NDA) and Habitat Management Areas (HMAs) continued with the implementation of the weed and pest animal control programmes and bushfire protection, detail of these management activities are provided in section 5.10 and 5.11.

Towards the end of 2013, work commenced on the planning to re-establish 76 hectares of Warkworth Sand Grassland areas within the Northern Biodiversity Area (Archerfield) and Southern Biodiversity Area (HMA2 and 3). This re-establishment programme aims to utilise salvaged topsoil and green mulch from the clearing of Warkworth Sands Woodland within the mine disturbance footprint, that was approved in November 2013 under Schedule 4, Condition 2, DA 300-9-2002i.

A rehabilitation plan for the disused sand quarry located in HMA2 was prepared in 2013, the plan includes a small rehabilitation trial and implementation of the plan is scheduled to commence in 2014.

5.9.2 Research

Approvals issued by both the State and Commonwealth Governments include conditions requiring MTW to undertake research on the Warkworth Sands Woodland (WSW) endangered ecological vegetation community, as well as to promote regeneration and rehabilitation of the other woodland/open woodland vegetation communities impacted by the mining extension.

These conditions, along with the MTW FFMP, provide the key requirements for managing and monitoring the Green Offsets, and provide the basis for future research requirements.

A research contract between the University of New England (UNE) and Coal & Allied for the five year research project ***Restoration Research for Warkworth Sands Woodlands*** was signed in February 2008. In 2013 UNE has concentrated on drafting papers for publication in 2014.

Information from the research was used to prepare a Warkworth Sand Restoration Manual, which will guide re-establishment activities scheduled for 2014.

5.9.3 Green Offsets Management Activities

Management activities undertaken in Green Offsets areas in 2013 are summarised below:

- Native grass seed harvest - Mechanical harvesting of native herb *Chrysocephalum* (***Chrysocephalum apiculatum***) was undertaken in the buffer property of 'Newport' in April 2013. In November a small quantity of salt bush was hand collected from the same property. These native seeds were collected in 2013 for use on Coal & Allied rehabilitation and re-establishment areas in 2013 and 2014.
- Asbestos material was removed from the Airfield shed in NDA1 in December 2013. Four tonnes of asbestos was professionally removed and disposed of in accordance with WorkCover Requirements. Figure 69 and 70 show the shed prior to and after removal.
- Track Management- Council and Crown approval was sought to repair and maintain relevant access tracks in the Green Offsets. Once approval is finalised these tracks will be maintained and improved to ensure that they are accessible in all weather conditions.
- A wombat assessment and relocation program was undertaken in areas ahead of mining at Warkworth in 2013. The program mapped all current wombat burrows in areas ahead of mining. Starter burrows were then prepared at the Archerfield Offset Property. The trapping and relocation of wombats was undertaken across several months. Activities included tracking current wombat burrows, setting and monitoring traps outside active burrows, and surveying all relevant areas for sign of wombats prior to clearing. A total of four wombats and one echidna were relocated throughout the year. Motion detecting cameras were used at the Archerfield starter burrows to monitor and confirm the ongoing presence of the wombats, see figure 71.



Figure 69: Prior to Asbestos material removal



Figure 70: After asbestos material removal



Figure 71: A relocated wombat at an Archerfield monitoring point

5.9.4 Ground Disturbance Permits

Ground Disturbance Permits (GDPs) are required when clearing or digging is to occur on the MTW mine site. This permit system is also utilised across the Green Offset areas to prevent unauthorised disturbance. Where vegetation clearance is to occur within an NDA prior written agreement of the Minister is required under Condition 1 of the Warkworth EPBC Approval (2002/629) and is obtained prior to GDP issue. Details of existing and new GDPs relating to

the Green Offsets during 2013 are presented in Table 41. Figure 72 shows a wombat starter burrow dug under GDP 811 in Archerfield.

Table 41: GDPs in effect on the Green Offsets during 2013

GDP	Start Date	End Date	Detail	Works in 2013
477	31 May 2010	31 Mar 2013	Tree planting in plots at Archerfield	Ongoing
527	21 Sep 2010	31 Dec 2015	Maintain existing tracks - Archerfield Fill potholes and grade	Ongoing
542	21 Sep 2010	31 Dec 2015	Maintain existing tracks Fill potholes and grade	Ongoing
562 (date extension)	13 Dec 2010	31 Dec 2013	Manual removal - weeds - Archerfield	Ongoing
591 (date extension)	9 Jan 2013	31 Dec 2013	Manual removal of weeds from Lesley's farm	Ongoing
608 (date extension)	6 May 2011	30 Jun 2013	Warkworth Sands Woodlands tube stock planting HMA2	Ongoing
628 (date extension)	23 Aug 2011	31 Dec 2014	Native grass management Newport Property	Ongoing
630	9 Mar 2012	31 Dec 2014	Native grass management Apple Yard Farm Property	Ongoing
631	28 Dec 2011	31 Dec 2014	Native grass management Kangaroo Down Property	Ongoing
759	23 Aug 2012	31 Dec 2013	Removal of fences	Ongoing
811	3 Dec 2012	31 Dec 2013	Wombat infrastructure	Ongoing



Figure 72: Wombat starter burrow dug in Archerfield using a Bobcat Auger

5.9.5 Green Offsets Weed Management

5.9.5.1 2013 Activities

Weed control is designed to limit the spread and colonisation of noxious and environmental weeds across the site. During 2013 the weed management activities were guided by the *Green Offsets Areas- Mount Thorley Warkworth Weed Management 2012- Annual report*. This Report was developed following inspection of the targeted weed control works undertaken throughout 2012 and consideration of ongoing weed issues and priorities across the Green Offsets.

Weed treatment methods included spraying, hand weeding, slashing and cutting and painting. Weed control was undertaken at Archerfield, HMA2, NDA1, NDA2, HMA3 and Leslies Farm. Weed control works focussed on HMA 2, HMA 3, NDA1 and NDA2. The primary target weed species for all areas were Mother of Millions (*Bryophyllum delagoense*) and Lantana (*Lantana camara*) and Paterson's Curse (*Echium plantagineum*). Secondary and opportunistic weeds targeted included: Prickly Pear (*Opuntia spp*), African Olive (*Olea europea subsp cuspidate*), African Boxthorn (*Lycium ferociimum*), Bridal creeper (*Asparagus asparagiodes*), Balloon Vine (*Cardiospermum grandiflorum*), Tree of heaven (*Ailanthus altissima*) and various Thistle species. Figure 73 and 74 show the results of successful weed management.

The colder months in June, July and August provided opportunity to target Mother of Millions, African Olive and African Boxthorn. An extensive effort was undertaken to control Mother of Millions in HMA2. A high kill rate was achieved throughout the targeted areas but young plants have been observed starting to re-establish and this species will continue to be targeted in 2014. Areas of Lantana bordering Warkworth Sands Woodlands in HMA 2 were treated by manual methods to ensure no off-target damage due to the high value native vegetation intermixed with this species. The Splatter Gun technique was used on large remnants of Lantana with no significant signs of natural regrowth intermixed.

Large areas of Paterson's Curse in NDA1 were treated by brushcutting all plants that were in flower to reduce the potential for seed set, with a follow up herbicide treatment on the re-sprouts approximately 2 weeks after cutting. This method proved highly successful and reduced the amount of herbicide used in this area.

Weed management work commenced in November 2013 on plots designated for Warkworth Sands Re-establishment in early 2014. Work will continue on these areas targeting Prickly Pear, woody weed species, and Galenia (*Galenia pubescens*) to reduce weed competition during re-establishment.



Figure 73: Treated Boxthorn (Lycium ferocissimum) around the base of native canopy species



Figure 74: Manually treated Lantana (Lantana camara) amongst Grevillea Montana

5.9.5.2 Activities Planned for 2014

Weed control for Warkworth offsets, including Archerfield Station, will continue in 2014. Treatment of all weeds will be undertaken in a strategic manner, capitalising on previous works undertaken by performing secondary and staged follow up weed control, and moving into new areas for primary control. Weed management in areas of high conservation value, those areas closest to property boundaries or in areas designated for native re-establishment will be given high priority.

5.9.6 Green Offsets Vertebrate Pest Management

Vertebrate pest management is undertaken in conjunction with surrounding landholdings and mines, giving a broad coverage and management of invasive species. Innovations and best practices implemented in 2013 included:

- Varied usages of attractants and lures surrounding baiting stations to increase chances of bait uptake, see figure 75. This included the selection of trap locations using the aid of a trained dog. The dog helps find locations where other dogs have marked their territory assisting the operator find the best placements and increasing the chances of trapping success.
- Undertaking the 2013 Vertebrate Pest Programme in conjunction with surrounding landholdings and mines, giving a broad coverage and management of invasive species.
- Strategic placement of soft jaw traps in various locations across the offsets to ensure the highest chance of trap capture.
- Use of Sand Pad monitoring to determine the presence and distribution of target and native species over the site without the potential deterrents of baits or traps to influence the behaviour of shy individuals.
- Maintain a record of all pest species sightings to inform the placement of baits and traps within known active areas.

A summary of vertebrate pest management activities undertaken during 2013 is presented in Table 42. Quarterly vertebrate pest management programs will continue in 2014.

Table 42: Green Offsets Vertebrate Pest Management Results Summary

Season	Total lethal baits laid	Wild Dog takes	Fox takes	Pig takes	Soft jaw leg hold trapping	Sand pad monitoring	Open range shooting
Summer	156	15	13	0	NA	No	Not undertaken
Autumn	156	9	13	0	NA	Yes	Not undertaken
Winter	156	0	10	0	0	No	Not undertaken
Spring	86	1	4	0	0	Yes	Not undertaken
Total	554	25	40	0	0	-	-

Sand pad monitoring was used twice during the reporting period to monitor animal abundance. Strips of orange fatty sand which is high in clay composition were laid across tracks to record prints of animals moving through the area. Species abundance figures were calculated using methods based on research carried out by the CSIRO and DECCW. Table 43 presents the resultant species abundance.

Table 43: Sand Pad Abundance Calculations 2013

Target Species	Autumn % Plot Nights*	Autumn Abundance**	Spring % Plot Nights*	Spring Abundance**
Wild Dog	1.3	Scarce	0.0	Scarce
Fox	22.78	Medium	19.75	Medium
Macropod	25	High	6.17	Medium
Rabbit	9.7	Medium	0.0	Scarce
Cat	5.5	Medium	0.0	Low
Hare	0.0	Low	0.0	Low

Notes:

* No. plots with tracks/total number of plot nights (no. plots x no. nights exposed)

** Calculated using techniques published by CSIRO and DECCW.



Figure 75: 2013 Vertebrate Pest Control Program

5.9.7 Audits and Reviews

Assessment of Green Offsets Area management is in a transition phase associated with the new development approval and legal appeal. No audits were undertaken in 2013.

5.9.8 Proposed 2014 Activities

Green Offset management and monitoring activities proposed for 2014 include:

- Continue implementation of WSW re-establishment trials at HMA2, HMA3 and Archerfield Station.
- Continued identification and management of native grass stands suitable for the harvesting of seed;
- Continue weed control and vertebrate pest management activities across the Warkworth and Archerfield Station Offset areas;
- Ongoing maintenance of the Green Offsets boundary fencing;
- Implementation of the Coal & Allied Bushfire Management Plan across the Warkworth and Archerfield Station Offset areas, which includes bushfire readiness works;
- Ongoing site clean-up including selected derelict structures, dumped rubbish and cars. Continued mapping of sites requiring clean up;
- Continued seed collection and propagation of flora specimens within the Green Offsets, especially those of the WSW vegetation community;
- Fencing of identified cultural heritage sites on a needs basis across the Green Offsets;
- Ongoing maintenance and improvement of Green Offsets access tracks including track relocations and closures to reduce risk to environmentally and culturally sensitive sites;
- Repairs and installation of erosion and sediment control on access tracks
- Ongoing management of erosion on a needs basis; and
- Implementation of the rehabilitation plan for the disused quarry in HMA2;

5.10 Vertebrate Pest Management

This section describes vertebrate pest management activities undertaken within operational areas in the MTW mining leases.

5.10.1 Performance

The 1080 baiting program at MTW to control of foxes and wild dogs continued during 2013.

Each 1080 baiting program involved laying 35-80 baiting stations near water sources and site boundaries. The 1080 baiting activities were integrated into broad scale wild dog and fox control programs undertaken at other mine sites and private landholdings, as well as National Parks and Wildlife Service Fox Threat Abatement Plan (TAP) Work. This integration ensured broad scale coverage of baits in the local area and enabled a larger population of dogs and foxes to all be susceptible and presented with 1080 baits.

A summary of vertebrate pest control works undertaken in 2013 is presented in Table 44. The majority of bait consumptions were recorded in the Abbey Green Rehabilitation Area and around the Northern Boundary of Warkworth.

Seasonal vertebrate pest management programs will continue in 2014 using similar methods and targeting similar species.

Table 44: MTW mining leases vertebrate pest management results summary

Season	Total 1080 baits laid	Wild Dog 1080 takes	Fox 1080 takes
Summer	160	0	14
Autumn/Winter	123	1	7
Spring	140	2	23
Total	423	3	44

5.11 Weed Management

5.11.1 Management

The objectives of the MTW weed control program are to:

- Maintain compliance with legal obligations;
- Protect and enhance the environmental values of MTW by eradicating or substantially reducing the distribution and density of weed populations, particularly in post-mining rehabilitated areas; and
- Meet community expectations for responsible land stewardship.

5.11.2 Performance

The weeds observed 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. Environmental weeds were also present on spoil dumps. Weeds on spoil dumps are not generally targeted for control because they cannot be accessed safely, however, they are monitored to ensure they are not colonised by noxious species and do not become source areas for infestation of adjacent rehabilitation and undisturbed areas. Weed species identified during the weed survey in 2012 are listed in Table 45. These weeds were targeted during the 2013 weed management program.

Table 45: Weed Species Identified At MTW during the 2012 Annual Survey

Noxious Weeds		Environmental Weeds
Common Name	Class (Upper Hunter)	Common Name
African Boxthorn	Weed of National Significance (WONS)	African Lovegrass
	4	
Blackberry	4	African Olive
Lantana	WONS	Castor Oil Plant
	4	
Noogoora Burr	4	Galenia
<i>Opuntia</i> Species:	WONS	Scotch Thistle / Saffron Thistle
Creeping Pear	4	
Prickly Pear		
Tiger Pear		
Mother of Millions	3	
Pampas Grass	4	
Paterson's Curse	4	

A total of 74 days of weed treatment work was undertaken on site at MTW during 2013 with a total of 219.5ha of land treated and 17 access tracks maintained.

Figure 76 illustrates the weed treatment areas across the MTW site in 2013. Weed treatment areas are assessed following the completion of periods of work to determine effectiveness of control works.

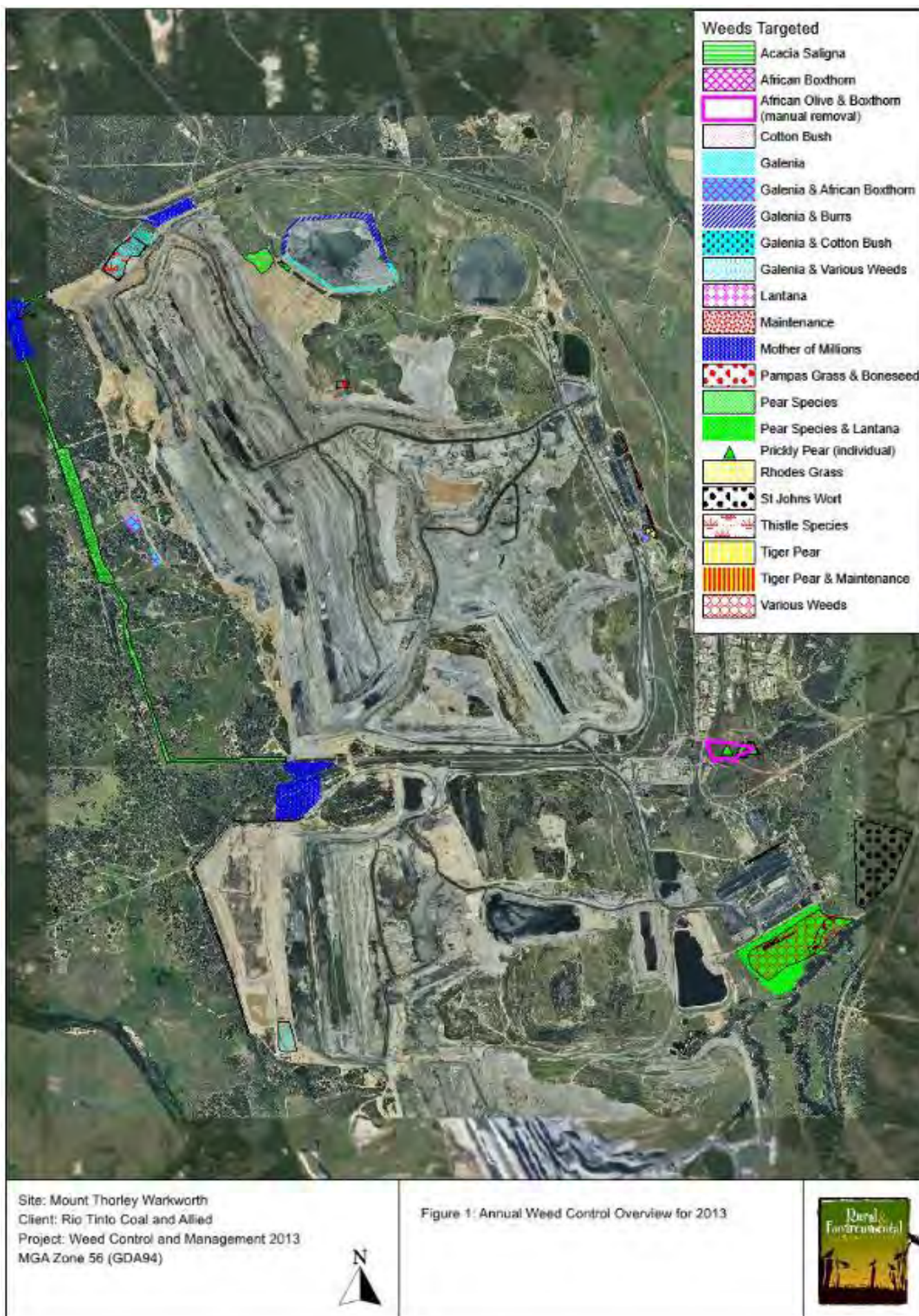


Figure 76: Weed control areas in 2013

An annual site weed survey was undertaken during October 2013. Four weeds species classified as Weeds of National Significance were observed during the 2013 survey:

- African Boxthorn (*Lycium ferocissimum*);
- Bitou Bush (*Chrysanthemoides monilifera* subsp *rotundata*)
- Lantana (*Lantana camara*); and
- *Opuntia* Species including Prickly Pear (*Opuntia stricta*), Tiger Pear (*Opuntia aurantiaca*) and Creeping pear (*Opuntia humifusa*)

Two other noxious weeds were identified at Mount Thorley Warkworth during the survey, including:

- Mother of Millions (*Bryophyllum delagonesse*)
- Pampas Grass (*Cortaderia celloana*)

Five environmental weed species were identified at Mount Thorley Warkworth during the survey, including:

- African Lovegrass (*Eragrostis curvula*)
- African Olive (*Olea europea* subspecies *cuspidata*)
- Castor Oil Plant (*Ricinus communis*)
- Galenia (*Galenia pubescens*)
- Various Thistles:
 - Scotch Thistle (*Onopordum acanthium*)
 - Saffron Thistle (*Carthamus lanatus*)
 - Variegated Thistle (*Silybum marianum*)

Five common weeds that are not officially declared or listed were also recorded at Mount Thorley Warkworth including:

- Blackberry Nightshade (*Solanum nigrum*)
- Golden wreath wattle (*Acacia saligna*)- sparsely scattered over entire site
- Narrow Leaved cotton bush (*Gomphocarpus fruticosus*)- sparsely scattered over entire site
- Spiny Rush (*Juncus acutus*)
- Wild Rose (*Rosa species*)

Species identified during the 2013 survey will form the basis of ongoing weed management works during 2014.

5.12 Rehabilitation Related Activities Planned for 2014

5.12.1 Performance Criteria and Rehabilitation Monitoring

Activities planned for 2014 include:

- implementation of the monitoring program;
- resultant data provides baseline information; and
- amendment of monitoring program in terms of timing of works, methodology used and density of transects (if required).

The rehabilitation monitoring program outlined in the MTW MOP will be implemented during 2014. The priority will be selecting suitable reference sites for the various rehabilitation types and commencing monitoring in these areas. Data collected from the reference sites during 2014 will be used to determine suitable target levels for the rehabilitation performance criteria.

A collaborative approach with neighbouring mines will be used for the establishment of reference sites. MTW and Ravensworth (Xstrata) both have planning approval commitments related to the re-establishment of the Central Hunter Box-Ironbark Woodland and Central Hunter Ironbark-Spotted Gum-Grey Box Forest communities in rehabilitation areas. The collaboration on establishing common biodiversity reference sites has been formalised through a project established through the Upper Hunter Mining Dialogue Land Management working group.

5.12.2 Cover Crop Rolling

One of the aims of using sacrificial cover crops is to provide additional opportunities for weed control prior to sowing long term seed mixes. An issue that presented at HVO in 2013 was the difficulty of targeting small weed plants growing under a knee-high cover crop due to the high levels of herbicide spray interception on the standing cover crop. The solution that was adopted was the use of a flexiroller (Figure 77) to flatten the cover crop on the surface and allow the weeds to poke up through the flattened stubble. As can be seen in Figure 78, the weeds are then exposed for effective herbicide spraying with a boom spray. Crop rolling will be implemented at MTW during 2014.



Figure 77 & 78: Crop rolling the millet cover crop on to the surface. Note the flexiroller is made up of individual rings which allow it to conform to the surface contours. Galenia plants exposed for effective herbicide spraying after crop rolling.

The configuration of the flexiroller lends itself to using in rehabilitation areas for this purpose because it is able to conform to the contours of the surface whereas a conventional rigid roller will bridge across any low points. The bridging action of a rigid roller will result in over compaction of the high points and ineffective rolling in low areas.

Rolling the crop onto the surface rather than slashing/mulching the stubble was preferred **because it leaves a more stable “attached” mulch (i.e. mulch still attached to roots) rather than** small pieces of stubble which would be more prone to being washed or blown off the soil surface. Rehabilitation areas with the rolled cover crop on the surface have been found to be very stable and resistant to the effects of both wind and water erosion.

5.12.3 Direct-Drill Sowing

A customised direct-drill sowing machine will be used for sowing the majority of seed mixes into rehabilitation areas during 2014. The advantages of using a direct-drill include:

- Seed is placed at the required depth and provided with soil cover and soil/seed contact;
- Sowing can be done through cover crop stubble providing stability while natives are establishing; and
- Minimal disturbance of soil at sowing means that additional weed seed will not be germinated.

The following aspects related to use of the direct-drill seeder will require further investigation and trialling during 2014:

1. Methods for processing native grass seed to improve its flowability through the direct-drill (i.e. use of commercial thresher); and
2. Bulking agents for the smaller components of the seed mixes to facilitate correct metering through the seeder.

5.12.4 Topsoil Stockpile Weed Management

The observations of Galenia infestations from 2011 and 2012 rehabilitation indicate that improved control of Galenia (and other problematic weeds) on topsoil stockpiles are required. The results of the herbicide spraying in rehabilitation areas will be applied to weed control

practices on the topsoil stockpiles. The use of residual herbicides (such as Grazon) on topsoil stockpiles would not be as limiting as in rehabilitation areas as the pre-plant period for trees and shrubs could be exhausted prior to the topsoil being used on rehabilitation.

5.12.5 Compost Inoculation

The mixed source compost stockpiles will continue to be inoculated during 2013 to reduce the odour from the stockpiles and to improve the agronomic properties of the compost material. Placing tarpaulins on the compost stockpiles following inoculation will be trialled in order to maintain a constant moisture profile through the heap. The inoculant manufacturers have advised that the beneficial microbes in the inoculant are most effective when the moisture content of the compost heap is above 45 per cent. Given the compost material is delivered with moisture levels between 20-45 per cent water will be added as required to achieve the desired moisture level and then tarps will be used to maintain these moisture levels for a period of six to eight weeks.

Testing will be undertaken on inoculated and non-inoculated compost to confirm improvement in compost quality. Measures will include: stability measures (i.e. oxygen demand, nitrogen drawdown), cation exchange capacity, available phosphorous, microbial levels etc.

5.12.6 Native Grass Pasture Management and Seed Harvesting

During 2013 specialist contractors were engaged to manage approximately 430ha of native grass pastures on Coal & Allied owned properties with a view to providing local provenance seed for use in HVO and MTW rehabilitation programmes. The 2013 harvest yielded approximately 2,000kg of native understorey seed and confirmed projected cost savings for the Coal & Allied harvested seed against current market prices.

The harvest program will be expanded during 2014 to target 4,000kg of native understorey seed. This amount represents the average annual requirement for rehabilitation activities across HVO and MTW. A further 875ha of the vacant properties within the Mt Pleasant footprint will be managed for the production of native seed during 2014. The expanded harvest area will also facilitate a two year rotation of harvesting on the various areas.

Management activities will include: herbicide spraying, slashing, aerating and sporadic grazing. The aim of managing the pastures will be to improve the yield and quality of the harvesting by controlling weeds, making the sward more even and reducing the amount of trash in the material harvested (Figure 79). Managing the Mt Pleasant properties for grass seed harvesting will provide the normal land management requirements of weed control and bushfire management and will have the added benefit of improving the quality of topsoils available for rehabilitation at Mt Pleasant.



Figure 79: Slashed native pasture in preparation for future grass seed harvesting.

5.12.7 Seed Production Area Trial

Following surveys of the local area it has been identified that there are gaps in seed supply for some native species that would be useful to include in rehabilitation seed mixes. Seed for these species would either not be available in sufficient quantities or be very costly to collect from wild collections. In order to provide long term quantities of seed for selected species at reasonable cost a trial seed orchard was set up in 2013 at the Coal & Allied owned Wandewoi property near HVO. The 2ha trial plot was established in 2013 to investigate the viability of seed production areas for native species.

Seed orchard activities planned for 2014 will involve tubestock planting and maintenance. Tubestock for planting in the seed orchard have been grown from seed collected locally. Seed collection methods used to provide the germplasm for the seed orchard were aimed at ensuring high levels of genetic diversity. Having genetically diverse parent plants in the seed orchard will provide seed with high levels of genetic diversity for use in rehabilitation activities.

Appendix 1- DRE Guideline Table

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3.2 environmental performance - summarised monitoring data - list monitoring, performance reports required by other department. -review performance outcomes	2.1.5.5	6.6 Outcomes of any independent review 6.8 Identify any trends in the monitoring data 6.9 Identify any discrepancies between the predicted and actual impacts	n/a n/a n/a
3.3 reportable incidents	n/a	6.3 Non-compliances	n/a

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		6.4 Actions to ensure compliance	n/a
3.4 further improvements	2.2.4		
3.14 spontaneous combustion	5.8		5.8
3.15 bushfire	3.12		3.12
3.16 mine subsidence	n/a		n/a
3.17 hydrocarbon contamination	3.9, 3.13.1		3.9, 3.13.1
3.18 methane drainage/ventilation	n/a		n/a
3.19 public safety	3.14		3.14
4.1 environmental complaints	4.1	6.10 environmental complaints	4.1
4.2 community liaison	4.2	6.11 review of community engagement	4.2
5 REHABILITATION (this AEMR period)	5	7.0 REHABILITATION	5
5.1 buildings	n/a		
5.2 rehabilitation of disturbed land	5.1, Appendix 7	7.1 summary of rehabilitation undertaken on site	5.1, Appendix 7
		7.3 rehabilitation progression - in accordance with MOP commitments	5.3
5.3 other infrastructure	5.2	7.2 decommissioning	5.2
5.4 rehabilitation trials and research	5.6, 5.9.2	7.5 rehabilitation trials and research	5.6, 5.9.2
		7.4 rehabilitation relinquishment	5.5
		7.6 temporary stabilisation of disturbed mining area (aerial seeding)	5.7
		7.8 offset area management	5.9
5.5 Further development of the final rehabilitation plan			
		5.2 Operations summary - 2013 reporting period	2.2
6 Activities proposed in the next AEMR period	2.1.2, 5.12	7(8) Proposed activities (next AEMR)	2.1.2, 5.12
Table: Rehabilitation summary	Appendix	Appendix: Rehabilitation tables	Appendix 7

Appendix 2: Meteorological Data

Mount Thorley Warkworth									
Meteorological Monitoring Data - Charlton Ridge Weather Station 2013									
Date	Wind Speed Maximum (m/s)	Wind Direction Average (Degrees)	Air Temperature Minimum (Degrees C)	Air Temperature Maximum (Degrees C)	Relative Humidity Minimum (%)	Relative Humidity Maximum (%)	Rainfall (mm)	Cumulative Rainfall (mm)	Solar Radiation Maximum (W/Sq . M)
1/01/2013	12.5	126.7	14.9	35.6	23.4	81.3	0.0	0.0	993
2/01/2013	14.7	267.0	20.1	39.7	11.8	72.4	0.0	0.0	1125
3/01/2013	13.8	139.4	17.5	30.0	20.2	76.6	0.0	0.0	1098
4/01/2013	10.9	127.4	16.6	28.3	39.8	76.4	0.0	0.0	1453
5/01/2013	11.4	138.5	15.5	35.3	16.5	85.6	0.0	0.0	1016
6/01/2013	9.8	134.4	17.2	37.8	14.4	79.9	0.0	0.0	1007
7/01/2013	13.8	125.5	18.3	34.8	24.8	82.5	0.0	0.0	1013
8/01/2013	10.5	113.2	20.3	33.8	28.8	72.0	0.0	0.0	1010
9/01/2013	17.2	302.8	18.7	40.0	13.0	76.0	0.0	0.0	1131
10/01/2013	15.4	195.0	18.5	35.1	17.5	63.8	0.0	0.0	1022
11/01/2013	12.9	105.4	17.6	28.6	40.9	72.0	0.0	0.0	1449
12/01/2013	14.8	189.4	17.6	40.7	14.7	78.1	0.0	0.0	1009
13/01/2013	16.1	229.2	20.7	43.2	12.8	70.1	0.0	0.0	1245
14/01/2013	13.4	134.3	18.0	32.0	40.9	92.6	1.8	1.8	1156
15/01/2013	11.5	130.8	14.5	28.8	30.9	89.3	0.6	2.4	1469
16/01/2013**	5.8	142.4	15.7	25.3	24.6	55.5	0.0	2.4	345.7
17/01/2013	13.5	175.6	15.2	36.5	22.8	85.7	0.0	2.4	1170

18/01/2013	11.6	146.9	18.8	39.2	20.2	76.5	0.0	2.4	973
19/01/2013	22.5	258.9	21.9	44.9	11.6	74.2	0.6	3.0	1009
20/01/2013	15.7	135.9	16.4	26.3	44.4	88.7	1.2	4.2	920
21/01/2013	9.1	144.3	15.9	21.1	77.1	93.8	5.6	9.8	388.3
22/01/2013	10.9	121.1	18.3	29.1	48.6	91.8	0.0	9.8	1393
23/01/2013	26.8	194.6	17.3	34.4	33.4	92.6	10.6	20.4	1536
24/01/2013	10.1	149.4	17.0	26.6	54.6	90.0	0.0	20.4	879
25/01/2013	10.8	133.7	17.8	30.2	46.0	85.4	0.0	20.4	1375
26/01/2013	10.6	121.6	18.5	33.5	35.1	89.3	0.0	20.4	1279
27/01/2013	13.3	112.0	20.1	33.3	35.4	86.1	0.0	20.4	1259
28/01/2013	10.9	149.0	17.9	22.7	76.0	93.9	23.6	44.0	358.1
29/01/2013	12.2	121.8	18.5	20.4	91.8	94.8	51.8	95.8	113.7
30/01/2013	10.2	179.3	18.1	30.4	45.3	95.5	30.8	126.6	1496
31/01/2013	9.9	128.7	17.5	28.3	50.8	87.3	0.0	126.6	1390
1/02/2013	11.1	168.9	19.1	34.5	29.0	88.8	0.0	126.6	1056
2/02/2013	18.8	203.0	16.0	30.8	38.5	93.0	16.0	142.6	1128
3/02/2013	18.6	172.7	12.6	21.1	51.1	92.7	10.0	152.6	921
4/02/2013	13.1	166.5	10.2	24.5	37.9	86.8	0.0	152.6	1509
5/02/2013	12.5	139.7	13.8	26.8	39.5	89.6	0.0	152.6	1368
6/02/2013	10.7	128.4	14.6	26.7	41.9	85.1	0.0	152.6	1483
7/02/2013	8.9	128.8	14.2	28.0	30.9	87.4	0.0	152.6	1189
8/02/2013	7.7	136.0	13.4	29.6	25.5	90.6	0.0	152.6	989
9/02/2013	10.2	155.7	13.8	33.8	24.9	91.8	0.0	152.6	972
10/02/2013	10.4	149.8	16.8	34.8	27.1	89.0	0.0	152.6	960
11/02/2013	20.6	184.1	16.9	34.7	24.6	92.2	12.8	165.4	993

12/02/2013	10.8	171.7	16.5	24.7	61.5	93.5	3.0	168.4	1540
13/02/2013	11.8	149.8	16.4	25.8	54.2	87.5	0.2	168.6	1451
14/02/2013	10.8	131.5	14.4	25.2	41.4	93.0	0.4	169.0	1111
15/02/2013	10.4	135.8	13.2	27.5	36.2	88.8	0.0	169.0	1303
16/02/2013	11.7	134.1	15.0	26.1	49.1	89.0	0.0	169.0	1379
17/02/2013	12.2	144.4	16.2	26.0	46.4	90.6	6.2	175.2	1392
18/02/2013	11.4	131.7	15.1	27.3	36.0	90.2	0.2	175.4	1178
19/02/2013	12.4	132.9	14.4	27.5	38.1	85.3	0.0	175.4	1308
20/02/2013	10.9	134.5	14.8	29.9	31.7	90.7	0.0	175.4	1068
21/02/2013	12.5	147.9	16.7	28.3	43.7	89.2	3.8	179.2	1314
22/02/2013	16.5	141.8	16.6	27.5	44.3	93.7	13.2	192.4	1349
23/02/2013	17.3	137.9	16.1	25.3	51.5	91.9	4.8	197.2	1008
24/02/2013	19.0	127.6	16.2	22.0	75.8	93.8	95.4	292.6	773.3
25/02/2013	11.1	138.4	17.7	31.7	42.9	95.0	0.2	292.8	1121
26/02/2013	8.9	128.7	18.1	31.1	50.6	93.1	0.0	292.8	1091
27/02/2013	8.8	115.3	18.5	28.8	48.4	86.6	0.0	292.8	1170
28/02/2013	7.1	145.1	17.3	30.4	37.8	89.3	0.0	292.8	1075
1/03/2013	11.8	234.3	14.6	29.2	45.7	92.6	7.0	299.8	816
2/03/2013	15.2	160.8	13.7	17.5	88.6	94.2	34.6	334.4	193.8
3/03/2013	13.4	152.4	13.1	16.7	87.1	94.9	20.2	354.6	259.6
4/03/2013	14.7	130.8	15.4	24.9	49.3	94.9	1.0	355.6	1424
5/03/2013	12.7	125.5	15.5	25.3	50.7	88.3	0.0	355.6	1430
6/03/2013	11.9	120.3	16.0	25.9	49.1	85.6	0.0	355.6	1438
7/03/2013	9.5	114.3	15.4	27.0	40.6	89.9	0.0	355.6	1498
8/03/2013	7.9	140.1	14.2	27.9	37.6	92.1	0.0	355.6	1065

10/03/2013	10.6	125.4	14.0	27.9	37.9	89.5	0.0	355.6	1328
11/03/2013	9.3	133.5	14.2	27.7	39.6	92.1	0.0	355.6	1083
12/03/2013	10.7	126.3	15.6	27.4	43.8	89.3	0.0	355.6	1332
13/03/2013	9.6	129.6	14.7	27.3	38.0	90.1	0.0	355.6	1142
14/03/2013	6.5	135.9	12.9	28.3	30.2	92.6	0.0	355.6	884
15/03/2013	8.2	146.9	13.3	27.8	47.8	93.3	0.0	355.6	1102
16/03/2013	8.8	141.7	16.9	25.9	58.1	88.8	0.0	355.6	1323
17/03/2013	12.0	222.2	15.4	30.7	39.4	92.8	0.0	355.6	870
18/03/2013	13.7	160.2	14.5	24.5	26.4	71.6	0.0	355.6	1250
19/03/2013	8.4	137.5	12.2	23.4	38.1	78.3	0.0	355.6	1290
20/03/2013	10.6	139.1	11.0	24.9	38.0	84.5	0.0	355.6	1091
21/03/2013	10.3	129.6	12.5	25.7	37.7	88.5	0.0	355.6	1107
22/03/2013	8.7	175.4	11.6	28.6	32.2	92.4	0.0	355.6	883
23/03/2013	16.3	306.6	17.6	30.9	39.6	79.3	0.0	355.6	1084
24/03/2013	12.3	241.7	18.0	31.4	37.7	90.2	2.8	358.4	1083
25/03/2013	10.0	210.4	17.1	31.2	22.4	92.6	0.2	358.6	1093
26/03/2013	16.6	153.6	15.2	36.0	21.5	85.5	1.2	359.8	827
27/03/2013	6.6	153.8	17.3	29.5	43.8	84.0	0.0	359.8	876
28/03/2013	7.6	174.6	16.2	32.3	29.3	94.0	0.0	359.8	797.7
29/03/2013	12.9	257.2	16.8	32.8	29.2	90.8	3.6	363.4	1109
30/03/2013	10.3	162.0	13.5	23.1	39.3	93.1	1.4	364.8	1036
31/03/2013	7.8	149.8	10.8	25.8	38.1	89.6	0.0	364.8	802
1/04/2013	10.4	219.3	14.3	24.8	33.7	88.6	0.0	364.8	1334
2/04/2013	6.9	143.3	13.0	25.5	40.7	85.9	0.0	364.8	1027
3/04/2013	8.9	195.6	12.0	27.0	27.2	92.7	0.0	364.8	768.4

4/04/2013	13.3	165.1	13.9	21.9	56.6	90.8	0.0	364.8	962
5/04/2013	9.7	148.9	12.4	20.9	63.8	91.8	0.8	365.6	1156
6/04/2013	9.8	134.9	13.0	23.9	36.4	90.0	0.2	365.8	1138
7/04/2013	11.5	144.8	11.1	23.7	42.8	90.6	0.0	365.8	977
8/04/2013	9.3	177.0	11.9	23.6	46.3	94.4	3.2	369.0	939
9/04/2013	9.1	178.9	10.6	24.5	39.7	94.2	0.2	369.2	761.2
10/04/2013	9.3	152.5	12.4	24.0	43.8	90.7	0.0	369.2	967
11/04/2013	7.7	139.8	11.5	24.7	39.2	93.6	0.0	369.2	924
12/04/2013	8.3	175.6	9.4	26.0	21.3	94.4	0.2	369.4	729.7
13/04/2013	8.0	130.6	12.1	25.4	38.1	87.4	0.0	369.4	996
14/04/2013	6.6	153.2	11.3	25.5	33.0	92.4	0.0	369.4	797.5
15/04/2013	6.8	200.6	11.3	28.5	27.9	93.9	0.0	369.4	584.5
16/04/2013	10.4	203.2	10.3	29.7	22.8	87.9	4.0	373.4	680.2
17/04/2013	8.6	165.3	14.7	21.2	58.3	92.0	2.8	376.2	1109
18/04/2013	7.3	145.5	12.3	23.2	47.3	89.0	0.0	376.2	1025
19/04/2013	7.5	205.9	11.9	24.2	40.9	93.7	0.0	376.2	829
20/04/2013	12.4	194.4	9.5	19.4	34.3	91.9	0.0	376.2	946
21/04/2013	11.4	192.5	10.6	14.8	45.7	92.8	9.2	385.4	253.7
22/04/2013	8.4	168.7	8.0	20.3	41.3	87.7	0.2	385.6	823
23/04/2013	10.2	232.6	10.5	24.5	27.2	88.3	0.0	385.6	706.1
24/04/2013	8.0	246.3	8.6	24.1	30.9	79.2	0.0	385.6	690.3
25/04/2013	8.8	229.7	7.2	23.0	25.5	87.0	0.0*	385.6	703.5
26/04/2013	6.1	215.1	8.0	22.5	30.0	78.6	0.0*	385.6	683.9
27/04/2013	8.1	278.4	7.2	25.5	23.3	79.3	0.0*	385.6	681.1
28/04/2013	6.3	204.2	7.9	26.5	23.7	82.7	0.0*	385.6	660.1

29/04/2013	9.5	269.6	9.6	28.2	18.5	77.9	0.0*	385.6	665.9
30/04/2013	6.8	211.5	9.5	28.9	16.8	77.9	0.0*	385.6	637.7
1/05/2013	7.5	140.2	13.9	25.0	44.0	90.2	0.0***	385.6	886
2/05/2013	12.2	251.2	13.7	29.0	27.9	92.4	0.0***	385.6	688.1
3/05/2013	12.2	154.5	9.8	20.2	27.8	84.4	0.0***	385.6	654.3
4/05/2013	7.3	212.2	6.8	22.3	30.8	90.1	0.0***	385.6	651.7
5/05/2013	10.7	237.1	8.8	26.1	19.9	79.8	0.0***	385.6	929
6/05/2013	9.1	147.8	8.9	20.5	38.4	76.8	0.0***	385.6	813
7/05/2013	7.7	150.0	6.2	19.7	40.9	89.8	0.0***	385.6	838
8/05/2013	6.0	152.6	8.8	20.0	51.4	90.0	0.0***	385.6	807
9/05/2013	6.2	170.5	8.7	20.6	49.3	93.8	0.0***	385.6	689.7
10/05/2013	5.3	184.8	8.6	22.6	36.8	93.7	0.0***	385.6	596.5
11/05/2013	6.2	185.4	7.1	22.2	36.9	92.7	0.0***	385.6	589.3
12/05/2013	7.3	165.7	9.1	22.3	52.2	91.6	0.0***	385.6	770.5
13/05/2013	4.7	182.7	8.1	21.3	38.2	95.5	0.0***	385.6	580.8
14/05/2013	7.8	248.8	7.7	22.6	39.2	94.2	1.0***	386.6	693.1
15/05/2013	6.8	237.5	8.1	21.1	36.3	93.9	0.0***	386.6	838
16/05/2013	12.9	305.2	4.0	19.4	33.4	84.7	0.0***	386.6	616.2
17/05/2013	16.3	302.6	10.1	20.4	35.0	74.9	0.0***	386.6	779.8
18/05/2013	13.6	288.5	7.7	19.2	27.8	82.6	0.0***	386.6	697
19/05/2013	9.1	282.3	3.9	18.4	27.9	83.0	0.0***	386.6	777.2
20/05/2013	8.4	275.3	5.3	17.8	29.5	72.3	0.0***	386.6	874
21/05/2013	8.8	293.6	3.2	18.5	33.8	80.1	0.0***	386.6	687.2
22/05/2013	11.5	280.7	7.3	22.0	27.5	72.4	8.0***	394.6	685.2
23/05/2013	6.5	169.8	8.5	14.5	52.5	94.0	6.5***	401.1	307.6

24/05/2013	11.7	166.9	7.2	15.4	68.7	94.5	4.5***	405.6	895
25/05/2013	14.2	164.8	9.3	17.8	54.9	93.2	0.0***	405.6	752.2
26/05/2013	8.9	168.5	6.7	19.7	42.6	92.1	0.0***	405.6	803
27/05/2013	6.0	237.5	3.1	20.1	25.8	93.3	0.0***	405.6	570.4
28/05/2013	8.3	196.8	4.2	16.6	56.0	92.5	1.0***	406.6	862
29/05/2013	5.3	152.8	10.3	17.5	69.1	94.8	0.0***	406.6	639.9
30/05/2013	4.4	187.9	8.5	18.7	55.6	95.9	0.5***	407.1	774.2
31/05/2013	9.8	195.9	6.2	22.3	38.4	95.0	0.0***	407.1	535.4
1/06/2013	8.4	201.4	6.6	23.2	36.9	93.7	0.0	407.1	534.7
2/06/2013	11.6	307.6	7.8	19.2	50.2	92.7	0.0	407.1	483.2
3/06/2013	15.9	245.1	9.9	17.4	55.4	94.3	0.0	407.1	892
4/06/2013	9.4	203.0	4.8	17.3	39.7	90.4	0.0	407.1	567.1
5/06/2013	9.1	222.5	4.2	18.5	45.4	91.5	0.0	407.1	545.5
6/06/2013	4.5	231.7	9.1	17.4	58.5	88.8	0.0	407.1	353.2
7/06/2013	13.0	277.4	13.3	21.7	56.6	85.5	0.2	407.3	612.4
8/06/2013	7.5	188.7	7.3	17.5	52.4	92.6	0.0	407.3	369.7
9/06/2013	5.6	180.3	6.1	18.3	52.9	94.6	0.2	407.5	642.3
10/06/2013	9.3	220.0	6.0	19.5	55.0	95.6	0.6	408.1	712.3
11/06/2013	7.4	270.3	7.4	20.7	51.1	95.4	0.4	408.5	571
12/06/2013	12.0	189.4	7.5	17.3	61.6	95.9	12.6	421.1	566.1
13/06/2013	13.8	287.0	8.4	18.0	54.3	95.6	0.2	421.3	795.4
14/06/2013	14.0	313.7	10.3	16.5	54.1	90.5	0.2	421.5	859
15/06/2013	10.2	298.0	9.0	19.2	35.9	84.1	0.0	421.5	623.8
16/06/2013	7.2	287.0	4.9	17.3	40.2	91.6	0.0	421.5	700.7
17/06/2013	8.0	289.1	3.6	16.4	48.9	90.9	0.0	421.5	828

18/06/2013	7.5	258.8	4.8	16.9	40.1	88.2	0.0	421.5	755.5
19/06/2013	12.2	181.0	6.9	15.5	47.5	91.5	0.6	422.1	756
20/06/2013	7.6	163.9	6.6	14.7	55.0	81.8	0.0	422.1	569.1
21/06/2013	6.5	176.3	5.9	15.4	53.3	90.6	0.0	422.1	795.8
22/06/2013	6.6	199.2	4.4	16.0	49.5	92.9	0.2	422.3	650.9
23/06/2013	8.1	164.3	8.2	15.1	62.4	91.8	1.4	423.7	845
24/06/2013	7.4	230.0	8.7	17.2	38.2	92.5	0.0	423.7	789.8
25/06/2013**	3.3	239.1	5.2	9.7	57.8	79.2	0.0	423.7	101.3
26/06/2013	4.8	234.8	8.2	14.5	56.1	89.2	0.0	423.7	573.9
27/06/2013	12.5	204.1	7.4	18.2	65.3	94.3	1.0	424.7	832
28/06/2013	8.4	155.4	11.5	14.8	79.5	95.4	7.2	431.9	267.4
29/06/2013	9.7	155.5	10.8	17.6	71.3	95.6	5.8	437.7	936
30/06/2013	6.8	161.7	10.7	16.6	73.4	96.1	14.8	452.5	779.3
1/07/2013	10.6	164.7	9.5	15.6	67.4	95.7	0.6	453.1	896
2/07/2013	8.8	160.7	8.3	16.8	62.7	94.1	0.2	453.3	823
3/07/2013	6.8	166.9	6.7	18.4	51.2	94.9	0.2	453.5	693.5
4/07/2013	6.8	260.5	4.0	18.3	42.3	96.6	0.2	453.7	539.5
5/07/2013	14.5	303.3	4.3	22.3	44.2	94.1	0.2	453.9	531.4
6/07/2013	15.3	303.8	8.6	20.5	26.8	76.3	0.0	453.9	533.9
7/07/2013	12.9	298.2	5.0	16.2	30.5	67.8	0.0	453.9	556.7
8/07/2013	6.8	259.6	2.1	16.8	36.2	86.7	0.0	453.9	547.5
9/07/2013	5.3	222.1	2.3	16.9	35.3	89.4	0.0	453.9	554.8
10/07/2013	9.1	170.5	3.2	15.6	52.3	89.9	0.0	453.9	637.8
11/07/2013	6.8	163.0	7.4	15.7	56.2	91.4	0.0	453.9	680.1
12/07/2013	7.1	171.7	7.2	17.6	56.0	93.0	0.0	453.9	806

13/07/2013	5.8	237.4	5.4	18.0	57.3	96.7	0.0	453.9	836
14/07/2013	6.5	162.3	5.8	18.6	52.5	96.0	0.2	454.1	656.9
15/07/2013	4.8	174.0	6.8	17.7	59.0	95.6	0.2	454.3	557.3
16/07/2013	6.2	257.6	9.8	18.8	58.2	95.4	1.6	455.9	754.1
17/07/2013	8.4	241.0	10.3	21.2	51.7	94.7	0.2	456.1	848
18/07/2013	8.9	227.6	9.9	22.4	47.9	95.2	0.0	456.1	607.4
19/07/2013	9.7	222.2	8.4	23.2	42.3	95.5	0.2	456.3	580.2
20/07/2013	11.0	298.7	10.6	19.9	53.7	93.5	1.8	458.1	609.3
21/07/2013	19.9	309.8	9.7	19.4	34.9	94.7	2.0	460.1	776.3
22/07/2013	12.7	302.4	5.9	15.7	27.5	70.8	0.0	460.1	582.4
23/07/2013	13.4	295.3	2.4	16.9	30.2	80.4	0.0	460.1	741.5
24/07/2013	10.1	261.1	2.3	16.4	34.8	81.1	0.0	460.1	809
25/07/2013	13.4	192.7	5.7	17.1	42.1	76.3	0.0	460.1	786.2
26/07/2013	5.3	215.6	3.9	17.7	37.9	89.2	0.0	460.1	576.4
27/07/2013	13.9	282.0	3.1	19.1	30.1	92.2	0.0	460.1	716.4
28/07/2013	4.7	194.0	3.0	18.4	39.7	90.6	0.0	460.1	588.9
29/07/2013	4.4	181.4	3.7	18.2	46.0	96.6	0.0	460.1	766.8
30/07/2013	5.9	228.3	3.8	21.9	35.1	94.1	0.0	460.1	600.3
31/07/2013	7.1	215.7	6.7	21.0	39.8	93.4	0.8	460.9	802
1/08/2013	11.2	161.1	8.9	17.4	56.7	90.9	0.0	460.9	954
2/08/2013	6.6	155.1	5.9	18.1	35.7	94.0	0.2	461.1	611.2
3/08/2013	12.4	269.2	5.3	20.5	28.9	95.2	0.0	461.1	778.3
4/08/2013	13.7	313.7	6.8	18.7	30.0	64.7	0.0	461.1	660.7
5/08/2013	17.1	311.1	7.8	18.7	31.9	66.8	0.0	461.1	868
6/08/2013	12.9	292.4	4.1	19.0	30.7	79.5	0.0	461.1	620.6

7/08/2013	15.5	297.2	4.8	22.5	20.8	79.7	0.0	461.1	621.7
8/08/2013	8.6	216.4	9.3	21.8	32.7	94.6	6.8	467.9	815
9/08/2013	12.4	247.6	7.8	14.7	42.8	94.8	0.0	467.9	1018
10/08/2013	10.6	296.5	4.6	20.3	32.7	87.6	0.0	467.9	736.6
11/08/2013	12.7	295.0	9.6	22.6	26.2	66.0	0.0	467.9	646.1
12/08/2013	12.6	292.2	4.1	23.2	32.0	90.2	0.0	467.9	636.2
13/08/2013	17.5	264.6	6.7	26.2	20.5	87.8	0.0	467.9	902
14/08/2013	13.9	309.2	6.8	21.6	19.4	75.9	0.0	467.9	661.5
15/08/2013	13.6	312.4	7.8	23.2	14.2	64.0	0.0	467.9	799.2
16/08/2013	12.5	189.7	4.9	18.4	14.9	69.4	0.0	467.9	673.3
17/08/2013	5.7	183.5	1.4	20.5	19.5	86.2	0.0	467.9	683.9
18/08/2013	16.5	269.4	4.8	22.1	31.9	87.0	0.0	467.9	928
19/08/2013	13.3	307.6	7.5	22.2	19.1	63.2	0.0	467.9	678.5
20/08/2013	16.9	287.0	8.9	22.1	24.3	46.8	0.0	467.9	783.3
21/08/2013	12.1	261.0	4.2	16.0	21.0	67.5	0.0	467.9	819
22/08/2013	11.5	288.7	1.0	17.5	25.6	75.6	0.0	467.9	797.5
23/08/2013	13.8	302.0	5.3	17.9	27.3	65.4	0.0	467.9	986
24/08/2013	15.2	303.4	9.7	19.5	32.6	60.7	0.0	467.9	1026
25/08/2013	10.3	232.6	9.5	22.6	31.9	82.8	0.0	467.9	749.4
26/08/2013	10.2	255.4	6.2	24.7	22.7	92.0	0.0	467.9	707.4
27/08/2013	9.0	240.9	5.7	23.1	21.4	79.3	0.0	467.9	727.8
28/08/2013	9.5	194.5	7.1	23.3	23.6	80.7	0.0	467.9	708
29/08/2013	9.5	189.2	6.1	24.3	22.5	91.4	0.0	467.9	700
30/08/2013	7.0	143.9	7.1	23.4	28.4	89.2	0.0	467.9	930
31/08/2013	18.5	248.9	11.9	28.5	18.7	84.5	0.0	467.9	711.8

1/09/2013	8.9	202.9	10.0	26.0	20.8	71.8	0.0	467.9	961
2/09/2013	7.8	132.3	7.5	24.1	26.9	84.6	0.0	467.9	820
3/09/2013	9.4	150.6	8.9	24.2	24.1	90.3	0.0	467.9	778
4/09/2013	9.6	133.0	9.4	24.1	36.6	89.6	0.0	467.9	881
5/09/2013	8.0	151.0	8.3	24.8	26.1	93.2	0.0	467.9	723.7
6/09/2013	14.2	299.5	8.3	28.7	19.9	89.0	0.0	467.9	739.5
7/09/2013	8.0	246.9	11.1	29.1	20.4	74.5	0.0	467.9	833
8/09/2013	11.8	258.4	12.3	30.1	13.2	82.0	0.0	467.9	895
9/09/2013	9.7	141.7	15.0	25.0	44.5	80.2	0.0	467.9	953
10/09/2013	8.4	197.7	16.2	27.0	30.1	82.5	0.0	467.9	1001
11/09/2013	21.4	301.3	16.2	30.5	14.2	66.7	0.0	467.9	813
12/09/2013	12.1	244.4	10.9	26.2	11.0	54.4	0.0	467.9	773.2
13/09/2013	13.3	209.7	7.8	24.9	18.3	67.7	0.0	467.9	791.5
14/09/2013	10.8	133.3	9.3	19.8	38.7	70.8	0.0	467.9	1026
15/09/2013	16.1	186.6	10.4	26.3	26.1	91.1	2.8	470.7	860
16/09/2013	9.8	136.6	9.2	23.1	30.6	92.9	0.0	470.7	1010
17/09/2013	7.8	131.4	11.5	14.7	72.0	95.2	28.4	499.1	159.1
18/09/2013	14.9	311.4	12.2	20.2	52.1	95.3	6.8	505.9	1228
19/09/2013	17.4	311.1	13.3	24.4	24.6	82.8	0.0	505.9	961
20/09/2013	15.4	309.0	11.6	23.0	19.6	62.5	0.0	505.9	831
21/09/2013	17.5	284.7	9.0	22.3	15.7	65.5	0.0	505.9	1134
22/09/2013	8.6	218.8	7.1	23.2	26.7	74.5	0.0	505.9	849
23/09/2013	8.7	187.6	7.2	25.6	20.8	86.0	0.0	505.9	832
24/09/2013	12.9	238.1	9.6	31.1	9.5	91.3	0.4	506.3	842
25/09/2013	14.4	284.9	12.5	32.0	9.8	57.2	0.0	506.3	932

26/09/2013	11.8	273.9	13.2	32.8	12.4	57.2	0.0	506.3	829
27/09/2013	21.7	270.6	13.1	33.5	9.5	64.5	0.0	506.3	827
28/09/2013	10.8	189.9	7.7	25.5	7.3	70.6	0.0	506.3	874
29/09/2013	17.6	261.8	7.5	30.2	6.4	81.0	0.0	506.3	875
30/09/2013	11.0	211.7	11.5	26.3	16.5	66.8	0.0	506.3	860
1/10/2013	12.9	254.6	8.5	30.6	9.4	80.4	0.0	506.3	896
2/10/2013	23.2	270.2	12.1	33.5	22.3	75.2	0.8	507.1	988
3/10/2013	15.4	284.3	8.8	25.8	15.4	70.7	0.0	507.1	879
4/10/2013	17.3	229.8	8.0	20.4	29.5	83.4	0.4	507.5	1246
5/10/2013	8.9	145.0	6.8	21.9	22.2	87.1	0.0	507.5	881
6/10/2013	12.6	267.0	6.9	30.2	9.0	92.3	0.0	507.5	1088
7/10/2013	6.1	148.7	10.2	33.2	5.8	60.9	0.0	507.5	288.3 7
8/10/2013	13.3	221.5	11.2**	19.2	18.5**	40.4	0.0	507.5	911
9/10/2013	11.8	157.4	10.9	25.7	17.4	78.1	0.0	507.5	1132
10/10/2013	11.8	276.5	8.2	30.6	11.5	89.2	0.0	507.5	906
11/10/2013	19.2	310.7	11.9	34.8	7.5	53.5	0.0	507.5	895
12/10/2013	9.4	122.4	14.1	28.8	26.8	78.3	0.0	507.5	344.2
13/10/2013	10.0	208.6	9.8	33.8	7.4	95.9	0.0	507.5	918
14/10/2013	24.4	282.2	15.6	35.4	5.5	81.6	2.4	509.9	967
15/10/2013	14.2	215.7	11.7	24.3	13.7	70.4	0.0	509.9	1091
16/10/2013	13.4	239.9	6.3	25.7	13.4	71.2	0.0	509.9	928
17/10/2013	14.8	269.3	6.9	30.1	8.2	65.4	0.0	509.9	935
18/10/2013	24.9	274.3	13.7	34.9	3.6	42.2	0.0	509.9	1056
19/10/2013	12.6	127.9	12.7	21.1	19.8	66.6	0.0	509.9	1240

20/10/2013	13.1	139.4	8.6	26.9	24.7	85.9	0.0	509.9	942
21/10/2013	10.7	191.9	11.7	32.2	15.8	94.7	0.0	509.9	914
22/10/2013	12.2	266.9	13.8	36.2	11.9	85.4	0.0	509.9	923
23/10/2013	10.4	158.9	17.6	35.0	20.8	67.0	0.0	509.9	1213
24/10/2013	19.7	267.8	20.9	34.9	12.2	67.3	0.0	509.9	1068
25/10/2013	13.8	229.4	14.1	26.8	9.3	52.8	0.0	509.9	957
26/10/2013	11.6	203.1	8.4	26.0	4.3	57.8	0.0	509.9	939
27/10/2013	12.8	171.1	9.3	26.9	12.5	78.2	0.0	509.9	966
28/10/2013	11.8	165.1	9.8	27.6	19.0	92.5	0.0	509.9	1079
29/10/2013	11.8	188.8	13.4	30.5	16.4	83.4	0.0	509.9	1147
30/10/2013	21.3	209.4	13.0	32.3	20.5	97.2	11.2	521.1	1159
31/10/2013	9.7	131.4	11.8	24.1	28.2	85.8	0.0	521.1	1246
1/11/2013	12.4	144.4	10.1	28.0	15.9	91.3	0.0	521.1	978
2/11/2013	11.6	136.7	14.9	28.6	27.4	81.2	0.0	521.1	1068
3/11/2013	13.3	241.0	12.8	35.1	7.7	95.8	0.0	521.1	1051
4/11/2013	17.0	244.0	15.6	35.6	3.2	67.3	0.0	521.1	1390
5/11/2013	14.7	121.5	12.3	23.6	15.1	71.1	0.0	521.1	1055
6/11/2013	9.5	133.8	11.7	22.9	36.1	77.6	0.0	521.1	1520
7/11/2013	11.9	144.5	7.9	28.2	20.2	89.0	0.0	521.1	983
8/11/2013	10.6	213.0	11.8	34.4	13.4	88.5	0.0	521.1	951
9/11/2013	15.9	263.4	14.7	38.2	10.4	68.5	0.0	521.1	1010
10/11/2013	19.2	258.3	17.8	35.9	16.5	68.8	2.6	523.7	1012
11/11/2013	11.8	140.1	13.3	22.7	37.4	98.2	18.0	541.7	1397
12/11/2013	11.8	170.2	12.5	19.1	74.2	99.1	8.4	550.1	1543
13/11/2013	10.7	169.0	13.2	25.0	44.2	97.9	0.2	550.3	1392

14/11/2013	12.0	233.9	12.4	31.3	8.5	99.8	0.0	550.3	1017
15/11/2013	15.4	212.4	12.6	31.4	6.5	65.7	6.2	556.5	1017
16/11/2013	6.6	143.1	14.2**	16.8	44.5**	78.1	0.4	556.9	166.2
17/11/2013	7.9	170.8	12.9**	14.9	58.8**	83.2	21.0	577.9	130.1
18/11/2013	13.1	151.6	12.5	27.6	31.4	97.6	18.2	596.1	1236
19/11/2013	16.7	187.4	12.4	16.4	74.8	99.3	0.2	596.3	370.4
20/11/2013	8.4	150.6	13.8	27.2	40.7	97.4	0.0	596.3	1613
21/11/2013	5.6	129.4	15.3**	22.0	36.9**	72.5	0.2	596.5	321.8
22/11/2013	13.4	140.4	13.0	30.1	34.7	99.8	5.2	601.7	1318
23/11/2013	11.5	130.6	17.0	23.8	62.9	95.6	10.2	611.9	1525
24/11/2013	12.7	212.9	15.1	22.3	65.4	98.9	0.0	611.9	1246
25/11/2013	12.8	205.6	11.2	27.9	22.0	99.8	4.4	616.3	1384
26/11/2013	14.2	162.2	13.8	26.3	34.4	90.3	0.0	616.3	1424
27/11/2013	4.3	137.7	11.4**	19.2	28.3**	59.3	0.0	616.3	364.4
28/11/2013	5.5	204.6	12.4**	24.5	14.8**	48.6	0.0	616.3	362.6
29/11/2013	12.1	180.0	11.0	35.2	13.6	92.0	31.8	648.1	1428
30/11/2013	6.1	138.5	12.9**	17.0	47.9**	74.7	0.0	648.1	296.8
1/12/2013	13.2	168.8	12.3	28.3	24.3	98.5	0.0	648.1	1371
2/12/2013	10.1	140.8	11.6	24.4	40.7	90.2	0.0	648.1	1526
3/12/2013	10.4	133.5	11.1	26.7	31.9	92.1	0.0	648.1	1310
4/12/2013	7.7	137.3	11.3	29.2	18.7	94.8	0.0	648.1	1059
5/12/2013	14.9	227.5	13.8	35.1	15.1	94.2	0.0	648.1	1232
6/12/2013	23.2	287.1	11.5	26.8	19.2	96.0	0.8	648.9	1380
7/12/2013	10.4	230.6	8.7	25.0	17.3	70.5	0.0	648.9	1369
8/12/2013	10.7	165.2	10.1	27.2	25.1	78.6	0.0	648.9	1116

9/12/2013	10.4	175.0	12.6	32.1	14.7	80.6	0.0	648.9	1063
10/12/2013	18.3	247.0	15.7	36.7	16.8	75.9	0.0	648.9	1327
11/12/2013	17.2	283.5	20.9	35.2	12.2	61.3	0.0	648.9	1234
12/12/2013	16.4	201.1	16.4	32.5	10.6	80.4	0.0	648.9	1076
13/12/2013	12.7	132.4	17.0	30.1	28.5	72.7	0.0	648.9	1318
14/12/2013	13.3	157.1	15.1	34.7	18.1	93.6	0.0	648.9	1013
15/12/2013	13.1	149.5	17.2	30.9	32.6	85.1	0.0	648.9	1398
16/12/2013	11.1	116.7	17.1	29.1	39.5	81.1	0.0	648.9	1437
17/12/2013	13.8	111.3	17.0	29.7	37.4	87.6	0.0	648.9	1370
18/12/2013	10.3	120.8	15.3	30.7	27.1	88.8	0.0	648.9	1137
19/12/2013	11.0	128.2	15.7	30.1	31.4	88.9	0.0	648.9	1098
20/12/2013	7.3	135.0	14.3	34.1	10.0	87.6	0.0	648.9	1074
21/12/2013	12.0	195.4	17.8	39.1	13.4	78.5	0.0	648.9	995
22/12/2013	11.8	133.3	20.8	33.4	31.5	79.7	0.0	648.9	967
23/12/2013	12.2	189.7	20.1	39.0	15.7	89.5	0.0	648.9	1120
24/12/2013	16.0	272.1	23.5	37.0	19.2	70.4	0.0	648.9	1477
25/12/2013	15.2	125.8	17.3	23.9	69.8	97.7	5.2	654.1	223.8
26/12/2013	7.5	118.2	16.9	21.0	78.5	98.7	9.6	663.7	345.8
27/12/2013	9.7	179.6	17.7	30.9	31.9	99.4	1.6	665.3	1446
28/12/2013	12.9	132.2	15.3	30.0	38.8	94.4	0.0	665.3	1172
29/12/2013	6.9	120.1	17.3	31.9	35.5	85.6	0.0	665.3	1317
30/12/2013	16.0	140.4	17.1	29.1	26.6	95.1	0.0	665.3	1325
31/12/2013	11.4	117.3	14.7	29.3	32.5	79.3	0.0	665.3	1075
* Data Sourced from HVO Corp Met Station									
** Data Sourced from 10min averages									

***** Data Sourced from Bulga Coal**

Appendix 3: Attended Noise Monitoring Results

Attended Noise Monitoring Results Quarter 1 2013 under Interim Noise Monitoring Program

Mount Thorley Warkworth Attended Noise Monitoring Results Quarter 1 2013							
MTW Complex L _{Aeq} (15 minute) Impact Assessment Criteria							
Location	Date and Time	Speed ^{1,9}	VTG ^{2,9}	Criterion dB	Criterion Applies? ³	MTW L _{Aeq} dB ^{4,5}	Exceedance ^{6,7}
Gouldsville Road	30/01/2013 22:27	2.8	-1	40	Y	<25	Nil
Wambo Road	30/01/2013 23:07	3	0.5	39	Y	38	Nil
Bulga Village	30/01/2013 23:53	2.9	0.5	38	Y	37	Nil
Noses Peak Road	31/01/2013 0:23	3	0.5	37	Y	39	2
Inlet Road West	31/01/2013 0:54	3.2	-1	35	N	30	NA
Inlet Road	31/01/2013 1:20	2.6	0.5	38	Y	39	1
Wambo Road	31/01/2013 1:59	2.9	-1	39	Y	38	Nil
Inlet Road	31/01/2013 2:49	2.2	0.5	38	Y	37	Nil
Long Point Road	12/03/2013 22:02	3.4	-1	36	N	<25	NA
Bulga Village	12/03/2013 22:40	3	-1	38	N	39	NA
Wambo Road	12/03/2013 23:32	2.3	3	39	Y	31	Nil
Inlet Road	13/03/2013	2.6	-1	38	Y	34	Nil

	0:09						
Inlet Road West	13/03/2013 0:41	2.2	3	35	Y	29	Nil
Noses Peak Road	13/03/2013 1:16	1.8	3	37	Y	42	5
Noses Peak Road	13/03/2013 2:27	2	0.5	37	Y	40	3
Wylies Flat	19/03/2013 22:26	3.3	-1	40	N	IA	NA
Bulga Village	19/03/2013 23:13	3.2	-1	38	N	41	NA
Wambo Road	19/03/2013 23:38	3.2	-1	39	N	39	NA
Noses Peak Road	20/03/2013 0:27	2.4	-1	37	Y	43	6
Inlet Road West	20/03/2013 0:57	2.2	3	35	Y	30	Nil
Inlet Road	20/03/2013 1:28	2.4	-1	38	Y	38	Nil
Noses Peak Road	20/03/2013 2:02	2.4	0.5	37	Y	43	6
Noses Peak Road	20/03/2013 3:11	2.8	-1	37	Y	42	5
Hambleton Hill	27/03/2013 22:00	1.8	3	38	Y	IA	Nil
Milbrodale	27/03/2013 22:58	1.5	3	38	Y	34	nil
Noses Peak Road	27/03/2013 23:39	1.5	3	37	Y	40	3
Inlet Road	28/03/2013 0:12	1.5	3	38	Y	38	Nil
Inlet Road West	28/03/2013 0:50	1.3	3	35	Y	28	Nil

Bulga Village	28/03/2013 1:18	2.1	-1	38	Y	37	Nil
Wambo Road	28/03/2013 1:43	1.6	-1	39	Y	36	Nil
Noses Peak Road	28/03/2013 3:03	1.5	0.5	37	Y	37	Nil

Mount Thorley Warkworth Attended Noise Monitoring Results Quarter 1 2013

MTW Complex L_{Aeq(15minute)} Land Acquisition Criteria

Location	Date and Time	Speed _{1,9}	VTG _{2,9}	Criterion dB	Criterion Applies? ³	MTW L _{Aeq} dB _{4,5}	Exceedance _{6,7}
Gouldsville Road	30/01/2013 22:27	2.8	-1	45	Y	<25	Nil
Wambo Road	30/01/2013 23:07	3	0.5	43	Y	38	Nil
Bulga Village	30/01/2013 23:53	2.9	0.5	43	Y	37	Nil
Noses Peak Road	31/01/2013 0:23	3	0.5	43	Y	39	Nil
Inlet Road West	31/01/2013 0:54	3.2	-1	43	N	30	NA
Inlet Road	31/01/2013 1:20	2.6	0.5	43	Y	39	Nil
Wambo Road	31/01/2013 1:59	2.9	-1	43	Y	38	Nil
Inlet Road	31/01/2013 2:49	2.2	0.5	43	Y	37	Nil
Wylies Flat	19/03/2013 22:26	3.3	-1.0	43	N	IA	NA
Bulga Village	19/03/2013 23:13	3.2	-1.0	43	N	41	NA
Wambo Road	19/03/2013 23:38	3.2	-1.0	43	N	39	NA

Noses Peak Road	20/03/2013 0:27	2.4	-1.0	43	Y	43	Nil
Inlet Road West	20/03/2013 0:57	2.2	3.0	43	Y	30	Nil
Inlet Road	20/03/2013 1:28	2.4	-1.0	43	Y	38	Nil
Noses Peak Road	20/03/2013 2:02	2.4	0.5	43	Y	43	Nil
Noses Peak Road	20/03/2013 3:11	2.8	-1.0	43	Y	42	Nil
Long Point Road	12/03/2013 22:02	3.4	-1	43	N	<25	NA
Bulga Village	12/03/2013 22:40	3	-1	43	N	39	NA
Wambo Road	12/03/2013 23:32	2.3	3	43	Y	31	Nil
Inlet Road	13/03/2013 0:09	2.6	-1	43	Y	34	Nil
Inlet Road West	13/03/2013 0:41	2.2	3	43	Y	29	Nil
Noses Peak Road	13/03/2013 1:16	1.8	3	43	Y	42	Nil
Noses Peak Road	13/03/2013 2:27	2	0.5	43	Y	40	Nil
Wylies Flat	19/03/2013 22:26	3.3	-1	43	N	IA	NA
Bulga Village	19/03/2013 23:13	3.2	-1	43	N	41	NA
Wambo Road	19/03/2013 23:38	3.2	-1	43	N	39	NA
Noses Peak Road	20/03/2013 0:27	2.4	-1	43	Y	43	Nil
Inlet Road	20/03/2013	2.2	3	43	Y	30	Nil

West	0:57						
Inlet Road	20/03/2013 1:28	2.4	-1	43	Y	38	Nil
Noses Peak Road	20/03/2013 2:02	2.4	0.5	43	Y	43	Nil
Noses Peak Road	20/03/2013 3:11	2.8	-1	43	Y	42	Nil
Hambledon Hill	27/03/2013 22:00	1.8	3	43	Y	IA	Nil
Milbrodale	27/03/2013 22:58	1.5	3	43	Y	34	Nil
Noses Peak Road	27/03/2013 23:39	1.5	3	43	Y	40	Nil
Inlet Road	28/03/2013 0:12	1.5	3	43	Y	38	Nil
Inlet Road West	28/03/2013 0:50	1.3	3	43	Y	28	Nil
Bulga Village	28/03/2013 1:18	2.1	-1	43	Y	37	Nil
Wambo Road	28/03/2013 1:43	1.6	-1	43	Y	36	Nil
Noses Peak Road	28/03/2013 3:03	1.5	0.5	43	Y	37	Nil
Mount Thorley Warkworth Attended Noise Monitoring Results Quarter 1 2013							
MTW Complex L_{A1,1min} Impact Assessment Criteria							
Location	Date and Time	Speed_{1,9}	VTG_{2,9}	Criterion dB	Criterion Applies?³	MTW L_{A1,1min} dB_{4,5}	Exceedance_{6,7}
Gouldsville Road	30/01/2013 22:27	2.8	-1	47	Y	40	Nil
Wambo Road	30/01/2013 23:07	3	0.5	48	Y	52	4

Bulga Village	30/01/2013 23:53	2.9	0.5	48	Y	43	Nil
Noses Peak Road	31/01/2013 0:23	3	0.5	48	Y	43	Nil
Inlet Road West	31/01/2013 0:54	3.2	-1	48	N	35	NA
Inlet Road	31/01/2013 1:20	2.6	0.5	48	Y	46	Nil
Wambo Road	31/01/2013 1:59	2.9	-1	48	Y	45	Nil
Inlet Road	31/01/2013 2:49	2.2	0.5	48	Y	45	Nil
Long Point Road	12/03/2013 22:02	3.4	-1	45	N	NM	NA
Bulga Village	12/03/2013 22:40	3	-1	48	N	42	NA
Wambo Road	12/03/2013 23:32	2.3	3	48	Y	35	Nil
Inlet Road	13/03/2013 0:09	2.6	-1	48	Y	44	Nil
Inlet Road West	13/03/2013 0:41	2.2	3	48	Y	32	Nil
Noses Peak Road	13/03/2013 1:16	1.8	3	48	Y	45	Nil
Noses Peak Road	13/03/2013 2:27	2	0.5	48	Y	46	Nil
Wylies Flat	19/03/2013 22:26	3.3	-1	45	N	IA	NA
Bulga Village	19/03/2013 23:13	3.2	-1	48	N	43	NA
Wambo Road	19/03/2013 23:38	3.2	-1	48	N	49	NA
Noses Peak	20/03/2013	2.4	-1	48	Y	50	2

Road	0:27						
Inlet Road West	20/03/2013 0:57	2.2	3	48	Y	41	Nil
Inlet Road	20/03/2013 1:28	2.4	-1	48	Y	49	1
Noses Peak Road	20/03/2013 2:02	2.4	0.5	48	Y	50	2
Noses Peak Road	20/03/2013 3:11	2.8	-1	48	Y	49	1
Hambledon Hill	27/03/2013 22:00	1.8	3	48	Y	IA	Nil
Milbrodale	27/03/2013 22:58	1.5	3	48	Y	40	Nil
Noses Peak Road	27/03/2013 23:39	1.5	3	48	Y	44	Nil
Inlet Road	28/03/2013 0:12	1.5	3	48	Y	46	Nil
Inlet Road West	28/03/2013 0:50	1.3	3	48	Y	35	Nil
Bulga Village	28/03/2013 1:18	2.1	-1	48	Y	48	Nil
Wambo Road	28/03/2013 1:43	1.6	-1	48	Y	42	Nil
Noses Peak Road	28/03/2013 3:03	1.5	0.5	48	Y	48	Nil

Notes:

1. Wind speed in metres per second;

2. VTG - Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data;

3. Noise emission limits apply for winds up to and including 3 metres per second (at a height of 10 metres); or temperature inversion conditions of up to 4°C/100m (at a height of 10 metres);

4. Estimated or measured L_{Aeq} dB attributed to MTW;

5. NM denotes MTW audible but not measurable, IA denotes inaudible;

6. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;

7. Bolded results in red are possible exceedances of relevant criterion;

8. This location has mitigation rights under the February 2012 approval. Specified criteria are for nearby receptors for comparative purposes only; and

9. Criterion may or may not apply due to rounding of meteorological data values.

Attended Noise Monitoring Results July to December 2013 under Interim Noise Monitoring Program

Mount Thorley Warkworth Attended Noise Monitoring Results July - December 2013							
Warkworth $L_{Aeq}(15\text{minute})$ Impact Assessment Criteria							
Location	Start Date and Time	Wind Speed m/s^5	VTG $^{\circ}C/100m^5$	Criterion dB	Criterion Applies? ¹	WML $L_{Aeq,15min} dB^{2,4}$	Exceedance ³
MTIE	31/07/2013 23:01	2.5	-1	NA	No	42	NA
Bulga Village	31/07/2013 23:31	1.6	0.5	38	Yes	NM	Nil
Gouldsville Rd	31/07/2013 22:34	2.3	-1	NA	No	<35	NA
Inlet Road West	1/08/2013 0:27	1.8	-1	35	Yes	IA	Nil
Long Point	31/07/2013 22:01	2.1	-1	37	Yes	32	Nil
Wollemi Peak Rd	1/08/2013 1:17	2.9	-1	35	Yes	IA	Nil
South Bulga	1/08/2013 0:56	2.7	-1	35	Yes	IA	Nil
Wambo Rd	31/07/2013 23:59	1.7	-1	38	Yes	IA	Nil
Warkworth	23/07/2013 23:16	2.8	-1	38	Yes	38	Nil
MTIE	8/08/2013 22:57	1.6	0.5	NA	No	43	NA
Bulga Village	8/08/2013 23:28	1.1	3	38	No	IA	NA
Gouldsville Rd	8/08/2013 22:27	1.3	3	NA	No	42	NA
Inlet Road West	9/08/2013 0:20	1.6	3	35	No	<20	NA
Long Point	8/08/2013 22:00	2.6	-1	37	Yes	36	Nil
Wollemi Peak Rd	9/08/2013 0:47	1.6	3	35	No	IA	NA
South Bulga	9/08/2013 1:12	2	3	35	No	IA	NA
Wambo Rd	8/08/2013 23:51	1	3	38	No	IA	NA
Warkworth	29/08/2013 2:29	1	3	38	No	NM	NA
MTIE	19/09/2013 22:48	3.8	-1	NA	No	44	NA
Bulga Village	19/09/2013 23:17	3.9	0.5	38	No	<20	NA
Gouldsville Rd	19/09/2013 22:23	3.5	-1	NA	No	IA	NA

Inlet Road West	20/09/2013 0:06	4.1	-1	35	No	IA	NA
Long Point	19/09/2013 22:00	3.7	-1	37	No	34	NA
Wollemi Peak Rd	20/09/2013 0:32	4	-1	35	No	25	NA
South Bulga	20/09/2013 0:56	3.9	-1	35	No	33	NA
Wambo Rd	19/09/2013 23:39	3.8	-1	38	No	IA	NA
Warkworth	19/09/2013 2:02	4	-1	38	No	IA	NA
MTIE	9/10/2013 22:54	2.4	-1	NA	No	44	NA
Bulga Village	9/10/2013 23:23	2.3	0.5	38	Yes	38	Nil
Gouldsville Rd	9/10/2013 22:26	2.6	-1	NA	No	<35	NA
Inlet Road West	10/10/2013 0:17	2.6	0.5	35	Yes	<20	Nil
Long Point	9/10/2013 22:00	2.9	0.5	37	Yes	34	Nil
Wollemi Peak Rd	10/10/2013 1:11	2.4	-1	35	Yes	IA	Nil
South Bulga	10/10/2013 0:47	3.1	0.5	35	No	IA	NA
Wambo Rd	9/10/2013 23:49	2.9	-1	38	Yes	<25	Nil
Warkworth	15/10/2013 22:35	3.2	-1	38	No	IA	NA
MTIE	20/11/2013 22:59	2.9	-1	NA	Y	IA	Nil
Bulga Village	20/11/2013 23:28	2.5	-1	38	Y	32	Nil
Gouldsville Rd	20/11/2013 22:27	2.9	0.5	NA	Y	31	Nil
Inlet Road West	21/11/2013 0:21	2.6	-1	35	Y	31	Nil
Long Point	20/11/2013 22:00	3.2	-1	37	N	IA	NA
Wollemi Peak Rd	21/11/2013 1:14	2.6	-1	35	Y	30	Nil
South Bulga	21/11/2013 0:51	2.4	-1	35	Y	IA	Nil
Wambo Rd	20/11/2013 23:52	2.9	-1	38	Y	32	Nil
Warkworth	21/11/2013 1:13	2.6	-1	38	Y	NM	Nil
MTIE	12/12/2013 22:50	3.7	-1	NA	N	IA	NA
Bulga Village	12/12/2013 23:20	3.8	-1	38	N	29	NA
Gouldsville Rd	12/12/2013 22:25	3.9	-1	NA	N	37	NA
Inlet Road West	13/12/2013 0:14	3	-1	35	N	28	NA
Long Point	12/12/2013 22:01	3.7	-1	37	N	IA	NA
Wollemi Peak Rd	13/12/2013 1:05	3	-1	35	N	IA	NA
South Bulga	13/12/2013 0:41	2.3	0.5	35	Y	IA	Nil
Wambo Rd	12/12/2013 23:46	3	-1	38	N	27	NA
Warkworth	18/12/2013 0:00	2.1	0.5	38	Y	NM	Nil

Mount Thorley Warkworth Attended Noise Monitoring Results July - December 2013							
Warkworth L _{Aeq} (15minute) Land Acquisition Criteria							
Location	Start Date and Time	Wind Speed m/s ⁵	VTG °C/100m ⁵	Criterion dB	Criterion Applies? ¹	WML L _{Aeq,15min} dB ^{2,4}	Exceedance ³
MTIE	31/07/2013 23:01	2.5	-1	44	No	42	Nil
Bulga Village	31/07/2013 23:31	1.6	0.5	43	Yes	NM	Nil
Gouldsville Rd	31/07/2013 22:34	2.3	-1	43	Yes	<35	Nil
Inlet Road West	1/08/2013 0:27	1.8	-1	40	Yes	IA	Nil
Long Point	31/07/2013 22:01	2.1	-1	40	Yes	32	Nil
Wollemi Peak Rd	1/08/2013 1:17	2.9	-1	40	Yes	IA	Nil
South Bulga	1/08/2013 0:56	2.7	-1	40	Yes	IA	Nil
Wambo Rd	31/07/2013 23:59	1.7	-1	40	Yes	IA	Nil
Warkworth	23/07/2013 23:16	2.8	-1	43	Yes	38	Nil
MTIE	8/08/2013 22:57	1.6	0.5	44	Yes	43	Nil
Bulga Village	8/08/2013 23:28	1.1	3	43	No	IA	NA
Gouldsville Rd	8/08/2013 22:27	1.3	3	43	No	42	NA
Inlet Road West	9/08/2013 0:20	1.6	3	40	No	<20	NA
Long Point	8/08/2013 22:00	2.6	-1	40	Yes	36	Nil
Wollemi Peak Rd	9/08/2013 0:47	1.6	3	40	No	IA	NA
South Bulga	9/08/2013 1:12	2	3	40	No	IA	NA
Wambo Rd	8/08/2013 23:51	1	3	40	No	IA	NA
Warkworth	29/08/2013 2:29	1	3	43	No	NM	NA
MTIE	19/09/2013 22:48	3.8	-1	NA	No	IA	NA
Bulga Village	19/09/2013 23:17	3.9	0.5	40	No	IA	NA
Gouldsville Rd	19/09/2013 22:23	3.5	-1	44	No	IA	NA
Inlet Road West	20/09/2013 0:06	4.1	-1	35	No	IA	NA
Long Point	19/09/2013 22:00	3.7	-1	39	No	IA	NA
Wollemi Peak Rd	20/09/2013 0:32	4	-1	38	No	IA	NA
South Bulga	20/09/2013 0:56	3.9	-1	37	No	IA	NA
Wambo Rd	19/09/2013 23:39	3.8	-1	40	No	IA	NA
Warkworth	19/09/2013 2:02	4	-1	38	No	IA	NA
MTIE	9/10/2013 22:54	2.4	-1	44	Yes	44	Nil
Bulga Village	9/10/2013 23:23	2.3	0.5	43	Yes	28	Nil
Gouldsville Rd	9/10/2013 22:26	2.6	-1	43	Yes	<35	Nil

Inlet Road West	10/10/2013 0:17	2.6	0.5	40	Yes	<20	Nil
Long Point	9/10/2013 22:00	2.9	0.5	40	Yes	34	Nil
Wollemi Peak Rd	10/10/2013 1:11	2.4	-1	40	Yes	IA	Nil
South Bulga	10/10/2013 0:47	3.1	0.5	40	No	IA	NA
Wambo Rd	9/10/2013 23:49	2.9	-1	40	Yes	<25	Nil
Warkworth	15/10/2013 22:35	3.2	-1	43	No	IA	NA
MTIE	20/11/2013 22:59	2.9	-1	44	Y	IA	Nil
Bulga Village	20/11/2013 23:28	2.5	-1	43	Y	32	Nil
Gouldsville Rd	20/11/2013 22:27	2.9	0.5	43	Y	31	Nil
Inlet Road West	21/11/2013 0:21	2.6	-1	40	Y	31	Nil
Long Point	20/11/2013 22:00	3.2	-1	40	N	IA	NA
Wollemi Peak Rd	21/11/2013 1:14	2.6	-1	40	Y	30	Nil
South Bulga	21/11/2013 0:51	2.4	-1	40	Y	IA	Nil
Wambo Rd	20/11/2013 23:52	2.9	-1	40	Y	32	Nil
Warkworth	21/11/2013 1:13	2.6	-1	43	Y	NM	Nil
MTIE	12/12/2013 22:50	3.7	-1	44	N	IA	NA
Bulga Village	12/12/2013 23:20	3.8	-1	43	N	29	NA
Gouldsville Rd	12/12/2013 22:25	3.9	-1	43	N	37	NA
Inlet Road West	13/12/2013 0:14	3	-1	40	N	28	NA
Long Point	12/12/2013 22:01	3.7	-1	40	N	IA	NA
Wollemi Peak Rd	13/12/2013 1:05	3	-1	40	N	IA	NA
South Bulga	13/12/2013 0:41	2.3	0.5	40	Y	IA	Nil
Wambo Rd	12/12/2013 23:46	3	-1	40	N	27	NA
Warkworth	18/12/2013 0:00	2.1	0.5	43	Y	NM	Nil

Mount Thorley Warkworth Attended Noise Monitoring Results July - December 2013							
Mount Thorley Operations L _{Aeq} (15minute) Impact Assessment Criteria							
Location	Start Date and Time	Wind Speed m/s ⁵	VTG °C/100m ⁵	Criterion dB	Criterion Applies?1	MT0 LA _{eq,15min} dB2,4	Exceedance ³
MTIE	31/07/2013 23:01	2.5	-1	NA	No	NM	NA
Bulga Village	31/07/2013 23:31	1.6	0.5	40	Yes	29	Nil
Gouldsville Rd	31/07/2013 22:34	2.3	-1	44	Yes	IA	Nil
Inlet Road West	1/08/2013 0:27	1.8	-1	35	Yes	27	Nil
Long Point	31/07/2013 22:01	2.1	-1	39	Yes	IA	Nil
Wollemi Peak Rd	1/08/2013 1:17	2.9	-1	38	Yes	31	Nil

South Bulga	1/08/2013 0:56	2.7	-1	37	Yes	30	Nil
Wambo Rd	31/07/2013 23:59	1.7	-1	40	Yes	25	Nil
Warkworth	23/07/2013 23:16	2.8	-1	38	Yes	IA	Nil
MTIE	8/08/2013 22:57	1.6	0.5	NA	No	NM	NA
Bulga Village	8/08/2013 23:28	1.1	3	40	Yes	IA	Nil
Gouldsville Rd	8/08/2013 22:27	1.3	3	44	Yes	IA	Nil
Inlet Road West	9/08/2013 0:20	1.6	3	35	Yes	<20	Nil
Long Point	8/08/2013 22:00	2.6	-1	39	Yes	IA	Nil
Wollemi Peak Rd	9/08/2013 0:47	1.6	3	38	Yes	27	Nil
South Bulga	9/08/2013 1:12	2	3	37	Yes	<25	Nil
Wambo Rd	8/08/2013 23:51	1	3	40	Yes	22	Nil
Warkworth	29/08/2013 2:29	1	3	38	Yes	IA	Nil
MTIE	19/09/2013 22:48	3.8	-1	NA	No	IA	NA
Bulga Village	19/09/2013 23:17	3.9	0.5	40	No	IA	NA
Gouldsville Rd	19/09/2013 22:23	3.5	-1	44	No	IA	NA
Inlet Road West	20/09/2013 0:06	4.1	-1	35	No	IA	NA
Long Point	19/09/2013 22:00	3.7	-1	39	No	IA	NA
Wollemi Peak Rd	20/09/2013 0:32	4	-1	38	No	IA	NA
South Bulga	20/09/2013 0:56	3.9	-1	37	No	IA	NA
Wambo Rd	19/09/2013 23:39	3.8	-1	40	No	IA	NA
Warkworth	19/09/2013 2:02	4	-1	38	No	IA	NA
MTIE	9/10/2013 22:54	2.4	-1	NA	No	NM	NA
Bulga Village	9/10/2013 23:23	2.3	0.5	40	Yes	IA	Nil
Gouldsville Rd	9/10/2013 22:26	2.6	-1	44	Yes	IA	Nil
Inlet Road West	10/10/2013 0:17	2.6	0.5	35	Yes	IA	Nil
Long Point	9/10/2013 22:00	2.9	0.5	39	Yes	IA	Nil
Wollemi Peak Rd	10/10/2013 1:11	2.4	-1	38	Yes	30	Nil
South Bulga	10/10/2013 0:47	3.1	0.5	37	No	30	NA
Wambo Rd	9/10/2013 23:49	2.9	-1	40	Yes	IA	Nil
Warkworth	15/10/2013 22:35	3.2	-1	38	No	IA	NA
MTIE	20/11/2013 22:59	2.9	-1	NA	Y	<35	Nil
Bulga Village	20/11/2013 23:28	2.5	-1	40	Y	NM	Nil
Gouldsville Rd	20/11/2013 22:27	2.9	0.5	44	Y	IA	Nil
Inlet Road West	21/11/2013 0:21	2.6	-1	35	Y	NM	Nil

Long Point	20/11/2013 22:00	3.2	-1	39	N	IA	NA
Wollemi Peak Rd	21/11/2013 1:14	2.6	-1	38	Y	36	Nil
South Bulga	21/11/2013 0:51	2.4	-1	37	Y	35	Nil
Wambo Rd	20/11/2013 23:52	2.9	-1	40	Y	<25	Nil
Warkworth	21/11/2013 1:13	2.6	-1	38	Y	IA	Nil
MTIE	12/12/2013 22:50	3.7	-1	NA	N	35	NA
Bulga Village	12/12/2013 23:20	3.8	-1	40	N	<25	NA
Gouldsville Rd	12/12/2013 22:25	3.9	-1	44	N	IA	NA
Inlet Road West	13/12/2013 0:14	3	-1	35	N	NM	NA
Long Point	12/12/2013 22:01	3.7	-1	39	N	IA	NA
Wollemi Peak Rd	13/12/2013 1:05	3	-1	38	Y	32	Nil
South Bulga	13/12/2013 0:41	2.3	0.5	37	Y	31	Nil
Wambo Rd	12/12/2013 23:46	3	-1	40	Y	IA	Nil
Warkworth	18/12/2013 0:00	2.1	0.5	38	Y	IA	Nil

Mount Thorley Warkworth Attended Noise Monitoring Results July - December 2013							
Mount Thorley Operations L _{A1, 1min} Impact Assessment Criteria							
Location	Start Date and Time	Wind Speed m/s ⁵	VTG °C/100m ⁵	Criterion dB	Criterion Applies?1	MTO L _{A1, 1min} dB2,4	Exceedance ³
MTIE	31/07/2013 23:01	2.5	-1	NA	No	42	NA
Bulga Village	31/07/2013 23:31	1.6	0.5	48	Yes	33	Nil
Gouldsville Rd	31/07/2013 22:34	2.3	-1	47	Yes	IA	Nil
Inlet Road West	1/08/2013 0:27	1.8	-1	48	Yes	34	Nil
Long Point	31/07/2013 22:01	2.1	-1	47	Yes	IA	Nil
Wollemi Peak Rd	1/08/2013 1:17	2.9	-1	48	Yes	35	Nil
South Bulga	1/08/2013 0:56	2.7	-1	48	Yes	34	Nil
Wambo Rd	31/07/2013 23:59	1.7	-1	48	Yes	30	Nil
Warkworth	23/07/2013 23:16	2.8	-1	48	Yes	IA	Nil
MTIE	8/08/2013 22:57	1.6	0.5	NA	No	42	NA
Bulga Village	8/08/2013 23:28	1.1	3	48	Yes	IA	Nil
Gouldsville Rd	8/08/2013 22:27	1.3	3	47	Yes	IA	Nil
Inlet Road West	9/08/2013 0:20	1.6	3	48	Yes	<20	Nil
Long Point	8/08/2013 22:00	2.6	-1	47	Yes	IA	Nil
Wollemi Peak Rd	9/08/2013 0:47	1.6	3	48	Yes	33	Nil
South Bulga	9/08/2013 1:12	2	3	48	Yes	28	Nil

Wambo Rd	8/08/2013 23:51	1	3	48	Yes	25	Nil
Warkworth	29/08/2013 2:29	1	3	48	Yes	IA	Nil
MTIE	19/09/2013 22:48	3.8	-1	NA	No	IA	NA
Bulga Village	19/09/2013 23:17	3.9	0.5	48	No	IA	NA
Gouldsville Rd	19/09/2013 22:23	3.5	-1	47	No	IA	NA
Inlet Road West	20/09/2013 0:06	4.1	-1	48	No	IA	NA
Long Point	19/09/2013 22:00	3.7	-1	47	No	IA	NA
Wollemi Peak Rd	20/09/2013 0:32	4	-1	48	No	IA	NA
South Bulga	20/09/2013 0:56	3.9	-1	48	No	IA	NA
Wambo Rd	19/09/2013 23:39	3.8	-1	48	No	IA	NA
Warkworth	19/09/2013 2:02	4	-1	48	No	IA	NA
MTIE	9/10/2013 22:54	2.4	-1	NA	No	44	NA
Bulga Village	9/10/2013 23:23	2.3	0.5	48	Yes	IA	Nil
Gouldsville Rd	9/10/2013 22:26	2.6	-1	47	Yes	IA	Nil
Inlet Road West	10/10/2013 0:17	2.6	0.5	48	Yes	IA	Nil
Long Point	9/10/2013 22:00	2.9	0.5	47	Yes	IA	Nil
Wollemi Peak Rd	10/10/2013 1:11	2.4	-1	48	Yes	36	Nil
South Bulga	10/10/2013 0:47	3.1	0.5	48	No	38	NA
Wambo Rd	9/10/2013 23:49	2.9	-1	48	Yes	IA	Nil
Warkworth	15/10/2013 22:35	3.2	-1	48	No	IA	NA
MTIE	20/11/2013 22:59	2.9	-1	NA	Y	<35	Nil
Bulga Village	20/11/2013 23:28	2.5	-1	48	Y	38	Nil
Gouldsville Rd	20/11/2013 22:27	2.9	0.5	47	Y	IA	Nil
Inlet Road West	21/11/2013 0:21	2.6	-1	48	Y	NM	Nil
Long Point	20/11/2013 22:00	3.2	-1	47	N	IA	NA
Wollemi Peak Rd	21/11/2013 1:14	2.6	-1	48	Y	40	Nil
South Bulga	21/11/2013 0:51	2.4	-1	48	Y	40	Nil
Wambo Rd	20/11/2013 23:52	2.9	-1	48	Y	30	Nil
Warkworth	21/11/2013 1:13	2.6	-1	48	Y	IA	Nil
MTIE	12/12/2013 22:50	3.7	-1	NA	N	36	NA
Bulga Village	12/12/2013 23:20	3.8	-1	48	N	28	NA
Gouldsville Rd	12/12/2013 22:25	3.9	-1	47	N	IA	NA
Inlet Road West	13/12/2013 0:14	3	-1	48	N	28	NA
Long Point	12/12/2013 22:01	3.7	-1	47	N	IA	NA

Wollemi Peak Rd	13/12/2013 1:05	3	-1	48	Y	38	Nil
South Bulga	13/12/2013 0:41	2.3	0.5	48	Y	37	Nil
Wambo Rd	12/12/2013 23:46	3	-1	48	Y	IA	Nil
Warkworth	18/12/2013 0:00	2.1	0.5	48	Y	IA	Nil

Mount Thorley Warkworth Attended Noise Monitoring Results July - December 2013							
Mount Thorley Operations L _{Aeq} (15minute) Land Acquisition Criteria							
Location	Start Date and Time	Wind Speed m/s ⁵	VTG °C/100m ⁵	Criterion dB	Criterion Applies?1	MTO LA _{eq,15min} dB2,4	Exceedance ³
MTIE	31/07/2013 23:01	2.5	-1	NA	No	NM	NA
Bulga Village	31/07/2013 23:31	1.6	0.5	43	Yes	29	Nil
Gouldsville Rd	31/07/2013 22:34	2.3	-1	45	Yes	IA	Nil
Inlet Road West	1/08/2013 0:27	1.8	-1	43	Yes	27	Nil
Long Point	31/07/2013 22:01	2.1	-1	43	Yes	IA	Nil
Wollemi Peak Rd	1/08/2013 1:17	2.9	-1	43	Yes	31	Nil
South Bulga	1/08/2013 0:56	2.7	-1	43	Yes	30	Nil
Wambo Rd	31/07/2013 23:59	1.7	-1	43	Yes	25	Nil
Warkworth	23/07/2013 23:16	2.8	-1	43	Yes	IA	Nil
MTIE	8/08/2013 22:57	1.6	0.5	NA	No	NM	NA
Bulga Village	8/08/2013 23:28	1.1	3	43	Yes	IA	Nil
Gouldsville Rd	8/08/2013 22:27	1.3	3	45	Yes	IA	Nil
Inlet Road West	9/08/2013 0:20	1.6	3	43	Yes	<20	Nil
Long Point	8/08/2013 22:00	2.6	-1	43	Yes	IA	Nil
Wollemi Peak Rd	9/08/2013 0:47	1.6	3	43	Yes	27	Nil
South Bulga	9/08/2013 1:12	2	3	43	Yes	<25	Nil
Wambo Rd	8/08/2013 23:51	1	3	43	Yes	22	Nil
Warkworth	29/08/2013 2:29	1	3	43	Yes	IA	Nil
MTIE	19/09/2013 22:48	3.8	-1	NA	No	IA	NA
Bulga Village	19/09/2013 23:17	3.9	0.5	43	No	IA	NA
Gouldsville Rd	19/09/2013 22:23	3.5	-1	45	No	IA	NA
Inlet Road West	20/09/2013 0:06	4.1	-1	43	No	IA	NA
Long Point	19/09/2013 22:00	3.7	-1	43	No	IA	NA
Wollemi Peak Rd	20/09/2013 0:32	4	-1	43	No	IA	NA
South Bulga	20/09/2013 0:56	3.9	-1	43	No	IA	NA
Wambo Rd	19/09/2013 23:39	3.8	-1	43	No	IA	NA

Warkworth	19/09/2013 2:02	4	-1	43	No	IA	NA
MTIE	9/10/2013 22:54	2.4	-1	NA	No	NM	NA
Bulga Village	9/10/2013 23:23	2.3	0.5	43	Yes	IA	Nil
Gouldsville Rd	9/10/2013 22:26	2.6	-1	45	Yes	IA	Nil
Inlet Road West	10/10/2013 0:17	2.6	0.5	43	Yes	IA	Nil
Long Point	9/10/2013 22:00	2.9	0.5	43	Yes	IA	Nil
Wollemi Peak Rd	10/10/2013 1:11	2.4	-1	43	Yes	30	Nil
South Bulga	10/10/2013 0:47	3.1	0.5	43	No	30	NA
Wambo Rd	9/10/2013 23:49	2.9	-1	43	Yes	IA	Nil
Warkworth	15/10/2013 22:35	3.2	-1	43	No	IA	NA
MTIE	20/11/2013 22:59	2.9	-1	NA	Y	<35	Nil
Bulga Village	20/11/2013 23:28	2.5	-1	43	Y	NM	Nil
Gouldsville Rd	20/11/2013 22:27	2.9	0.5	45	Y	IA	Nil
Inlet Road West	21/11/2013 0:21	2.6	-1	43	Y	NM	Nil
Long Point	20/11/2013 22:00	3.2	-1	43	N	IA	NA
Wollemi Peak Rd	21/11/2013 1:14	2.6	-1	43	Y	36	Nil
South Bulga	21/11/2013 0:51	2.4	-1	43	Y	35	Nil
Wambo Rd	20/11/2013 23:52	2.9	-1	43	Y	<25	Nil
Warkworth	21/11/2013 1:13	2.6	-1	43	Y	IA	Nil
MTIE	12/12/2013 22:50	3.7	-1	NA	N	35	NA
Bulga Village	12/12/2013 23:20	3.8	-1	43	N	<25	NA
Gouldsville Rd	12/12/2013 22:25	3.9	-1	45	N	IA	NA
Inlet Road West	13/12/2013 0:14	3	-1	43	N	NM	NA
Long Point	12/12/2013 22:01	3.7	-1	43	N	IA	NA
Wollemi Peak Rd	13/12/2013 1:05	3	-1	43	Y	32	Nil
South Bulga	13/12/2013 0:41	2.3	0.5	43	Y	31	Nil
Wambo Rd	12/12/2013 23:46	3	-1	43	Y	IA	Nil
Warkworth	18/12/2013 0:00	2.1	0.5	43	Y	IA	Nil

1. Noise emission limits apply up to and including 3 metres per second (at a height of 10 metres), or temperature inversion conditions of up to 40C/100m (at a height of 10 metres);

2. Estimated or measured LAeq,15minute attributed to Mt Thorley Operations (MTO);

3. NA in exceedance column means atmospheric conditions outside conditions specified in project approval and so criterion is not applicable;

4. Bolded results in red are possible exceedances of relevant criteria; and

5. Criterion may or may not apply due to rounding of meteorological data values.

Appendix 4: Surface Water Monitoring Results

MTW Surface Water Monitoring 2013					
Station	Date	EC (µS/cm)	pH (pH units)	TSS (mg/L)	Comment
W1 Hunter River	12/03/2013	443	7.6	27	
W1 Hunter River	18/06/2013	739	8.0	<5	
W1 Hunter River	11/09/2013	834	8.6	14	
W1 Hunter River	11/12/2013	767	8.2	13	
W3 Hunter River	12/03/2013	457	7.7	24	
W3 Hunter River	18/06/2013	773	8.0	<5	
W3 Hunter River	11/09/2013	855	8.6	13	
W3 Hunter River	11/12/2013	791	8.4	13	
W4 Doctor's Creek	11/03/2013	3320	7.8	16	
W4 Doctor's Creek	17/06/2013	11760	8.4	<5	
W4 Doctor's Creek	10/09/2013	-	-	-	Insufficient Water for sampling
W4 Doctor's Creek	11/12/2013	2080	8.1	12	
W5 Loders Creek	8/01/2013	8950	8.5	14	
W5 Loders Creek	13/02/2013	6260	8.0	8	
W5 Loders Creek	11/03/2013	5930	7.9	9	
W5 Loders Creek	9/04/2013	12440	8.1	10	
W5 Loders Creek	14/05/2013	13490	8.0	7	
W5 Loders Creek	18/06/2013	13220	8.1	6	
W5 Loders Creek	16/07/2013	11840	8.1	<5	
W5 Loders Creek	6/08/2013	14000	8.2	<5	
W5 Loders Creek	10/09/2013	14140	8.2	<5	
W5 Loders Creek	15/10/2013	11780	8.7	<5	
W5 Loders Creek	4/11/2013	12700	8.8	<5	
W5 Loders Creek	11/12/2013	8320	8.7	12	
W14 Doctors' Creek	12/03/2013	620	8.3	31	
W14 Doctors' Creek	17/06/2013	-	-	-	Insufficient Water for sampling
W14 Doctors' Creek	11/09/2013	-	-	-	Dry
W14 Doctors' Creek	11/12/2013	-	-	-	Dry
W15 Loders Creek	12/03/2013	7550	8.1	6	
W15 Loders Creek	18/06/2013	11970	8.2	105	
W15 Loders Creek	11/09/2013	13150	8.1	38	

W15 Loders Creek	11/12/2013	11050	7.9	10	
W27 Longford Creek	12/03/2013	288	7.0	104	
W27 Longford Creek	18/06/2013	314	8.2	42	
W27 Longford Creek	11/09/2013	262	7.5	<5	
W27 Longford Creek	11/12/2013	308	7.7	92	
WW5 Dight's Creek	12/03/2013	1083	7.7	52	
WW5 Dight's Creek	18/06/2013	227	8.3	77	
WW5 Dight's Creek	11/09/2013	-	-	-	Dry
WW5 Dight's Creek	11/12/2013	447	8.0	14	
Wollombi Brook	11/01/2013	934	6.9	16	
Wollombi Brook	13/02/2013	383	7.2	9	
Wollombi Brook	12/03/2013	289	7.1	14	
Wollombi Brook	9/04/2013	577	7.4	6	
Wollombi Brook	18/06/2013	507	7.6	<5	
Wollombi Brook	11/09/2013	795	7.5	<5	
Wollombi Brook	11/12/2013	641	8.0	<5	
Wollombi Brook Upstream	11/01/2013	1138	7.5	6	
Wollombi Brook Upstream	13/02/2013	373	8.0	6	
Wollombi Brook Upstream	13/03/2013	323	7.1	8	
Wollombi Brook Upstream	9/04/2013	558	7.3	<5	
Wollombi Brook Upstream	14/05/2013	594	7.5	5	
Wollombi Brook Upstream	18/06/2013	511	8.4	<5	
Wollombi Brook Upstream	16/07/2013	470	7.7	<5	
Wollombi Brook Upstream	6/08/2013	582	7.6	<5	
Wollombi Brook Upstream	11/09/2013	713	7.2	<5	
Wollombi Brook Upstream	15/10/2013	815	7.2	5	
Wollombi Brook Upstream	4/11/2013	903	7.1	<5	
Wollombi Brook Upstream	11/12/2013	606	7.6	<5	
SP1 (Salt Pan Creek)	11/01/2013	-	-	-	Dry
SP1 (Salt Pan Creek)	13/02/2013	2290	7.4	<5	
SP1 (Salt Pan Creek)	12/03/2013	2200	7.2	18	
SP1 (Salt Pan Creek)	9/04/2013	16360	8.0	13	
SP1 (Salt Pan Creek)	14/05/2013	17630	8.3	6	
SP1 (Salt Pan Creek)	18/06/2013	15560	7.6	<5	
SP1 (Salt Pan Creek)	16/07/2013	15830	7.7	<5	

SP1 (Salt Pan Creek)	6/08/2013	17600	8.1	<5	
SP1 (Salt Pan Creek)	11/09/2013	18160	8.5	20	
SP1 (Salt Pan Creek)	15/10/2013	26200	8.5	10	Low water level
SP1 (Salt Pan Creek)	4/11/2013	29900	8.4	40	
SP1 (Salt Pan Creek)	11/12/2013	22900	8.5	11	
Dam 1S	8/01/2013	16640	9.1	61	
Dam 1S	13/02/2013	6520	9.3	89	
Dam 1S	11/03/2013	904	8.0	123	
Dam 1S	9/04/2013	1500	8.2	<5	
Dam 1S	14/05/2013	4800	8.4	54	
Dam 1S	17/06/2013	5770	8.6	-	Sample not collected for TSS
Dam 1S	16/07/2013	6480	8.4	26	
Dam 1S	6/08/2013	6560	8.5	18	
Dam 1S	10/09/2013	5310	8.4	126	
Dam 1S	15/10/2013	4090	8.8	11	
Dam 1S	4/11/2013	4030	9.0	44	
Dam 1S	11/12/2013	5030	9.2	45	
Dam 1N	12/03/2013	2330	8.9	10	
Dam 1N	18/06/2013	5550	8.1	19	
Dam 1N	11/09/2013	6070	8.9	40	
Dam 1N	12/12/2013	2990	8.6	19	
Dam 9S	11/03/2013	4770	9.0	10	
Dam 9S	17/06/2013	6120	8.8	46	
Dam 9S	10/09/2013	7100	8.8	18	
Dam 9S	11/12/2013	7320	8.9	16	
Dam 15S	11/03/2013	4040	9.1	24	
Dam 15S	17/06/2013	597	8.5	13	
Dam 15S	10/09/2013	7300	9.0	93	
Dam 15S	11/12/2013	4720	8.9	16	
W18	11/03/2013	1639	8.3	40	
W18	17/06/2013	5210	8.6	39	
W18	10/09/2013	6660	8.9	35	
W18	11/12/2013	4600	9.0	11	
W21	11/03/2013	618	7.0	297	
W21	17/06/2013	2330	7.6	32	

W21	10/09/2013	3270	8.5	32	
W21	11/12/2013	1769	8.1	687	
W23	11/03/2013	493	8.1	108	
W23	17/06/2013	615	7.4	66	
W23	10/09/2013	769	7.8	34	
W23	11/12/2013	684	8.8	123	
W25	11/03/2013	656	7.2	486	
W25	17/06/2013	2420	8.4	70	
W25	10/09/2013	3660	8.5	110	
W25	11/12/2013	2240	8.3	279	

Appendix 5: Monitoring Results for Groundwater sites

MTW Groundwater Monitoring 2013					
Station	Date	Comment	RL Standing Water Level (mAHD)	Electrical Conductivity (µS/cm)	pH (pH units)
G3	27/03/2013		23.54	7050	7.5
G3	19/06/2013		21.81	7380	7.7
G3	4/09/2013		20.27	7740	7.8
G3	10/12/2013		18.60	7600	7.8
OH1121	3/04/2013		35.33	7990	7.1
OH1121	26/06/2013		35.38	7130	7.3
OH1121	4/09/2013		35.37	8200	7.1
OH1121	10/12/2013		35.32	7480	7.1
OH1122 (1)	27/03/2013		56.49	11090	7.3
OH1122 (1)	5/07/2013		56.34	12900	7.0
OH1122 (1)	5/09/2013		55.81	12650	6.9
OH1122 (1)	11/12/2013		55.52	12050	7.2
OH1122 (2)	27/03/2013	Dry	26.40	-	-
OH1122 (2)	5/07/2013	Dry	26.18	-	-
OH1122 (2)	5/09/2013	Dry	26.40	-	-
OH1122 (2)	11/12/2013	Dry	26.40	-	-
OH1122 (3)	27/03/2013		31.77	11590	7.3
OH1122 (3)	5/07/2013		31.10	12140	7.2
OH1122 (3)	5/09/2013		29.98	12070	7.2
OH1122 (3)	11/12/2013		29.14	11710	7.2
OH1123 (1)	3/04/2013		57.10	16790	7.0
OH1123 (1)	4/07/2013		57.39	17730	6.8
OH1123 (1)	5/09/2013		51.52	17720	6.9
OH1123 (1)	11/12/2013		51.30	15970	6.8
OH1123 (2)	3/04/2013		43.36	18400	7.1
OH1123 (2)	4/07/2013		46.89	18500	7.0
OH1123 (2)	5/09/2013		40.26	18300	6.9
OH1123 (2)	11/12/2013		33.50	17910	7.1
OH1123 (3)	3/04/2013		43.05	17310	7.1
OH1123 (3)	4/07/2013		46.41	17150	7.1

OH1123 (3)	5/09/2013		39.66	17010	7.0
OH1123 (3)	11/12/2013		34.15	16430	7.1
OH1125 (1)	27/03/2013		58.18	13460	6.8
OH1125 (1)	5/07/2013		58.98	15100	6.7
OH1125 (1)	4/09/2013		59.76	14110	6.7
OH1125 (1)	10/12/2013		59.75	14420	6.7
OH1125 (2)	27/03/2013	Dry	62.59	-	-
OH1125 (2)	5/07/2013	Dry	62.59	-	-
OH1125 (2)	4/09/2013	Dry	62.59	-	-
OH1125 (2)	10/12/2013	Dry	62.59	-	-
OH1125 (3)	27/03/2013		40.57	12890	6.9
OH1125 (3)	5/07/2013		47.87	14480	6.7
OH1125 (3)	4/09/2013		49.88	13770	6.7
OH1125 (3)	10/12/2013		48.37	14020	6.8
OH1126	27/03/2013		50.40	6600	7.0
OH1126	3/07/2013		50.60	7960	6.7
OH1126	4/09/2013		50.69	7770	6.6
OH1126	11/12/2013		50.57	7860	7.0
OH1127	3/04/2013		35.59	11920	7.0
OH1127	26/06/2013		35.63	9580	7.1
OH1127	4/09/2013		35.63	11480	6.9
OH1127	10/12/2013		35.64	11220	6.9
OH1137	27/03/2013	Low EC - suspected transcription error during sampling	55.40	2860	6.9
OH1137	3/07/2013		55.58	18100	7.0
OH1137	4/09/2013		55.46	17200	6.9
OH1137	11/12/2013		55.36	17210	7.0
OH1138 (1)	27/03/2013		61.97	15820	6.9
OH1138 (1)	3/07/2013		61.98	18600	6.5
OH1138 (1)	4/09/2013		61.82	17380	6.4
OH1138 (1)	11/12/2013		61.86	18460	6.8
OH1138 (2)	27/03/2013		56.33	10530	7.0
OH1138 (2)	3/07/2013		56.40	11860	6.7
OH1138 (2)	4/09/2013		56.41	11170	6.7
OH1138 (2)	11/12/2013		56.46	11600	6.8
OH786	27/03/2013		54.83	488	7.7
OH786	3/07/2013		53.25	785	7.3
OH786	4/09/2013		49.81	931	7.6
OH786	11/12/2013		54.95	555	7.6
OH787	27/03/2013		36.26	16510	7.6

OH787	3/07/2013		36.27	17660	7.7
OH787	4/09/2013		36.27	17230	7.6
OH787	11/12/2013		36.29	17420	7.3
OH788	3/04/2013		35.78	11730	7.8
OH788	26/06/2013		35.82	9340	7.5
OH788	4/09/2013		35.82	11580	7.2
OH788	11/12/2013		35.80	11570	7.3
OH942	27/03/2013		46.69	22900	6.8
OH942	3/07/2013		46.68	25700	6.7
OH942	4/09/2013		46.65	24000	6.7
OH942	10/01/2014		46.59	17510	6.8
OH943	3/04/2013		35.86	8220	7.5
OH943	26/06/2013	Insufficient water for sampling	35.88	-	-
OH943	4/09/2013		35.87	8120	7.4
OH943	11/12/2013		35.85	7550	7.2
OH944	27/03/2013	Insufficient water for sampling	40.16	-	-
OH944	3/07/2013	Insufficient water for sampling	40.16	-	-
OH944	4/09/2013	Dry	39.68	-	-
OH944	11/12/2013	Dry	39.68	-	-
PZ7D	28/03/2013		51.90	1718	8.0
PZ7D	27/06/2013		51.83	1730	7.5
PZ7D	5/09/2013		51.81	1830	8.1
PZ7D	10/12/2013		51.74	1626	8.0
PZ7S	28/03/2013		51.39	1543	6.9
PZ7S	27/06/2013		51.49	1290	6.8
PZ7S	5/09/2013		51.51	1090	7.8
PZ7S	10/12/2013		51.48	1482	7.0
PZ8D	27/03/2013		60.53	8100	7.6
PZ8D	19/06/2013		60.35	8260	8.1
PZ8D	5/09/2013		58.97	7680	7.4
PZ8D	10/12/2013		60.12	8000	7.6
PZ8S	27/03/2013		60.71	13860	6.7
PZ8S	19/06/2013		60.64	14320	7.0
PZ8S	5/09/2013		60.56	14450	6.7
PZ8S	10/12/2013		60.48	14280	6.7
PZ9D	27/03/2013		52.38	9540	6.9
PZ9D	19/06/2013		51.87	9590	7.3
PZ9D	4/09/2013		51.98	10100	7.0
PZ9D	10/12/2013		51.46	10000	6.9
PZ9S	27/03/2013		60.99	14560	6.7
PZ9S	19/06/2013		60.84	15120	6.9
PZ9S	4/09/2013		60.68	15140	6.8
PZ9S	10/12/2013		60.53	15290	6.8
WOH2139A	28/03/2013		54.84	1960	7.3
WOH2139A	4/07/2013		54.84	2050	7.4
WOH2139A	5/09/2013		54.46	2230	7.5
WOH2139A	10/12/2013		54.22	1980	7.5
WOH2141A	28/03/2013	Dry	46.14	-	-
WOH2141A	27/06/2013	Insufficient water for sampling	45.96	-	-

WOH2141A	5/09/2013	Dry	45.69	-	-
WOH2141A	10/12/2013	Dry	45.69	-	-
WOH2141B	28/03/2013		51.35	7300	7.5
WOH2141B	27/06/2013		51.22	8630	7.7
WOH2141B	5/09/2013		51.08	9600	8.0
WOH2141B	10/12/2013		51.05	9550	8.0
WOH2153A	28/03/2013		61.86	1850	7.9
WOH2153A	2/07/2013		60.95	1810	7.6
WOH2153A	5/09/2013		61.87	1890	8.1
WOH2153A	10/12/2013		61.74	1822	7.7
WOH2153B	28/03/2013		59.60	1851	7.8
WOH2153B	2/07/2013		59.63	1860	7.8
WOH2153B	5/09/2013		59.75	2000	8.1
WOH2153B	10/12/2013		59.48	1820	7.8
WOH2154A	28/03/2013		59.11	3550	7.9
WOH2154A	2/07/2013		60.04	4650	7.5
WOH2154A	5/09/2013		60.71	4860	7.6
WOH2154A	10/12/2013		60.48	4220	7.5
WOH2154B	28/03/2013		57.69	3890	7.7
WOH2154B	2/07/2013		57.64	4610	7.7
WOH2154B	5/09/2013		57.58	4750	7.7
WOH2154B	10/12/2013		57.53	4500	7.4
WOH2155A	28/03/2013		67.88	7050	7.5
WOH2155A	27/06/2013		68.08	7560	7.4
WOH2155A	5/09/2013		67.45	7390	7.6
WOH2155A	10/12/2013		66.92	7150	7.6
WOH2155B	28/03/2013		59.63	5150	7.7
WOH2155B	27/06/2013		59.72	5420	7.5
WOH2155B	5/09/2013		59.78	5730	7.6
WOH2155B	10/12/2013		59.93	5210	7.5
WOH2156A	28/03/2013		66.25	10730	7.7
WOH2156A	4/07/2013		66.95	17890	7.0
WOH2156A	5/09/2013		66.53	15500	7.4
WOH2156A	10/12/2013		65.82	15890	7.4
WOH2156B	28/03/2013		68.66	7630	7.4
WOH2156B	4/07/2013		68.44	8360	7.3
WOH2156B	5/09/2013		69.48	9580	7.4
WOH2156B	10/12/2013		69.22	10090	7.4

Appendix 6: MTW 2013 Complaints Summary

Type	Month	Date	Complainant	Location	Method received	Time
Noise	January	03-Jan-13	36	Bulga	Complaints Hotline	11:42
Noise	January	03-Jan-13	36	Bulga	Complaints Hotline	21:16
Noise	January	03-Jan-13	56	Bulga	Complaints Hotline	22:58
Noise	January	03-Jan-13	69	Bulga	Complaints Hotline	22:41
Noise	January	04-Jan-13	36	Bulga	Complaints Hotline	10:30
Dust	January	05-Jan-13	9	Bulga Village	Complaints Hotline	12:17
Noise	January	07-Jan-13	2	Bulga	Complaints Hotline	22:30
Noise	January	07-Jan-13	23	Bulga	Complaints Hotline	21:36
Noise	January	07-Jan-13	36	Bulga	Complaints Hotline	20:53
Noise	January	07-Jan-13	36	Bulga	Complaints Hotline	22:58
Noise	January	07-Jan-13	69	Bulga	Complaints Hotline	23:24
Dust	January	09-Jan-13	27	Long Point	Complaints Hotline	14:18
Noise	January	09-Jan-13	36	Bulga	Complaints Hotline	16:51
Blast	January	09-Jan-13	70	Bulga	DoPI Hotline	14:23
Noise	January	10-Jan-13	56	Bulga	Complaints Hotline	22:51
Blast	January	11-Jan-13	23	Bulga	Complaints Hotline	13:10
Noise	January	11-Jan-13	58	Bulga	Complaints Hotline	20:30 20:41
Noise	January	12-Jan-13	1	Bulga	Complaints Hotline	19:45
Noise	January	12-Jan-13	2	Bulga	Complaints Hotline	22:24
Noise	January	12-Jan-13	4	Bulga	Complaints Hotline	19:31
Noise	January	12-Jan-13	23	Bulga	Complaints Hotline	19:34

Noise	January	12-Jan-13	59	Bulga	Complaints Hotline	19:34
Noise	January	12-Jan-13	62	Bulga	Complaints Hotline	22:31
Noise	January	12-Jan-13	69	Bulga	Complaints Hotline	19:19
Noise	January	14-Jan-13	2	Bulga	Complaints Hotline	23:00
Noise	January	15-Jan-13	4	Bulga	Complaints Hotline	6:21
Noise	January	15-Jan-13	36	Bulga	Complaints Hotline	22:15
Noise	January	16-Jan-13	2	Bulga	Complaints Hotline	22:37
Noise	January	16-Jan-13	7	Bulga	Complaints Hotline	22:57
Noise	January	17-Jan-13	2	Bulga	Complaints Hotline	19:52 21:13
Noise	January	17-Jan-13	4	Bulga	Complaints Hotline	20:44 20:58
Noise	January	17-Jan-13	35	Bulga	Complaints Hotline	20:52
Noise	January	17-Jan-13	36	Bulga	Complaints Hotline	21:28
Noise	January	17-Jan-13	56	Bulga	Complaints Hotline	22:46
Noise	January	17-Jan-13	59	Bulga	Complaints Hotline	21:12
Dust	January	18-Jan-13	DoPI	Unspecified	Phone call to Environmental Coordinator	10:16
Dust	January	18-Jan-13	34	Bulga	Phone call to CR Specialist	10:12
Noise	January	19-Jan-13	2	Bulga	Complaints Hotline	0:16
Noise	January	20-Jan-13	60	Bulga	Complaints Hotline	2:42 3:26
Noise	January	21-Jan-13	7	Bulga	Complaints Hotline	21:17
Noise	January	21-Jan-13	10	Bulga	Complaints Hotline	22:00
Noise	January	21-Jan-13	23	Bulga	Complaints Hotline	21:33
Noise	January	21-Jan-13	45	Bulga	Complaints Hotline	21:46

Noise	January	21-Jan-13	56	Bulga	Complaints Hotline	22:10
Noise	January	21-Jan-13	59	Bulga	Complaints Hotline	0:53
Noise	January	24-Jan-13	45	Bulga	Complaints Hotline	22:18
Dust	January	24-Jan-13	51	Putty Road	Complaints Hotline	15:20
Noise	January	24-Jan-13	56	Bulga	Complaints Hotline	23:00
Noise	January	25-Jan-13	4	Bulga	Complaints Hotline	6:28
Noise	January	25-Jan-13	23	Bulga	Complaints Hotline	5:06
Noise	January	25-Jan-13	34	Bulga	Complaints Hotline	3:36
Noise	January	25-Jan-13	45	Bulga	Complaints Hotline	22:59
Noise	January	26-Jan-13	59	Bulga	Complaints Hotline	21:01 22:47
Noise	January	27-Jan-13	69	Bulga	Complaints Hotline	0:09
Noise	January	28-Jan-13	60	Bulga	Complaints Hotline	0:09
Noise	January	29-Jan-13	36	Bulga	Complaints Hotline	21:52
Noise	January	30-Jan-13	60	Bulga	Complaints Hotline	21:15
Noise	January	31-Jan-13	7	Bulga	Complaints Hotline	21:08
Noise	January	31-Jan-13	23	Bulga	Complaints Hotline	21:45
Noise	January	31-Jan-13	35	Bulga	Complaints Hotline	20:40 21:59 23:24
Noise	January	31-Jan-13	36	Bulga	Complaints Hotline	20:34
Noise	January	31-Jan-13	56	Bulga	Complaints Hotline	22:58
Noise	January	31-Jan-13	57	Bulga	Complaints Hotline	22:02
Noise	January	31-Jan-13	59	Bulga	Complaints Hotline	21:24 22:37
Noise	January	31-Jan-13	69	Bulga	Complaints Hotline	21:45
Dust	February	01-Feb-13	4	Bulga	Complaints Hotline	15:09

Noise	February	01-Feb-13	23	Bulga	Complaints Hotline	4:51
Noise	February	05-Feb-13	7	Bulga	Complaints Hotline	22:32
Noise	February	05-Feb-13	9	Bulga Village	Complaints Hotline	20:59
Noise	February	05-Feb-13	53	Bulga	Complaints Hotline	22:17
Noise	February	05-Feb-13	60	Bulga	Complaints Hotline	21:26 21:51
Noise	February	05-Feb-13	69	Bulga	Complaints Hotline	21:23
Noise	February	06-Feb-13	9	Bulga Village	Complaints Hotline	21:18
Noise	February	06-Feb-13	36	Bulga	Complaints Hotline	8:04
Light	February	06-Feb-13	38	Bulga	Complaints Hotline	23:58
Noise	February	06-Feb-13	47	Bulga	Complaints Hotline	2:21
Noise	February	07-Feb-13	35	Bulga	Complaints Hotline	0:43
Noise	February	11-Feb-13	45	Bulga	Complaints Hotline	22:12 10:31
Noise	February	13-Feb-13	7	Bulga	Complaints Hotline	21:11
Noise	February	13-Feb-13	23	Bulga	Complaints Hotline	20:56
Noise	February	13-Feb-13	45	Bulga	Complaints Hotline	21:41
Noise	February	13-Feb-13	53	Bulga	Complaints Hotline	22:28
Noise	February	13-Feb-13	56	Bulga	Complaints Hotline	21:42
Noise	February	13-Feb-13	59	Bulga	Complaints Hotline	22:01
Noise	February	14-Feb-13	7	Bulga	Complaints Hotline	6:26
Noise	February	14-Feb-13	7	Bulga	Complaints Hotline	22:11
Blast	February	14-Feb-13	14	Bulga	Complaints Hotline	13:45
Noise	February	14-Feb-13	45	Bulga	Complaints Hotline	22:42
Dust	February	14-Feb-13	62	Bulga	Complaints Hotline	21:30

Noise	February	15-Feb-13	45	Bulga	Complaints Hotline	5:11 5:55 6:23
Noise	February	17-Feb-13	4	Bulga	Complaints Hotline	7:49
Noise	February	17-Feb-13	7	Bulga	Complaints Hotline	22:20
Noise	February	17-Feb-13	59	Bulga	Complaints Hotline	21:56 23:46
Noise	February	17-Feb-13	60	Bulga	Complaints Hotline	21:21
Noise	February	18-Feb-13	23	Bulga	Complaints Hotline	9:07
Noise	February	18-Feb-13	34	Bulga	Complaints Hotline	22:24
Noise	February	18-Feb-13	37	Bulga	Complaints Hotline	23:01 0:29
Noise	February	18-Feb-13	62	Bulga	Complaints Hotline	21:14 22:39
Noise	February	19-Feb-13	23	Bulga	Complaints Hotline	0:10
Noise	February	19-Feb-13	23	Bulga	Complaints Hotline	21:14
Noise	February	19-Feb-13	52	Bulga	Complaints Hotline	22:27
Dust	February	19-Feb-13	71	Bulga	manual entry	15:42
Noise	February	20-Feb-13	69	Bulga	Complaints Hotline	21:15
Light	February	21-Feb-13	64	Unspecified	Complaints Hotline	22:52
Noise	February	22-Feb-13	9	Bulga Village	Complaints Hotline	7:41
Noise	February	24-Feb-13	7	Bulga	Complaints Hotline	21:57
Noise	February	24-Feb-13	18	Bulga	Complaints Hotline	20:04
Noise	February	24-Feb-13	23	Bulga	Complaints Hotline	23:20
Noise	February	24-Feb-13	23	Bulga	Complaints Hotline	19:08 20:06
Noise	February	24-Feb-13	30	Bulga	Complaints Hotline	19:07

Noise	February	24-Feb-13	33	Bulga	Complaints Hotline	18:11
Noise	February	24-Feb-13	36	Bulga	Complaints Hotline	7:58
Noise	February	24-Feb-13	36	Bulga	Complaints Hotline	17:38 19:28
Noise	February	24-Feb-13	53	Bulga	Complaints Hotline	21:03
Noise	February	24-Feb-13	59	Bulga	Complaints Hotline	20:59 22:44
Noise	February	24-Feb-13	61	Unspecified	Complaints Hotline	19:28
Noise	February	24-Feb-13	66	Bulga	Complaints Hotline	19:50 20:20
Noise	February	24-Feb-13	69	Bulga	Complaints Hotline	19:07
Noise	February	25-Feb-13	7	Bulga	Complaints Hotline	6:04
Noise	February	25-Feb-13	30	Bulga	Complaints Hotline	22:22
Noise	February	25-Feb-13	36	Bulga	Complaints Hotline	9:47
Noise	February	26-Feb-13	2	Bulga	Complaints Hotline	22:57
Noise	February	26-Feb-13	56	Bulga	Complaints Hotline	22:42
Noise	February	27-Feb-13	36	Bulga	Complaints Hotline	7:32
Noise	February	27-Feb-13	56	Bulga	Complaints Hotline	23:04
Noise	February	27-Feb-13	59	Bulga	EPA Hotline	21:44 21:53
Noise	February	27-Feb-13	69	Bulga	Complaints Hotline	8:13
Light	March	02-Mar-13	42	Bulga	Complaints Hotline	0:06
Noise	March	04-Mar-13	36	Bulga	Complaints Hotline	7:33
Light	March	04-Mar-13	42	Bulga	Complaints Hotline	19:54 21:28
Noise	March	04-Mar-13	2	Bulga	Complaints Hotline	21:39
Noise	March	04-Mar-13	23	Bulga	Complaints Hotline	23:14

Noise	March	05-Mar-13	37	Bulga	Complaints Hotline	8:20
Noise	March	05-Mar-13	DoPI	Unspecified	Complaints Hotline	10:40
Noise	March	05-Mar-13	23	Bulga	Complaints Hotline	20:51
Noise	March	05-Mar-13	42	Bulga	Complaints Hotline	22:02
Noise	March	05-Mar-13	36	Bulga	Complaints Hotline	22:07
Noise	March	05-Mar-13	52	Bulga	Complaints Hotline	22:41
Noise	March	06-Mar-13	26	Bulga	Complaints Hotline	4:52
Noise	March	06-Mar-13	23	Bulga	Complaints Hotline	21:34
Blast	March	07-Mar-13	31	Bulga	Phone to Enviromental Coordinator	14:30
Noise	March	07-Mar-13	34	Bulga	Complaints Hotline	0:53
Noise	March	07-Mar-13	29	Bulga	Complaints Hotline	5:43
Noise	March	07-Mar-13	62	Bulga	Complaints Hotline	21:28
Noise	March	08-Mar-13	33	Bulga	Complaints Hotline	7:39
Noise	March	09-Mar-13	23	Bulga	Complaints Hotline	0:41
Noise	March	09-Mar-13	52	Bulga	Complaints Hotline	4:56
Noise	March	09-Mar-13	54	Bulga	Complaints Hotline	5:40
Noise	March	09-Mar-13	30	Bulga	Complaints Hotline	7:39
Noise	March	09-Mar-13	36	Bulga	Complaints Hotline	7:53
Noise	March	09-Mar-13	9	Bulga Village	Complaints Hotline	22:08
Noise	March	09-Mar-13	61	Bulga	Complaints Hotline	22:12
Noise	March	09-Mar-13	56	Bulga	Complaints Hotline	22:15
Noise	March	09-Mar-13	73	Bulga	Complaints Hotline	22:17
Noise	March	09-Mar-13	52	Bulga	Complaints Hotline	22:44
Noise	March	09-Mar-13	59	Bulga	Complaints Hotline	22:49

Noise	March	10-Mar-13	35	Bulga	Complaints Hotline	21:04
Noise	March	10-Mar-13	36	Bulga	Complaints Hotline	21:06
Noise	March	10-Mar-13	23	Bulga	Complaints Hotline	21:32
Noise	March	10-Mar-13	62	Bulga	Complaints Hotline	21:47
Noise	March	10-Mar-13	42	Bulga	Complaints Hotline	22:19
Noise	March	10-Mar-13	59	Bulga	Complaints Hotline	22:19
Noise	March	10-Mar-13	2	Bulga	Complaints Hotline	22:40
Noise	March	10-Mar-13	69	Bulga	Complaints Hotline	22:53
Noise	March	10-Mar-13	56	Bulga	Complaints Hotline	23:23
Noise	March	11-Mar-13	2	Bulga	Complaints Hotline	8:52
Noise	March	11-Mar-13	60	Bulga	Complaints Hotline	20:55 21:09 22:22 22:34
Noise	March	11-Mar-13	7	Bulga	Complaints Hotline	21:31
Noise	March	11-Mar-13	2	Bulga	Complaints Hotline	21:41
Noise	March	11-Mar-13	50	Bulga	Complaints Hotline	21:46
Noise	March	11-Mar-13	56	Bulga	Complaints Hotline	23:15
Noise	March	12-Mar-13	9	Bulga Village	Complaints Hotline	6:00
Noise	March	12-Mar-13	37	Bulga	Complaints Hotline	8:03
Noise	March	12-Mar-13	62	Bulga	Complaints Hotline	21:04
Noise	March	12-Mar-13	56	Bulga	Complaints Hotline	23:01
Noise	March	13-Mar-13	26	Bulga	Complaints Hotline	5:16
Noise	March	13-Mar-13	23	Bulga	Complaints Hotline	5:49
Noise	March	19-Mar-13	1	Bulga	Complaints Hotline	3:01
Noise	March	19-Mar-13	50	Bulga	Complaints Hotline	3:38

Noise	March	19-Mar-13	9	Bulga Village	Complaints Hotline	6:01
Noise	March	19-Mar-13	7	Bulga	Complaints Hotline	6:04
Noise	March	19-Mar-13	15	Bulga	Complaints Hotline	8:16 8:43
Blast	March	19-Mar-13	12	Bulga	Complaints Hotline	16:41
Noise	March	19-Mar-13	34	Bulga	Complaints Hotline	22:04
Noise	March	19-Mar-13	35	Bulga	Complaints Hotline	22:38
Noise	March	19-Mar-13	56	Bulga	Complaints Hotline	23:20
Noise	March	20-Mar-13	54	Bulga	Complaints Hotline	0:32
Noise	March	20-Mar-13	26	Bulga	Complaints Hotline	3:42
Noise	March	20-Mar-13	2	Bulga	Complaints Hotline	6:02
Noise	March	20-Mar-13	37	Bulga	Complaints Hotline	8:17
Noise	March	20-Mar-13	69	Bulga	Complaints Hotline	21:57
Noise	March	20-Mar-13	7	Bulga	Complaints Hotline	22:26
Noise	March	20-Mar-13	53	Bulga	Complaints Hotline	23:00
Noise	March	20-Mar-13	56	Bulga	Complaints Hotline	23:26
Noise	March	21-Mar-13	35	Bulga	Complaints Hotline	20:22 21:33
Noise	March	21-Mar-13	42	Bulga	Complaints Hotline	21:17
Noise	March	21-Mar-13	23	Bulga	Complaints Hotline	21:32
Noise	March	21-Mar-13	53	Bulga	Complaints Hotline	21:41
Noise	March	21-Mar-13	2	Bulga	Complaints Hotline	21:56
Noise	March	21-Mar-13	7	Bulga	Complaints Hotline	22:14
Noise	March	21-Mar-13	56	Bulga	Complaints Hotline	23:44
Blast	March	22-Mar-13	12	Bulga	Complaints Hotline	16:00

Dust	March	22-Mar-13	72	Bulga	Complaints Hotline	16:18
Dust	March	22-Mar-13	19	Glenridding	Complaints Hotline	21:33
Blast	March	23-Mar-13	11	Bulga	Complaints Hotline	10:26
Light	March	23-Mar-13	39	Unspecified	Complaints Hotline	19:13
Noise	March	23-Mar-13	23	Bulga	Complaints Hotline	20:45
Noise	March	23-Mar-13	7	Bulga	Complaints Hotline	21:39
Noise	March	23-Mar-13	68	Unspecified	Complaints Hotline	21:39
Noise	March	23-Mar-13	2	Bulga	Complaints Hotline	22:59
Noise	March	24-Mar-13	56	Bulga	Complaints Hotline	0:05
Dust	March	24-Mar-13	51	Putty Road	Complaints Hotline	20:56
Noise	March	25-Mar-13	23	Bulga	Complaints Hotline	19:43
Noise	March	25-Mar-13	69	Bulga	Complaints Hotline	21:41
Noise	March	25-Mar-13	54	Bulga	Complaints Hotline	21:43
Noise	March	25-Mar-13	2	Bulga	Complaints Hotline	21:58
Noise	March	25-Mar-13	22	Bulga	Complaints Hotline	22:28
Noise	March	25-Mar-13	56	Bulga	Complaints Hotline	22:42
Noise	March	25-Mar-13	53	Bulga	Complaints Hotline	22:50
Noise	March	26-Mar-13	23	Bulga	Complaints Hotline	19:19
Noise	March	26-Mar-13	22	Bulga	Complaints Hotline	21:44
Noise	March	26-Mar-13	66	Bulga	Complaints Hotline	22:01
Noise	March	26-Mar-13	50	Bulga	Complaints Hotline	22:09
Noise	March	26-Mar-13	2	Bulga	Complaints Hotline	22:23
Noise	March	26-Mar-13	56	Bulga	Complaints Hotline	22:30
Noise	March	27-Mar-13	54	Bulga	Complaints Hotline	0:32
Noise	March	27-Mar-13	54	Bulga	Complaints Hotline	20:28

Noise	March	27-Mar-13	59	Bulga	Complaints Hotline	21:01 22:37
Noise	March	27-Mar-13	2	Bulga	Complaints Hotline	21:47
Noise	March	27-Mar-13	7	Bulga	Complaints Hotline	22:31
Noise	March	27-Mar-13	23	Bulga	Complaints Hotline	22:44
Noise	March	27-Mar-13	30	Bulga	Complaints Hotline	23:26
Blast	March	28-Mar-13	14	Bulga	Complaints Hotline	10:50
Blast	March	28-Mar-13	72	Bulga	Complaints Hotline	10:50
Noise	March	29-Mar-13	2	Bulga	Complaints Hotline	22:06
Noise	March	30-Mar-13	23	Bulga	Complaints Hotline	4:37
Noise	March	30-Mar-13	2	Bulga	Complaints Hotline	9:05
Noise	March	30-Mar-13	2	Bulga	Complaints Hotline	21:56
Noise	March	30-Mar-13	42	Bulga	Complaints Hotline	22:07
Noise	March	30-Mar-13	23	Bulga	Complaints Hotline	23:11
Noise	March	30-Mar-13	56	Bulga	Complaints Hotline	23:37
Light	March	31-Mar-13	42	Bulga	Complaints Hotline	20:05
Noise	April	01-Apr-13	22	Bulga	Complaints Hotline	21:01
Noise	April	01-Apr-13	45	Bulga	Complaints Hotline	21:34
Noise	April	01-Apr-13	62	Bulga	Complaints Hotline	22:19
Noise	April	01-Apr-13	50	Bulga	Complaints Hotline	22:35
Noise	April	01-Apr-13	56	Bulga	Complaints Hotline	22:48
Noise	April	02-Apr-13	56	Bulga	Complaints Hotline	22:54
Blast	April	03-Apr-13	46	Unspecified	Complaints Hotline	10:57
Noise	April	03-Apr-13	45	Bulga	Complaints Hotline	19:57 20:44
Noise	April	03-Apr-13	62	Bulga	Complaints Hotline	21:41

Noise	April	03-Apr-13	56	Bulga	Complaints Hotline	22:56
Noise	April	04-Apr-13	45	Bulga	Complaints Hotline	20:40
Noise	April	04-Apr-13	62	Bulga	Complaints Hotline	21:28 22:23
Noise	April	04-Apr-13	42	Bulga	Complaints Hotline	21:41
Noise	April	05-Apr-13	23	Bulga	Complaints Hotline	8:14
Noise	April	05-Apr-13	26	Bulga	Complaints Hotline	9:18
Light	April	05-Apr-13	42	Bulga	Complaints Hotline	10:23
Noise	April	05-Apr-13	22	Bulga	Complaints Hotline	21:35 23:05
Noise	April	05-Apr-13	52	Bulga	Complaints Hotline	22:36
Noise	April	05-Apr-13	56	Bulga	Complaints Hotline	23:15
Noise	April	06-Apr-13	26	Bulga	Complaints Hotline	8:49
Noise	April	06-Apr-13	23	Bulga	Complaints Hotline	9:18
Noise	April	06-Apr-13	50	Bulga	Complaints Hotline	9:33
Noise	April	06-Apr-13	23	Bulga	Complaints Hotline	21:43
Noise	April	06-Apr-13	45	Bulga	Complaints Hotline	22:00
Noise	April	06-Apr-13	7	Bulga	Complaints Hotline	22:08
Noise	April	06-Apr-13	32	Bulga	Complaints Hotline	22:23
Noise	April	06-Apr-13	56	Bulga	Complaints Hotline	22:48
Noise	April	06-Apr-13	26	Bulga	Complaints Hotline	23:36
Light	April	07-Apr-13	42	Bulga	Complaints Hotline	18:42 20:30
Noise	April	07-Apr-13	23	Bulga	Complaints Hotline	20:52
Noise	April	07-Apr-13	53	Bulga	Complaints Hotline	21:12
Noise	April	07-Apr-13	24	Bulga	Complaints Hotline	21:16

Noise	April	07-Apr-13	15	Bulga	Complaints Hotline	21:30
Noise	April	07-Apr-13	52	Bulga	Complaints Hotline	22:28
Noise	April	08-Apr-13	53	Bulga	Complaints Hotline	23:00
Noise	April	09-Apr-13	6	Bulga	Complaints Hotline	20:35
Noise	April	09-Apr-13	31	Bulga	Complaints Hotline	21:18
Noise	April	09-Apr-13	45	Bulga	Complaints Hotline	21:33
Noise	April	09-Apr-13	53	Bulga	Complaints Hotline	21:41
Noise	April	09-Apr-13	7	Bulga	Complaints Hotline	22:11
Noise	April	09-Apr-13	56	Bulga	Complaints Hotline	22:25
Noise	April	10-Apr-13	45	Bulga	Complaints Hotline	2:28
Noise	April	10-Apr-13	22	Bulga	Complaints Hotline	20:13
Noise	April	11-Apr-13	45	Bulga	Complaints Hotline	21:35
Noise	April	11-Apr-13	7	Bulga	Complaints Hotline	21:36
Noise	April	12-Apr-13	15	Bulga	Complaints Hotline	5:48
Noise	April	12-Apr-13	29	Bulga	Complaints Hotline	6:02
Noise	April	12-Apr-13	31	Bulga	Complaints Hotline	7:48
Noise	April	12-Apr-13	50	Bulga	Complaints Hotline	8:49
Noise	April	12-Apr-13	23	Bulga	Complaints Hotline	9:11
Noise	April	12-Apr-13	56	Bulga	Complaints Hotline	23:03
Noise	April	12-Apr-13	50	Bulga	Complaints Hotline	23:21
Noise	April	13-Apr-13	Anonymous	Unspecified	Complaints Hotline	21:20
Noise	April	13-Apr-13	56	Bulga	Complaints Hotline	22:58
Blast	April	18-Apr-13	21	Unspecified	Complaints Hotline	17:17
Noise	April	21-Apr-13	7	Bulga	Complaints Hotline	20:47
Noise	April	21-Apr-13	56	Bulga	Complaints Hotline	22:58

Noise	April	24-Apr-13	69	Bulga	Complaints Hotline	20:00
Noise	April	24-Apr-13	23	Bulga	Complaints Hotline	21:29
Noise	April	24-Apr-13	56	Bulga	Complaints Hotline	22:47
Noise	April	25-Apr-13	60	Bulga	Complaints Hotline	22:07
Dust	April	26-Apr-13	19	Glenridding	Complaints Hotline	17:39
Noise	April	26-Apr-13	60	Bulga	Complaints Hotline	21:50
Noise	April	27-Apr-13	60	Bulga	Complaints Hotline	0:19 0:51
Noise	April	27-Apr-13	30	Bulga	Complaints Hotline	7:55
Noise	April	27-Apr-13	23	Bulga	Complaints Hotline	8:56
Dust	April	27-Apr-13	50	Bulga	Complaints Hotline	10:42
Noise	April	27-Apr-13	45	Bulga	Complaints Hotline	20:26
Noise	April	27-Apr-13	69	Bulga	Complaints Hotline	21:44
Noise	April	27-Apr-13	56	Bulga	Complaints Hotline	21:49
Noise	April	27-Apr-13	60	Bulga	Complaints Hotline	22:08
Dust	April	29-Apr-13	27	Long Point	Complaints Hotline	10:45
Noise	April	29-Apr-13	45	Bulga	Complaints Hotline	21:45
Noise	April	30-Apr-13	56	Bulga	Complaints Hotline	22:40
Blast	May	02-May-13	14	Bulga	Complaints Hotline	16:04
Noise	May	02-May-13	62	Bulga	Complaints Hotline	21:35
Dust	May	03-May-13	9	Bulga Village	Complaints Hotline	9:17
Noise	May	03-May-13	45	Bulga	Complaints Hotline	21:59
Light	May	04-May-13	60	Bulga	Complaints Hotline	21:11
Noise	May	06-May-13	45	Bulga	Complaints Hotline	20:41
Noise	May	07-May-13	4	Bulga	Complaints Hotline	6:26

Noise	May	07-May-13	7	Bulga	Complaints Hotline	21:23
Noise	May	07-May-13	7	Bulga	Complaints Hotline	7:42
Noise	May	07-May-13	9	Bulga Village	Complaints Hotline	20:29
Noise	May	07-May-13	23	Bulga	Complaints Hotline	20:56
Noise	May	07-May-13	42	Bulga	Complaints Hotline	21:41
Noise	May	07-May-13	45	Bulga	Complaints Hotline	1:27
Noise	May	07-May-13	45	Bulga	Complaints Hotline	20:24
Noise	May	07-May-13	45	Bulga	Complaints Hotline	21:44
Noise	May	07-May-13	53	Bulga	Complaints Hotline	23:21
Noise	May	07-May-13	54	Bulga	Complaints Hotline	20:31
Noise	May	07-May-13	69	Bulga	Complaints Hotline	20:13
Blast	May	08-May-13	23	Bulga	Complaints Hotline	13:09
Noise	May	08-May-13	23	Bulga	Complaints Hotline	21:24
Noise	May	08-May-13	41	Unspecified	Complaints Hotline	19:33
Noise	May	08-May-13	56	Bulga	Complaints Hotline	22:54
Noise	May	08-May-13	69	Bulga	Complaints Hotline	20:35
Noise	May	09-May-13	30	Bulga	Complaints Hotline	0:10
Noise	May	09-May-13	50	Bulga	Complaints Hotline	1:56
Noise	May	09-May-13	56	Bulga	Complaints Hotline	22:56
Noise	May	09-May-13	69	Bulga	Complaints Hotline	21:38
Noise	May	10-May-13	56	Bulga	Complaints Hotline	23:37
Noise	May	11-May-13	23	Bulga	Complaints Hotline	20:52
Noise	May	11-May-13	52	Bulga	Complaints Hotline	22:53
Noise	May	11-May-13	53	Bulga	Complaints Hotline	21:17

Noise	May	11-May-13	56	Bulga	Complaints Hotline	23:22
Noise	May	12-May-13	23	Bulga	Complaints Hotline	19:32 20:34
Noise	May	12-May-13	35	Bulga	Complaints Hotline	20:20 20:25 20:32
Noise	May	12-May-13	59	Bulga	Complaints Hotline	19:56 21:21
Dust	May	13-May-13	50	Bulga	Complaints Hotline	11:25
Blast	May	14-May-13	25	Bulga	Complaints Hotline	14:40
Blast	May	14-May-13	31	Bulga	Complaints Hotline	14:37
Dust	May	15-May-13	Anonymous	Unspecified	Complaints Hotline	14:57
Light	May	16-May-13	42	Bulga	Complaints Hotline	18:14
Noise	May	20-May-13	1	Bulga	Complaints Hotline	23:09
Noise	May	23-May-13	45	Bulga	Complaints Hotline	20:44
Noise	May	25-May-13	56	Bulga	Complaints Hotline	23:43
Noise	May	26-May-13	9	Bulga Village	Complaints Hotline	20:26
Noise	May	26-May-13	23	Bulga	Complaints Hotline	19:29
Noise	May	26-May-13	56	Bulga	Complaints Hotline	22:23
Noise	May	26-May-13	69	Bulga	Complaints Hotline	20:46
Noise	May	27-May-13	30	Bulga	Complaints Hotline	23:58
Noise	May	28-May-13	4	Bulga	Complaints Hotline	09:35 11:29
Noise	May	28-May-13	23	Bulga	Complaints Hotline	22:19
Noise	May	28-May-13	26	Bulga	Complaints Hotline	4:31
Noise	May	28-May-13	35	Bulga	Complaints Hotline	21:21
Noise	May	28-May-13	69	Bulga	Complaints Hotline	10:16

Noise	May	29-May-13	56	Bulga	Complaints Hotline	23:08
Noise	May	30-May-13	35	Bulga	Complaints Hotline	19:59
Noise	May	30-May-13	36	Bulga	Complaints Hotline	19:54
Noise	May	31-May-13	1	Bulga	Complaints Hotline	20:29
Noise	May	31-May-13	35	Bulga	Complaints Hotline	23:18
Noise	May	31-May-13	36	Bulga	Complaints Hotline	20:26
Blast	May	31-May-13	57	Bulga	Complaints Hotline	12:14
Noise	June	01-Jun-13	15	Bulga	Complaints Hotline	21:33
Noise	June	04-Jun-13	56	Bulga	Complaints Hotline	22:36
Noise	June	05-Jun-13	23	Bulga	Complaints Hotline	7:42
Noise	June	05-Jun-13	62	Bulga	Complaints Hotline	9:01
Noise	June	05-Jun-13	52	Bulga	Complaints Hotline	9:03
Noise	June	06-Jun-13	23	Bulga	Complaints Hotline	20:53
Noise	June	08-Jun-13	8	Bulga	Complaints Hotline	15:09
Noise	June	08-Jun-13	71	Bulga	Complaints Hotline	15:32
Noise	June	08-Jun-13	2	Bulga	Complaints Hotline	21:27
Noise	June	08-Jun-13	56	Bulga	Complaints Hotline	23:38
Noise	June	09-Jun-13	28	Bulga	Complaints Hotline	2:39
Noise	June	09-Jun-13	54	Bulga	Complaints Hotline	18:30
Noise	June	10-Jun-13	23	Bulga	Complaints Hotline	7:05
Noise	June	10-Jun-13	62	Bulga	Complaints Hotline	7:56
Noise	June	10-Jun-13	23	Bulga	Complaints Hotline	10:42
Noise	June	10-Jun-13	8	Bulga	Complaints Hotline	11:00
Noise	June	11-Jun-13	69	Bulga	Complaints Hotline	20:07
Noise	June	11-Jun-13	23	Bulga	Complaints Hotline	21:02

						22:40
Noise	June	12-Jun-13	23	Bulga	Complaints Hotline	7:36
Noise	June	12-Jun-13	4	Bulga	Complaints Hotline	8:19
Blast	June	12-Jun-13	44	Bulga	Complaints Hotline	14:52
Noise	June	13-Jun-13	2	Bulga	Complaints Hotline	22:23
Dust	June	14-Jun-13	23	Bulga	Complaints Hotline	20:34
Noise	June	16-Jun-13	20	Long Point	Complaints Hotline	21:54
Noise	June	20-Jun-13	15	Bulga	Complaints Hotline	20:22
Dust	June	21-Jun-13	51	Putty Road	Complaints Hotline	13:10
Noise	June	26-Jun-13	2	Bulga	Complaints Hotline	20:54 21:56
Noise	June	26-Jun-13	62	Bulga	Complaints Hotline	22:25
Noise	June	27-Jun-13	8	Bulga	Complaints Hotline	7:40
Noise	June	28-Jun-13	23	Bulga	Complaints Hotline	18:03
Noise	June	28-Jun-13	35	Bulga	Complaints Hotline	18:23
Noise	June	28-Jun-13	2	Bulga	Complaints Hotline	18:28
Noise	July	03-Jul-13	69	Bulga	Complaints Hotline	20:20
Noise	July	03-Jul-13	50	Bulga	Complaints Hotline	22:12
Noise	July	03-Jul-13	56	Bulga	Complaints Hotline	22:27
Noise	July	03-Jul-13	69	Bulga	Complaints Hotline	22:50
Light	July	05-Jul-13	Anonymous	Unspecified	Complaints Hotline	20:18
Noise	July	05-Jul-13	49	Gowrie	Complaints Hotline	22:48
Noise	July	07-Jul-13	49	Gowrie	Complaints Hotline	6:17 8:18 8:24
Noise	July	07-Jul-13	49	Gowrie	Complaints Hotline	23:37

Noise	July	08-Jul-13	16	Maison Dieu	Complaints Hotline	8:11
Dust	July	08-Jul-13	34	Bulga	Complaints Hotline	9:04
Noise	July	08-Jul-13	45	Bulga	Complaints Hotline	20:33
Noise	July	08-Jul-13	23	Bulga	Complaints Hotline	22:10
Noise	July	09-Jul-13	45	Bulga	Complaints Hotline	19:56 20:21 20:50
Noise	July	09-Jul-13	50	Bulga	Complaints Hotline	22:37
Noise	July	09-Jul-13	56	Bulga	Complaints Hotline	22:43
Noise	July	09-Jul-13	52	Bulga	Complaints Hotline	23:03
Noise	July	09-Jul-13	59	Bulga	Complaints Hotline	23:37
Noise	July	10-Jul-13	26	Bulga	Complaints Hotline	4:49
Noise	July	10-Jul-13	59	Bulga	Complaints Hotline	5:16
Noise	July	10-Jul-13	Anonymous	Unspecified	Complaints Hotline	5:31
Noise	July	10-Jul-13	23	Bulga	Complaints Hotline	6:39
Noise	July	10-Jul-13	23	Bulga	Complaints Hotline	7:59
Noise	July	10-Jul-13	50	Bulga	Complaints Hotline	10:29
Noise	July	11-Jul-13	26	Bulga	Complaints Hotline	5:25
Noise	July	11-Jul-13	66	Bulga	Complaints Hotline	8:33
Noise	July	11-Jul-13	37	Bulga	Complaints Hotline	9:14
Noise	July	11-Jul-13	59	Bulga	Complaints Hotline	19:30 19:52 20:58
Noise	July	11-Jul-13	69	Bulga	Complaints Hotline	20:01
Noise	July	11-Jul-13	66	Bulga	Complaints Hotline	20:50
Noise	July	11-Jul-13	52	Bulga	Complaints Hotline	21:42
Noise	July	11-Jul-13	56	Bulga	Complaints Hotline	22:09

Noise	July	11-Jul-13	23	Bulga	Complaints Hotline	22:21
Dust	July	12-Jul-13	36	Bulga	Complaints Hotline	11:02
Blast	July	12-Jul-13	25	Bulga	Complaints Hotline	12:41
Blast	July	12-Jul-13	67	Gowrie	Complaints Hotline	12:44
Blast	July	12-Jul-13	23	Bulga	Complaints Hotline	12:54
Noise	July	13-Jul-13	59	Bulga	Complaints Hotline	20:59 22:07
Noise	July	14-Jul-13	44	Bulga	Complaints Hotline	0:58
Noise	July	14-Jul-13	23	Bulga	Complaints Hotline	3:35
Noise	July	14-Jul-13	30	Bulga	Complaints Hotline	10:20
Noise	July	14-Jul-13	59	Bulga	Complaints Hotline	19:38
Noise	July	14-Jul-13	69	Bulga	Complaints Hotline	20:13
Noise	July	14-Jul-13	45	Bulga	Complaints Hotline	21:13
Noise	July	16-Jul-13	49	Gowrie	Complaints Hotline	4:36
Noise	July	16-Jul-13	13	Unspecified	Complaints Hotline	21:03
Noise	July	16-Jul-13	24	Bulga	Complaints Hotline	22:05 22:29
Noise	July	16-Jul-13	52	Bulga	Complaints Hotline	23:18
Noise	July	17-Jul-13	33	Bulga	Complaints Hotline	8:12
Noise	July	17-Jul-13	67	Gowrie	Complaints Hotline	21:19
Noise	July	17-Jul-13	50	Bulga	Complaints Hotline	21:44
Noise	July	17-Jul-13	69	Bulga	Complaints Hotline	22:15
Noise	July	18-Jul-13	59	Bulga	Complaints Hotline	10:03
Noise	July	18-Jul-13	69	Bulga	Complaints Hotline	10:09
Noise	July	18-Jul-13	59	Bulga	Complaints Hotline	19:49
Noise	July	18-Jul-13	56	Bulga	Complaints Hotline	22:56

Dust	July	22-Jul-13	17	Glennridding	Complaints Hotline	16:21
Noise	July	23-Jul-13	49	Gowrie	Complaints Hotline	23:38
Blast	July	25-Jul-13	7	Bulga	Complaints Hotline	13:56
Noise	July	25-Jul-13	69	Bulga	Complaints Hotline	21:18
Noise	July	25-Jul-13	56	Bulga	Complaints Hotline	23:57
Dust	July	26-Jul-13	50	Bulga	Complaints Hotline	10:38
Noise	July	27-Jul-13	56	Bulga	Complaints Hotline	0:37
Noise	July	27-Jul-13	4	Bulga	Complaints Hotline	8:18 8:20
Noise	July	27-Jul-13	30	Bulga	Complaints Hotline	8:37
Noise	July	27-Jul-13	2	Bulga	Complaints Hotline	9:00
Noise	July	27-Jul-13	54	Bulga	Complaints Hotline	20:16
Noise	July	27-Jul-13	52	Bulga	Complaints Hotline	22:29
Noise	July	28-Jul-13	56	Bulga	Complaints Hotline	0:15
Noise	July	28-Jul-13	8	Bulga	Complaints Hotline	10:10
Noise	July	28-Jul-13	37	Bulga	Complaints Hotline	10:24
Noise	July	28-Jul-13	69	Bulga	Complaints Hotline	11:03
Noise	July	28-Jul-13	22	Bulga	Complaints Hotline	21:34
Noise	July	29-Jul-13	59	Bulga	Complaints Hotline	9:33
Noise	July	29-Jul-13	62	Bulga	Complaints Hotline	21:56
Noise	July	29-Jul-13	52	Bulga	Complaints Hotline	22:59
Light	July	30-Jul-13	17	Glennridding	Complaints Hotline	17:49
Noise	August	01-Aug-13	69	Bulga	Complaints Hotline	22:38
Noise	August	01-Aug-13	56	Bulga	Complaints Hotline	22:53
Noise	August	02-Aug-13	66	Bulga	Complaints Hotline	9:02

Noise	August	05-Aug-13	67	Gowrie	Complaints Hotline	6:09
Dust	August	05-Aug-13	Anonymous	Unspecified	Complaints Hotline	15:18
Dust	August	06-Aug-13	Anonymous	Unspecified	Complaints Hotline	14:13
Blast	August	09-Aug-13	31	Bulga	Complaints Hotline	13:32
Noise	August	09-Aug-13	67	Gowrie	Complaints Hotline	20:30
Dust	August	12-Aug-13	19	Glenridding	Complaints Hotline	12:54
Noise	August	14-Aug-13	20	Long Point	Complaints Hotline	21:48
Blast	August	15-Aug-13	40	Bulga	Complaints Hotline	17:19
Noise	August	15-Aug-13	23	Bulga	Complaints Hotline	21:50
Noise	August	16-Aug-13	35	Bulga	Complaints Hotline	0:18
Noise	August	16-Aug-13	71	Bulga	Complaints Hotline	8:36
Noise	August	16-Aug-13	59	Bulga	Complaints Hotline	9:38
Noise	August	16-Aug-13	8	Bulga	Complaints Hotline	9:39
Dust	August	16-Aug-13	34	Bulga	Complaints Hotline	11:40
Noise	August	16-Aug-13	35	Bulga	Complaints Hotline	18:23
Noise	August	16-Aug-13	57	Bulga	Complaints Hotline	20:10
Noise	August	16-Aug-13	66	Bulga	Complaints Hotline	21:33
Noise	August	16-Aug-13	56	Bulga	Complaints Hotline	23:27
Noise	August	17-Aug-13	20	Long Point	Complaints Hotline	22:24
Dust	August	18-Aug-13	Anonymous	Unspecified	Complaints Hotline	16:35
Light	August	22-Aug-13	42	Bulga	Complaints Hotline	19:44 20:56
Noise	August	24-Aug-13	49	Gowrie	Complaints Hotline	5:09
Noise	August	24-Aug-13	49	Gowrie	Complaints Hotline	7:44
Noise	August	24-Aug-13	36	Bulga	Complaints Hotline	21:37

Noise	August	24-Aug-13	69	Bulga	Complaints Hotline	22:25
Noise	August	24-Aug-13	52	Bulga	Complaints Hotline	22:40
Noise	August	24-Aug-13	23	Bulga	Complaints Hotline	22:44
Noise	August	24-Aug-13	56	Bulga	Complaints Hotline	23:39
Noise	August	26-Aug-13	66	Bulga	Complaints Hotline	21:28
Noise	August	26-Aug-13	69	Bulga	Complaints Hotline	21:28
Noise	August	26-Aug-13	56	Bulga	Complaints Hotline	23:23
Dust	August	27-Aug-13	70	Bulga	Complaints Hotline	10:46
Blast	August	27-Aug-13	70	Bulga	Complaints Hotline	10:46
Blast	August	27-Aug-13	72	Bulga	Complaints Hotline	13:42
Blast	August	27-Aug-13	53	Bulga	Complaints Hotline	13:45
Blast	August	27-Aug-13	26	Bulga	Complaints Hotline	15:23
Noise	August	27-Aug-13	55	Bulga	Complaints Hotline	21:13
Noise	August	27-Aug-13	66	Bulga	Complaints Hotline	21:43
Noise	August	27-Aug-13	69	Bulga	Complaints Hotline	21:44
Noise	August	27-Aug-13	56	Bulga	Complaints Hotline	23:29
Noise	August	28-Aug-13	52	Bulga	Complaints Hotline	9:03
Noise	August	28-Aug-13	69	Bulga	Complaints Hotline	20:25 21:09
Noise	August	28-Aug-13	2	Bulga	Complaints Hotline	21:57
Noise	August	28-Aug-13	53	Bulga	Complaints Hotline	22:40
Noise	August	28-Aug-13	56	Bulga	Complaints Hotline	22:59
Noise	August	29-Aug-13	5	Bulga	Complaints Hotline	4:24
Noise	August	29-Aug-13	30	Bulga	Complaints Hotline	7:37
Noise	August	29-Aug-13	9	Bulga Village	Complaints Hotline	8:38

Noise	August	29-Aug-13	69	Bulga	Complaints Hotline	8:40
Noise	August	29-Aug-13	59	Bulga	Complaints Hotline	8:44
Noise	August	29-Aug-13	8	Bulga	Complaints Hotline	8:50
Noise	August	29-Aug-13	9	Bulga Village	Complaints Hotline	20:00
Noise	August	29-Aug-13	55	Bulga	Complaints Hotline	20:22 20:31
Noise	August	29-Aug-13	30	Bulga	Complaints Hotline	20:52
Noise	August	29-Aug-13	56	Bulga	Complaints Hotline	23:59
Noise	August	30-Aug-13	9	Bulga Village	Complaints Hotline	1:05
Dust	August	31-Aug-13	36	Bulga	Complaints Hotline	0:28
Noise	August	31-Aug-13	56	Bulga	Complaints Hotline	23:40
Noise	September	01-Sep-13	23	Bulga	Complaints Hotline	19:40
Noise	September	01-Sep-13	54	Bulga	Complaints Hotline	19:50
Noise	September	01-Sep-13	44	Bulga	Complaints Hotline	20:48
Dust	September	02-Sep-13	34	Bulga	Complaints Hotline	17:16
Noise	September	02-Sep-13	72	Bulga	Complaints Hotline	19:49 20:05
Noise	September	02-Sep-13	26	Bulga	Complaints Hotline	20:34
Noise	September	02-Sep-13	37	Bulga	Complaints Hotline	21:18
Noise	September	02-Sep-13	36	Bulga	Complaints Hotline	21:36
Noise	September	02-Sep-13	69	Bulga	Complaints Hotline	21:36
Noise	September	03-Sep-13	56	Bulga	Complaints Hotline	2:36
Noise	September	03-Sep-13	8	Bulga	Complaints Hotline	8:22
Noise	September	03-Sep-13	50	Bulga	Complaints Hotline	8:26
Noise	September	03-Sep-13	9	Bulga	Complaints Hotline	8:29

				Village		
Noise	September	03-Sep-13	37	Bulga	Complaints Hotline	19:07
Noise	September	03-Sep-13	54	Bulga	Complaints Hotline	19:58
Noise	September	03-Sep-13	69	Bulga	Complaints Hotline	20:07
Noise	September	03-Sep-13	52	Bulga	Complaints Hotline	20:37
Dust	September	03-Sep-13	34	Bulga	Complaints Hotline	21:19
Noise	September	04-Sep-13	69	Bulga	Complaints Hotline	19:28
Noise	September	04-Sep-13	52	Bulga	Complaints Hotline	21:41
Noise	September	04-Sep-13	56	Bulga	Complaints Hotline	22:59
Blast	September	05-Sep-13	14	Bulga	Complaints Hotline	11:14
Noise	September	05-Sep-13	20	Long Point	Complaints Hotline	22:18
Noise	September	06-Sep-13	20	Long Point	Complaints Hotline	0:10
Blast	September	06-Sep-13	23	Bulga	Complaints Hotline	14:26
Noise	September	06-Sep-13	23	Bulga	Complaints Hotline	20:45
Noise	September	08-Sep-13	56	Bulga	Complaints Hotline	23:42
Dust	September	10-Sep-13	34	Bulga	Complaints Hotline	8:05
Dust	September	10-Sep-13	43	Bulga	Complaints Hotline	8:59
Noise	September	11-Sep-13	65	Long Point	Complaints Hotline	23:10
Noise	September	12-Sep-13	20	Long Point	Complaints Hotline	22:40
Noise	September	13-Sep-13	45	Bulga	Complaints Hotline	10:59
Noise	September	13-Sep-13	36	Bulga	Complaints Hotline	19:37
Noise	September	13-Sep-13	Anonymous	Unspecified	Complaints Hotline	19:50
Noise	September	13-Sep-13	69	Bulga	Complaints Hotline	20:45
Noise	September	13-Sep-13	56	Bulga	Complaints Hotline	23:18
Noise	September	15-Sep-13	45	Bulga	Complaints Hotline	19:39

Noise	September	15-Sep-13	9	Bulga Village	Complaints Hotline	19:53
Noise	September	15-Sep-13	Anonymous	Unspecified	Complaints Hotline	20:00
Noise	September	15-Sep-13	69	Bulga	Complaints Hotline	20:44
Noise	September	16-Sep-13	31	Bulga	Complaints Hotline	8:06
Noise	September	18-Sep-13	67	Gowrie	Complaints Hotline	19:35
Noise	September	19-Sep-13	67	Gowrie	Complaints Hotline	5:42
Noise	September	21-Sep-13	Anonymous	Unspecified	Complaints Hotline	17:30
Noise	September	21-Sep-13	69	Bulga	Complaints Hotline	20:46
Noise	September	21-Sep-13	59	Bulga	Complaints Hotline	20:58
Noise	September	21-Sep-13	31	Bulga	Complaints Hotline	22:00
Noise	September	21-Sep-13	26	Bulga	Complaints Hotline	22:57
Noise	September	22-Sep-13	69	Bulga	Complaints Hotline	19:03
Noise	September	22-Sep-13	Anonymous	Unspecified	Complaints Hotline	20:07
Noise	September	22-Sep-13	5	Bulga	Complaints Hotline	21:02
Noise	September	22-Sep-13	36	Bulga	Complaints Hotline	21:37
Noise	September	22-Sep-13	52	Bulga	Complaints Hotline	22:33
Blast	September	25-Sep-13	23	Bulga	Complaints Hotline	10:32
Dust	September	25-Sep-13	27	Long Point	Complaints Hotline	16:11
Noise	September	27-Sep-13	56	Bulga	Complaints Hotline	23:07
Noise	September	28-Sep-13	31	Bulga	Complaints Hotline	6:37
Noise	September	28-Sep-13	69	Bulga	Complaints Hotline	7:46
Noise	September	29-Sep-13	23	Bulga	Complaints Hotline	21:08
Noise	September	30-Sep-13	15	Bulga	Complaints Hotline	6:56
Dust	October	02-Oct-13	Anonymous	Unspecified	Complaints Hotline	10:55

Noise	October	02-Oct-13	26	Bulga	Complaints Hotline	12:04
Noise	October	03-Oct-13	20	Long Point	Complaints Hotline	23:42
Blast	October	04-Oct-13	72	Bulga	Complaints Hotline	14:10
Blast	October	04-Oct-13	14	Bulga	Complaints Hotline	15:04
Blast	October	04-Oct-13	63	Bulga	Complaints Hotline	15:11
Light	October	04-Oct-13	20	Long Point	Complaints Hotline	19:57
Noise	October	04-Oct-13	69	Bulga	Complaints Hotline	22:00
Noise	October	04-Oct-13	59	Bulga	Complaints Hotline	22:57
Noise	October	04-Oct-13	56	Bulga	Complaints Hotline	23:18
Dust	October	09-Oct-13	71	Bulga	Complaints Hotline	16:45
Light	October	09-Oct-13	42	Bulga	Complaints Hotline	21:13
Dust	October	09-Oct-13	3	Gouldsville	Complaints Hotline	22:35
Noise	October	11-Oct-13	67	Gowrie	Complaints Hotline	20:49
Noise	October	11-Oct-13	45	Bulga	Complaints Hotline	20:57
Noise	October	12-Oct-13	69	Bulga	Complaints Hotline	20:16
Noise	October	13-Oct-13	56	Bulga	Complaints Hotline	0:15
Light	October	13-Oct-13	42	Bulga	Complaints Hotline	22:42
Dust	October	17-Oct-13	5	Bulga	Complaints Hotline	8:52
Light	October	17-Oct-13	42	Bulga	Complaints Hotline	19:36
Noise	October	18-Oct-13	35	Bulga	Complaints Hotline	20:47
Noise	October	19-Oct-13	45	Bulga	Complaints Hotline	20:59
Light	October	19-Oct-13	42	Bulga	Complaints Hotline	21:10
Noise	October	19-Oct-13	50	Bulga	Complaints Hotline	22:24
Noise	October	19-Oct-13	56	Bulga	Complaints Hotline	23:47
Noise	October	19-Oct-13	23	Bulga	Complaints Hotline	23:50

Noise	October	20-Oct-13	45	Bulga	Complaints Hotline	0:57
Noise	October	20-Oct-13	69	Bulga	Complaints Hotline	20:26
Noise	October	20-Oct-13	59	Bulga	Complaints Hotline	21:28
Noise	October	20-Oct-13	23	Bulga	Complaints Hotline	21:40
Light	October	22-Oct-13	42	Bulga	Complaints Hotline	19:23
Noise	October	22-Oct-13	69	Bulga	Complaints Hotline	21:34
Noise	October	22-Oct-13	23	Bulga	Complaints Hotline	21:35
Noise	October	22-Oct-13	59	Bulga	Complaints Hotline	21:46 22:55
Noise	October	22-Oct-13	9	Bulga Village	Complaints Hotline	21:49
Noise	October	22-Oct-13	56	Bulga	Complaints Hotline	21:58
Noise	October	26-Oct-13	45	Bulga	Complaints Hotline	21:44
Noise	October	27-Oct-13	35	Bulga	Complaints Hotline	22:24
Noise	October	27-Oct-13	56	Bulga	Complaints Hotline	22:46
Noise	October	28-Oct-13	23	Bulga	Complaints Hotline	20:48
Noise	October	28-Oct-13	56	Bulga	Complaints Hotline	23:00
Blast	October	30-Oct-13	23	Bulga	Complaints Hotline	14:33
Dust	October	30-Oct-13	27	Long Point	Complaints Hotline	15:00
Noise	October	30-Oct-13	69	Bulga	Complaints Hotline	20:59
Noise	October	30-Oct-13	56	Bulga	Complaints Hotline	22:54
Noise	October	31-Oct-13	56	Bulga	Complaints Hotline	3:26
Noise	October	31-Oct-13	23	Bulga	Complaints Hotline	4:39
Noise	October	31-Oct-13	45	Bulga	Complaints Hotline	21:49
Noise	November	01-Nov-13	23	Bulga	Complaints Hotline	21:06
Noise	November	01-Nov-13	26	Bulga	Complaints Hotline	21:18

Noise	November	01-Nov-13	59	Bulga	Complaints Hotline	21:37
Noise	November	03-Nov-13	67	Gowrie	Complaints Hotline	0:08
Noise	November	06-Nov-13	34	Bulga	Complaints Hotline	3:09
Noise	November	06-Nov-13	37	Bulga	Complaints Hotline	7:39
Noise	November	06-Nov-13	23	Bulga	Complaints Hotline	19:54
Noise	November	06-Nov-13	45	Bulga	Complaints Hotline	21:43
Noise	November	06-Nov-13	23	Bulga	Complaints Hotline	22:04
Noise	November	07-Nov-13	Anonymous	Unspecified	Complaints Hotline	7:52
Noise	November	07-Nov-13	23	Bulga	Complaints Hotline	21:38
Noise	November	07-Nov-13	45	Bulga	Complaints Hotline	21:41
Noise	November	07-Nov-13	69	Bulga	Complaints Hotline	21:59
Dust	November	08-Nov-13	53	Bulga	Complaints Hotline	10:19
Dust	November	08-Nov-13	48	Bulga	Complaints Hotline	13:20
Noise	November	10-Nov-13	45	Bulga	Complaints Hotline	21:51
Noise	November	10-Nov-13	56	Bulga	Complaints Hotline	23:00
Noise	November	12-Nov-13	69	Bulga	Complaints Hotline	21:40
Noise	November	12-Nov-13	45	Bulga	Complaints Hotline	21:47
Noise	November	12-Nov-13	22	Bulga	Complaints Hotline	22:30
Noise	November	12-Nov-13	50	Bulga	Complaints Hotline	22:40
Noise	November	12-Nov-13	59	Bulga	Complaints Hotline	22:49
Noise	November	12-Nov-13	56	Bulga	Complaints Hotline	23:03
Noise	November	13-Nov-13	67	Gowrie	Complaints Hotline	21:12
Noise	November	13-Nov-13	56	Bulga	Complaints Hotline	23:01
Noise	November	14-Nov-13	45	Bulga	Complaints Hotline	20:17
Noise	November	14-Nov-13	56	Bulga	Complaints Hotline	23:05

Noise	November	15-Nov-13	62	Bulga	Complaints Hotline	21:58
Noise	November	20-Nov-13	30	Bulga	Complaints Hotline	21:06
Noise	November	20-Nov-13	35	Bulga	Complaints Hotline	21:06
Noise	November	20-Nov-13	69	Bulga	Complaints Hotline	21:18
Noise	November	20-Nov-13	53	Bulga	Complaints Hotline	21:46
Noise	November	21-Nov-13	53	Bulga	Complaints Hotline	19:47
Noise	November	22-Nov-13	56	Bulga	Complaints Hotline	0:43
Noise	November	22-Nov-13	3	Gouldsville	Complaints Hotline	9:04
Noise	November	24-Nov-13	67	Gowrie	Complaints Hotline	0:20
Noise	November	24-Nov-13	Anonymous	Unspecified	Complaints Hotline	7:45
Noise	November	24-Nov-13	3	Gouldsville	Complaints Hotline	8:42
Dust	November	24-Nov-13	48	Bulga	Complaints Hotline	17:50
Blast	November	26-Nov-13	72	Bulga	Complaints Hotline	13:50
Noise	November	27-Nov-13	69	Bulga	Complaints Hotline	21:22
Noise	November	27-Nov-13	30	Bulga	Complaints Hotline	22:27
Noise	December	01-Dec-13	9	Bulga Village	Complaints Hotline	21:18
Noise	December	01-Dec-13	69	Bulga	Complaints Hotline	21:35
Noise	December	01-Dec-13	56	Bulga	Complaints Hotline	22:57
Noise	December	02-Dec-13	59	Bulga	Complaints Hotline	21:11
Noise	December	03-Dec-13	62	Bulga	Complaints Hotline	21:23
Noise	December	03-Dec-13	45	Bulga	Complaints Hotline	21:53
Blast	December	06-Dec-13	26	Bulga	Complaints Hotline	13:07
Other	December	06-Dec-13	Anonymous	Unspecified	Complaints Hotline	13:32
Noise	December	06-Dec-13	69	Bulga	Complaints Hotline	20:35

Noise	December	06-Dec-13	35	Bulga	Complaints Hotline	22:21
Noise	December	07-Dec-13	69	Bulga	Complaints Hotline	21:19
Noise	December	07-Dec-13	23	Bulga	Complaints Hotline	21:49
Noise	December	07-Dec-13	56	Bulga	Complaints Hotline	22:35
Dust	December	10-Dec-13	5	Bulga	Complaints Hotline	14:34
Blast	December	11-Dec-13	4	Bulga	Complaints Hotline	12:51
Blast	December	11-Dec-13	31	Bulga	Complaints Hotline	13:44
Noise	December	11-Dec-13	67	Gowrie	Complaints Hotline	22:19
Noise	December	11-Dec-13	Anonymous	Unspecified	Complaints Hotline	23:38
Noise	December	12-Dec-13	35	Bulga	Complaints Hotline	21:32
Noise	December	12-Dec-13	62	Bulga	Complaints Hotline	21:37
Noise	December	13-Dec-13	62	Bulga	Complaints Hotline	20:36
Noise	December	13-Dec-13	45	Bulga	Complaints Hotline	21:37
Noise	December	17-Dec-13	26	Bulga	Complaints Hotline	4:53
Noise	December	17-Dec-13	69	Bulga	Complaints Hotline	5:50
Noise	December	17-Dec-13	45	Bulga	Complaints Hotline	22:06
Noise	December	17-Dec-13	23	Bulga	Complaints Hotline	22:22
Noise	December	17-Dec-13	69	Bulga	Complaints Hotline	22:28
Noise	December	17-Dec-13	56	Bulga	Complaints Hotline	22:45
Noise	December	18-Dec-13	45	Bulga	Complaints Hotline	22:50
Light	December	18-Dec-13	42	Bulga	Complaints Hotline	22:58
Noise	December	19-Dec-13	4	Bulga	Complaints Hotline	6:16
Other	December	19-Dec-13	Anonymous	Unspecified	Complaints Hotline	20:09
Noise	December	19-Dec-13	69	Bulga	Complaints Hotline	20:28
Noise	December	19-Dec-13	4	Bulga	Complaints Hotline	20:34

						20:57
Noise	December	19-Dec-13	23	Bulga	Complaints Hotline	23:33
Noise	December	20-Dec-13	67	Gowrie	Complaints Hotline	1:11
Noise	December	26-Dec-13	67	Gowrie	Complaints Hotline	22:40
Noise	December	27-Dec-13	35	Bulga	Complaints Hotline	22:10
Noise	December	27-Dec-13	56	Bulga	Complaints Hotline	22:34
Noise	December	27-Dec-13	35	Bulga	Complaints Hotline	23:09
Noise	December	28-Dec-13	69	Bulga	Complaints Hotline	20:35
Dust	December	29-Dec-13	27	Long Point	Complaints Hotline	11:26
Dust	December	29-Dec-13	11	Bulga	Complaints Hotline	11:34
Noise	December	30-Dec-13	53	Bulga	Complaints Hotline	22:07
Dust	December	31-Dec-13	60	Bulga	Complaints Hotline	14:16
Dust	December	31-Dec-13	34	Bulga	Complaints Hotline	18:54

Appendix 7: Annual Rehabilitation Report Form

Annual Rehabilitation Report Form – Mines
Year Ending: 2013
Mine: Mt Thorley Warkworth
Company: Rio Tinto Coal Australia – Coal & Allied
Plans Attached:
Mt Thorley Warkworth – AEMR MTW 2013
Approved Mining Operations Plan:
MTW MOP (2012 – 2016) - Approval Date 12/11/2012
Total Area Covered by Mining Operations Plan:
MTW MOP – 6,185ha
Total Area Covered by Mining Lease for This Mine: 6,185ha

Table 1: Rehabilitation Progress, 2013

Rehabilitation Activity Type	Domain Identifier	Primary Domain	Secondary Domain	Total Area last reported (ha)	Total Area to date (ha)
1.1 Active mining and infrastructure area, facilities, including roads and tracks	1A	Final Void	Final Void	5.0	6.6
	1C	Final Void	Rehabilitation Area - Grassland	0.0	0.0
	2A	Water Management Areas	Final Void	3.2	3.2
	2B	Water Management Areas	Water Management Areas	46.9	46.9
	2C	Water Management Areas	Rehabilitation Area - Grassland	5.1	5.1
	2E	Water Management Areas	Rehabilitation Area - Woodland	9.3	9.3
	3B	Infrastructure Area	Water Management Areas	5.1	5.1
	3C	Infrastructure Area	Rehabilitation Area - Grassland	81.0	81.0

Rehabilitation Activity Type	Domain Identifier	Primary Domain	Secondary Domain	Total Area last reported (ha)	Total Area to date (ha)
	3E	Infrastructure Area	Rehabilitation Area - Woodland	66.9	67.0
	4C	Tailings Storage Facility	Rehabilitation Area - Grassland	45.8	45.8
	4D	Tailings Storage Facility	Rehabilitation Area - Trees over Grass	1.1	1.1
	4E	Tailings Storage Facility	Rehabilitation Area - Woodland	91.0	91.0
	5A	Overburden Emplacement Area	Final Void	43.5	43.8
	5B	Overburden Emplacement Area	Water Management Areas	0.3	0.3
	5C	Overburden Emplacement Area	Rehabilitation Area - Grassland	443.1	471.1
	5D	Overburden Emplacement Area	Rehabilitation Area - Trees over Grass	271.1	272.5
	5E	Overburden Emplacement Area	Rehabilitation Area - Woodland	1403.1	1411.3
	Total - Active			2521.5	2561.0
1.2 Decommissioning	Total - Decommissioning			0.0	0.0
1.3 Landform Establishment					3.5
	Total - Landform Establishment			0.0	(Included in 1.1)
1.4 Growth Medium Development					3.1
	Total - Growth Medium Development			0.0	(Included in 1.1)
1.5 Ecosystem and Land Use Establishment	5C	Overburden Emplacement Area	Rehabilitation Area - Grassland	39.0	0.0
	5D	Overburden Emplacement Area	Rehabilitation Area - Trees over Grass		0.1
	5E	Overburden Emplacement Area	Rehabilitation Area - Woodland	25.6	61.6
	Total - Ecosystem and Land Use Establishment			64.6	61.7
1.6 Ecosystem and Land Use Development	2B	Water Management Areas	Water Management Areas	0.8	0.8
	2C	Water Management Areas	Rehabilitation Area - Grassland	0.8	0.8
	5B	Overburden Emplacement Area	Water Management Areas	0.7	0.7
	5C	Overburden Emplacement Area	Rehabilitation Area - Grassland	561.1	571.8
	5D	Overburden Emplacement Area	Rehabilitation Area - Trees over Grass	32.8	32.4

Rehabilitation Activity Type	Domain Identifier	Primary Domain	Secondary Domain	Total Area last reported (ha)	Total Area to date (ha)
	5E	Overburden Emplacement Area	Rehabilitation Area - Woodland	228.6	199.1
	Total - Ecosystem and Land Use Development			824.8	805.6
1.7 Rehabilitation Complete	Total - Rehabilitation Complete			0.0	0.0
1.8 Total Area Disturbed (items 1.1 to 1.7)	1A	Final Void	Final Void	5.0	6.6
	2A	Water Management Areas	Final Void	3.2	3.2
	2B	Water Management Areas	Water Management Areas	47.7	47.7
	2C	Water Management Areas	Rehabilitation Area - Grassland	5.9	5.9
	2E	Water Management Areas	Rehabilitation Area - Woodland	9.3	9.3
	3B	Infrastructure Area	Water Management Areas	5.1	5.1
	3C	Infrastructure Area	Rehabilitation Area - Grassland	81.0	81.0
	3E	Infrastructure Area	Rehabilitation Area - Woodland	66.9	67.0
	4C	Tailings Storage Facility	Rehabilitation Area - Grassland	45.8	45.8
	4D	Tailings Storage Facility	Rehabilitation Area - Trees over Grass	1.1	1.1
	4E	Tailings Storage Facility	Rehabilitation Area - Woodland	91.0	91.0
	5A	Overburden Emplacement Area	Final Void	43.5	43.8
	5B	Overburden Emplacement Area	Water Management Areas	1.0	1.0
	5C	Overburden Emplacement Area	Rehabilitation Area - Grassland	1043.2	1042.9
	5D	Overburden Emplacement Area	Rehabilitation Area - Trees over Grass	303.9	305.0
	5E	Overburden Emplacement Area	Rehabilitation Area - Woodland	1657.3	1672.0
	Total - Footprint			3410.9	3428.4

Table 2: Soil Management and Erosion, 2013

Soil Stockpiling/ Use	Soil Used This Period (m ³)	Soil Pre-stripped This Period (m ³)	Soil Stockpiled to Date (m ³)	Soil Stockpiled Last Report (m ³)
	64,700	71,387	1,256,541	1,249,854
2.2 Erosion Treatment	Total Area to Date (ha)	Total Area Last Report (ha)	Total Area This Report (ha)	Area Retreated This Period (ha)
	Not Available			
Approx. area of sheet or gully erosion requiring reshaping topdressing and/or resowing	Not Available			

Table 3: Weed Control and Feral Animal Control

	Area in ha
3.1 Approx. area adversely affected by weeds as of the date of this report.	Not Available
3.2 Area treated for weed control during the period covered by the report.	71ha
3.3 Give summary of control strategies used and verification by approval agency(s)	
Species targeted in rehabilitation areas during 2013 included: galenia, <i>Acacia saligna</i> , african boxthorn, mother of millions, pattersons curse, opuntia species (pear), thistle and pampas grass.	

Table 4: Management of Rehabilitated Areas

4.1 Area treated with maintenance fertiliser.	0ha
4.2 Area treated by rotational grazing, cropping or slashing.	90ha
Give summary	90ha Warkworth rehabilitation area licence agreement in place for grazing.

Table 5: Variations to Rehabilitation Program

Has rehabilitation work proceeded generally in accordance with the conditions of an accepted Mining Operations Plan	Yes
If not please cite any approval granted for variations, or briefly describe the seasonal conditions or other reasons for any changes and the nature of any changes which have been made.	
NA	

Table 6: Planned Operations During the Next Report Period

6.1 Area estimated to be disturbed (currently undisturbed) ha.	56.8ha
6.2 Area estimated to be rehabilitated (ha)	100ha

Appendix 8: Rehabilitation and Disturbance Map MTW 2013

