Annual Environmental Management Report (ML 1579, ML 1685 & ML 1693) and Annual Review (PA 11_0047) for the Tarrawonga Coal Mine

1 May 2013 – 30 April 2014
Tarrawonga Coal Pty Ltd

Annual Environmental Management Report (ML 1579, ML 1685 & ML 1963) and Annual Review (PA 11_0047) for the Tarrawonga Coal Mine

MOP Commencement Date 1-11-2013 – Nominal MOP Completion Date 31-10-2015
AEMR Commencement Date 1-05-2013 – AEMR Completion Date 30-04-2014

Tarrawonga Coal Pty Ltd

**Head Office**
Level 28, 259 George Street
SYDNEY NSW 2000
PO Box R1113
ROYAL EXCHANGE NSW 1225
Phone: +61-2-8507 9700
Fax: +61-2-8507 9701

**Site**
Tarrawonga Site Office
Goonbri Road
Boggabri NSW 2382
PO Box 600
GUNNEDAH NSW 2380
Phone: +61-2-6743 4000
Fax: +61-2-6743 4466

**Gunnedah Office**
Whitehaven CHPP
10409 Kamilaroi Highway
PO Box 600
GUNNEDAH NSW 2380
Phone: +61-2-6742 4337
Fax: +61-2-6742 3607

**Reporting Officer:** Jill Johnson

**Title:** Group Environment Manager

**Signature:** _______________________

**Date:** _______________________

**Distribution:**
- Environment Protection Authority
- Department of Planning and Environment
- Department of Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy
- Department of Trade and Investment, Regional Infrastructure and Services – Primary Industries, Food and Water
- NSW Office of Water
- Gunnedah Shire Council
- Narrabri Shire Council
- Tarrawonga Coal Mine Community Consultative Committee
TABLE OF CONTENTS

ACRONYMS USED THROUGHOUT THIS DOCUMENT .......................................................... 1

1 INTRODUCTION AND OBJECTIVES ................................................................. 2

1.1 Scope .......................................................................................................... 2

1.1.1 Introduction and Period of Reporting .........................................................2

1.1.2 The Company ...............................................................................................2

1.1.3 Background and History of the Tarrawonga Coal Mine ......................4

1.1.4 Products and Markets .............................................................................5

1.1.5 Operational and Environmental Management .......................................6

1.1.6 Corporate Environmental Policy ............................................................7

1.2 Approval Status ........................................................................................... 8

1.2.1 Leases, Licences and Approvals .................................................................8

1.2.2 Amendments to Leases, Licences and Approvals .....................................8

1.3 Actions Requested at Previous AEMR Review .........................................11

2 SUMMARY OF OPERATIONS ........................................................................... 13

2.1 Exploration, Resources / Reserves and Mine Life ................................ 13

2.1.1 Exploration ............................................................................................. 13

2.1.2 Resources and Reserves ......................................................................... 13

2.1.3 Estimated Mine Life ............................................................................... 13

2.2 Land Preparation ....................................................................................... 14

2.3 Construction .............................................................................................. 15

2.4 Mining ....................................................................................................... 17

2.4.1 Mining Method ....................................................................................... 17

2.4.2 Mining Constraints ............................................................................... 17

2.4.3 Mining Equipment ............................................................................... 18

2.4.4 Hours of Operations ............................................................................ 19

2.5 Processing .................................................................................................. 19

2.5.1 Outline of Processing Activities ............................................................ 19

2.5.2 Changes or Additions to the Process or Facilities ............................... 19

2.6 Waste Management .................................................................................. 20

2.6.1 Introduction ............................................................................................ 20

2.6.2 Domestic Type Wastes ......................................................................... 21

2.6.3 Oil Containment and Disposal ................................................................. 21

2.6.4 Sewage Treatment and Disposal ............................................................. 21

2.6.5 Mine Equipment Tyres ......................................................................... 21

2.6.6 Overburden and Interburden ................................................................. 21

2.6.7 Processing Plant Residues .................................................................... 22

2.7 Stockpile Capacity ...................................................................................... 23

2.8 Water Management .................................................................................. 23

2.8.1 Objectives .............................................................................................. 23

2.8.2 Surface Water Management ................................................................. 24

2.8.3 Discharges ............................................................................................. 25

2.8.4 Water Sources, Demand and Use .......................................................... 25

2.8.5 Stored Water ......................................................................................... 26

2.8.6 Groundwater Management ................................................................. 26
Introduction and Objectives

2.9 Hazardous and Explosive Material Management ........................................ 27
2.10 Infrastructure Management ....................................................................... 28
2.11 Product Transport ...................................................................................... 28

3 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE ...................................... 29
3.1 Air Pollution .............................................................................................. 29
  3.1.1 Criteria ..................................................................................................... 29
  3.1.2 Control Procedures ................................................................................... 34
  3.1.3 Dust Monitoring ......................................................................................... 35
  3.1.4 Comparison with EA Predictions .............................................................. 39
3.2 Erosion and Sedimentation ........................................................................ 40
  3.2.1 Management ............................................................................................ 40
  3.2.2 Performance ............................................................................................. 41
  3.2.3 Comparison with EA Measures ................................................................. 41
3.3 Surface Water Pollution ............................................................................. 42
  3.3.1 Management ............................................................................................ 42
  3.3.2 Performance ............................................................................................. 42
  3.3.3 Comparison with EA predictions .............................................................. 43
3.4 Groundwater Pollution .............................................................................. 44
  3.4.1 Management ............................................................................................ 44
  3.4.2 Performance ............................................................................................. 44
  3.4.3 Comparison with EA predictions .............................................................. 45
3.5 Contaminated or Polluted Land .................................................................. 45
3.6 Threatened Flora ....................................................................................... 46
  3.6.1 Comparisons with EA Measures ............................................................... 47
3.7 Threatened Fauna ...................................................................................... 47
  3.7.1 Comparison with EA Measures ................................................................. 48
3.8 Weeds ....................................................................................................... 49
  3.8.1 Management ............................................................................................ 49
  3.8.2 Performance ............................................................................................. 49
3.9 Blasting ..................................................................................................... 49
  3.9.1 Blast Criteria and Control Procedures ...................................................... 49
  3.9.2 Performance ............................................................................................. 50
  3.9.3 Comparison with EA predictions .............................................................. 51
3.10 Operational Noise .................................................................................... 51
  3.10.1 Criteria ..................................................................................................... 51
  3.10.2 Control Procedures ................................................................................... 52
  3.10.3 Operational Noise Monitoring .................................................................. 52
  3.10.4 Comparison with EA predictions .............................................................. 54
3.11 Visual, Light ............................................................................................. 55
  3.11.1 Management ............................................................................................ 55
  3.11.2 Performance ............................................................................................. 55
  3.11.3 Comparison with EA Predictions .............................................................. 55
3.12 Aboriginal Heritage Management .............................................................. 56
  3.12.1 Management and Consultation ............................................................... 56
  3.12.2 Comparison with EA Measures ................................................................. 57
3.13 Natural Heritage ...................................................................................... 57
3.14 Spontaneous Combustion ................................................................. 57
  3.14.1 Management .............................................................................. 57
  3.14.2 Performance ............................................................................. 58
3.15 Bushfire Management ................................................................. 58
  3.15.1 Management .............................................................................. 58
  3.15.2 Performance ............................................................................. 58
3.16 Mine Subsidence ........................................................................... 58
3.17 Hydrocarbon Contamination ....................................................... 58
  3.17.1 Management .............................................................................. 58
  3.17.2 Performance ............................................................................. 59
  3.17.3 Greenhouse Gas Emissions ......................................................... 59
  3.17.4 Comparison with EA Predictions ................................................. 61
3.18 Methane Drainage / Ventilation .................................................. 62
3.19 Public Safety .................................................................................. 62
  3.19.1 Management .............................................................................. 62
  3.19.2 Performance ............................................................................. 62
3.20 Feral Animal Control ..................................................................... 62
3.21 Land Capability .............................................................................. 62
3.22 Meteorological Monitoring .......................................................... 63
  3.22.1 Introduction ............................................................................... 63
  3.22.2 Rainfall ..................................................................................... 63
  3.22.3 Temperature ............................................................................. 64
  3.22.4 Wind Speed and Direction ......................................................... 65
  3.22.5 Inversions ................................................................................ 65
4 COMMUNITY RELATIONS ..................................................................... 67
  4.1 Environmental Complaints .......................................................... 67
  4.2 Employment Status, Demography and Socio-Economic Contributions 73
    4.2.1 Employment Status and Demography ........................................ 73
    4.2.2 Social and Economic Contributions .......................................... 73
  4.3 Community Liaison ........................................................................ 73
5 REHABILITATION ................................................................................ 75
  5.1 Buildings ..................................................................................... 75
  5.2 Rehabilitation of Disturbed Land .................................................. 75
    5.2.1 Objectives ............................................................................... 75
    5.2.2 Variations Against MOP ............................................................ 78
    5.2.3 Post Rehabilitation Land Use ..................................................... 79
    5.2.4 Landform Details ..................................................................... 79
    5.2.5 Cover Material ........................................................................ 79
    5.2.6 Vegetation ............................................................................... 79
    5.2.7 Progression to Maturity ............................................................. 79
    5.2.8 Present & Future Habitat ............................................................ 80
    5.2.9 Weeds & Other Unwanted Vegetation ....................................... 80
    5.2.10 Erosion Control ................................................................. 80
    5.2.11 Erosion, Pollution and Contamination Strategies ....................... 81
    5.2.12 Fencing ................................................................................ 81
    5.2.13 Pollution Monitoring ............................................................. 81
Introduction and Objectives

5.2.14 Achievements During the Reporting Period ............................................. 81
5.3 Rehabilitation Monitoring and Performance ............................................... 84

6 CONTINUOUS IMPROVEMENT AND TARGET INITIATIVES ................................. 85
6.1 Objectives ................................................................................................. 85
6.2 Achievements to Date ................................................................................ 85
6.3 Targets and Goals ...................................................................................... 85

TABLES
Table 1 - Tenements, Licences and Approvals .................................................. 10
Table 2 - Production and Waste Summary ...................................................... 15
Table 3 - Mining Equipment ........................................................................... 18
Table 4 - Stored Water .................................................................................... 26
Table 5 - Deposited Dust Monitoring Data ...................................................... 36
Table 6 - GHG Emissions - Diesel Fuel ............................................................ 59
Table 7 - GHG Emissions Summary ................................................................. 60
Table 8 - Rainfall Data .................................................................................... 63
Table 9 - Average Monthly Temperatures ....................................................... 65
Table 10 - Complaints Summary (2013/2014 Reporting Period) ...................... 68
Table 11 - Yearly Complaints Comparison ...................................................... 72
Table 12 - MOP Rehabilitation Commitments ............................................... 75
Table 13 – Understorey Species ....................................................................... 82
Table 14 - Rehabilitation Summary ................................................................. 83
Table 15 - Maintenance Activities on Rehabilitated Land .................................. 84

FIGURES
Figure 1 - Regional Location .......................................................................... 3
Figure 2 - SB25 (adjacent to northern extension area) .................................... 16
Figure 3 - Rock lined waterway on the southern emplacement ................. 16
Figure 4 - Coal Movement and Production Summary .................................. 20
Figure 5 - Environmental Monitoring Locations .......................................... 31
Figure 6 – Surface Water Monitoring Locations ......................................... 32
Figure 7 - Groundwater Monitoring Locations ............................................ 33
Figure 8 - Templemore HVAS PM10 Data ..................................................... 38
Figure 9 - Merriown HVAS PM10 Data .......................................................... 38
Figure 10 - Monthly Rainfall Data ................................................................. 64

PLANS
Plan 3 - Land Preparation Tarrawonga Mine .................................................. 86
Plan 4 - Mining and Rehabilitation Tarrawonga Mine .................................... 86
APPENDICES
Appendix 1  PA 11_0047 and EPBC Approval
Appendix 2  Environment Protection Licence 12365
Appendix 3  Compliance Review
  • PA 11_0047 (Table A3-1)
  • Environment Protection Licence 12365 (Table A3-2)
  • ML 1579 (Table A3-3)
  • ML 1685 (Table A3-3)
  • ML 1693 (Table A3-3)
Appendix 4  Dust Monitoring Results
Appendix 5  Surface Water and Wet Weather Discharge Monitoring Data
Appendix 6  Groundwater Monitoring Data
Appendix 7  Rehabilitation Monitoring Report
Appendix 8  Blast Monitoring Results
Appendix 9  Noise Monitoring Results
Appendix 10 Meteorological Data
ACRONYMS USED THROUGHOUT THIS DOCUMENT

AEMR - Annual Environmental Management Review
AQGHGA - Air Quality and Greenhouse Gas Assessment
BCD - Bollool Creek Downstream
BCU - Bollool Creek Upstream
BOS - Biodiversity Offset Strategy
CCC - Community Consultative Committee
CHPP - Coal Handling and Preparation Plant
DA - Development Application
DECCW - Department of Environment, Climate Change and Water (now EPA)
DoP - Department of Planning (now DoPI)
DoPI - Department of Planning and Infrastructure
DRE - Division of Resources and Energy
EA - Environmental Assessment
EC - Electrical Conductivity
EEO - Energy Efficiency Opportunity
EIS - Environmental Impact Statement
EL - Exploration Licence
EPA - Environment Protection Authority
EPL - Environment Protection Licence
LOM - Life-of-Mine
ML - Mining Lease or Megalitres
MOP - Mining Operations Plan
MSDS - Material Safety Data Sheet
NCD - Nagero Creek Downstream
NCU - Nagero Creek Upstream
OEH - Office of Environment and Heritage
PEA - Preliminary Environmental Assessment
PM$_{10}$ - Particulate Matter 10 microns in diameter or smaller
PRP - Pollution Reduction Program
ROM - Run-of-Mine
SB - Sediment Basin
SD - Storage Dam
SWL - Standing Water Level
TCM - Tarrawonga Coal Mine
TCPL - Tarrawonga Coal Pty Ltd
TSP - Total Suspended Particles
TSS - Total Suspended Solids
WCL - Whitehaven Coal Limited
WCMPL - Whitehaven Coal Mining Pty Ltd
INTRODUCTION AND OBJECTIVES

1.1 Scope

1.1.1 Introduction and Period of Reporting

This is the eighth Annual Environmental Management Report (AEMR) produced for the Tarrawonga Coal Mine, and it has been prepared in accordance with Condition 3 of Mining Lease ML 1579 and ML 1685 and Condition 4 of ML 1693 (Mining Act 1992), and Condition 4 (Schedule 5) of PA 11_0047. The current Mining Operations Plan for Tarrawonga was prepared under the new guidelines “ESG3: Mining Operations Plan (MOP) Guidelines”. There are currently no guidelines associated with the preparation of AEMRs in the new format and therefore this AEMR generally follows the format identified in the Department of Primary Industries Mineral Resources (DPI-MR) document, entitled “Guidelines to the Mining, Rehabilitation and Environmental Management Process”, Version 3 dated January 2006. It also addresses Condition 4 (Schedule 5) of PA 11_0047, which requires provision of an Annual Review and is herein referred to as an AEMR/Annual Review.

Though primarily covering the period from 1st May 2013 to 30th April 2014 (the reporting period), where relevant the AEMR/Annual Review provides information on historical aspects of the operations, longer term trends in environmental monitoring results and provides relevant information on activities to be undertaken during the ensuing period, i.e. from 1st May 2014 to 30th April 2015, or beyond.

1.1.2 The Company

The Tarrawonga Coal Mine (TCM) is located approximately 15km northeast of Boggabri, 10km north of the former Canyon Coal Mine (in closure) and south of, and adjacent to, the Boggabri Coal Mine (Figure 1). The mine site is contained within Mining Lease (ML) 1579, ML 1685 and ML 1693, as shown in Figure 1. The mine is being developed by Tarrawonga Coal Pty Ltd (TCPL), a joint venture between Whitehaven Coal Mining Pty Ltd (WCMPL) (70%) and Idemitsu Boggabri Coal Pty Ltd (IBC) (30%), and operates under Environment Protection Licence (EPL) 12365 and Project Approval (PA) 11_0047. WCMPL is a subsidiary company of Whitehaven Coal Limited (WCL), a publicly listed company which has several coal mining interests in the Gunnedah region of NSW. The mine is operated by WCMPL.
Figure 1 - Regional Location
WCL’s coal mining assets are as follows:

- Canyon Coal Mine (formerly Whitehaven Coal Mine), 10km south of Tarrawonga, 100% owned by WCL, which ceased production in July 2009 and is currently under final rehabilitation;
- Whitehaven Rail Siding and Coal Handling and Preparation Plant (CHPP), 6km north-west of Gunnedah, 100% owned by WCL;
- Werris Creek Coal Mine, 4km south of Werris Creek, 100% owned by WCL;
- Narrabri Underground Coal Mine, 30km south-southeast of Narrabri, 70% owned by subsidiary company Narrabri Coal Pty Ltd. Production commenced mid 2010;
- Rocglen Coal Mine (formerly Belmont Coal Mine), 28km north of Gunnedah, 100% owned by WCL, which commenced operations in 2008;
- Sunnyside Coal Mine, 15km south west of Gunnedah, 100% owned by subsidiary company Namoi Mining Pty Ltd, which commenced production in 2008 and remained in care and maintenance during the reporting period;
- WCL also has 100% ownership of the Bonshaw project near Ashford;
- 100% ownership of the former Gunnedah Colliery through Namoi Mining Pty Ltd;
- 100% ownership of the former Vickery site and adjacent deposits, with the environmental assessment for the Vickery Project completed currently pending determination;
- 75% ownership of the Maules Creek Project, via the Aston Resources/Whitehaven merger, with joint venture partners ITOCHU (15%) and J-Power (10%). The Maules Creek Project has conditional approval with construction work commencing in the near future;
- 100% ownership of Dingo, Sienna and Monto projects (QLD) and Ferndale and Oaklands projects (NSW) via the Whitehaven/Coalworks merger; and
- WCL is also actively pursuing other prospective tenements with a view of maintaining a long-term presence in the Gunnedah Basin.

1.1.3 Background and History of the Tarrawonga Coal Mine

The Tarrawonga Coal Mine was developed after substantial investigations were undertaken under Exploration Licence 5967, granted in July 2002. Following completion of relevant assessments and studies, the Department of Planning
provided approval to the development via Development Consent (DA-88-4-2005) on the 9th November 2005. Environment Protection Licence (EPL) 12365 was also granted on 9th January 2006.

The Development Consent provided for the extraction of approximately 12.4 million tonnes of ROM coal, at a maximum rate of 2 million tonnes per year. The consent allowed for the crushing and screening of ROM coal at the mine site prior to transport to the Whitehaven CHPP near Gunnedah. It also allowed for the disposal of rejects from the Whitehaven CHPP at the mine.

Prior to commencement of operations in 2006, a Mining Operations Plan (MOP) was developed for a period of up to 6 years, until February 2012. In late 2009, following additional exploration works, an extension of the open cut pit limit and modifications to the northern and southern waste emplacements were identified to enable access to a further 4 million tonnes of coal. Consequently, a modification to the original consent DA-88-4-2005 was applied for under Section 75W of the Environmental Planning and Assessment Act. This modification was approved on 15th October 2010. As a consequence of this approval, an amendment to the existing MOP was developed, and subsequently approved, by the former I&I NSW in December 2010 (effective from the period 1st July 2010 – 30th June 2013).

In 2011, TCPL sought approval under the now repealed Part 3A, Section 75J of the EP&A Act for a continuation and extension of operations. The potential environmental impacts associated with the extension were assessed in the Tarrawonga Coal Project Environmental Assessment (Whitehaven Coal Pty Ltd, 2012). The extension project would allow continued development of the mining operations to facilitate a run-of-mine (ROM) coal production rate of up to 3 million tonnes per annum, and life of mine to 2030. PA 11_0047 was granted on 22nd January 2013 by the Planning Assessment Commission as the delegated approval authority, and received conditional federal approval on the 11th March 2013.

Subsequent to PA 11_0047 and conditional Federal approval, a new MOP was prepared in accordance with “ESG3 Mining Operations Plan (MOP) Guidelines, September 2013” and approved by DRE on 23rd October 2013. MOP Amendment A, which incorporated an additional road to the offsite explosives facility, was approved on 6th December 2013. The current MOP has been developed for a 2 year period expiring 31st October 2015.

1.1.4 Products and Markets

Coal within the Tarrawonga coal deposit can be described as a high volatility coal which will produce a very low sulphur, semi-soft coking/thermal coal, with typically <10% ash. It is expected that up to 65% of coal produced would be suitable for
marketing as a thermal or semi soft coking coal without the requirement for further washing. The coal also contains a low percentage of sulphur and phosphorous and exhibits a high energy.

The majority of coal produced is exported to Asia.

### 1.1.5 Operational and Environmental Management

#### 1.1.5.1 Contacts

The management personnel responsible for operational and environmental performance at the Tarrawonga Coal Mine and their relevant contacts are as follows:

- Mr Anthony Margetts, Manager Mining Engineering - retains statutory responsibility for mining activities at the site. Contact: (02) 6743 4000.
- Mr Nigel Wood, General Manager, Open Cut Operations - oversees open cut operations for the Whitehaven Group. Contact: (02) 6741 9303.
- Mrs Jill Johnson, Group Environment Manager - oversees environmental and rehabilitation performance for all Whitehaven sites. Contact: (02) 6741 9321.
- Mr Lachlan Johnson, Environmental Officer – oversees day to day environmental compliance and performance at the Tarrawonga Mine. Contact: (02) 6743 4000.

#### 1.1.5.2 Support Personnel

In addition to the personnel identified in Section 1.1.5.1, Tarrawonga Coal utilises specialist assistance as and when required. Specialist environmentally-based or related companies or consultants involved in activities at the mine during the reporting period included:

- ALS Acirl Pty Ltd;
- PAE Holmes;
- Eco Logical Australia Pty Ltd;
- Orica Blasting Limited;
- Spectrum Acoustics;
- G&B Ward Earthmoving;
- URS Australia;
- Dust Control Solutions;
- Geoterra Pty Ltd;
• RPS;
• Parsons Brinkerhoff;
• Tobiah Tree Mulching Services;
• Enright Land Management;
• Urban Tree Management Services;
• Fields Environmental Solutions;
• GSS Environmental; and
• Countrywide Ecological Services.

All mining and environmental management activities are undertaken generally in accordance with the MOP, management plans and procedures prepared in satisfaction of Tarrawonga Coal’s Mining Leases, EPL 12365, Project Approval, and the relevant legislation.

1.1.6 Corporate Environmental Policy

WCL has a documented Health, Safety and Environmental Policy which states:

Whitehaven intends to conduct business in a way that maintains a safe and healthy workplace for its employees, contractors, visitors and the surrounding community and will protect the environment in all stages of exploration, mining, processing and train loading.

Whitehaven aims to:

• Achieve zero injuries and occupational illnesses.
• Achieve zero equipment damage.
• Achieve zero environmental incidents.

Whitehaven will strive to achieve these goals by:

• Ensuring health, safety and environment is considered in all planning and work activities.
• Involve employees through regular communication, consultation and training.
• Identifying and controlling all potential hazards in the workplace through hazard identification and risk analysis.
• Ensuring all incidents are reported, controlled and learning’s applied and shared.
• Providing effective injury management and rehabilitation for all employees.
• Seeking continuous improvement in performance by taking into account employee & community concerns and advances in health, safety and environment.
• Complying with legislative and other requirements and providing necessary training and resources.
Whitehaven will ensure the availability of human, financial and physical resources to maintain and implement the Health and Safety Management System.

Responsibilities of people employed at Whitehaven Coal:

All persons employed by Whitehaven have a personal responsibility to comply with this policy and associated Health, Safety & Environment systems. No work is to be undertaken without a clear understanding of a safe method that minimizes the risk of injury, equipment damage and environmental harm.

Whitehaven employees shall:

• Work in a healthy, safe and environmentally responsible manner.
• Encourage others to work in a healthy, safe and environmentally responsible manner.
• Promptly report incidents, unsafe practices or conditions and environmental concerns as they become apparent.
• Co-operate with Management in the support of promotion of health and safety responsible environmental management in the work place.

This policy applies to all mines operated by Whitehaven Coal Limited and its subsidiaries.

1.2 Approval Status

1.2.1 Leases, Licences and Approvals

Table 1 identifies the leases, licences and approvals in place for the Tarrawonga Coal Mine at the end of the reporting period, the issuing/responsible Authority, dates of issue, duration (where limited) and relevant comments. The list is presented chronologically according to the date of issue.

Reviews of compliance/performance with the conditions identified in PA 11_0047 (Appendix 1), EPL 12365 (Appendix 2), and ML 1579, ML 1685 and ML 1693 are presented in Appendix 3, Tables A3-1, A3-2 and A3-3, respectively.

1.2.2 Amendments to Leases, Licences and Approvals

Amendments to leases, licences and approvals for the Tarrawonga Coal Mine during the reporting period (or planned for the next reporting period) are as follows:

• EPL 12365 – two licence variations were issued by the EPA (6th September 2013 and 5th February 2014) as detailed below:
  - The premises details on the license have been amended to reflect the land approved under Project Approval 11_0047.
  - Conditions U1 & U2 have been modified to include implementation dates for each PRP.
• ML 1685 was issued 18th July 2013.

• ML 1693 was issued 14th October 2013.

• As discussed in Section 1.1.3, the MOP for the LOM project was approved in October 2013. MOP Amendment A, which included an additional access road, was approved in December 2013.

• MOP Amendment B is planned to be submitted to DRE early during the next reporting period. This MOP amendment incorporates the latest Life of Mine Plan.

• The Offset Management Plan (OMP) for the Willeroi Offset Area has been developed in accordance with CoA associated with PA 11_0047 and EPBC 2011/5923 Willeroi Offset and was submitted to the Department Sustainability Environmental Water Populations & Communities (former, now Department of the Environment (DoE)) on 7th March 2014. Approval is pending.

• Management plans that are required to be developed and adopted under PA 11_0047 were prepared and submitted to the DP&E in accordance with CoA. The Heritage Management Plan has been approved and the Bushfire Management Plan and Waste Management Plan finalised. The remaining management plans have been reviewed by relevant agencies and will be resubmitted in the upcoming reporting period for approval.
Table 1 - Tenements, Licences and Approvals

<table>
<thead>
<tr>
<th>Issuing / Responsible Authority</th>
<th>Type of Lease, Licence, Approval</th>
<th>Date of Issue</th>
<th>Expiry</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Primary Industries (DPI)¹</td>
<td>Exploration Licence (EL 5967)</td>
<td>24/07/2002</td>
<td>23/07/2015</td>
<td>Renewed 5th August 2013</td>
</tr>
<tr>
<td>DA originally issued by Minister for Infrastructure and Planning²</td>
<td>Development Application (DA) 88-4-2005</td>
<td>09/11/2005</td>
<td>09/11/2017</td>
<td>Original consent. It is anticipated that this consent will be surrendered during the next reporting period.</td>
</tr>
<tr>
<td>Department of Primary Industries - Mineral Resources¹</td>
<td>Mining Lease (ML) 1579</td>
<td>03/04/2006</td>
<td>02/04/2027</td>
<td>Expires 21 years from commencement</td>
</tr>
<tr>
<td>Department of Primary Industries - Mineral Resources¹</td>
<td>Mining Operations Plan (MOP)</td>
<td>09/05/2006</td>
<td>28/02/2012</td>
<td>Replaced by MOP Amendment approved in 2010</td>
</tr>
<tr>
<td>Department of Environment, Climate Change and Water (DECCW)³</td>
<td>Environment Protection Licence (EPL) No. 12365 (Appendix 2)</td>
<td>09/01/2006</td>
<td>Anniversary date: 9 January</td>
<td>Variations to EPL made in Dec 07, Sep 08, May 09 Dec 11, Mar 13.</td>
</tr>
<tr>
<td>Department of Water and Energy (DWE)⁴</td>
<td>90BL253276, 90BL253278, 90BL253279, 90BL253280, 90BL254253, 90BL254254, 90BL254255, 90BL254221, 90BL254214, 90BL255766, 90BL254692</td>
<td>18/05/2006</td>
<td>Perpetuity</td>
<td>Monitoring bores</td>
</tr>
<tr>
<td>Director, Mining and Industry Projects for Department of Planning²</td>
<td>Notice of Modification (DA) 88-4-2005 MOD 1 (Appendix 1)</td>
<td>15/10/2010</td>
<td>09/11/2017</td>
<td>Modification to original consent</td>
</tr>
<tr>
<td>Industry &amp; Investment NSW¹</td>
<td>Mining Operations Plan (MOP) Amendment</td>
<td>01/07/2010</td>
<td>30/06/2013. Extension granted to 30/10/2013</td>
<td>Superseded by 2013 MOP</td>
</tr>
<tr>
<td>Department of Planning and Infrastructure (DoPI)²</td>
<td>Project Approval PA 11_0047</td>
<td>22/01/2013</td>
<td>31/12/2030</td>
<td>Project Approval for LOM Extension Project. Expires December 2030</td>
</tr>
<tr>
<td>Department of Sustainability, Environment, Water, Population</td>
<td>EPBC 2011/5923</td>
<td>11/03/2013</td>
<td>31/12/2053</td>
<td>Conditional Federal Project Approval for LOM Project</td>
</tr>
<tr>
<td>Issuing / Responsible Authority</td>
<td>Type of Lease, Licence, Approval</td>
<td>Date of Issue</td>
<td>Expiry</td>
<td>Comments</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>and Communities (SEWPaC) *5</td>
<td>Mining Lease (ML) 1685</td>
<td>18/07/2013</td>
<td>14/11/2032</td>
<td></td>
</tr>
<tr>
<td>Department of Trade &amp; Investment – Regional Infrastructure and Services</td>
<td>Mining Lease (ML) 1693</td>
<td>14/10/2013</td>
<td>14/10/2034</td>
<td>Expires 21 years from commencement</td>
</tr>
<tr>
<td>Division of Resources and Energy (DRE)</td>
<td>Mining Operations Plan (MOP)</td>
<td>23/10/2013</td>
<td>31/10/2015</td>
<td>MOP prepared under the new ESG3 Guidelines for LOM Project</td>
</tr>
<tr>
<td>Division of Resources and Energy (DRE)</td>
<td>Mining Operations Plan Amendment A (MOP)</td>
<td>6/12/2013</td>
<td>31/10/2015</td>
<td>Amendment to MOP</td>
</tr>
</tbody>
</table>

*5 Now, Department of Trade and Investment, Regional Infrastructure and Services, Division of Resources and Energy (DTIRIS – DRE)
*6 Now, Department of Planning and Environment (DP&E)
*7 Now, Environment Protection Authority (EPA)
*8 Now, NSW Office of Water (NOW)
*9 Now, Department of the Environment

1.3 Actions Requested at Previous AEMR Review

The annual environmental meeting for the 2012/2013 AEMR for the Tarrawonga Coal Mine was undertaken by DRE, EPA & DP&E on the 18th February 2014.

Formal advice was received from the DRE and EPA on the 6th March and 4th March 2014 respectively.

Two actions were identified by the DRE, as follows:

- The provision of a top soil balance to be included in the next AEMR, which also identifies any shortfalls in topsoil availability for future rehabilitation. This is addressed in Section 2.2; and

- A review of the Mining Operations Plan if a change to the Mine Plan occurs. If actions resulting from altered Mine Plan are not consistent with this approved MOP, seek to amend the MOP. As identified in Section 1.2.2, an amendment to the MOP will be sought in the next reporting period.

Advice received from the EPA is as follows:

- It was advised that the southern emplacement area is proposed to remain in its current form until the infrastructure area is relocated and the access road
is realigned. The timing of these activities is uncertain. The EPA has concerns about how potential dust generation from the southern emplacement area during this interim period will be managed. No additional management options appear to be proposed to mitigate dust potential.

As discussed in Section 3.1.2, the site plans to undertake a trial to stabilise the southern face of the emplacement during the next reporting period.

No formal advice was received from DP&E.

Matters discussed during the onsite meeting have been addressed throughout the document as required and where applicable.
2 SUMMARY OF OPERATIONS

2.1 Exploration, Resources / Reserves and Mine Life

2.1.1 Exploration

Exploration drilling was undertaken during the reporting period in ML 1579, ML 1685, ML 1693 with a total of 28 holes drilled (16 open core holes, 2 core holes and 10 blast holes). Exploration drilling carried out during the reporting period guided future mine planning and was carried out in accordance with EA.

2.1.2 Resources and Reserves

Eight coal seams are present within the Tarrawonga Open Cut and are listed below in increasing depth from the surface:

- Braymont (BR);
- Bollool Creek (BC);
- Jeralong (JE);
- Jeralong Lower (JEL);
- Merriown (ME);
- Merriown Lower (MEL);
- Velyama (VE); and
- Nagero (NA).

The coal seams range in thickness up to 4.0m, with an average thickness of 1.5m. Significant conglomerate interburden below the Nagero seam presents a practical divide between those seams mineable by open cut methods and those for which the potential may exist for future underground mining (the Northam, Therribri, Flixton and Tarrawonga seams).

2.1.3 Estimated Mine Life

The total thickness of the coal to be mined is approximately 20m, with the depth below the natural surface varying between 20m and 120m. With the approval of the Tarrawonga Mine Extension, it is estimated that the coal resource remaining within the Tarrawonga Deposit will be exhausted by 2030.
2.2 Land Preparation

Land preparation activities undertaken at the mine during the reporting period were conducted in accordance with commitments identified in the MOP and included:

- Vegetation removal in advance of the active pit over an area of approximately 1.5 ha comprising the White Cypress Pine – Narrow-leaved Ironbark Shrub/Grass Open Forest of the Western Nandewar Bioregion vegetation type.
- During the reporting period, no topsoil, subsoil and friable overburden was stripped into final stockpile locations. Soil stripping areas shown on Plan 3 indicate areas where material has been pushed to enable water management facilities to be established and drill access to the eastern hill. Actual volumes of material can be quantified upon transport to stockpile location, which will occur in the next reporting period. Existing stockpile locations are shown on Plan 3.

Table 2 shows that at the end of the reporting period, a total of 11,425 m$^3$ of subsoil and topsoil had been replaced on reshaped areas of the final landform. A further 794,987 m$^3$ of topsoil and subsoil remains stockpiled within the mining lease.

During the reporting period, the mine, which was developed as a series of approximately 60 m wide strips, advanced minimally east as most activity was restricted to the existing pit area. This advance comprises the actual working pit area and stripping in advance of the open cut.

At the end of the reporting period there was sufficient topsoil to cover all exposed areas to a depth of 200mm as specified in the EA and MOP. The disturbed areas include infrastructure area (29.7ha), active mining area (108.1ha), waste emplacements (206.2ha), tailings emplacement (5ha) and shaped waste emplacement (7.6ha), totalling 356.6ha of disturbed land. To cover this area to the depth specified in the EA and MOP a total of 713,200m$^3$ would be required, which is slightly less than what is currently stockpiled. Where possible, the site strips soil to a greater depth than required in an effort to ensure sufficient quantities of topsoil are available for rehabilitation during the mine life and at closure.
### Table 2 - Production and Waste Summary

<table>
<thead>
<tr>
<th></th>
<th>Cumulative Production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start of Reporting Period (up to 30/4/13)</td>
</tr>
<tr>
<td>Soil Stripped (m³)</td>
<td>1,242,037</td>
</tr>
<tr>
<td>Soil Used/spread (m³)</td>
<td>435,625</td>
</tr>
<tr>
<td>Waste Rock (m³)</td>
<td>99,355,486</td>
</tr>
<tr>
<td>ROM Coal (t)</td>
<td>10,281,375</td>
</tr>
<tr>
<td>Product (t)</td>
<td>9,178,067</td>
</tr>
<tr>
<td>Domestic Product (t)</td>
<td>154,812</td>
</tr>
</tbody>
</table>

ROM Coal is total production at the mine site. The difference between ROM Coal and final Product is related to changes in stockpile volumes both at the mine and the CHPP during the reporting period.

#### 2.3 Construction

Construction activities over the last 12 months have included:

- Construction of Sediment Basin 25 (SB25) (Figure 2) and an associated dirty water diversion drain as part of the northern extension which will provide for improved sediment detention and dirty water capacity;
- Construction of an access road to the offsite Remote Mixing Site (RMS) facility and magazine; and
- A rock lined waterway (Figure 3) was installed on the southern emplacement within the existing rehabilitation zone.
Section 2  Summary of Operations

Figure 2 - SB25 (adjacent to northern extension area)

Figure 3 - Rock lined waterway on the southern emplacement
2.4 Mining

2.4.1 Mining Method

All mining during the reporting period was undertaken by open cut methods using the techniques identified in the MOP, namely:

- Separate topsoil and subsoil removal by open bowl scraper and/or dozer push into windrows and load into articulated trucks with loader;
- Friable overburden removal by scraper;
- Drilling and blasting the underlying competent overburden;
- Overburden (and interburden) removal by bulldozers and/or excavator and dump trucks, with the overburden placed in and over the mined-out areas of the open cut; and
- Coal extraction by excavator loading into haul trucks for transport to the ROM stockpile.

All coal was assessed in pit and, depending on the seam, known quality, and the extent of dilution, was classified into:

- “clean” - (by-pass) top seam; and
- “dirty” - (to be washed).

The in-pit classification determines the form of subsequent processing undertaken on-site or off-site.

During the reporting period, a total of 15,703,231 bcm friable and competent overburden was removed to produce 1,851,575t ROM coal at an average overburden:coal stripping ratio of 8.5:1 (See Table 2). The lower strip ratio is a result of mining within the existing pit and south of the hill section avoiding for the present the greater overburden removal that would be required to access the coal under the hill. Plan 4 presents the status of mine and infrastructure development as of 30th April 2014. Plan 4 also identifies the limit of mining at the commencement of the reporting period.

2.4.2 Mining Constraints

Day-to-day mining activities are primarily constrained by economic considerations which, in turn, are determined to a large extent by factors beyond Tarrawonga Coal’s control (i.e. coal price and demand). Economic factors determine the viability of the determined overburden:coal stripping ratio, and hence the lateral extent of mining undertaken.
Other constraints to mining operations at the mine have included or continue to include:

- The depth of weathering of the coal seams which influences the volume of overburden requiring removal to access the coal;
- The potential presence of faulting within the seam structure which may influence the sequence and possibly the method of mining;
- The potential for an uneven coal seam floor which could potentially complicate vehicular access to the coal;
- Agricultural and ecological considerations;
- Inclement weather; and
- The existence of Aboriginal heritage sites within the ML area.

### 2.4.3 Mining Equipment

Table 3 presents a list of mining equipment in use at the mine at the end of the reporting period, together with its principal function(s) and frequency of use.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NUMBER IN OPERATION</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>O &amp; K RH170 Excavator</td>
<td>3</td>
<td>Overburden excavation and loading</td>
</tr>
<tr>
<td>Hitachi EX1900 Excavator</td>
<td>1</td>
<td>Overburden / interburden / coal loading</td>
</tr>
<tr>
<td>CAT 785 Dump Trucks</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>CAT 789 Dump Trucks</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Terex SKF Drill</td>
<td>1</td>
<td>Blast hole drilling</td>
</tr>
<tr>
<td>CAT SKSW Drill</td>
<td>1</td>
<td>Blast hole drilling</td>
</tr>
<tr>
<td>Cubex 1320 Drill</td>
<td>1</td>
<td>Blast hole drilling</td>
</tr>
<tr>
<td>CAT D11R Dozer</td>
<td>3</td>
<td>Interburden / coal ripping / pushing, dump maintenance</td>
</tr>
<tr>
<td>CAT D10T Dozer</td>
<td>5</td>
<td>Interburden / coal ripping / pushing, dump maintenance</td>
</tr>
<tr>
<td>Water Cart</td>
<td>3</td>
<td>Dust Suppression</td>
</tr>
<tr>
<td>CAT 16M Grader</td>
<td>2</td>
<td>Road maintenance</td>
</tr>
<tr>
<td>Service Truck</td>
<td>2</td>
<td>Machinery servicing</td>
</tr>
<tr>
<td>Cummins Genset</td>
<td>2</td>
<td>Power for site offices, workshop and coal loader</td>
</tr>
<tr>
<td>Mobile Crusher</td>
<td>1</td>
<td>Crushing</td>
</tr>
<tr>
<td>IT38G Loader</td>
<td>2</td>
<td>Loading</td>
</tr>
<tr>
<td>Lighting Plant</td>
<td>16</td>
<td>Lighting</td>
</tr>
<tr>
<td>CAT 988H Loader</td>
<td>2</td>
<td>Coal Pad</td>
</tr>
</tbody>
</table>
2.4.4 Hours of Operations

PA 11_0047 permits 24 hour operation of mining activities, and allows for changes to coal transportation following the commissioning of the Boggabri Rail Spur Line, and Boggabri CHPP. At this stage, mining operations have not been undertaken on a 24 hour basis, nor is the Boggabri rail spur or CHPP commissioned. TCPL has made some minor changes to operating times to accommodate changes in the working roster for improved production and economic stability.

Open cut mining activities, including processing of coal, generally occurred between the hours of 6:30 am and midnight Monday to Friday, between midnight and 3:00 am Tuesday to Saturday, and 6:30 am to 5:00 pm Saturdays. On occasion a Sunday day shift has been run to meet production deadlines.

Coal transportation from the mine site has continued between the hours of 7:00 am to 9:15 pm Monday to Friday, and 7:00 am to 5:15 pm on Saturdays. These times ensure that all coal trucks are off the public road network by 10:00 pm Monday to Friday, and 6:00 pm Saturdays.

General maintenance activities were permitted any time Monday to Sunday.

2.5 Processing

2.5.1 Outline of Processing Activities

With the exception of coal crushing to <200 mm, no coal processing was undertaken within the Project Area.

Figure 4 presents a schematic of coal movements and washery inputs, outputs and yields for the reporting period. The flowchart shows that over the last 12 months a total of 2,008,613 tonnes of coal was transported from the Tarrawonga site to the CHPP. 898,979 tonnes was direct bypass coal (i.e. crushed product coal not requiring washing) whilst 1,110,942 tonnes was directed through the washery, producing 901,381 tonnes of washed product (average yield of 81%). Coal from the CHPP was despatched via rail to domestic and export markets (Figure 4).

The slight variations in totals (i.e. washery input + bypass does not total coal from site and washery output + bypass coal does not total coal sales) are simply a result of variations in stockpiles.
2.5.2 Changes or Additions to the Process or Facilities
No significant changes or additions to processes carried out at the mine have occurred.

2.6 Waste Management
2.6.1 Introduction
Wastes produced from the Tarrawonga Coal Mine (or at the Whitehaven CHPP) remain unchanged from those identified in the previous AEMR and Environmental Assessment and are comprised of:

- General domestic-type wastes from on-site buildings and routine maintenance consumables;
- Oils and grease;
- Sewage;
- Overburden and interburden;
- Mine equipment tyres; and
- Coarse and fine coal rejects from any coal preparation undertaken.

The following sub-sections identify the management procedures adopted for each of these wastes throughout the reporting period. Management procedures remain unchanged from those previously identified and will be continued for the ensuing reporting period.
2.6.2 Domestic Type Wastes
All general wastes were collected on-site and placed into large storage receptacles on a daily basis. An industrial waste collector collected this waste on a weekly basis. TCPL has established a recycling program for domestic type wastes which are collected in separate receptacles and delivered to the Gunnedah Waste Management Centre for recycling.

2.6.3 Oil Containment and Disposal
Waste oils from the maintenance building were pumped from machinery to bulk storage tanks bunded in accordance with EPA requirements (also see Section 2.8.2). When breakdown maintenance was undertaken away from this location, oil was pumped from the equipment to a tank on the service truck from which it was subsequently transferred to the bulk storage tank.

Waste oil stored at the maintenance building was collected and disposed of by a licensed contractor approximately once every three months.

Oil filters at Tarrawonga are crushed prior to collection.

Runoff from the concrete vehicle and equipment wash pad was directed to an oil separator and containment system for subsequent pump out and disposal.

2.6.4 Sewage Treatment and Disposal
Effluent from the sewage and ablutions facilities at the mine was managed through the Council-approved septic system which is serviced by a licenced contractor. Pump outs are undertaken by a licensed waste disposal contractor on an as-needs-basis.

2.6.5 Mine Equipment Tyres
Mine equipment tyres are retained (stored) on site until disposal within the open cut void. Tyres were disposed of in-pit during the reporting period with the disposal location recorded by site personnel.

2.6.6 Overburden and Interburden
Overburden and interburden materials at the mine comprise conglomerates, sandstones, shales and mudstones which are prone to various degrees of breakdown on exposure to the atmosphere. The overburden is cast into the mined-out areas by blasting or removed from above the coal seam by a combination of dozer pushing and
excavator loading and hauling using dump trucks. Interburden removal to enable lower coal ply excavation is undertaken by excavator and dump truck.

During the reporting period, all overburden and interburden was blasted/pushed/dumped within areas nominated in the MOP for overburden emplacement.

### 2.6.7 Processing Plant Residues

#### 2.6.7.1 Physical and Chemical Characteristics

The coarse and fine rejects produced from washing Tarrawonga coal comprise a mixture of coal and non-coal materials, e.g. sedimentary rocks such as shale, mudstone or claystone, and sand, silts and clays which either occur naturally within the coal seam or represent overburden or interburden materials which dilute the coal during its extraction.

#### 2.6.7.2 Reject Handling and Disposal Procedures

**Coarse Reject** – As rehabilitation progresses at the mine, coarse reject produced from the Whitehaven CHPP will be backloaded to the mine for placement in the open cut prior to reshaping and rehabilitation. Coarse reject emplacement commenced in the current emplacement area in August 2010 following approval under Section 100 of the *Coal Mine Health and Safety Act 2002*. Approximately 458,177 tonnes of coarse reject has been disposed at the site during the reporting period.

**Fine Reject** – Pumped to a series of ten fine reject ponds within the Whitehaven CHPP balloon loop and adjacent to the Whitehaven CHPP for consolidation. The ponds are encircled by bunding and drains to contain fine reject in the event of a pond failure. Following consolidation, the fine rejects are excavated and transported to the former Gunnedah Colliery for use in final landform development and emplacement in the Melville and North Cut Void.

#### 2.6.7.3 Monitoring and Management of Containment Facilities

Routine management and monitoring of reject material at the Whitehaven Siding is undertaken by Whitehaven Coal personnel under the direction of the Plant Manager. Inspections of the reject ponds at the Whitehaven CHPP are undertaken by officers of DRE, the statutorily responsible Authority.
2.7 Stockpile Capacity

All ROM coal produced is delivered to clean and dirty ROM stockpiles. ROM stockpile capacity at the Tarrawonga Coal Mine is approximately 150,000t. Average stockpile volume during the reporting period was 142,322 tonnes.

2.8 Water Management

2.8.1 Objectives

The mine lies within the catchment of the Namoi River. Locally, and within proximity of the project site, Goonbri Creek, Bollol Creek and Nagero Creek all provide flows to the Namoi River during runoff events. The design of sediment detention basins within the disturbed area of the mine aims to limit the opportunity of discharge of runoff from mine-disturbed area, i.e. after appropriate detention time to satisfy licensed discharge criteria.

There are seven wet weather discharge points nominated in the current EPL 12365. These are SD17, SD16, SD9, SB14, SB22, SB23 and SB24 (Plan 4). SB18 has been identified as an error as the relevant licence variation submitted by TCPL requested inclusion of SB24, not SB18. This error will need to be rectified when the next license variation is submitted to the EPA.

Management of water at the mine is undertaken with the following objectives:

(i) The quantity of water exhibiting elevated suspended solids loadings is minimised;

(ii) Erosion is minimised;

(iii) Sediment-laden water is contained for a sufficient period that if it discharges, satisfies the discharge criteria identified in EPL 12365;

(iv) Surface water is harvested off-site to the extent permissible, thereby minimising water extraction from bores or other sources;

(v) Groundwater is not contaminated;

(vi) Downstream water users are not adversely affected by the Mine’s operations, either in terms of quantity or quality; and

(vii) The water management system is consistent with planned rehabilitation objectives and long-term land use.
2.8.2 Surface Water Management

Water within the project approval area is nominally classified either as “clean”, “sediment-laden” or “dirty”, or “contaminated”, depending on the source of the flow and its potential for physical or chemical contamination.

“Clean water” comprises water which emanates from areas undisturbed by mining activities, flows from sediment basins following its clarification in those structures or is contained within, or discharges from, storage dams. Within the DA Area, clean surface water flows either pass to natural drainage lines and hence off-site or are collected by diversion banks and directed to the storage dams for use on-site. All water flowing from sediment basins ultimately flows to storage dams.

“Dirty water” comprises water which does or could potentially contain elevated levels of suspended solids originating from areas of mining-related disturbance.

Dirty water originating from surface runoff is collected by catch banks located down slope of the potential sources of pollution and directed to the sediment basins. Water collecting within the sediment basins is used for dust suppression in addition to waters in the storage dams to avoid potential for off-site water discharge.

The sediment basins are either cleaned out once their capacity is reduced by 20% or supplementary structures are installed to provide the required storage volume. In the event of structure replacement, the contents of the former structure will be allowed to dry prior to being capped and rehabilitated.

The principal components of the water management systems in place at the end of the reporting period are shown on Plan 4.

“Contaminated Water Management”. Two self bunded diesel fuel tanks with capacities of 68,000L and 105,000L (62,000L and 94,500L safe fill respectively) are maintained adjacent to the Tarrawonga workshop area. This ensures that in the event of a leak from the tanks, there is sufficient capacity to adequately store the full complement of diesel from those tanks. Tarrawonga Coal has also installed an additional concrete bund adjacent to the fuel tanks to house other oils and lubricants in a safe and efficient manner. Any associated spills within the bund then report to an oil separating unit for disposal by an appropriately licensed contractor. Waters potentially contaminated with hydrocarbons from the workshop area are also diverted to the oil separator, with clean water used for dust suppression purposes. Spill kits are also maintained on the mine site.

The likelihood of localised spills of fuel or oil external to bunded areas is kept to a minimum by the adoption of the above practice. In the event that localised spills do occur, immediate action would be undertaken to ensure appropriate clean-up and minimisation of harm.
Water originating from the open cut pit is pumped to Void Water Dams or retained in pit within managed sumps. Pit water is also used for dust suppression.

2.8.3 Discharges

Wet weather discharges that occurred during the reporting period are discussed in Section 3.3.2.

2.8.4 Water Sources, Demand and Use

Within the Project Approval area and immediate vicinity of the mine, surface water resources are limited to a number of ephemeral drainage lines which flow for a short period after substantial rainfall, farm dams, water storage dams and a series of interlinked sediment basins within the Project Approval area as shown on Plans 3 and 4.

Water is required on the mine site primarily for dust suppression purposes, with minor quantities required for potable, toilet and ablutions purposes. Where practicable, water collected on-site is retained or reused, with water for dust suppression sourced from a combination of on-site water harvesting, inflows from the exposed coal seam, overburden and interburden, and groundwater extraction. Water for potable, toilet and ablutions purposes is trucked to the site from Gunnedah or Boggabri.

During the reporting period, a total of approximately 424ML was used for mine site and processing facility dust suppression purposes, with all water sourced within the Project Approval area.

Water sources comprise the following:

- Groundwater/surface water inflows to the open cut (majority being surface water inflows); and
- Surface flows to sediment basins and storage dams within the Project Approval area.

The pipeline from Boggabri Coal, which was installed during the last reporting period, was not utilised during the reporting period. Ongoing logistical and commercial challenges have hampered any efforts to utilise this pipeline when prolonged dry periods have seen water resources below a satisfactory level. The utilisation of high security water from the Namoi River under a standing agreement with Whitehaven’s Maules Creek Project was explored but ultimately discarded due to logistical challenges. This option remains available for future situations.
During the prolonged dry summer period preliminary desktop investigations were carried out to identify a reliable groundwater source on a nearby adjacent Tarrawonga owned property utilising existing groundwater entitlements. It is expected that this investigation will be completed in the next reporting period with that information to be used in the event that water resources fall below an acceptable level.

There was a significant reduction in water usage over the reporting period with approximately 424ML used. This reduction can be attributed a number of factors including the necessity in the previous reporting period to utilise large amounts of water to keep water storage levels at an acceptable level to reduce the risk of a discharge event.

During this reporting period a Dustex trial was also undertaken.

As required in PA 11_0047, an updated Water Management Plan was developed during the reporting period and submitted for review to the DoPI. URS Australia Pty Ltd was engaged to complete the Plan to a standard which addresses the requirements in the Project Approval. It is expected that the amended plan, incorporating Department comments, will be re-submitted for approval during the next reporting period.

### 2.8.5 Stored Water

Table 4 presents an estimate of the volume of stored water at the beginning and end of the reporting period.

<table>
<thead>
<tr>
<th></th>
<th>Volumes Held (m³)</th>
<th>Storage Capacity at the end of the Reporting Period (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start of Reporting Period</td>
<td>At end of Reporting Period</td>
</tr>
<tr>
<td>Clean Water (in Storage Dams)</td>
<td>38,432</td>
<td>41,143</td>
</tr>
<tr>
<td>Dirty Water (in Sediment Basins)</td>
<td>93,908</td>
<td>136,623</td>
</tr>
<tr>
<td>Controlled Discharge Water (salinity trading schemes)</td>
<td>N/A*</td>
<td>N/A*</td>
</tr>
<tr>
<td>Pit Water</td>
<td>110,654</td>
<td>132,072</td>
</tr>
</tbody>
</table>

* N/A = Not applicable for the Tarrawonga Coal Mine

### 2.8.6 Groundwater Management

Inflows into the open cut are irregular and result from a combination of:
• Direct rainfall runoff and infiltration through the emplaced overburden which flows down-dip to the open cut sumps;
• Where the open cut workings expose water stored within fractures in the rock mass or coal seams; and/or
• From areas where weakly cemented gravel overburden has been encountered.

Inflows not reporting to the sump(s) within the open cut either evaporate or are incorporated within the coal or replaced overburden.

Contamination of groundwater is controlled by the management of chemical, oil and grease spills and storage, with:

• Vehicle maintenance carried out in designated areas;
• Any spills being cleaned up; and
• Fuels, oils and greases being stored within a bunded area, constructed in accordance with AS 1940-2004 (also see Section 2.8.2) and/or EPA requirements.

Groundwater from surrounding bores is monitored on a regular basis to detect and assess any changes in groundwater quality or level that may be attributable to the mine (see Section 3.4.2).

2.9 Hazardous and Explosive Material Management

During the reporting period two contractors undertook the blasting services for Tarrawonga; Orica Mining Services up until December 2013 and LDE Corporation commenced blasting operations 6th January 2014.

No explosive materials are retained within the mine site. Orica Mining Services had a storage facility located between the Tarrawonga and Canyon sites to remove the requirement for on-site storage.

An offsite remote mixing station (RMS) and magazine was constructed to the west of Tarrawonga outside ML 1579 and LDE Corporation operates out of this facility.

Orica mixed nitropril with distillate to produce an explosive on the day of each blast using a purpose built explosives mixer and in a quantity adequate only for that particular blast.

LDE Corporation utilise a low density hybrid explosive product that has a very low potential to produce fume (NOx gases). This product is mixed at the RMS prior to being transported onsite and loaded into the shot. A generic product is also utilised where necessary.
Safety Data Sheets (SDS’s) are retained on-site for all hazardous materials, independent of the quantity. Additionally, all contractors are required to supply SDS sheets for any hazardous goods they may bring onto the site.

2.10 Infrastructure Management

Management of infrastructure (e.g. buildings, roads, generators and pumps) and other facilities not specified elsewhere within this AEMR/Annual Review, is undertaken on an as-needs basis or in accordance with Statutory requirements in order to maintain them in an operationally efficient, safe, neat and tidy condition, and one which does not result in the direct or indirect generation of unacceptable environmental impacts.

2.11 Product Transport

All sized (<200 mm) ROM coal delivered to the Whitehaven CHPP that is destined for the export market is transported via rail to the Port Waratah or Kooragang Island ship loaders at the Port of Newcastle. Approximately 2,008,613 tonnes of coal was transported from the mine over the reporting period in approximately 48,950 truckloads. This equated to an average of 179 truckloads of coal being transported per haulage day from the mine to the Whitehaven CHPP.
3 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

The following sub-sections document the implementation and effectiveness of the various control strategies adopted at the Tarrawonga Coal Mine, together with monitoring data for the reporting period. Existing monitoring sites are shown in Figure 5, Figure 6 and Figure 7. Where relevant, life of mine monitoring data is also included as a basis for discussion on longer-term trends. A risk identification matrix and the relevant Environmental Management procedures are identified in the Tarrawonga Coal Mine MOP.

3.1 Air Pollution

3.1.1 Criteria

The air quality criteria applicable to the Tarrawonga Coal Mine are specified in PA 11_0047 Schedule 3 Condition 24, Tables 6, 7 & 8 (Appendix 1) which is summarised below:

- Acceptable mean annual increase in deposited dust – 2g/m²/month.
- Mean annual dust deposition (all sources) – 4g/m²/month.
- Mean annual TSP (all sources) concentration – 90 μg/m³.
- Mean annual PM₁₀ particulate level – 30 μg/m³.
- 24 hour average PM₁₀ particulate level – 50 μg/m³.

Additionally, exhaust gases on earthmoving/mining equipment should not be visible for more than 10 seconds continuously.

Routine air quality monitoring at the Tarrawonga Coal Mine is required for deposited dust and PM₁₀ particulates. Monitoring of deposited dust is undertaken on a monthly basis whilst PM₁₀ levels are monitored every 6 days.

Monitoring continues at all sites but exceedances on project-related properties are not reportable to the EPA and monitoring results are not reportable via the Annual Return.

Throughout the reporting period, real time PM₁₀ TEOM (air quality) monitoring was conducted with a permanent monitoring station located at the nearby “Flixton” property (Figure 3). Data is generated every 15 minutes and correlated against current weather conditions, with alarms notifying site personnel of elevated PM₁₀ results when wind conditions and direction is indicative of mining influence on the monitor. Real-time monitoring is used as a management tool to facilitate in the day to day mine plan and operations and is not a compliance monitor.
Schedule 3, Condition 29 of PA 11_0047 requires the updating of the existing Air Quality and Greenhouse Gas Management Plan. This Plan has been developed and was submitted to the Director General during the last reporting period. It is expected that the plan will be resubmitted, with changes to address comments, for approval in the next reporting period. A requirement of the approval, which is addressed in the Management Plan, is the development of a proactive and reactive air quality management system that includes PM$_{2.5}$ monitoring. A real time PM$_{2.5}$ TEOM is located at the “Will-gai” property south of Tarrawonga.
Figure 5 - Environmental Monitoring Locations
Figure 6 – Surface Water Monitoring Locations
Figure 7 - Groundwater Monitoring Locations
3.1.2 Control Procedures

In order to satisfy the criteria identified above, Tarrawonga Coal employs a range of air pollution control measures including:

- Use of trunks, branches and litter from clearing for mine site rehabilitation. No materials are burnt;
- Limiting groundcover removal in advance of mining consistent with operational requirements. Under normal operational circumstances, a maximum of 100 m is prepared in advance of mining;
- Groundcover removal as part of the topsoil removal activities, rather than prior to topsoil removal;
- Where practicable, limiting soil stripping activities to periods when there is sufficient soil moisture to prevent significant dust lift-off and avoiding periods of high winds;
- Soil stripping using open bowl scrapers, thereby eliminating the dust generated from elevated scrapers;
- Application of water to exposed surfaces, with emphasis on those areas subject to frequent vehicle / equipment movements which may cause dust generation and dispersal;
- Use of water injection on the drilling rig;
- Use of imported aggregates for blast hole stemming;
- Water application at the crusher and on the conveyor discharge point to the coal bin;
- Cessation of coal processing activities during periods of concurrent high winds and temperatures which cause coal dust dispersal, independent of water applications. This situation did not arise during the reporting period;
- ROM coal pad watering;
- Progressive shaping and rehabilitation of areas once they are no longer required for mining purposes;
- Speed limit restrictions on all vehicles and equipment on the mine site;
- Equipment exhaust positioning to avoid exhausts impinging on the ground and causing dust lift-off; and
- Use of covers on all product coal trucks. Toll was the principal contractor engaged in the haulage of coal from the Tarrawonga Mine to the CHPP until January 2014 when BIS Industries took over the contract. All coal haulage
vehicles, including those operated by sub-contractors, are fitted with roll-over
tarpaulins.

The site has continued to implement the requirements of the Pollution Studies and
Reduction Programs listed in the EPL. The requirements relate to:

- Best practice management of wheel generated dust;
- Best practice management of disturbing and handling overburden in adverse
  weather conditions; and
- Trialling best practice measures for disturbing and handling overburden.

During the next reporting period it is proposed to undertake a trial with the objective
to stabilise the exposed area of the southern waste emplacement to minimise the
potential for dust generation during dry and/or high wind conditions. The trial will
likely involve aerial seeding of species with a higher likelihood of germinating in
waste rock.

### 3.1.3 Dust Monitoring

Table 5 presents a summary of the deposited dust monitoring data for the reporting
period while Appendix 4 presents the results of all dust monitoring over the life of
the mine to date. A graphical representation of the total insoluble solids and ash
content data for each of the sites monitored during the reporting period is also
included in Appendix 4.

It should be noted that the deposited dust result recorded for September 2009
(October 2009 for Idemitsu monitors) has been excluded from the long term average
for each site. Dry conditions prevailed over the latter part of 2009 which contributed
to severe dust storms around late September 2009. The results during the period do
not represent normal deposited dust levels. The highly anomalous result of
254g/m²/month recorded in October 2009 at D-15 Forest View has also been
excluded from the long term average.

Figure 5 identifies the locations of the various deposited dust gauges maintained
during the reporting period.
Table 5 - Deposited Dust Monitoring Data

<table>
<thead>
<tr>
<th>Site (see Figure 5)</th>
<th>Property Name</th>
<th>Mean Annual Total Insoluble Solids*1 (g/m²/month)</th>
<th>Cumulative Total Insoluble Solids*3 (g/m²/month)</th>
<th>Mean Ash*1 (g/m²/month)</th>
<th>Long Term Mean Total Insoluble Solids (g/m²/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EB-4</td>
<td>TEMPLEMORE</td>
<td>3.0</td>
<td>4.2</td>
<td>1.1</td>
<td>2.4</td>
</tr>
<tr>
<td>EB-5</td>
<td>BOLLOL CREEK STATION</td>
<td>4.3</td>
<td>5.5</td>
<td>3.8</td>
<td>2.8</td>
</tr>
<tr>
<td>EB-6</td>
<td>AMBARDO</td>
<td>0.8</td>
<td>2.0</td>
<td>0.5</td>
<td>1.1</td>
</tr>
<tr>
<td>EB-7</td>
<td>TARRAWONGA</td>
<td>0.9</td>
<td>2.1</td>
<td>0.6</td>
<td>1.0</td>
</tr>
<tr>
<td>EB-8</td>
<td>THUN</td>
<td>2.7</td>
<td>3.9</td>
<td>2.3</td>
<td>2.5</td>
</tr>
<tr>
<td>EB-9</td>
<td>PINE GROVE</td>
<td>1.0</td>
<td>2.2</td>
<td>0.7</td>
<td>1.0</td>
</tr>
<tr>
<td>EB-10</td>
<td>TARRAWONGA MINE</td>
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<td>9.5</td>
<td>2.7</td>
<td>4.0</td>
</tr>
<tr>
<td>EB-11</td>
<td>TARRAWONGA MINE</td>
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<td>2.7</td>
<td>1.4</td>
<td>1.8</td>
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<td>EB-14</td>
<td>WESTERN BOUNDARY OF ML</td>
<td>1.8</td>
<td>3.0</td>
<td>1.0</td>
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</tr>
<tr>
<td>EB-15</td>
<td>WESTERN BOUNDARY OF ML</td>
<td>6.1</td>
<td>7.3</td>
<td>4.8</td>
<td>4.8</td>
</tr>
<tr>
<td>D-2*2</td>
<td>NAGERO</td>
<td>4.1</td>
<td>5.3</td>
<td>1.4</td>
<td>3.7</td>
</tr>
<tr>
<td>D-4*2</td>
<td>GREEN HILLS</td>
<td>1.7</td>
<td>2.9</td>
<td>0.8</td>
<td>3.7</td>
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<tr>
<td>D-7*2</td>
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<td>0.7</td>
<td>1.2</td>
</tr>
<tr>
<td>D-15*3</td>
<td>FOREST VIEW</td>
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<td>2.2</td>
<td>0.7</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Grey = project related (TCPL or Boggabri Coal)

*1 At end of reporting period

*2 Site is monitored and maintained by Boggabri Coal

*3 Includes 1.2g/m²/month background levels

A review of Table 5 and Appendix 4 shows that:

- The mean annual total insoluble solids (deposited dust) criterion was satisfied at all monitoring locations, except for EB-5 “Bollol Creek Station”, EB-10 “Mine”, EB-15 “Western Boundary” and D2 “Nagero”. All sites where the mean annual deposited dust criteria exceeded the 4g/m²/month criteria are on project related property. It should be noted that the Total Insoluble Matter value can be significantly impacted by other sources. When compared to the ash component (that proportion retained after combustion), the values are reduced and are generally reflective of a significant vegetative component in the sample.

- EB-5 is located at “Bollol Creek Station”, which is a project related property to the east of the mine. Increased dust deposition can be attributed to the
easterly progression of the pit and the close proximity of the gauge to local unsealed roads including Goonbri Rd and Blair Athol Lane.

- EB-10 is located south-west of the mine on project related land. It is in closer proximity to the unsealed Goonbri Road than the mine and, given the prevailing wind directions, it is assumed that the monitor is impacted by dust generation from the road.

- EB-15 is located on the western boundary of the mining lease, in close proximity to Boggabri Coal infrastructure and facilities most likely leading to anomalous results when Boggabri Coal construction works are being undertaken.

- D-2 is located west of Tarrawonga, in close proximity to the Boggabri Coal infrastructure area. Elevated results are most likely due to construction works being undertaken at the Boggabri Coal facility.

- Boggabri Coal ceased monitoring of D-2 “Nagero”, D-7 “Merriown” and D-15 “Forest View” during the reporting period. All deposition gauges located on Boggabri Mine owned land were removed from EPL 12407.

TCPL has a High Volume Air Sampler (PM$_{10}$) located at the property “Templemore”, to the south-east of the mine site. There is another PM$_{10}$ monitor located on the “Merriown” property, to the west of the mine site, which is operated by Boggabri Coal and is used as a cumulative impact monitor for the Boggabri and Tarrawonga mines. Each sampler runs for 24 hours every 6 days, with filter papers sent to an accredited laboratory for analysis.

During the reporting period, the PM$_{10}$ results at the “Templemore” monitor have exceeded compliance with the 24 hour criteria on one occasion in February 2014. This was primarily due to particularly dry weather conditions during this period and therefore increased dust generation from nearby unsealed. As the “Templemore” monitor is located on project owned property, and is unoccupied, the 24 hour PM$_{10}$ criteria do not apply at this property. Despite the exceedances in the 24 hour criteria, the “Templemore” monitor remains within the annual average compliance criteria of 30 µg/m$^3$, with an annual average at the end of April 2014 of 22.22µg/m$^3$ (Figure 8). The results for PM$_{10}$ at “Templemore” generally correlate well with the rainfall received, with higher PM$_{10}$ levels recorded during the drier periods.
During the reporting period, the PM10 results at the “Merriown” monitor have exceeded compliance with the 24 hour criteria on one occasion on 15th October 2013. This was primarily due to particularly dry weather conditions during this period and therefore increased dust generation from nearby unsealed. The “Merriown” monitor remains within the annual average compliance criteria of 30 µg/m³, with the running annual average of 12.70 µg/m³ at the end of the reporting period (Figure 9).
The full data set for the PM$_{10}$ monitoring over the life of the mine, including graphs of long term data records, is contained within Appendix 4.

Tarrawonga has continued to receive complaints about dust despite continuing to improve dust management practices over the reporting period through both increased water application on haul roads, and Dustex trials on haul roads to improve dust mitigation. It should be noted that the number of complaints received has reduced significantly from the previous reporting period.

Dust impacts are further complicated by cumulative impacts from Tarrawonga and Boggabri Coal, with complainants not necessarily able to distinguish dust sources from Tarrawonga, Boggabri or the local gravel roads. As Tarrawonga mine is the operation most visible to complainants, it tends to be associated with the dust complaints. This is despite photographic evidence from the site camera located on the northern emplacement which has generally supported Tarrawonga claims that dust generation is minimised with no specific dust source associated with operating equipment being able to be identified.

A major contributing factor to visible dust in the wider valley is dust generation from gravel roads such as Rangari Road, Goonbri Road, Wean Road, Dripping Rock Road and Leard Forest Road. During the winter period, with temperature inversions prevalent, a layer of dust is visible during the early morning until the inversion layer dissipates. The impact of road dust on overall dust levels has been identified on preliminary dust charts produced by the real time PM$_{10}$ units located at the “Flixton” property, with spikes in PM$_{10}$ concentrations correlating with additional road use associated with shift change events at the mine sites. Tarrawonga employees and contractors are encouraged to utilise sealed roads where possible to minimise this impact.

### 3.1.4 Comparison with EA Predictions

The Air Quality and Greenhouse Gas Assessment (AQGHGA) was undertaken by PAEHolmes Pty Ltd as part of the Tarrawonga Coal Project mine extension (Tarrawonga Coal Project Environmental Assessment, Appendix D, 2012). The predicted levels and comparisons with actual monitoring data are included below for both dust deposition and PM$_{10}$.

**Dust Deposition**

The AQGHGA predicted that the annual average dust deposition levels at all receptors surrounding the Project Area would be below the relevant criteria of 4g/m$^2$/month for cumulative dust deposition when using a background dust deposition level of 1.2g/m$^2$/month.
The reporting period average for “Tarrawonga” (at the time, the only privately owned property surrounding the mine) was 0.9 g/m²/month. During the reporting period the property was purchased by Whitehaven. Combined with the background dust deposition level, this monitor matches the Tarrawonga Coal Project EA prediction of not exceeding 4 g/m²/month. All monitoring locations where exceedances have occurred are on project-related properties.

EB-10 is located between the south-west boundary of the ML and the unsealed Goonbri Road. Dust generated by mining activities would generally not travel in a south-westerly direction and as a result the exceedance of cumulative deposited dust levels is considered to be not directly associated with operations at Tarrawonga.

The exceedance at EB-15 is not unexpected as this monitor is located between Boggabri Coal’s ROM pad and Tarrawonga operations. This is also the case of D-2 “Nagero” to the west of the mine.

EB5 Bollol Creek is project owned land located to the east of the mine. The easterly progression of the mine and prevailing westerly winds along with non project related activities including the unsealed public road can be attributed to the elevated result and increase from the previous reporting period.

**PM**₁₀

The AQGHGA predicted that cumulative impacts from the extension of the Tarrawonga mine and background levels would not exceed the annual average PM₁₀ limit of 30 µg/m³ at any receiver or the 24 hour PM₁₀ concentration limit of 50 µg/m³ at any privately-owned receiver. The highest 24 hour concentration recorded during the reporting period was 63.7 µg/m³ at “Templemore” and 57.1 µg/m³ at “Merriown”. The highest annual average during the reporting period was 22.85 µg/m³ at “Templemore” and 18.56 µg/m³ at “Merriown”. Although the annual averages of both monitors were well below the annual average criteria, exceedances of the 24 hour concentration limit occurred at “Templemore” in February 2014 and Merriown in October 2013. As previously mentioned, this site is project related and therefore the criterion does not apply.

### 3.2 Erosion and Sedimentation

#### 3.2.1 Management

Methods for the management of erosion and sediment control at the mine are presented in the MOP, the Erosion and Sediment Control Plan and Site Water Management Plan.

Control of erosion and sediment generation is achieved primarily through the implementation of water management controls identified in Section 2.8.2 and shown
on Plan 4. Water usage for dust suppression ensures adequate storage capacity is available within the various water containment structures to receive inflows. Additional measures which assist in the control of erosion and sedimentation include:

- Minimising the extent of disturbance consistent with operational requirements;
- Revegetation of long-term subsoil and topsoil stockpiles, areas shaped to their final landform and areas no longer required for mining-related purposes;
- Undertaking soil management activities generally in accordance with the soil stripping and stockpiling recommendations from Geoff Cunningham Natural Resource Consultants and McKenzie Soil Management; and
- Installation of contour banks and rock-lined waterways on the final landform following soil application.

Soil stockpiles have been placed in gently sloping or near flat areas surrounded by grassland which effectively reduces the runoff velocity, and hence erosive potential, from any run-on waters. However, TCPL is aware of the potential for stockpile erosion and will adopt stockpile protective procedures to minimise impacts as required over the remaining life of the mine. All soil stockpiles on the site have been sown to cover crops on completion to aid in stabilisation.

### 3.2.2 Performance

The effectiveness of the procedures for erosion and sedimentation management are assessed visually as part of routine mine operations and supervision undertaken by Tarrawonga Coal, with any ameliorative works initiated as and when required.

Proposed works to de-silt sediment basins and storage dams has been postponed until suitable climatic conditions persist to provide an opportunity to undertake the works. Predicted seasonal and climatic conditions indicate that the proposed works will be possible in the next reporting period.

A rock drain was constructed on the southern emplacement to convey runoff from contour banks and is directed into SB16A. The drain reduces erosion and reduces the risk of contour banks failing during large storm events.

### 3.2.3 Comparison with EA Measures

The Tarrawonga Coal Project EA stated that new and existing erosion and sediment control structures would be inspected by mine personnel on a regular basis and
following rainfall events greater than 25mm in a 24 hour period to assess integrity, identify instances of potential erosion and determine retained capacity. The Environmental Officer is responsible for undertaking monthly environmental inspections as well as inspections after heavy rainfall. Site mining supervisors also undertake daily inspections of the site which include visual assessment of water management structures.

During the 4th quarter of the reporting period it was proposed to de-silt a number of dams across the site in increase on site water capacity, however, due to high rainfall during March this project was not carried out. Subject to the seasonal conditions it is proposed that this will occur during the next reporting period.

Progressive construction of water management on rehabilitated areas has occurred as required. For example, extension of the rock lined waterway on the western face of the southern emplacement has been completed.

### 3.3 Surface Water Pollution

#### 3.3.1 Management

The prevention of surface water pollution is achieved through the management of surface water as presented in Section 2.8.2.

#### 3.3.2 Performance

##### 3.3.2.1 Wet Weather Discharges

TCPL has, at all times, made every effort practically possible to avoid discharge and to minimise impacts when discharge is inevitable (ie. maintenance of sediment control fencing). One (1) instance of wet weather discharge occurred during the reporting period, as detailed below. The discharge was sampled in accordance with the requirements of EPL 12365 (Appendix 5). Rainfall records are shown in Appendix 10.

Wet weather discharge occurred from Storage Dam 9 on the 28th March 2014. The discharge occurred following 133.8 mm in the preceding 5 days. Water quality from this discharge complied with all parameters, including a TSS level of 12mg/L. This rainfall event exceeded the 5 day 90%ile design criteria and all efforts were made prior to this event to prevent a discharge. Both Nagero Creek (upstream and downstream) and Bollol Creek (upstream and downstream) were able to be sampled at the time with TSS results of 88 mg/L, 89mg/L, 160mg/l and 631mg/l respectively, indicating that non-project related discharge waters did have an influence upon water quality in Bollol Creek.
3.3.2.2 Conclusion

Significant improvements have been made in regards to managing wet weather discharge issues, with the successful trial and implementation of liquid flocculant into storage dams when required, as well as constructing additional dams for increased storage capacity and improved water management. Signage indicating dam names and purpose as well as level indicators has been installed to allow for easy identification of necessary storage capacities. In addition to this, the existing Water Management Plan prepared by URS under the previous mining approval DA 88-4-2005 MOD 1 was updated to comply with PA 11_0047 during the last reporting period, with correspondence received during this reporting period. It is expected that the revised plan, incorporating comments, will be resubmitted early in the next reporting period for approval.

3.3.2.3 Surface Water Storages

In addition to monitoring of wet weather discharge events, TCPL undertakes quarterly sampling of surface waters, with samples during the reporting period referred to ALS Acirl Pty Ltd for analysis. The results of analysis are presented in Appendix 5.

Whilst there are no criteria or concentration limits specified for the quarterly surface water samples, the results do provide an indication as to the quality of waters on-site.

EC levels in various storages have shown to be variable, and have been the subject of previous discussions during AEMR reviews. Results presented over the last 12 months continue to identify fluctuating EC levels.

The assessment of sediment load during these quarterly water monitoring events also provides an indication of the capacity for those storages to meet water quality criteria should a wet weather discharge occur, and if additional treatment methods would be warranted to minimise potential for a non-compliant discharge.

3.3.3 Comparison with EA predictions

The Tarrawonga Coal Project EA identified no consistent difference between water quality at sites upstream and downstream of the mine. It did however note potential impacts on creek water quality from elevated suspended solids contained in runoff and/or leakage or spillage of hydrocarbons from infrastructure area. No hydrocarbon related issues or impacts on creek water quality from elevated suspended solids in runoff have occurred during the reporting period.
SB25 was constructed during the reporting period. As per the Tarrawonga Coal Project EA, off-site creek monitoring locations have not changed. Assessment of Arsenic, Molybdenum and Selenium have continued in accordance with water management plan requirements, with no suggested trend of enrichment of these minerals in surface waters adjacent to the overburden emplacements.

3.4 Groundwater Pollution

3.4.1 Management

With the exception of fuels and oils, no materials occur, or are retained on the mine site which is likely to be a source of groundwater pollution.

The methods for management of potential pollutants are summarised in Section 2.8. Ongoing monitoring to assess trends in groundwater chemistry will enable assessment of potential contaminants to groundwater, with particular emphasis on heavy metals and major cations and anions. Groundwater monitoring requirements are identified in the Water Management Plan.

3.4.2 Performance

Throughout the life of the mine to date, Tarrawonga Coal’s performance with respect to groundwater management, the prevention of pollution and the assessment of impacts on groundwater availability to other surrounding users, has been assessed through groundwater level and chemistry monitoring undertaken at a series of operating and abandoned bores within ML 1579, 1685 and 1693 and extending to distances of up to 3km from the mining activities, where practicable, at the frequency and for the parameters identified in the Water Management Plan.

Appendix 6 presents the results of the groundwater monitoring undertaken since the commencement of mining at the Tarrawonga Coal Mine. Monitoring sites are shown on Figure 7.

Groundwater sampling and analysis was conducted by ALS Acirl Pty Ltd during the reporting period. A review of the groundwater monitoring results presented in Appendix 6 shows the following trends:

Groundwater levels

Groundwater levels within most bores remained relatively consistent throughout the reporting period. This includes the trend of fluctuation shown in some bores over many years. The SWL in MW7 has been consistent through the reporting period, which is a different result to previous years where it showed a consistent drop in SWL.
Two vibrating wire piezometers were installed into exploration boreholes drilled in 2011 (TA60c and TA65c). Logger data continues to demonstrate a consistent trend of no perceptible drawdown as a consequence of mining operations, with water levels remaining relatively constant and generally within a range of 20cm over the reporting period.

Groundwater quality

- The water in most bores is generally neutral in pH to mildly alkaline.
- The water in all bores can be described as fresh to brackish.
- During the reporting period the water quality at all monitoring locations has been within the ANZECC guideline trigger values for livestock drinking water.

3.4.3 Comparison with EA predictions

The Tarrawonga Coal Project EA identified that there would be negligible drawdown effect on alluvial and porous rock systems and would only be in an area where no privately-owned bores are located. It also indicated that variations in standing water levels across the monitoring network are generally considered to be typical of natural effects and a response to rainfall trends and farming activity. This has been the case throughout the reporting period with all monitoring locations maintaining consistent levels (with fluctuations). Vibrating Wire Piezometer installed in TA60 and TA65 continue to demonstrate depressurisation as predicted in the Tarrawonga Coal Project EA as the mine moves toward the east.

3.5 Contaminated or Polluted Land

Prior to mining, the project area was a greenfields site. Discussion with landowners during the preparation of the EIS revealed that no environmentally harmful products had been used on their landholding nor had there been any disposal of potential environmental contaminants. This situation has remained unchanged throughout the life of the mine to date and consequently there is no reason to expect that contaminated lands would be present within the project area.

Areas identified of potential land contamination during the Life of Mine Extension Environmental Assessment have not been disturbed during this reporting period and are several years from disturbance based on current mine planning.
3.6 Threatened Flora

Investigations undertaken by Geoff Cunningham Natural Resource Consultants Pty Ltd as part of the original Mine EIS identified no significant impact on threatened flora species, endangered ecological communities, endangered flora populations or critical habitat as a consequence of the development.

Notwithstanding the findings of the initial flora investigations, procedures were identified in the Flora and Fauna Management Plan for the site for ongoing monitoring, specifically through the establishment of flora monitoring quadrats for use in future rehabilitation of the mine site.

Establishment of monitoring plots commenced in April 2007 and has continued as required. Over the life of the mine, a total of 28 quadrats are to be established across rehabilitation sites and control sites.

During the reporting period, vegetation monitoring was conducted during mid to late 2013 and early 2014 through Eco Logical Australia Pty Ltd. This monitoring comprised of:

- Remote sensing (multi-spectral imaging) on the 25th August 2013;
- Terrestrial fauna and habitat survey on the 2nd and 3rd September and 21st and 23rd October 2013; and
- Monitoring of native vegetation areas was conducted 2nd December 2013 and 9th and 10th January 2014.

As rehabilitation of pasture areas had only recently been undertaken, monitoring of the rehabilitated pasture will take place and be reported to during the next reporting period.

Changes in the Normalised Differential Vegetation Index (NDVI) of multi-spectral imagery captured on 30th September 2012 and 25th August 2013 were assessed. These identified an increase in groundcover across most of the site. One area of significant increase in photosynthetically active biomass (PAB) was identified in the southern portion of Pasture Rehabilitation Zone (Appendix 7). Field validation by WCM found the area to have an increase in weed cover, particularly Mayne’s Pest. This is not an environmental or noxious weed, so no specific management action is required.

Scattered areas of increase and decrease in PAB across the image can be attributed to shadow position and slight image shift. This is particularly pronounced around dam perimeters. Key weeds identified for additional control included the African Boxthorn and Prickly Pear. A copy of the 2013 report is included in Appendix 7.

The Whitehaven Regional Biobank site was formally established on the 28th June 2012 under Biobank Agreement 43. This Biobank site now accounts for Tarrawonga...
offset requirements associated with the original Tarrawonga development and the 2010 modification. The biobank credits required to be retired for these approvals occurred on the 17th April 2013, and the area is now subject to active management in accordance with the Management Plan for the Regional Biobank site.

The Offset Management Plan for the Willeroi Biodiversity Offset Area (EPBC approval requirement) has been submitted to the Department of Environment for approval. The Biodiversity Management Plan (required by the Project Approval) also incorporates management measures for Willeroi. It has been submitted to DP&E for approval and at the end of the reporting period, Tarrawonga had not received advice from DP&E.

3.6.1 Comparisons with EA Measures
The Biodiversity Assessment undertaken as part of the Tarrawonga Coal Project EA outlines the approved areas of disturbance. Approximately 1.5 ha was cleared in advance of the pit during the reporting period. Flora and fauna monitoring has occurred as identified in the Tarrawonga Coal Project EA (see Appendix 7 for reports), with pre-start clearance surveys completed by recognised ecologists prior to clearing activity.

3.7 Threatened Fauna
Investigations into the occurrence of threatened fauna within the Project Area were undertaken by Countrywide Ecological Service (CES) as part of the original EIS preparation phase. Those investigations identified that the proposed development was unlikely to significantly affect threatened species found or likely to occur in or around the mine site.

Notwithstanding these findings, the Flora and Fauna Management Plan was developed to monitor possible impacts on native fauna diversity. This is assessed using the control quadrats established for flora monitoring purposes, the re-establishing of native vegetation community quadrats, the re-establishing of pasture land monitoring quadrats, and will also involve additional sampling for amphibians, mammals and birds external to these quadrats to gain an appreciation of any significant changes to the native fauna assemblage in the presence of mining and absence of grazing.

During the reporting period, as part of PA 11_0047 requirements, a Biodiversity Management Plan was developed. Once approved, this Biodiversity Management Plan will replace the existing Flora and Fauna Management plan with updated procedures, policies and management strategies for the site itself and for the
Willeroi Offset area, in conjunction with the Offset Management Plan required by the EPBC approval.

The annual fauna monitoring program was undertaken in September 2013 by Eco Logical Australia Pty Ltd (ELA). Additionally, ELA undertook terrestrial fauna and habitat monitoring as part of their Rehabilitation Monitoring Report in December 2013. The report is provided in Appendix 7 and includes details on the suite of monitoring undertaken. As with flora monitoring, the results from the Eco Logical assessment will form a quantitative set of baseline data for ongoing monitoring via these methods.

A total of 66 bird species were recorded across all monitoring sites by ELA, with most species being recorded in the woodland control plots. However, there was a significant increase of species identified on rehabilitation survey plots with twice as many species recorded in September 2013 than September 2012. Five species listed as vulnerable under the TSC Act were recorded during the survey, most of which occurred in control plots. One occurred in Fauna Rehab 01.

- *Chthonicola sagittata* (Speckled Warbler)
- *Climacteris picumnus* (Brown Treecreeper)
- *Daphoenositta chrysoptera* (Varied Sittella)
- *Hieraaetus morphnoides* (Little Eagle)
- *Neophema pulchella* (Turquoise Parrot).

Of the non-bird fauna *Macropus giganteus* (Eastern Grey Kangaroo) and *Macropus robustus* (Common Wallaroo) were noted in all monitoring zones. *Wallabia bicolor* (Swamp Wallaby) was also recorded in the control zones. These species have been recorded in previous years. *Cryptoblepharus virgatus* (Wall Skink) was recorded in Fauna Rehab 01, whilst *Varanus varius* (Lace Monitor) was recorded in Fauna Control 3.

### 3.7.1 Comparison with EA Measures

The Tarrawonga Coal Project EA identified pre-clearance fauna surveys, rehabilitation and revegetation of disturbed areas and fauna monitoring as measures to avoid or mitigate impacts on fauna. Appendix 7 provides the Rehabilitation Monitoring Report undertaken by Eco Logical Australia. Rehabilitation is discussed in Section 5.
3.8 Weeds

3.8.1 Management

Weed management within the Project area involves general observations as well as six-monthly targeted inspections to determine levels of weed infestation. Weed control is undertaken by contractors or Whitehaven’s Field Officer. All persons involved with weed control hold required chemical handling certificates.

3.8.2 Performance

Ongoing weed management during the reporting period comprised:

- Spot spraying of African Boxthorn within the ML (particularly in the waste emplacement rehabilitation and around SB5A);
- Removal of Silverleaf Nightshade and spraying of Mother-of-Millions along road sides and within the ML;
- Spot spraying of general weeds and grasses around the administration office and workshops;
- Spot spraying of Prickly Pear, Bathurst Burr and Noogoora Burr within the ML;
- Introduction of Cactoblastis and Cochineal to eradicate Prickly Pear plants; and
- Spraying of grasses along rip lines and mounded areas to reduce competition with planted tubestock in rehabilitation areas.

Key recommendations from the ELA report relating to weed control include targeted control of African Boxthorn across the site which will be undertaken during the next reporting period.

3.9 Blasting

3.9.1 Blast Criteria and Control Procedures

3.9.1.1 Blast Criteria

Blasting criteria for the Tarrawonga Coal Mine are nominated in PA 11_0047 and specify that:

- Blasting must only be carried out between 9.00 am and 5.00 pm, Monday to Saturday inclusive. Blasting is not allowed on Sundays, public holidays or at any other time without the written approval of the Director-General.
• A maximum of one (1) blast per day; unless an additional blast is required following a blast misfire and a maximum of 4 blasts per week averaged over a calendar year for the project:

• The overpressure level from blasting operations must not:
  ▪ exceed 115dB (Lin Peak) for more than 5% of the total number of blasts over a period of 12 months; and
  ▪ exceed 120dB (Lin Peak) at any time.

• Ground vibration peak particle velocity from the blasting operations must not:
  ▪ exceed 5mm/s for more than 5% of the total number of blasts during each reporting period; and
  ▪ exceed 10mm/s at any time,

at any residence on privately-owned land.

3.9.1.2 Control Procedures

Flyrock, air vibration, ground vibration and dust from blasting are controlled using a combination of design and operational methods which are detailed in the MOP and/or documented blasting procedures.

3.9.2 Performance

During the reporting period, a total of 50 blasts were initiated (all of which were monitored).

There was only one instance of monitoring results exceeding 115 dBL during the reporting period, occurring at the project-related “Templemore”. This exceedance falls within the allowable 5% of blasts in a 12 month period over 115 dBL but not greater than 120 dBL. There were no instances of blast results exceeding 120 dBL during this reporting period.

The maximum recorded ground vibration during the reporting period was 2.43mm/s recorded at Tarrawonga Station on 6th June 2013. This is well inside the consent criteria of 10 mm/s.

All blast monitoring results for the reporting period, including the time of initiation has been included in Appendix 8.
3.9.3 Comparison with EA predictions

Blasting impact predictions are presented in Appendix C of the Tarrawonga Coal Project EA and indicate that vibration and air blast emissions would comply with the relevant human comfort and structural damage criteria at nearby privately-owned receivers. PA 11_0047 allows for 5% of blasts to exceed 115 dB so the blast of the 23rd August 2013 which recorded an overpressure level of 116.5dBL is not considered non-compliance.

The Blast Management Plan was updated to comply with requirements in PA 11_0047 during the reporting period and is subject to approval by DP&E, with approval expected in the next reporting period. An additional requirement of the Blast Management Plan was the development of a Road Closure Management Plan in preparation for the mine moving further to the East, closer to on Goonbri Road. Approval of this plan is expected in the next reporting period.

3.10 Operational Noise

3.10.1 Criteria

For the purpose of monitoring noise performance throughout the reporting period following the granting of PA 11_0047, the criteria adopted for compliance is that of PA 11_0047 which is specified as follows:

<table>
<thead>
<tr>
<th>Noise Criteria dB(A)</th>
<th>Day, Evening &amp; Night $L_{Aeq}$ ($\text{l}_{\text{15 min}}$)</th>
<th>Night $L_{A1}$ ($\text{l}_{\text{1 min}}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All other privately-owned residences</td>
<td>35</td>
<td>45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Road Traffic Noise Criteria dB(A)</th>
<th>$L_{Aeq}$ ($\text{l}_{\text{1 hour}}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any residence on privately-owned land</td>
<td>60</td>
</tr>
</tbody>
</table>

In August 2013, the property “Kyalla” was acquired and is now project owned land. This acquisition occurred following an agreement between both parties of terms for acquisition during the last reporting period. Subsequently the EPL has been amended to remove the noise criteria for the “Kyalla” property and is consistent with the project approval.

A number of other specific conditions (ie. acquisition, monitoring protocols and cumulative impacts) are listed in PA 11_0047 (Appendix 1) and EPL 12365 (Appendix 2).
3.10.2 Control Procedures

Control of noise generation and propagation on the mine site is by a combination of general source and propagation path methods including:

- Installation and maintenance of appropriate mufflers on plant and equipment;
- Where operationally feasible, scheduling activities to minimise operation of equipment in exposed locations when winds are blowing towards residences;
- Equipment removal or replacement;
- Changing operational procedures;
- Restricting hours of operations;
- Enclosure of fixed items of plant, eg generators;
- Bunding close to noise sources to create obstructions to the propagation path;
- On-going site road maintenance using the mine-based grader; and
- Regular equipment maintenance.

Tarrawonga Coal also regularly liaises with the majority of surrounding neighbours to seek feedback not only on noise, but on all mining activities. Any issues raised are investigated and appropriate measures are implemented to alleviate further impacts.

3.10.3 Operational Noise Monitoring

3.10.3.1 Introduction

In order to indicate to mine management the need, or otherwise further address noise related matters, routine attended noise monitoring programs were undertaken quarterly during the reporting period by Spectrum Acoustics. The noise monitoring sites are identified on Figure 5. A copy of all the attended noise monitoring reports is presented in Appendix 9.

In addition to the operational noise requirements, Tarrawonga Coal monitors road transport noise along public sections of the coal haulage route in accordance with the Tarrawonga and Rocolen Road Noise Management Plans. This monitoring occurs at the privately owned residences on the “Weroona” property and “Brooklyn” property located off Blue Vale Road. The results of this noise monitoring is also contained within Appendix 9.
In accordance with the requirements of PA 11_0047 and EPL 12365, TCPL undertook real time noise monitoring during the reporting period. Monitoring was undertaken at the following properties:

- “Blair Athol”: May 2013– 8th June 2013
- Laird property: 8th June – 11th November 2013
- “Matong”: 12th November 2013 to end of reporting period.

During this reporting period, Tarrawonga Coal continued to implement the procedures in relation to real time monitoring. The procedure has shown to provide crucial data in relation to the management of noise emissions from the operation.

The following sub-sections present a summary of the outcomes of attended noise monitoring over the reporting period.

### 3.10.3.2 June/July 2013 Noise Monitoring - Attended

Noise monitoring was undertaken from the 26th and 27th June and 1st and 2nd July 2013 at “Tarrawonga” (N1). TCM did not exceed the operational noise criterion at the Tarrawonga monitoring location. Atmospheric conditions at the times of the monitoring were calm and cold and there is high likelihood of a moderate to strong temperature inversion being in place.

Noise from TCM was inaudible during the sleep disturbance monitoring at “Tarrawonga” on the nights of 26th June and 1st and 2nd July 2013.

At the time of monitoring the “Tarrawonga” landholder retained acquisition rights under the Project Approval.

### 3.10.3.3 June 2013 Noise Monitoring – Road Noise

Road noise monitoring was conducted at the “Brooklyn” (2 residences) and “Weroona” properties on the 25th June 2013, with the following observations and results:

- 60 truck movements were recorded during the measurement period for Residence 1 and 2 at “Brooklyn” (4.26pm to 5.28pm). The calculated contribution at Residence 1 from mine-related vehicles was 57 dB(A)_{eq} (1 hour). The calculated contribution from mine-related vehicles at Residence 2 was 43 dB(A)_{eq} (1 hour). Both results are below the daytime criterion of 60 dB(A)_{eq} (1 hour).

- Over the course of the measurement period at “Weroona” (3:05pm to 4:07pm) there were 61 coal truck movements related to Tarrawonga and
Rocglen. The total measured contribution from mine-related vehicles at “Weroona” was 47dB(A), $L_{eq} (1 \text{ hour})$. This is below the daytime criterion of 60 dB(A) $L_{eq} (1 \text{ hour})$.

3.10.3.4 September 2013 Noise Monitoring – Attended

Noise monitoring was undertaken from the 25th to 28th September 2013. TCM were in excess of the operational noise criterion at the “Tarrawonga” monitoring location during the day on 28th September (37dB(A)). The measured level is consistent with modelled predictions and at the time of monitoring the landholder retained acquisition rights under the Project Approval.

3.10.3.5 December 2013 Noise Monitoring – Attended

Noise monitoring was undertaken from the 2nd to 4th December 2013. Noise emissions from TCM were higher than the operational noise criterion at the “Tarrawonga” monitoring location during the night of the 3rd (37dB(A)) and during the day and evening of 4th December (40dB(A) and 37dB(A) respectively). TCM also exceeded the sleep disturbance criterion during the monitoring on the 5th December (48 dB(A)).

At the time of monitoring, agreement had recently been reached in terms of acquisition of the “Tarrawonga” property, and as a consequence, it was considered project related.

3.10.3.6 March 2014 Noise Monitoring – Attended

Noise monitoring was undertaken from the 3rd to 6th March 2014. Noise emissions were within specified criteria. As the “Tarrawonga” property is project owned land the noise criterion does not apply.

3.10.3.7 March 2014 Noise Monitoring – Road Noise

Road noise monitoring was due to be undertaken in March 2013 but due to a lack of truck movements along the haul road from Tarrawonga and inclement weather at the time monitoring was to be undertaken, it was postponed until June 2013 and will be reported during the next reporting period.

3.10.4 Comparison with EA predictions

During the reporting period it was identified that noise levels measured at the “Tarrawonga” property were generally in accordance with predictions made in the
2011 Extension EA, with noise levels up to 5dB above the standard 35dB criteria. The “Tarrawonga” property was acquired during the reporting period and is now project related.

TCM will revise the noise monitoring locations during the next reporting period to include monitoring at private receivers.

3.11 Visual, Light

3.11.1 Management

Management/minimisation of local and more distant visual impacts is achieved by:

- Undertaking activities in accordance with the various management plans applicable to the mine, all of which incorporate safeguards which indirectly reduce visual impact;
- Minimising the extent of land disturbance / clearing in advance of mining;
- Progressive rehabilitation of disturbed areas; and
- Sympathetic positioning and direction of lights to avoid them impacting on local residences.

3.11.2 Performance

Tarrawonga Coal has minimised the visual impact of its activities to the extent practicable, however, the continued progression of the southern waste emplacement to the south and the increased height of the emplacement have resulted in increased visibility from non-mining related properties. TCM is aware of the visual impact this emplacement has created, and with the granting of PA 11_0047, will fast-track rehabilitation of the southern emplacement as much as possible.

Short term stabilisation of the southern waste emplacement has been considered and will be actioned in the next reporting period. Vegetating this area will improve the appearance of the site from the nearby public roads and private receivers.

Visual impacts from dust generation are discussed in Sections 3.1.3 and 4.1.

3.11.3 Comparison with EA Predictions

The Tarrawonga Coal Project EA provided simulations from neighbouring properties as well as predictions for general visual impacts created by the mine.
Mine management continually reiterates the importance of sympathetic positioning of lighting plant however it is difficult at times to locate lighting to avoid any offsite impact whilst maintaining safety requirements. In the event that complaints are received in relation to lighting, immediate action is taken on site to reduce the lighting impact wherever possible.

The Tarrawonga Coal Project EA also notes progressive rehabilitation as a visual impact mitigation measure. Section 5 discusses rehabilitation during the reporting period.

3.12 Aboriginal Heritage Management

3.12.1 Management and Consultation

A Cultural Heritage Assessment was completed in September 2011 as part of the Tarrawonga Coal Project EA by Kayandel Archaeological Services. A total of 57 sites (21 open artefacts, 11 scarred trees and 21 isolated artefacts) were located during the surveys of the Project Area. An updated Heritage Management Plan (HMP) was approved, as required in PA 11_0047, during the reporting period, to manage and reduce impacts by incorporating updated procedures for assessment and recovery of culturally significant objects as the mine progresses. An additional requirement of PA 11_0047 includes the development of an Aboriginal Conservation Strategy in conjunction with the Boggabri Coal Mine and Maules Creek Project. The Strategy is being developed and will be completed during the next reporting period.

Prior to the updated HMP being approved in February 2014, Tarrawonga Coal, through the soil stripping contractor, consulted with Red Chief Local Aboriginal Land Council (LALC). In accordance with the agreement with the Red Chief LALC, notification of planned topsoil stripping was provided by the soil stripping contractor directly to the Red Chief LALC site monitors approximately 2 to 3 days in advance of planned activities. During this time, no Aboriginal heritage material was identified during soil stripping activities.

Following the approval of the HMP in February 2014, cultural artefact salvage was undertaken in ML 1685 associated with the northern extension. There are 9 identified sites located within the northern extension comprising a mixture of isolated artefact, stone artefact scatter and culturally modified trees. During initial consultation it was identified that it was not practical to undertake the salvage of culturally modified trees and that this would be undertaken at a later date (in the next reporting period). The salvage of other artefacts was undertaken on the 25th February 2014 with eight of the nine Registered Aboriginal Parties (RAPs) participating. Gunida Gunyah elected not to participate in any salvage works or any
other site based work as a result of the ongoing political issues associated with mining in the Gunnedah basin. They will continue to be consulted with for any other cultural heritage matter as identified in the HMP.

During the salvage of the five isolated sites, only one artefact was recovered at BC18 (AHIMS # 20-4-0112). No other artefacts were observed or recovered from the other four designated sites; BC17 (AHIMS # 20-4-0111), BC19 (AHIMS # 20-4-0113, BC22 (AHIMS # 20-4-0116) and TCEP-IF-002 (AHIMS # 20-4-0303).

At the artefact scatter site, TCEP-OS-020 (AHIMS # 20-4-341), eight artefacts were recovered and recorded.

TCEP-ST-001 (AHIMS# 20-4-0299) was determined by all parties not to be of an Aboriginal cultural practice but rather a surveyor’s mark. This site will be deregistered as an Aboriginal Cultural Heritage site.

To date, the measures in place to protect Aboriginal cultural heritage are considered satisfactory, with all measures identified in the EA, Project Approval and HMP in place. New procedures have been implemented to manage a significantly larger number of registered Aboriginal parties identified through the Tarrawonga Coal Project EA (refer to HMP).

3.12.2 Comparison with EA Measures

Management measures for Aboriginal Heritage items are detailed in the Tarrawonga Coal Project EA. During the reporting period the Heritage Management Plan was approved by DP&E. All measures, where applicable, have been implemented during the reporting period including, salvage works, monitoring of soil stripping and ground disturbance activities by Registered Aboriginal Parties.

3.13 Natural Heritage

There are no features of natural heritage within the Project Area and hence, no specific management procedures are required.

3.14 Spontaneous Combustion

3.14.1 Management

Tarrawonga Coal has a low percentage of inorganic sulphur and hence a low potential for exothermic oxidation reactions. The short residence time of ROM coal stockpiles at the mine also minimises the potential for spontaneous combustion incidents.
In the event of spontaneous combustion Tarrawonga Coal personnel are present within the area of the ROM coal stockpiles during work hours and are trained to watch for indications of spontaneous combustion. Any incident would be followed by excavation to identify the source and extinguishment through water saturation.

### 3.14.2 Performance

There were no incidents of spontaneous combustion during the reporting period.

### 3.15 Bushfire Management

#### 3.15.1 Management

The existing Bushfire Management Plan was updated in April 2013, as required by Condition 59 of Schedule 3 of PA 11_0047. The plan identifies policies, procedures, responsibilities, equipment and equipment maintenance schedules, emergency response procedures and contact details in place for the Tarrawonga Coal Mine. The Plan was issued to both the Rural Fire Service and Narrabri Shire Council for reference and is available on the Whitehaven website.

Tarrawonga Coal maintains firebreaks around both its landholding and the mine area and maintains fire fighting equipment as well as earthmoving equipment, a water truck etc which would be used in the control of fires.

#### 3.15.2 Performance

There were no bushfire incidents on or adjacent to the Project Area during the 2013/2014 reporting period.

### 3.16 Mine Subsidence

Mine subsidence is not an issue with open cut mines and hence it is not an issue with the Tarrawonga Coal Mine.

### 3.17 Hydrocarbon Contamination

#### 3.17.1 Management

It is Tarrawonga Coal’s objective that:

- All bulk hydrocarbons, i.e. fuel, oils, grease etc (both new and waste) retained at the Tarrawonga Coal Mine be contained within bunded areas within the contained water management system as described in Section 2.8.2;
• All fixed or portable equipment incorporate self-contained bunding;
• Hydrocarbon-contaminated materials be disposed of appropriately; and
• Minor spillages, if occurring, are cleaned up and the contaminated soil either bio-remediated or transferred off-site to an appropriately licensed waste disposal area.

Major spillages, if occurring, would be treated in accordance with the three-phase system identified in the relevant management plan required under the Project Approval.

3.17.2 Performance
Tarrawonga Coal’s procedures for hydrocarbon management have been effective throughout the reporting period with:
• No surface or groundwater contamination evident or reported by landowners; and
• No requirement for off-site disposal of contaminated materials.

A concrete apron has been constructed at the refuelling area to contain any spillages and prevent soil contamination.

3.17.3 Greenhouse Gas Emissions

Diesel Consumption

During the reporting period, a total of 15,934,213 litres of diesel fuel was used on site for mining related activity, which is a decrease of approximately 3.07 million litres since the last reporting period. This is a result of improved mine plan efficiencies whilst maintaining increased production. Assuming an energy content of Automotive Diesel Oil of 38.6 GJ/kL and using Table 3 of the National Greenhouse Accounts (NGA) Factors – July 2011, the estimated direct – Scope 1 Greenhouse Gas emissions including all CO2 and non CO2 gases are shown in Table 6.

<table>
<thead>
<tr>
<th>Table 6 - GHG Emissions - Diesel Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Fuel Usage kL</td>
</tr>
<tr>
<td>GHG 2012/13</td>
</tr>
</tbody>
</table>

The Tarrawonga site does not utilise electricity from the power grid, but via a number of diesel powered gensets. The emissions associated with diesel consumption by the gensets are included in the table above.
Explosives

During the reporting period, a total of 10,263 tonnes of explosives was used at Tarrawonga Coal Mine, which is a decrease of approximately 1,195 tonnes from last year. Assuming a conversion factor of 0.1778, it is estimated that blasting at the mine yielded 1,825 equivalent tonnes of CO₂.

Fugitive Emissions

Fugitive emissions from ROM coal production are reported via Whitehaven’s National Greenhouse and Energy Report, as required by the National Greenhouse and Energy Reporting Act 2007. Emissions for Tarrawonga are determined from borehole samples taken at the mine and gas sampling analysed by external consultants. The actual gas content from each gas bearing strata is then applied to the mass of the gas bearing strata which is under the extraction area of the mine during the relevant financial year. The 2012/2013 National Greenhouse and Energy Report for the Whitehaven Group identified emissions from Tarrawonga of 1,956 total tonnes CO₂-e carbon dioxide equivalent.

Summary

A summary of calculated total CO₂ equivalent tonnes/year for the reporting period is provided in Table 7.

<table>
<thead>
<tr>
<th>Source</th>
<th>Calculated Total CO₂ Equivalent tonnes/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel</td>
<td>43,022</td>
</tr>
<tr>
<td>Explosives</td>
<td>1,825</td>
</tr>
<tr>
<td>Fugitive Emissions</td>
<td>1,956</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>46,803</td>
</tr>
</tbody>
</table>

The potential for reducing greenhouse gas emissions at Tarrawonga is related predominantly to consumption of diesel use by plant and equipment. Methods are in place at site to maximise efficiency from the mining fleet through regular maintenance scheduling and, where possible, minimising the gradient and length of loaded haul runs for the operating dump trucks.

Tarrawonga Coal remains committed to a reduction in emission levels as a result of operations at the mine site. Up until March 2013, Tarrawonga Coal had operated a fleet of Terex dump trucks (electric drive) which had proven to burn less diesel fuel as compared to a standard mechanical drive fleet. However, with the WHC cost reduction process undertaken in March 2013 as a means of addressing ongoing economic viability, these trucks were stood down due to modifications to the mining plan to improve economic efficiency. The change in the mining plan, installation of
larger CAT 785 and 789 trucks and maintenance of a production rate of 2Mtpa has, to some extent, offset any impacts associated with cessation of the electric drive fleet. Additionally, the biodiversity offset area at the Willeroi Property and the Regional Biobank site would assist with reducing the TCM carbon footprint, in particular the regeneration of areas previously cleared for agricultural purposes and the conservation commitment in place with the offsets to be maintained in perpetuity.

The fuel burn rate has increased over the last 12 months with an average rate of 7.8 litres/tonne of ROM coal. This compares to 9.8 litres/tonne ROM coal in 2012/2013 reporting period and 9.7 litres/tonne of ROM coal in the 2011/2012 AEMR period. The decrease since the last reporting period can be attributed to mine planning efficiencies, reduced overburden/coal strip ratio and shorter haul distances.

As part of Whitehaven’s participation in the Commonwealth government’s Energy Efficiency Opportunities (EEO) Program, the Tarrawonga site is subject to review and assessment of energy use performance and potential energy savings mechanisms. The site has been undertaking energy efficiency works in accordance with the requirements of the program and in the last reporting year noted a decrease in fuel use by ancillary equipment (dozers, water carts and graders), whilst maintaining or increasing production, as a result of streamlined mine planning and scheduling.

3.17.4 Comparison with EA Predictions

Greenhouse gas emissions associated with the mine were assessed in Appendix D of the Tarrawonga Coal Project EA. The total direct (Scope 1) emissions were estimated to be approximately 0.2 million tonnes of carbon-dioxide equivalent (Mt CO₂-e) per annum. Scope 1 emissions are the release of greenhouse gases into the atmosphere as a direct result of an activity, or series of activities, that constitute the facility and include fugitive emissions from coal mines and diesel combustion.

Actual consumption (combining the major Scope 1 contributors of fugitive emissions, diesel consumption and explosives) totalled approximately 47,000 tonnes (or 0.047 Mt), which is significantly lower than the predicted emissions. This is expected as PAE Holmes identified in Appendix D of the Tarrawonga Coal Project EA that their estimation was expected to be a significant overestimate as it was based on the standard National Greenhouse Accounts factor which at the time was identified to be approximately 45 times greater than the factor measured for the same coal seams for a nearby mining project. This assumption was confirmed during 2012 drilling at Tarrawonga and subsequent NGERS reporting.
3.18 Methane Drainage / Ventilation

Methane drainage / ventilation are not of relevance to open cut mines and hence are not an issue at the mine.

3.19 Public Safety

3.19.1 Management

The mine is located wholly on WCL and Boggabri Coal owned land in a relatively remote area, in excess of 1 km from any public road and accessible only by a single access road which is locked when no mine-related personnel are at the mine. The site is fenced and appropriate signs installed.

Visitors to the mine are required to report to the mine office and unauthorised personnel are not permitted to move around the mine area unaccompanied. Procedures are in place with respect to blasting to ensure the area around each blast site is clear of personnel and that all surrounding residents are advised in advance of proposed blasts.

3.19.2 Performance

The procedures in place have been generally effective throughout the reporting period. However, anti-coal activists have on numerous occasions bypassed locked gates and ignored mine area safety signage to access areas of the mine site.

3.20 Feral Animal Control

Tarrawonga Coal continues to monitor feral animal occurrences both onsite and on other mine owned land and implements necessary control programmes if and when necessary.

In September 2013, Whitehaven participated in an aerial control campaign of feral animals (goats and pigs) on its offset properties.

3.21 Land Capability

All land currently disturbed by mining is classified as Land Capability Class III, IV, VI and VII with the remaining areas to be disturbed over the life of the approved mine primarily comprising Class III, IV & VI. All disturbance during the reporting period was undertaken on Class III, VI and VII land.
On completion of all mining activities, the successful rehabilitation of areas of disturbance and the relinquishment of the mining leases, the land affected by mining within the Project Area will, in the main, be returned to a classification similar to that prior to mining.

3.22 Meteorological Monitoring

3.22.1 Introduction

A weather station is located at the project owned “Templemore” property.

3.22.2 Rainfall

Rainfall data for the reporting period recorded from the “Templemore” meteorological station is presented in Table 8 and Figure 10. Full station data is presented in Appendix 10.

<table>
<thead>
<tr>
<th>Month</th>
<th>Monthly Rainfall (mm)</th>
<th>Long Term Average* (mm)</th>
<th>Cumulative Rainfall (mm)</th>
<th>Number of Rain Days (≥1mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2013</td>
<td>21.6</td>
<td>42.5</td>
<td>21.6</td>
<td>5</td>
</tr>
<tr>
<td>June 2013</td>
<td>136.6</td>
<td>43.6</td>
<td>158.2</td>
<td>7</td>
</tr>
<tr>
<td>July 2013</td>
<td>21.4</td>
<td>42.7</td>
<td>179.6</td>
<td>4</td>
</tr>
<tr>
<td>August 2013</td>
<td>5.0</td>
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<td>January 2014</td>
<td>8.4</td>
<td>71.7</td>
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<td>February 2014</td>
<td>37.8</td>
<td>67.3</td>
<td>406.8</td>
<td>3</td>
</tr>
<tr>
<td>March 2014</td>
<td>168.0</td>
<td>47.8</td>
<td>574.0</td>
<td>9</td>
</tr>
<tr>
<td>April 2014</td>
<td>8.2</td>
<td>37.2</td>
<td>582.2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>582.2</td>
<td>621.7</td>
<td>582.2</td>
<td>47</td>
</tr>
</tbody>
</table>
A review of Table 8 and Figure 10 shows that the total rainfall at the mine during the reporting period was 581.2mm. The total rainfall at the site was 40.3mm less than the annual average rainfall for Gunnedah and 97.8mm less than the mine’s total rainfall for the 2012/2013 AEMR/Annual Review reporting period. Below average rainfall was experienced for the majority of the reporting period. Nine of the twelve months received well below average rainfall. June and November 2013 and March 2014 received well above average rainfall which ultimately bolstered the annual figures.

3.22.3 Temperature

Average maximum and minimum temperatures for the reporting period are presented in Table 9 together with long-term monthly averages for Gunnedah Pool (Bureau of Meteorology Station 055023).
### Table 9 - Average Monthly Temperatures
(May 2013 – April 2014)

<table>
<thead>
<tr>
<th>Month</th>
<th>Average Daily Temperature</th>
<th>Station 055023 (Gunnedah Pool)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reporting Period</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Min (°C)</td>
<td>Max (°C)</td>
</tr>
<tr>
<td>May 2013</td>
<td>5.2</td>
<td>21.7</td>
</tr>
<tr>
<td>June 2013</td>
<td>4.3</td>
<td>17.4</td>
</tr>
<tr>
<td>July 2013</td>
<td>2.6</td>
<td>18.6</td>
</tr>
<tr>
<td>August 2013</td>
<td>1.5</td>
<td>20.8</td>
</tr>
<tr>
<td>September 2013</td>
<td>5.3</td>
<td>27.1</td>
</tr>
<tr>
<td>October 2013</td>
<td>8.1</td>
<td>29.0</td>
</tr>
<tr>
<td>November 2013</td>
<td>11.6</td>
<td>30.5</td>
</tr>
<tr>
<td>December 2013</td>
<td>14.5</td>
<td>33.5</td>
</tr>
<tr>
<td>January 2014</td>
<td>18.2</td>
<td>36.1</td>
</tr>
<tr>
<td>February 2014</td>
<td>18.0</td>
<td>34.1</td>
</tr>
<tr>
<td>March 2014</td>
<td>16.4</td>
<td>29.4</td>
</tr>
<tr>
<td>April 2014</td>
<td>11.4</td>
<td>26.3</td>
</tr>
<tr>
<td>Annual Average</td>
<td>9.8</td>
<td>27.0</td>
</tr>
</tbody>
</table>

* Averages from 1876-2014

#### 3.22.4 Wind Speed and Direction

Fifteen minute average wind speed and direction data is collected from the Tarrawonga meteorological station, as it, together with operational records and environmental monitoring results, can be used to assess the environmental effects or consequences of specific activities undertaken at the mine or in surrounding areas. Monthly wind roses show that the dominant wind directions during the reporting period were from the south east and north (Appendix 10).

#### 3.22.5 Inversions

The meteorological station at “Templemore” is fitted with temperature sensors at 2m and 10m intervals to assist in the determination of inversion conditions. As the noise results obtained over the reporting period were generally in compliance or within modelled limits, no specific investigation into temperature inversion impacts on noise propagation was undertaken. Noise exceedances at the “Tarrawonga” property were modelled in the Tarrawonga Project Approval EA and the owner of this property retained compulsory acquisition rights under PA 11_0047 prior to Whitehaven acquiring the property. As of July 2013, TCM has access to data from a 60m tower with temperature sensors located at Boggabri Coal, as part of the...
cumulative management of air quality and noise. This data will provide more detailed information on inversion layers throughout the winter and impacts will be reported during the next reporting period.
4 COMMUNITY RELATIONS

4.1 Environmental Complaints

Tarrawonga Coal maintains a designated complaints line, with messages checked on a daily basis (seven days/week) by the Environmental Officer. In the event of a complaint, details pertaining to the complainant, complaint and action taken are recorded on a “Complaints Form”.

Eleven (11) complaints were received during the reporting period. The nature of the complaints, details and responses to each complaint are presented in Table 10. The number of complaints has reduced dramatically since previous reporting periods (55 recorded in the 2012/2013 AEMR period and 24 recorded during the 2011/2012 AEMR period) however there is some doubling up of complaints whereby a complaint was made directly to the mine and then additionally via the EPA.

Table 10 provides a comparison of complaints received over the past AEMR reporting periods.

The most common complaints were related to dust (including dust generation on the unsealed sections of nearby roads), blasting and noise. Anonymous complaints received via the EPA totalled 27% of the complaints whilst complaints from the most prominent complainant totalled 36%. The remaining 37% of complaints were from individuals who registered either one or two complaints during the reporting period.

Any complaints that are made are reported to the Community Consultative Committee and documented in the AEMR/Annual Review.
Table 10 - Complaints Summary (2013/2014 Reporting Period)

<table>
<thead>
<tr>
<th>Method</th>
<th>Date/Time of Complaint</th>
<th>Nature of Complaint</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA on behalf of anonymous complainant</td>
<td>31/05/2013 9:46am</td>
<td>Complaint relating to dust from the mines at 6am on Friday 31st May.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Environmental Manager requested advice from the Tarrawonga site Environmental Officer as to conditions at the time of the complaint and relevant mitigation measures being undertaken to reduce dust lift off. The Environmental Officer confirmed that 1,632,000L of water was used on site over the preceding period (6am 30th May to 3am 31st May). On entry to site on the morning of 31st May the Environmental Officer noted slightly elevated dust levels in the general area, and put this down to general mining and road dust being trapped in an inversion layer. Subsequent site based inspections of dust levels was taken throughout the morning with no evidence of individual pieces of mining equipment generating significant dust loads. The Environmental Officer noted that by 10am, upon breakup of the inversion layer, the visible dust had generally dispersed. The Environmental Officer had also noted during the day on 30th May that farming activities on the “Ambardo” property was generating significant dust from farming equipment, with this dust travelling in a generally north-north east direction.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Photographs of the site over the time of the complaint were provided to the EPA as part of the response.</td>
</tr>
<tr>
<td>Phone call to Tarrawonga site (spoke with Operations Manager)</td>
<td>12/07/2013 12:50pm</td>
<td>Complaint relating to what the complainant believed to be vibration from the blast earlier in the day. The complainant said he felt the vibration through the ground and it shook the whole house. He noted that he had been noticing blasts more and more lately.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Operations Manager advised the complainant that the blast wasn’t out of the ordinary in terms of the size and type of blast however the overcast conditions on the day likely contributed to the effects of the blast being experienced at the complainant’s property. The Operations Manager also explained that the complainant would have noticed airblast overpressure rather than ground vibration however the complainant was adamant it was ground vibration. The Operations Manager committed to investigating the blast with the view of improving blasting in the future. The monitor results showed no trigger on noise, however did trigger at Templemore and Tarrawonga Station on vibration, below exceedance levels. (Templemore: 1.42mm/s and 101.4dBL, Tarrawonga: 0.45mm/s and 80.5dBL). Following receipt of the complainant’s concerns, Whitehaven sought specialist advice in relation to this blast from Orica’s vibration specialist, who indicated that the blast effects may have been exacerbated by an initial presplit hole that was not fully contained. This could have caused airblast like effects (without necessarily triggering) a significant distance past the radius of the blast monitors. Environmental factors (low cloud, still day) would have amplified the effects of the blast. Orica also indicated vibration would not have propagated the distance to the complainant’s property, and that the effects of rattling windows would have been as a consequence of blast overpressure. Alternative options for blasting, relating to presplit shots and possibly the direction of firing, will be considered in consultation with Whitehaven.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Letter issued to the complainant detailing the blast investigation outcomes.</td>
</tr>
<tr>
<td>EPA on behalf of anonymous complainant</td>
<td>25/07/2013 12:10pm</td>
<td>Complaint relating to noise and vibration from unspecified mine blast. Caller was working inside 48 Laidlaw Street Boggabri and at 12:10 this afternoon the house shook, the cornice loudly cracked and the windows rattled. Caller said the Tarrawonga did undertake a significant blast at 12:08pm on the 25/7/13. The Environmental Manager requested advice from the Tarrawonga site Environmental Officer as to conditions at the time of blast and if monitoring results were complaint. Monitoring results were compliant, (Tarrawonga monitor, SW of the mine and towards alleged impact area did not trigger) and weather condition were clear and were well under the criteria applied in the blast management plan for adverse weather conditions. Whitehaven sought specialist advice from qualified Orica personnel. An investigation stated that with data available from the blast monitoring, geological and weather conditions, no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental report formulated and reported to the EPA. No further action required.</td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5/08/2013</td>
<td>10:00am</td>
<td>Complainant concerned about dust in area.</td>
</tr>
<tr>
<td>14/08/2013</td>
<td>4:00pm</td>
<td>Complainant concerned about dust in area from mine personnel and mine related vehicles travelling on gravel roads, particularly from 4pm onwards. Complainant requested mines talk with their staff to again reiterate that they should use sealed roads wherever possible. It is impossible for Tarrawonga Coal to stipulate that its employees cannot use public roads, and it would be most likely that the only employees for Tarrawonga that would utilise gravel roads in the area are those that have no alternate option. Notwithstanding this, site will be requested to toolbox this issue with personnel and encourage them, wherever possible, to limit travel on gravel roads. Nil required.</td>
</tr>
<tr>
<td>3/10/2013</td>
<td>8:26am</td>
<td>Potential near miss on the Kamilaroi Highway near Blue Vale Road intersection with Whitehaven employees, approximately 5pm on the 2/10/13. The complainant was travelling east towards Gunnedah approaching the Blue Vale Road intersection when a blue Holden ute turned left onto the Highway in the turning lane and veered into the complainant's lane without looking. The complainant veered slightly onto the wrong side of the Highway and the ute pulled back into the turning lane and the proceeded to follow the complainant to town. The complainant turned right onto Quia Road and took a photo of the ute that was involved in the incident. The driver of the ute, who works at Tarrawonga, was counselled by site personnel in regards to his driving, in particular merging onto the Kamilaroi Highway. Nil required.</td>
</tr>
<tr>
<td>7/11/13</td>
<td></td>
<td>Complaint in relation to a blast that had just been initiated at the Tarrawonga site was requested to provide details of the blast. Information obtained confirmed that a review of the weather forecast was undertaken prior to setting the blast date. The forecast indicated Letter issued to complainant.</td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6/01/2014</td>
<td>8:45pm</td>
<td>Complaint in relation to a mine vehicle travelling west along the Manilla-Boggabri Road near the Wean Race Course at excessive speed. The complaint's wife was heading east along the road when the mine vehicle passed, showering her in rocks and dust, and cracking her windscreen. The complaint is not in relation to the windscreen, but the general safety of other road users when these people travel at excessive speed along poor quality roads. The complainant is concerned someone will be seriously injured or killed as a result of mine personnel causing a road accident.</td>
</tr>
<tr>
<td>9/04/2014</td>
<td>7:48am</td>
<td>The complaint related to increased dust and noise levels over the two weeks; a noticeable increase in mine related dust with a particular occurrence on Saturday 5/4. Second email noted that mine related noise was distinct morning of 11/4.</td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Complainant's Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Email to Environmental Manager 22/04/2014 6:10pm</td>
<td>Complaint about the dense dust in the valley and all around the mountains to the east of the Tarrawonga mine that morning. The complainant said the dust was very heavy and thick and there was a black layer above the mine site which all seemed to be floating in an easterly direction towards the complainant’s homes and working environment. The complainant also noted mine noise that she is hearing during the night at her two properties. She said it is quite loud.</td>
<td>Environmental Superintendent responded via email (8/5/2014) advising that the site Environmental Officer would contact the complainant to arrange a meeting to discuss the issues.</td>
</tr>
<tr>
<td>Email to Environmental Manager 28/04/2014 4:15pm</td>
<td>Complaint regarding noise over the last week being louder than normal and that this is a continuation from the complainant’s last email. The complainant said it concerns her as she hears this noise at night and it has been loud during the days as well.</td>
<td>Environmental Superintendent responded via email (8/5/2014) advising that the site Environmental Officer would contact the complainant to arrange a meeting to discuss the issues.</td>
</tr>
<tr>
<td>AEMR/Annual Review Period</td>
<td>Dust</td>
<td>Noise</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>2006-2007</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2007-2008</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>2008-2009</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>2009-2010</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2010-2011</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2011-2012</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>2012-2013</td>
<td>23</td>
<td>6</td>
</tr>
<tr>
<td>2013-2014</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
4.2 Employment Status, Demography and Socio-Economic Contributions

4.2.1 Employment Status and Demography

During the reporting period, the mine had an average of 82 Tarrawonga personnel and 16 contractors. This is a decrease of approximately 5 people over the reporting period. Additional personnel were employed by contractors in the haulage of coal from the mine site back to the Whitehaven CHPP.

Approximately 50% of mine related employees reside in the Gunnedah / Boggabri area with the remainder residing in adjoining areas of Narrabri, Manilla and Curlewis.

4.2.2 Social and Economic Contributions

In addition to direct and indirect employment, and the purchase of goods and services from local suppliers, the Whitehaven Group continues to support the local community. Whitehaven also provides cadetships to local university students in a variety of fields.

As members of the Gunnedah / Boggabri area community, mine-related employees also contribute socially and economically through their involvement in community sporting, educational and social organisations and expenditure of a component of their disposable income.

4.3 Community Liaison

In accordance with Condition 7 of Schedule 5 of PA 11_0047, a Community Consultative Committee (CCC) continues to meet on regular basis, meeting 4 times per year. The committee comprises representatives of Narrabri and Gunnedah Shire Councils, Tarrawonga Coal and the community and is chaired by John Turner (Independent Chairman)

During the reporting period meetings were held on the 8th May 2013, 14th August 2013, 19th November 2013 and 12th February 2014.

Tarrawonga Coal representatives continue to maintain regular personal contact with the neighbours in the vicinity of the mine and CHPP. These contacts not only provide a means of information dissemination, but also enable Tarrawonga Coal to ascertain and address any potential issues which may arise from time to time.
Community organisations and other local business and institutions regularly identify an interest with activities occurring at the mine site. In this regard, and to maintain links with those business and community members, information is provided as required, and on occasion, guided tours of the facility have been undertaken.

Whitehaven also employs a Manager Community Relations who has a long term association with Gunnedah and was formerly employed with Gunnedah Shire Council.
5 REHABILITATION

5.1 Buildings

There was no removal of buildings or rehabilitation of building sites during the reporting period.

5.2 Rehabilitation of Disturbed Land

5.2.1 Objectives

Tarrawonga Coal’s rehabilitation / land use objectives for the Project approval area, (ie. the area within the boundary of ML 1579, ML 1685 and ML 1693) are identified in the Mining Operations Plan Amendment A and in Table 12:

Table 12 - MOP Rehabilitation Commitments

<table>
<thead>
<tr>
<th>Post Mining Land Use</th>
<th>Key Rehabilitation Goals</th>
</tr>
</thead>
</table>
| Final Landforms      | • Create a physically and chemically stable and non-polluting post-mining landform.  
|                      | • Construct the Northern Emplacement to a maximum height of 370m AHD to integrate with the adjoining southern extent of the Boggabri Coal Mine waste rock emplacement and blend with the surrounding undisturbed environment including Leard State Forest (adjacent ridgeline has local high points between 370 and 382 m) and the Willow Tree Range.  
|                      | • Re-profile the Southern Emplacement to a final height of 340M AHD and partially infill the adjoining services corridor so that it integrates with the Northern Emplacement.  
|                      | • The Northern and Southern Emplacements will be shaped to be free draining with outer batters predominantly 10 degrees or shallower.  
|                      | • Construct the final top surface of the Northern Emplacement so that it drains in a stable manner to Goonbri Creek via a series of terraces with drop structures on the intervening batters. |
| Final Void           | • Progressively backfill the open cut with overburden and interburden and reshape completed areas to their final landform shape so that they can be progressively rehabilitated.  
|                      | • Partially backfill the final void to the extent required to minimise long-term drawdown and water quality effects on local groundwater aquifers, so that their beneficial use is not compromised.  
|                      | • The total catchment for the final void will be defined by perimeter bunds and limited to achieve a target final void water equilibrium level of approximately 240 to 260 m AHD |
| Rehabilitation and   | • Rehabilitation of land disturbed by the project will contribute to approximately 752 ha of native woodland vegetation communities |
**Revegetation Areas**

within the project area, focused on Box Gum Woodland EEC.

- Native vegetation areas in the Northern Emplacement will be vegetated with species to integrate with Boggabri’s waste rock emplacement and the adjoining Leard State Forest.
- The Southern Emplacement will be rehabilitated with native tree, shrub and grass species to achieve a native woodland / forest post mining land use.
- The establishment of a minimum of 210 ha of Class 3 agricultural suitability land, including 160 ha with cropping capability. The final landform for agricultural areas will be developed to blend with the adjoining agricultural areas consistent with that area immediately adjacent to Goonbri Creek.
- Minimise active disturbance areas by progressively rehabilitating, and by restricting clearing to the minimum required for operations.
- Recover vegetation and habitat resources during clearing activities where practically possible and re-use in rehabilitated areas to provide habitat resources for fauna (e.g. trees, hollows).
- Use soil resources stripped from disturbance areas directly for rehabilitation, but if this is not possible, minimise the time soil is stored in temporary stockpiles before being reused.
- Install erosion and sediment control measures prior to the commencement of soil stripping and rehabilitation activities.
- Plant cover crops on newly rehabilitated mine landform areas (and topsoil stockpiles) as soon as possible after completing earthworks, to minimise the potential for soil erosion.
- Stabilise new infrastructure disturbance areas (e.g. road and dam embankments) as soon as possible by topsoiling and seeding.
- Plant vegetation screens in key areas ahead of mine disturbance activities, to allow growth and screening to occur prior to the commencement of disturbance activities.
- Revegetate the mine landforms to a combination of native woodland/forest and agricultural land uses that meet community and regulatory expectations in consideration of existing land uses and conservation values
- Construct the low permeability barrier and permanent Goonbri Creek alignment such that they achieve their design objectives and the low flow channel is revegetated with riparian and floodplain vegetation, by using species characteristic of the Bracteate Honeymyrtle (*Melaleuca bracteata*) community. (Note: Not to be undertaken within this MOP period).
- Enhance the habitat values and biodiversity of the 3 km section of Goonbri Creek downstream of ML 1693, through revegetation, stock exclusion, and remedial earthworks if required. (Note: Not undertaken within this MOP period).
## Rehabilitation Objectives

### Primary Domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Rehabilitation Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active Mining</strong></td>
<td>• Rehabilitation resources including vegetation, topsoil and habitat resources will be identified for salvage ahead of mining.</td>
</tr>
<tr>
<td></td>
<td>• Vegetation and topsoil will be progressively stripped ahead of mining to minimise the total area of disturbance and the potential period of soil storage.</td>
</tr>
<tr>
<td></td>
<td>• Mined areas will be progressively backfilled and rehabilitated where possible.</td>
</tr>
<tr>
<td><strong>Water Management</strong></td>
<td>• Clean water will be diverted around operational areas prior to disturbance, where practical.</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td>• Mining infrastructure will be removed progressively, and the area rehabilitated, when no longer required.</td>
</tr>
<tr>
<td><strong>Topsoil Stockpile</strong></td>
<td>• Topsoil stockpiles will be stabilised with sterile cover crops to minimise weed infestation and retain soil biological health.</td>
</tr>
<tr>
<td></td>
<td>• Topsoil stockpiles will be constructed and managed to optimise physical, chemical and biological characteristics.</td>
</tr>
<tr>
<td></td>
<td>• Topsoil stockpile areas will be rehabilitated progressively when no longer required.</td>
</tr>
<tr>
<td><strong>Overburden Emplacements</strong></td>
<td>• Final landform will be safe, stable and adequately drained.</td>
</tr>
<tr>
<td></td>
<td>• Final landforms will be designed to integrate with the surrounding landscape.</td>
</tr>
<tr>
<td></td>
<td>• The Northern Emplacement will be progressively constructed to a maximum height of 370 m AHD to integrate with the southern extent of the Boggabri waste rock emplacement.</td>
</tr>
<tr>
<td></td>
<td>• The Southern Emplacement will be progressively constructed to a maximum height of 340 m AHD.</td>
</tr>
<tr>
<td></td>
<td>• Outer batter slopes for the Northern and Southern Emplacements will be predominantly constructed at 10 degrees or shallower.</td>
</tr>
<tr>
<td></td>
<td>• Any potentially acid forming (PAF) material will be covered with at...</td>
</tr>
</tbody>
</table>
least 15 m of non-acid forming material (NAF).
• Final outer surfaces of overburden emplacements will be constructed with non-sodic or low sodicity and/or will be treated with gypsum.
• Dump sequencing will be optimised to facilitate progressive shaping and rehabilitation.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Rehabilitation Objective</th>
</tr>
</thead>
</table>
| Final Void                    | • Final void will be safe, stable and non-polluting.  
• Final void northern and eastern highwalls will be profiled to be geotechnically stable with slopes approximately 60 degrees.  
• Material from the Southern Emplacement will be used to partially infill the southern and western low walls of the open cut to construct final grades generally between 10 and 15 degrees.  
• Surface water inflows to the final void will be managed through appropriate landform design (including final void perimeter bunding and the permanent flood bund) to minimise long term drawdown and potential water quality impacts on local aquifers.  
• Native vegetation will be established above the permanent water level (260 m AHD).                                                                                                                                                                                                                   |
| Water Management Area         | • The final landform drainage will integrate with the surrounding catchments and will achieve long term geomorphic stability and minimise erosion.  
• Sediment dams identified for retention in the final landform will be decontaminated and preserved as clean water farm dams or water sources for native fauna.                                                                                                                                                                |
| Agricultural Rehabilitation Area | • At least 210 ha of Class 3 agricultural land (including 160 ha constructed on emplaced overburden) will be reinstated on areas disturbed by mining.  
• Soil profiles (soil characteristics and soil depths) will be reinstated to produce an Effective Rooting Depth at least 1.5 m, and capable of sustaining cereal and pasture production comparable to pre-mining agricultural areas near Goonbri Creek.                                                                                      |
| Woodland Rehabilitation Area  | • Approximately 752 ha of open woodland/forest, with riparian corridors (including Goonbri Creek realignment) will be established on areas disturbed by mining.  
• Woodland Rehabilitation Areas will be comparable with adjacent undisturbed remnant native vegetation including areas commensurate with Box-Gum Woodland EEC.                                                                                                                                                                                      |

5.2.2 Variations Against MOP

No rehabilitation was undertaken in association with the northern extension as the commencement of the operations was delayed by approximately 9 months.
Operations in this area will commence during the next AEMR period and the first stage of rehabilitation will follow as planned in the MOP.

A small area of rehabilitation works (as detailed in Section 5.2.14) was carried on the southern emplacement. There was, however, a postponement of the remaining works (tree planting only) until the next reporting period due to poor seasonal conditions.

5.2.3 Post Rehabilitation Land Use
The rehabilitation areas on the northern and southern emplacements are open woodlands at varying stages of maturity. Rehabilitation on the southern emplacement is only immature and still requires ongoing maintenance. Rehabilitation on the northern emplacement is further advanced and requires significantly less maintenance and is nearly to the point where it could be considered that open woodland land use has been achieved.

5.2.4 Landform Details
The rehabilitation areas on the northern emplacement and southern emplacement have been shaped with an average slope of 10° and utilise contours banks to divert runoff to rock lined waterways which minimise erosion.

5.2.5 Cover Material
Topsoil stripped as part of the mine operations and expansion was used on the northern and southern rehabilitation areas and replaced utilising scrapers to spread the soil to an average depth of 150-250mm.

5.2.6 Vegetation
Rehabilitation has been undertaken in accordance with the EA, MOP and management plans.

5.2.7 Progression to Maturity
The rehabilitation on the northern emplacement is progressing well towards maturity. As it nears maturity, the number of risks have become fewer and those that remain are predominately beyond the control of the Tarrawonga. Ongoing weed and pest control will continue as part of the maintenance of these areas, any necessary infill plating will be undertaken and water management structures will be
repaired as necessary. For the area of the northern rehabilitation that has yet to be planted with tubestock, the risks are far more significant, however they can be readily managed and monitored to ensure that a high survival rate is achieved and these trees reach maturity. Risks associated with weather are considered most likely to impact on the survival of trees. Many of these risks can be managed through timely planting, follow up watering and weed and pest control.

The rehabilitation on the southern emplacement is significantly younger and is susceptible to a risks including adverse weather, pests, soil condition, and planting techniques. It is therefore important to manage this area more intensely than areas that are considered mature or nearing maturity. A planting schedule and follow-up maintenance plan is a key component to the survival of tube stock. This includes timely planting, watering and pest control.

5.2.8 Present & Future Habitat

Winter and spring monitoring programmes are undertaken on site by Ecological Australia. Part of this monitoring provides an annual snapshot to ascertain the resident habitat in these areas. This compared to baseline data collected from adjacent unaffected land surrounding the mine to determine its success and progression in regards to habitat value for native and threatened species.

5.2.9 Weeds & Other Unwanted Vegetation

Monthly inspections of rehabilitation areas, as well as random visits, are undertaken to monitor weeds within the rehabilitation areas. A regular spraying regime is utilised to target identified weeds throughout both the northern and southern rehabilitation areas. Weeds listed as noxious under the Noxious Weeds Act 1993 are targeted and controlled in accordance with requirements of that legislation.

5.2.10 Erosion Control

Between both the northern and southern rehabilitation areas there are only minor signs of erosion including signs of some minor channelling, in particular on the southern rehabilitation area where the establishment of trees and understorey has not yet commenced or is in the early stages.
5.2.11 Erosion, Pollution and Contamination Strategies

Each of the rehabilitation areas on the northern and southern emplacements has been shaped and constructed with a series of contour banks which feed into a rock lined waterway. Within each level, the topsoil is mounded for tree planting which also facilitates in reducing runoff and facilitates infiltration. The rock lined waterways, which run straight down the batter, are designed to convey water away from the contour banks and slow the water to minimise erosion within the rehabilitation areas.

5.2.12 Fencing

No exclusion fencing is in place. Fencing is restricted to property boundary and some internal fences outside of the disturbance limit.

5.2.13 Pollution Monitoring

Sediment basins and storage dams are sampled quarterly and in the event of a discharge from licensed discharge point/s. These results are utilised to monitor pollution levels and ensure discharge waters are within compliance criteria as set out in the EPL.

5.2.14 Achievements During the Reporting Period

The northern extension is approximately nine months behind schedule, which has significantly impacted upon the availability of areas for rehabilitation. Active rehabilitation has progressed on those areas no longer required for production purposes. A total of 5 ha on the southern emplacement was shaped and seeded during the reporting period. Within this 5 ha, revegetation activities comprising the planting of native tubestock across 2.6ha occurred as outlined in Table 13.

Works undertaken during the reporting period included:

- Topsoiling and seeding of SB25;
- Completion of the rock waterway on the western face of the southern emplacement, topsoiling, installation of contour banks and seeding.

Existing rehabilitation on the northern and western faces of the northern emplacement continues to progress well.

Ongoing drought conditions since the last reporting period have impacted upon the area of tubestock planted. It is anticipated that this shortfall will be addressed as
soon as seasonal conditions improve during the next reporting period. It is planned to plant tubestock over approximately 8ha on both the northern and southern emplacements in areas which have already been seeded. Cover crop and tubestock establishment will occur over a further 2ha on the northern emplacement.

Table 13 – Understorey Species

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Species</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>21st August 2013</td>
<td>Western face of the Southern emplacement.</td>
<td>Acacia decora</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eucalyptus melliodora</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eucalyptus albens</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eucalyptus creba</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dodonaea viscosa</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eucalyptus populnea</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eucalyptus pilligaensis</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>560</strong></td>
</tr>
</tbody>
</table>
### Table 14 - Rehabilitation Summary

<table>
<thead>
<tr>
<th>Area Affected (hectares)</th>
<th>This Report Period (as of 30.04.14)</th>
<th>Last Report Period (as of 30.04.13)</th>
<th>Next Report Period (estimated)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A: MINE LEASE AREA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1 Mine Lease(s) Area</td>
<td>1,224.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B: DISTURBED AREAS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1 Infrastructure area</td>
<td>29.7</td>
<td>29.7</td>
<td>29.7</td>
</tr>
<tr>
<td>(other disturbed areas to be rehabilitated at closure including facilities, roads)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2: Active Mining Area</td>
<td>108.1</td>
<td>98.4</td>
<td>100.0</td>
</tr>
<tr>
<td>(excluding items B3 - B5 below)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B3 Waste emplacements</td>
<td>206.2</td>
<td>187.0</td>
<td>223.0</td>
</tr>
<tr>
<td>(active/unshaped/in or out-of-pit)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B4 Tailings emplacements</td>
<td>5.0</td>
<td>4.5</td>
<td>5.0</td>
</tr>
<tr>
<td>(active/unshaped/uncapped)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B5 Shaped waste emplacement</td>
<td>7.6</td>
<td>7.6</td>
<td>2.0</td>
</tr>
<tr>
<td>(awaits final vegetation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ALL DISTURBED AREAS</strong></td>
<td>356.6</td>
<td>327.2</td>
<td>359.7</td>
</tr>
<tr>
<td><strong>C REHABILITATION PROGRESS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1 Total Rehabilitated area*</td>
<td>51.0</td>
<td>46.0</td>
<td>53.0</td>
</tr>
<tr>
<td>(except for maintenance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D: REHABILITATION ON SLOPES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1 10 to 18 degrees</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>D2 Greater than 18 degrees</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>E: SURFACE OF REHABILITATED LAND</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1 Pasture and grasses</td>
<td>23.5</td>
<td>18.5</td>
<td>25.5</td>
</tr>
<tr>
<td>E2 Native forest/ecosystems*</td>
<td>27.5</td>
<td>27.5</td>
<td>27.5</td>
</tr>
<tr>
<td>E3 Plantations and crops</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E4 Other (include non vegetative outcomes)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Areas with established tubestock are considered to be “native forest/ecosystem”. “Pasture and Grasses” also includes areas with recently planted tube stock that are not yet established. C1 – Total Rehabilitated Area includes all rehabilitation regardless of progress.
Table 15 - Maintenance Activities on Rehabilitated Land

<table>
<thead>
<tr>
<th>NATURE OF TREATMENT</th>
<th>Area Treated (ha)</th>
<th>Report period</th>
<th>Next period</th>
<th>Comment/control strategies/treatment detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional erosion control works (drains re-contouring, rock protection)</td>
<td>1 1</td>
<td>1 1</td>
<td></td>
<td>Repair of washouts and replacement of sediment control measures (hay bales) on western side of ML</td>
</tr>
<tr>
<td>Re-covering (detail - further topsoil, subsoil sealing etc)</td>
<td>Nil Nil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil treatment (detail - fertilizer, lime, gypsum etc)</td>
<td>Nil 4.9</td>
<td></td>
<td></td>
<td>Northern emplacement – chook manure and phosphorous</td>
</tr>
<tr>
<td>Treatment/Management (detail - grazing, cropping, slashing etc)</td>
<td>Nil Nil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-seeding/Replanting (detail - species density, season etc)</td>
<td>Nil 7.5ha</td>
<td></td>
<td></td>
<td>Northern Emplacement – pasture and tubestock Southern Emplacement - Tubestock</td>
</tr>
<tr>
<td>Adversely Affected by Weeds (detail - type and treatment)</td>
<td>5 5</td>
<td>5 5</td>
<td></td>
<td>General weed control (spot spraying within a 5ha area).</td>
</tr>
<tr>
<td>Feral animal control (detail - additional fencing, trapping, baiting etc)</td>
<td>* Nil</td>
<td></td>
<td></td>
<td>* See Section 3.20</td>
</tr>
</tbody>
</table>

5.3 Rehabilitation Monitoring and Performance

Rehabilitation/revegetation monitoring by Whitehaven personnel has been confined to inspections of water management structures, soil stockpiles and seeded/planted areas for evidence of instability or poor germination. Results over the reporting period were good in terms of the minimal erosion experienced over prolonged periods of wet weather. Planted seedlings continue to develop well on the northern emplacement. Tubestock and grass cover establishment continues to be poor on the Southern Emplacement, with ongoing monitoring continuing by site personnel. Poor seasonal conditions throughout the reporting period (long dry periods and extreme summer temperatures) resulted in an extremely high mortality of planted tubestock. Sections 3.6 and 3.7 and Appendix 7 provide details on the rehabilitation monitoring undertaken by Eco Logical Australia in late 2013.
6 CONTINUOUS IMPROVEMENT AND TARGET INITIATIVES

6.1 Objectives
TCPL has an ongoing commitment to environmental management and aims to minimise any adverse impacts on the physical, biological, cultural and socio-economic environment in the area of the mine and in surrounding areas.

Improvements in environmental management will be achieved through the effective implementation of the operational and monitoring aspects of the MOP, which in turn, will incorporate relevant aspects of various management plans and monitoring programs prepared in accordance with the mine’s Project Approval.

6.2 Achievements to Date
Achievements at the mine over its eighth year of operation have included:

- Approval of the Heritage Management Plan in February 2014;
- Ongoing development of the remaining management plans required by PA 11_0047;
- Continued effective management of site water, resulting in only one discharge during the reporting period which was within compliance limits;
- Continuation of cumulative impacts strategies preparation and submission to Planning & Environment with Boggabri Coal and Maules Creek Coal; and
- Ongoing relationship with local community, neighbours and community groups. Tarrawonga Coal recognises its role in the local community and that its activities have the potential to create benefits which extend beyond the life of the mine.

6.3 Targets and Goals
Targets and goals for the 2014 / 2015 reporting period include:

- Completion and implementation of additional Management Plans required for State and Federal approvals;
- Continual improvements in site rehabilitation;
- Continued community liaison, support and involvement / education in the mines activities;
- Compliance with all relevant conditions of the lease, licences and consents;
- Stabilisation of the southern face of the southern emplacement to minimise dust generation whilst it remains un-rehabilitated;
• Implementation of management actions within the Regional Biobank site, pertinent to Tarrawonga offset requirements;
• Implementation of management actions at the Willeroi Offset Area once the management plans are approved.