



# Centennial Coal

Angus Place



## ***2013 ANNUAL ENVIRONMENTAL MANAGEMENT REPORT***

**Mining Titles/Leases:**

**CCL704, ML1424, Pt. CCL702**

**Angus Place**

MOP Approval Period	July 2013 to May 2015
AEMR Reporting Period	1 Jan 2013 - 31 Dec 2013
Version	V2
Leaseholder	Centennial Angus Place Pty. Ltd.
Reporting Officer	Natalie Conroy
Title	Environment and Community Co-ordinator
Date	6/6/2014



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# 1. INTRODUCTION

## Angus Place and Kerosene Vale Collieries

Angus Place Colliery is situated in the New South Wales western coal field and is owned and operated by Centennial Angus Place Pty Ltd, which exists as a joint venture company between Centennial Coal Pty. Ltd. and SK Kores Pty Ltd, pursuant to the joint venture agreement. Centennial Angus Place Pty Ltd acquired Angus Place Colliery from Powercoal Pty. Ltd. in August 2002.

In 2010, Centennial Coal Ltd was subjected to a successful takeover bid by Banpu Public Company Limited, listed on the Thailand Stock Exchange. Following the acquisition, Centennial Coal Company was delisted and now exists as Centennial Coal Company Pty Ltd, a subsidiary of Banpu Public Limited.

The principle components of the development are an underground longwall mine, associated underground development panels, supporting surface infrastructure (Angus Place pit top), a secondary coal stockpile area situated at the abandoned Newcom Colliery pit top (Kerosene Vale) and dedicated haul roads to Delta Electricity's Wallerawang and Mount Piper Power Stations. The latter is owned privately by Coal>Link Pty. Ltd., however, is operated by Centennial Angus Place under an agreement between the two parties.

Angus Place Colliery is located five kilometres north of the village of Lidsdale, eight kilometres northeast of the township of Wallerawang and 15 kilometres northwest of the city of Lithgow. Angus Place is bordered by Baal Bone Colliery (Xstrata Coal Pty Ltd) and Invincible Colliery (CET Resources Pty Ltd) to the north; Centennial Springvale Coal to the south; and the Wolgan Valley and Newnes State Forest to the north-east. The Angus Place Colliery pit top lies within the Coxs River Catchment, reporting to the Sydney Catchment area; the Colliery Holding Boundary (lease areas) traverses both the Coxs and Wolgan River Catchment areas, the latter of which reports to the Hawkesbury Nepean Catchment. The Locality of Angus Place is shown in Figure 1 below.

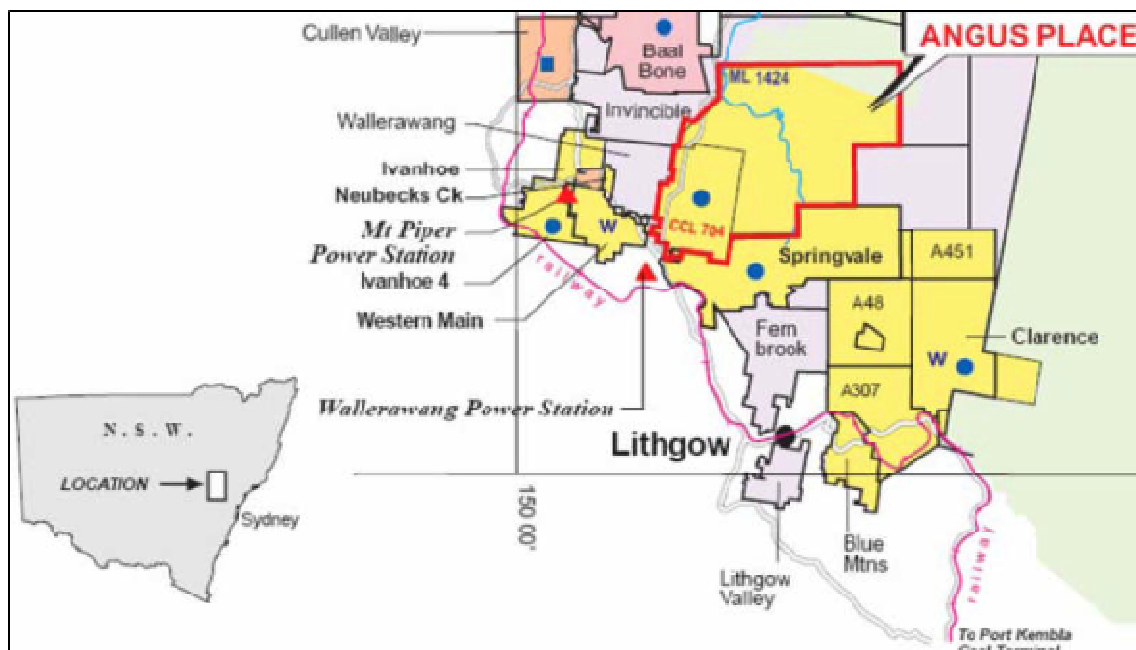


Figure 1: Regional Location of Angus Place

The surface lands adjacent to and above the Angus Place Colliery underground workings are situated on the Newnes State Forest which comprises of narrow gorges with high ridgelines, steep sided slopes and sandstone cliffs above incised valleys, hilly areas with relatively flat crests and spurs and moderately sloped ephemeral drainage lines. Streams, such as Kangaroo Creek and the Wolgan River and their tributaries can be found in the vicinity.

Angus Place Colliery commenced production in 1979, after being developed as an extension of the Newcom Mine at Kerosene Vale. Coal is extracted from the Lidsdale seam, which exists as a conglomerate with the Lithgow seam. The Lidsdale seam typically exists as the lower three metres of the conglomerate.

The longwall method of mining is utilised at Angus Place Colliery. Longwall mining is a form of underground coal mining where a block (termed a longwall) of coal is mined using a longwall shearer. At Angus Place Colliery the longwall blocks are typically 3km by 300m at an average depth of cover of 300-350m. The longwall mining method is supported by roadway development, mined using a continuous miner unit. Development activities entail the extraction of coal to produce underground roadways and headings, enabling access to future longwall extraction areas. Mains development extraction is undertaken using continuous miner units, which simultaneously allow the installation of roof bolts for roof support.

Coal is currently extracted for domestic power generation only at both Wallerawang and Mount Piper Power Stations. Approximately 225 employees and 75 contractors are employed by Angus Place Colliery, operating across three shifts during the week and two shifts over the weekend enabling continuous operations. In 2013 coal was mined from Longwall 980. Simultaneous development of the 900W and 910 panels also took place. Additionally, development of underground roadways from the eastern extent of longwall 910 to the approved Ventilation Facility also occurred in 2013. This is shown in Appendix 2.

### **Commonwealth Colliery**

Commonwealth Colliery is legally described as Lot 1 in Deposited Plan (DP) 52865 and Lot 1 in DP 65810 and is located in the Lithgow City Council Local Government Area. The site is currently leased by Angus Place Colliery, situated approximately 3.2 km north east of the site. From an investigation into the history of the site, information obtained suggests that the coal mining operations at Commonwealth Colliery were not limited to the site, and that two larger open cut pits located to the north and west of the site also formed part of the Commonwealth Colliery. The information further indicates that the former Commonwealth Colliery was the first open cut coal mine in NSW, commencing operations in 1940. It is understood that the Federal Government took over Commonwealth Colliery in 1944 in an effort to increase production until mining ceased in the 1950's. The disturbed areas of the Site have since been partially rehabilitated to grassland and pine forest. Further rehabilitation is required to satisfy Industry and Investment NSW requirements.

### **Vale of Clwydd No 2 Colliery**

The Vale of Clwydd No. 2 Colliery is a former mining operation which exists in the western coal field of NSW. The Vale of Clwydd No. 2 Colliery has been partially rehabilitated since its closure however, there are still remnants of various derelict mine buildings present at the site. The mine's development began in 1926 and closed during the Great Depression in 1930. The pit top is located to the west of Wolgan Road, approximately 1km north of the Angus Place pit top.

Appendix 1 Figure 1 illustrates the site and situation of Angus Place Colliery, Kerosene Vale, Commonwealth and Vale of Clwydd Collieries.

## **Guidelines and Conditions**

The 2013 Annual Environmental Management Report (AEMR) has been executed in accordance with the *Guidelines to the Mining, Rehabilitation and Environmental Management Process* (2006). All Plans required under the *Guidelines* are presented in Appendix 2. The 2013 AEMR also complies with the following conditions:

- Schedule 5, Condition 3 of the Mod 2 Consolidated Angus Place Project Approval (06\_0021) granted on 22<sup>nd</sup> April 2013.
- The annual reporting conditions stipulated in the Angus Place Water Licenses which are regulated by the NSW Officer of Water (Condition 2).
- ML1424 Condition 3 *Annual Environmental Management Report*.
- CCL 704 Condition 4 *Environment Management Reporting*.

## **1.1 CONSENTS, LEASES, LICENCES AND OTHER APPROVALS**

### **1.1.1 Consents**

One Project Approval is applicable to Angus Place Colliery, which was approved by the NSW Department of Planning (DoP) pursuant to a Part 3A application in accordance with the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act). Project Approval (PA) 06\_0021 was granted on 13 September 2006 to expand the mining area and increase the production limit to 3.5 million tonnes per annum (Appendix 3). PA 06\_0021 is currently due to lapse on 18 August 2024.

Angus Place Colliery has modified Project Approval 06\_\_0021 on 3 occasions pursuant to a Section 75W of the EP&A Act. An overview of these modifications is outlined in the following paragraphs.

In 2010 Angus Place Colliery proposed to extend its operations through the development and extraction of two additional longwall panels, as well as development of the nominated supporting surface infrastructure. The project was approved under EP&A Act on the 29<sup>th</sup> of August 2011.

In May 2011 an EPBC Referral for 910/900W was submitted to SEWPaC. The proposed action was determined as a controlled action requiring consideration under the EPBC Act. The element of the proposed modification of the existing consent that has potential impact on Matter of National Environmental Significance (MNES) under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) consists of the proposed longwalls. These longwall panels will potentially result in mine subsidence occurring beneath the Endangered Ecological Community (EEC) known as Temperate Highland Pet Swamps on Sandstone (THPSS). On the 17<sup>th</sup> of April 2012 Angus Place received approval from SEWPaC to extract coal using longwall mining techniques in the above mentioned panels. This action is subject to conditions of approval. During 2013 there was no Longwall extraction of these panels.

On the 22<sup>nd</sup> of April 2013 (MOD 2) Angus Place Colliery received approval for the Ventilation Facility Project. This project for the construction and operation of a ventilations facility and supporting infrastructure. Additionally the project allowed for the development of roadways to the ventilation site and trial mining in the area north-east of the collierys existing operation.

On the 9<sup>th</sup> of December 2013 Angus Place received approval from the Department of Planning and Infrastructure to modify the Collierys Project Approval for a third time. This modification provided for the extension of Longwall 980 and Longwall 900W length by 43.4

meters and 104.8 meters respectively and increasing the extraction height from 3.25 meters to 3.425 meters.

Additionally during the reporting period Angus Place Colliery prepared and submitted for adequacy an Environmental Impact Statement for the Angus Place Mine Extension Project to obtain approval for the continuation of mining at the Colliery. The project is a State Significant Development in Accordance with the State Environmental Planning Policy 2011. The mine will therefore be seeking approval under Part 4 of the EP&A Act.

### **1.1.2 Leases**

The Angus Place holding includes CCL 704 (granted 02/01/1990; period of renewal until 14/01/2023), ML1424 (granted 09/02/1998; period of renewal until 18/08/2024) and part of CCL702 (Plan PC10, Appendix 2). CCL704 and ML1424 are held by Centennial Angus Place Pty. Ltd., after being transferred from Powercoal Pty Ltd in 2003. CCL702 is held by Coalpac Pty Ltd, however, Angus Place Colliery has title to a portion of the lease via a sublease agreement.

The area held by Angus Place under mining title is 10,278 hectares, of which 175 hectares is surface title including colliery pit top and surface infrastructure areas, including the Kerosene Vale site.

On 16 December 2010 Conditional Approval was given for the addition of 29.97 hectares of ML 1326 to the Angus Place Colliery Holding and the simultaneous deletion of this area from the Centennial Springvale Colliery Holding. This area will enable the mining of an additional longwall (Longwall 900 West) and associated gateroads. As reported in Section 1.1.1 Consents, the 910/900W Project has been approved by both state and federal government.

As noted in the 2012 AEMR, a MOP a MOP Amendment was drafted for the inclusion of the Ventilation Facility Project outlined in section 1.1.1 Consents and submitted to DTRIS on the 13<sup>th</sup> of December 2012. The purpose of the amendment was to provide information relating to the construction and operation of the Ventilation Facility Project. Angus Place received approval for the addendum from DTRIS on the 7<sup>th</sup> of February 2013.

During the reporting period Angus Place prepared, submitted and obtained approval for a new Mining Operations Plan (MOP). The MOP described the mining operations and environmental management for the period July 2013- May 2015 inclusive and is consistent with the approved Subsidence Management Plan commitments, Environment Protection Licence 467 requirements, the Angus Place Project Approval 06\_0021 as well as other relevant environmental legislation applicable to the Colliery. This MOP was approved by DTRIS approved in July 2013.

### **Subsidence Management Plan**

The original Subsidence Management Plan (SMP) application, submitted June 2005, applied for mining activities to be carried out in Longwalls 930-980. Approval for longwall 930 only was granted on 9 December 2005.

During the reporting period, Angus Place varied the SMP on three occasions. All variations to the SMP are documented in Table 1.

**Table 1: SMP Approval variations**

Variation	Description	Approval Date
October 2006	Revisions to the installation position of Longwalls 940 & 950 Revisions to the take-off positions of Longwall 940 to 980 Variation to the gateroad pillar widths	29 <sup>th</sup> December 2006
March 2008	Variation of chain pillar dimension 960 Panel Minor increase in the width of Longwall 960	17 <sup>th</sup> April 2008
March 2009	Variation of the chain pillar width of 970 & 980 Panel Increase in the width of Longwall 970 Decrease in the width of Longwall 980	20 <sup>th</sup> April 2009
March 2010	Minor variation to chain pillar lengths 970 & 980 Panel	25 <sup>th</sup> March 2010
October 2013	Minor variation in Longwall 980 height	4 <sup>th</sup> October 2013
November 2013	Variation in Longwall 980 length	23 <sup>rd</sup> December 2013
November 2013	SMP Term extension	11 <sup>th</sup> December 2013

As required under Schedule 3 Condition 3C of Project Approval 06\_0021 and the Mining Lease the Colliery SLR (formally GSS Environmental) prepared an Integrated SMP Extraction Plan for 900W and 910 in consultation with relevant stakeholders. This extraction Plan was submitted on the 27<sup>th</sup> November 2013. At the end of the reporting period Angus Place was awaiting feedback from relevant departments. An update on the integrated SMP Extraction Plan therefore will be provided in the 2014 AEMR.

It is noted that as required under the terms of approval for MOD 3 the integrated SMP Extraction Plan will be revised in 2014.

### 1.1.3 Licences

#### Environment Protection Licence 467

Centennial Springvale Pty. Ltd. is the licensee of the Angus Place Colliery Environment Protection Licence (EPL) 467, which encompasses the pit top, Kerosene Vale site and emergency licensed discharge point on the Newnes State Forest. EPL 467 appears as Appendix 4. The Licence allows for four utilisation/discharge points and has an anniversary date of 1 January. Variations to the EPL throughout 2013 are documented in Section 3.3.

#### Water Licences

Angus Place Colliery has three extractive Water Licences associated with the 930 dewatering borehole (decommissioned), 940 dewatering borehole and the pit top groundwater collection system. All license applications were pursuant to Part 5 of the Water Act 1912 and are regulated by the NSW Office of Water. Following the gazettal and starting of the Greater Metropolitan Region Water Sharing Plan, during the reporting period, licences were converted the water access Licences and approvals. The Angus Place extractive bores licenses are summarised in Table 2.



**Table 2: Dewatering Bore Licences**

Current Licence number	Previous Licence number	Description	Issue date	Expiry date*
10WA118750	10BL601852	930 dewatering bore (decommissioned)	04/09/2007	03/09/2012
10WA118750	10BL601851	940 dewatering bore	04/09/2007	03/09/2012
10WA118748	10BL601838	Groundwater collection system	04/09/2007	03/09/2012

\*It is noted that from the start of the Water Sharing Plans licence renewals will not be sent out until after July 2014. This was confirmed by NSW Office of Water on the 19<sup>th</sup> of December 2013. To this end, the above mentioned are deemed to be current and active.

940 dewatering borehole flows are monitored by bore pumping rates, with all water pumped into the Springvale – Delta Water Transfer Scheme during normal operation (Section 3.6.5). The Groundwater Collection System flows are monitored via a weir structure and level sensor situated at LDP001 (Section 3.6.2) where water is discharged offsite to Kangaroo Creek flowing into the Cox's River.

In addition to the three extractive bore licenses, there are six monitoring bore licenses held by the Colliery. These licenses are associated with the several Newnes Plateau groundwater and multilevel piezometers across the lease area on the Newnes State Forest.

The monitoring bore licenses are summarised in the table below.

**Table 3: Monitoring bore licences**

Licence number	Description	Issue date	Expiry date
10BL601829	Newnes Plateau Groundwater piezometers	04/09/2007	Perpetuity
10BL603236	Piezors AP1PR to AP6PR	28/08/2009	Perpetuity
10BL603802	Piezors AP8PR to AP12PR	03/03/2010	Perpetuity
10BL604512	Licensing of Geological boreholes and groundwater monitoring bores	17/2/2011	Perpetuity
10BL604709	Observation Bores	22/6/2011	Perpetuity
10BL605132	Stage 2 Exploration Program	18/4/2012	Perpetuity

The Groundwater Monitoring Piezometers/boreholes are used to monitor aquifer pressure levels only and do not extract water once installed.

All Water Licenses appear as Appendix 5.

### **Radiation Licences**

On the 1<sup>st</sup> of July 2013, radiation sell/possess licences and registrations were converted to radiation management licences by the EPA. This licence is granted under the Radiation Control Act 1990. Angus Places Radiation Management licence Number is RML29229 and is scheduled to expire on the 14/4/2014.

During 2013, an inspection of the Angus Place fixed radiation gauge was undertaken by an accredited contractor.

### **1.1.4 Other Approvals**

#### **Occupation Permit**

The Newnes State Forest is located above the majority of the underground workings. To enable Angus Place Colliery to operate under the forest and to build infrastructure and other surface facilities, an Occupation Permit is required from Forests NSW.

During the reporting period, Centennial Angus Place and Forests Corporation of NSW entered a new access and use arrangement (Level 3 Permit) which incorporated the Ventilation Facility as required under MOD 2 Statement of Commitments.

#### **Exploration License**

Angus Place Colliery has three approved Exploration Licenses administered by Industry and Investment NSW.

Exploration license EL6856 is applicable to majority of the lease area across the Newnes State Forest. EL6293 is applicable to areas surrounding the Wolgan Road. During the reporting period, Angus Place received EL8188 which is associated with the Angus Place Mine Extension Project.

There was no drilling activities undertaken during the reporting period as outlined in Section 2.1

#### **S95 Certificate**

A s95 certificate is granted for the hand removal of weeds within Narrow Swamp. A Section 95 certificate was deemed necessary as the weed removal activities are occurring in an Endangered Ecological Community. The certification was issued under the *Threatened Species Conservation Act, 1995* pursuant to Section 95(2).

This certificate was renewed on the 27<sup>th</sup> of June 2013 by OEH and expires on the 30<sup>th</sup> of June 2015. The Certificate number is 1132233.

Periodic progress updates on weed removal activities were reported in the four monthly Subsidence Management Status Reports. Further detail is also outlined in Section 3.12.

## 1.2 MINE CONTACTS

Mine Manager: Brian Nicholls  
 Phone (02) 6354 8721  
 Fax (02) 6355 1493  
 Email brian.nicholls@centennialcoal.com.au

Environment And Community Co-ordinator: Natalie Conroy  
 Phone (02) 6354 8938  
 Fax (02) 6355 1493  
 Email natalie.conroy@centennialcoal.com.au

Angus Place Enquires: (02) 6354 8700

Angus Place Community Complaints: (02) 6354 8744

## 1.3 ACTIONS REQUIRED BY PREVIOUS AEMR REVIEW

Actions required from the previous AEMR review are presented in the table below.

**Table 4: Actions Required from the 2012 AEMR**

Actions Required	Update/Reference
Risk Assessment for water treatment chemicals	During the reporting period a review of hazardous substances storage locations and volumes was undertaken. A number of improvements have been made including the changing store delivery sizes, relocation of chemical stored in areas were used occasionally, installation of safety eye wash station and the purchase of a large Bulki-box for the Pit Top. Improvements are documented in Section 2.10
Ongoing housekeeping improvements	Housekeeping reviews continue to be undertaken on a regular basis. Inspection of the work area after task completion is part of the work management system. To assist in identification of equipment which may no longer be required a flagging system is used. Where appropriate equipment no longer suitable for use is removed. This will continue to be targeted in 2014.
Reporting against predictions	Predications are outlined within relevant parts of Section 3.0
Update of Management Plans required under MOD 2	Management Plans updated in 2013 are documented in Section 2.12
Include update of Longwall 970 cracking	Surrounding debris continue to fill in minor crack identified and reported previously. Changes are documented in the SMSR and EOP Reports. Update is provided in Section 3.20.

## 1.4 PLANS REQUIRED UNDER THE GUIDELINES

The table below presents the location of plans required under the DPI-MR AEMR Guidelines for Angus Place, Kerosene Vale, Commonwealth Colliery and Vale of Clwydd (VOC) No 2 Colliery. The majority of operations plans are not required for Kerosene Vale, Commonwealth, and Vale of Clwydd No2 as no mining activities were undertaken at the three sites. During 2013 Kerosene Vale was only utilised as a stockpiling facility.

**Table 5: Plans Required under the DPI AEMR 2006 Guidelines**

Plan Required	Angus Place Ref N°	Kerosene Vale Ref N°	VOC Ref N°	Commonwealth Ref N°
Mine and Context	Appendix 1, Figure 1	Appendix 1, Figure 1	Appendix 1, Figure 1	Appendix 1, Figure 1
Proposed Mining in 2014	Appendix 2, 7258	Not required	Not required	Not required
Proposed Land Preparation during 2014	Appendix 9, Ventilation Facility	Nil	Nil	Nil
Proposed Rehabilitation during 2014	Appendix 9 Figure 1 and 2 Ventilation Facility, Partial Rehabilitation where possible of Ventilation Facility	Appendix 9 Figure 5, Stockpiled material removal	Appendix 9, Figure 7- Nil	Appendix 9 Figure 6 -Nil
Plan 6. Final Rehabilitation for Site	Not changed since MOP (not required)	See Appendix 9	See Appendix 9	See Appendix 9

## 2. OPERATIONS DURING THE REPORTING PERIOD

### 2.1 EXPLORATION

There was no exploration drilling in 2013. Drill sites from the previous exploration program have been rehabilitated. Rehabilitation status and process of the drill sites are documented in section 5.2

## 2.2 REPORT ON ACTIVITIES PROPOSED IN 2013 AEMR

The table below presents the activities that were proposed by Angus Place to be carried out during 2013. Section 6 includes the activities proposed for the 2014 reporting period.

**Table 6: Summary of Progress on Activities Proposed for 2013**

Activity	Update
Development of the Extraction Plan for 900W and 910N. This will include a coal Resource Recovery Plan, Subsidence Monitoring and Reporting Program, Built Features Management Plan, Public Safety Engagement Plan and a Rehabilitation Management Plan.	The Extraction Plan for 900W and 910N was prepared and submitted in 2013 in accordance with Schedule 3 Condition 3C of Project Approval 06_021. This has been documented in Section 1.1.2.
Preparation of a new MOP. The current MOP will expire on July 2013. The new MOP will be prepared in accordance with latest DITRIS <i>Interim Mining Operations Plan Guidelines</i> (Interim MOP Guideline), proposed for release in November 2012	A New MOP was prepared, submitted and approved in 2013 in accordance with MOP guideline. The MOP has been approved by DRE. This has been documented in Section 1.1.2.
Undertake Noise Management Works. A Traffic light Management System will be installed on the Wallerawang Haul road to assist in the distribution of trucks to prevent bunching which has been attributable to noise exceedances.	A Traffic light management system has been installed near the CHP on Wallerawang Haul Road in 2013. This has been documented in Section 3.14.
Implement outcome of Dust PRP Audit. This will include the development to a plan for stockpile storage and windbreak at the kerosene vale site.	A Plan for Kerosene Vale coal storage has been developed and wind breaks are established around the kerosene vale site. This has been documented in Section 3.4.
Continue to action the requirements of Project Approval 06_0021. This will include but not be limited to a review a management plans and the preparation of a rehabilitation strategy.	During the reporting period Angus Place continued to action the requirements of Project 06_0021. Key Milestones include: The Development of the Extraction Plan for 900W and 910, The preparation of Rehabilitation Management plans (Ventilation Facility and for 900W and 910N Extraction Area), Commissioning the Independent Audit and Reviewing relevant Management Plans. This has been outline din Section 2.12
Continue to undertake contaminated land assessment works to enable rehabilitation of the study site.	Contaminated Land assessments were undertaken at the Kerosene Vale Site in 2013. This has been documented in Section 3.8.

<p>Continue to improve water management controls. This will included the utilisation of the water clarifier during a rainfall event, investigating changes in coagulant dosing, and investigating locations additional sedimentation dams for capture.</p>	<p>Water management controls continued to improve in 2013. The clarifier was used during the reporting period to treat water contained within the LDP003 dam however below average rainfall conditions have hindered the testing during rainfall events. Investigation works regarding the suitability of an additional sedimentation dam at kerosene vale is being assessed due to soil characteristics. These works will continue in 2014. Improvements in water management undertaken in 2013 including the carpark culvert, LDP003 weir, erosion and sediment control works at kerosene vale are documented in Section 2.9.2</p>
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### 2.3 LAND PREPARATION

Angus Place is an underground mining operation and subsequently there are generally only very minor works resulting in surface disturbance.

During the 2013 reporting period the MOD 2 was approved by the DP&I allowing for the development of underground roadways and the construction and operation of a Ventilation Facility (APC-VS2) and supporting infrastructure. Prior to the commencement of land preparation works Angus Place submitted a MOP Addendum and a Construction Environmental Management Plan to DTIRIS and DP&I for approval respectively. Following approval of the MOP Addendum and the Construction Environmental Management Plan land preparation commenced within the Newnes State Forest on 11 June 2013.

Land preparation associated with the Ventilation Facility Project included the consideration and construction of appropriate erosion and sediment control measures, clearing of vegetation and the stripping and stockpiling of topsoil. Land preparation works completed during the 2013 reporting period included works associated with the Ventilation Facility Project including Ventilation Facility Site, the switch yard, substation site and a new access track into the Ventilation Facility Site. All land preparation activities were undertaken in accordance with the approved Construction Environmental Management Plan. Details regarding construction activities during the reporting period have been outlined in Section 2.2.

A comparison of the completed land preparations works completed at the end of the reporting period and the projected land preparation outlined within the July 2013 - 2015 MOP has been provided in Table 7. Details of clearing have also been reported within the rehabilitation tables in Section 5.2 and have been illustrated in Appendix 9.

**Table 7 Land Preparation Areas in 2013 Associated with the Ventilation Facility Project**

Area	Actual	MOP Predictions
Switch Yard	2,499m <sup>2</sup>	3,600m <sup>2</sup>
Substation Site	34,267m <sup>2</sup>	24,042m <sup>2</sup>
Ventilation Facility Site	69,345m <sup>2</sup>	74,042m <sup>2</sup>
Access tracks	2,762m <sup>2</sup>	6,682m <sup>2</sup>
Total	108,873m <sup>2</sup>	108,366m <sup>2</sup>

The results provided in Table 7 demonstrate that site disturbance associated with the switch yard and Ventilation Facility Site have been slightly over estimated from the projected disturbance areas outlined within the MOP and the 2012 EA. The MOP projected that there would be approximately 3,920m<sup>2</sup> of additional clearing of access tracks completed during the reporting period. This clearing was associated with the proposed widening of approximately 4.5km of Sunnyside Ridge Road by 20m to accommodate the installation of a trenched electrical power supply to the Ventilation Facility Site. These works will be undertaken in 2014.

During the reporting period there was a small increase in the projected disturbance associated with the substation site, however the total land preparation area will not exceed the approved predicted vegetation clearance of 17.3ha as outlined in the 2012 EA for the Ventilation Facility Project.

## 2.4 CONSTRUCTION

Construction associated with Ventilation Facility Project commenced in June 2013 following the approval of the Construction Environmental Management Plan. During the reporting period the following activities were undertaken:

1. Site preparation including clearing of vegetation, topsoil management, earthworks (including cut and fill, preparation of the hard stand areas and road works) and the establishment of erosion and sediment control structures;
2. Site establishment including fencing, security gates and CCTV cameras, an office, installation of communication equipment and temporary solar power supply;
3. The mobilisation and establishment of two major contractors; and
4. Commencement of works including the excavation of the ventilation shaft, construction of new access road from Sunnyside Ridge Road to the Ventilation Facility Site and the installation of electrical supply infrastructure.

The table below summarises materials movements associated with the land preparation/construction activities completed in 2013.

**Table 8 Material Production Schedule associated with Land Preparation and Construction Activities**

	Cumulative Production				
	Start of the reporting Period	End of the Reporting Period	MOP Prediction (end of 2013)	During Next Reporting Period (estimated)	MOP Prediction (end of 2014)
Topsoil stripped (m <sup>3</sup> )	0	22,370	173,000	980	64,080
Topsoil used/spread (m <sup>3</sup> )	0	0	NA	800	NA
Waste rock (t)	0	0	NA	0	NA

The predicted topsoil stripping volumes outlined in the MOP and shown in Table 8 were based upon the maximum recoverable volumes as outlined in the Soil and Land Resource Assessment prepared by GSS Environmental (2012) as a component of the MOD 2 EA. However the Soil and Land Resource Assessment also indicates that as “the majority of this material will be stripped for construction purposes, it is expected that only 20 – 30mm will be removed and salvaged as the surface is levelled for construction” (GSS Environmental 2012). Subsequently Angus Place has revised the predictions for topsoil stripping volumes based upon a stripping depth of 20 – 30mm and a revised surface disturbance area of approximately 10.9ha (see Table 7). Based on these areas it is expected that Angus Place would recover between 21,800 – 32,700m<sup>3</sup> of topsoil in 2013, which is consistent with the recorded volumes of topsoil stripped during the reporting period.

As outlined in Section 2.3, Angus Place expects to undertake clearing of approximately 3,920m<sup>2</sup> in 2014. This clearing is associated with the proposed widening of approximately 4.5km of Sunnyside Ridge Road by 20m to accommodate the installation of a trenched electrical power supply to the Ventilation Facility Site. Based upon the revised stripping depth of 20 - 30mm it is expected that approximately 784 – 1,176ha.



Construction associated with Ventilation Facility Project commenced in June 2013



**Figure 2: Entrance into the Ventilation Facility site**



**Figure 3: Ventilation Shaft Drilling area**

Construction activities will continue in 2014 at the ventilation facility site.

As outlined within the 2012 MOD 2 EA the project includes:

- Construction and operation of a Ventilation Facility consisting of both upcast (exhaust) and downcast (intake) shafts, an air compressor station, emulsion mixing and supply plant, various services boreholes, electrical substation, self-bunded diesel storage tank, back-up generator, internal roadways and hardstand area, spoil emplacement area, water management control ponds, fire controls (including Bushfire Asset Protection Zones), security fencing and miscellaneous buildings;
- Construction of a new access track from Sunnyside Ridge Road to the Ventilation Facility;
- Establishment of a 66kV/11kV electrical substation (including Bushfire Asset Protection Zone and security fencing) situated off Sunnyside Ridge Road;
- Construction and operation of a switchyard facility (including access track);
- 66kV trenched electrical power supply from existing powerline running adjacent to Blackfellows Hands
- Road to the proposed substation adjacent to Sunnyside Ridge Road; and

- 11kV trenched electrical power supply from the proposed substation to the proposed Ventilation Facility along Sunnyside Ridge Road and the proposed new track to the Ventilation Facility

## 2.5 MINING

During the reporting period longwall coal was extracted from longwalls 980. This longwall commenced on the 29<sup>th</sup> November 2012. During the reporting period, simultaneous development of the 900W and 910 panels also took place (Plan 6260, Appendix 2). As approved in MOD 2, mining commenced in the trial mining extending from the 910 panel towards the ventilation facility being constructed. Mining has progressed in accordance with the SMP Approval and as outlined in the MOP.

Total ROM coal produced during the 2013 calendar year totalled 3,974,795 tonnes (see Table 9 and 10 below). The limit stipulated on PA 06\_0021 is 4.0 million tonnes and EPL 467 is 5 million tonnes per year. During 2012 a variation was sought to the EPL so that it was consistent with Schedule 2, Condition 6 of the sites Project Approval 06\_0021.

No coal washing occurs at Angus Place Colliery, as the mine delivers sized ROM coal domestically to both Wallerawang and Mount Piper power stations. There are no reject losses from the operation and saleable coal yield is 100 percent.

**Table 9: 2007-July 2013 MOP Term**

Calender Year	Production (tonnes)	MOP Financial Year	MOP Provisional Production (tonnes)
2007	2,804,583	2006/07	2,753,000
2008	2,083,811	2007/08	3,137,000
2009	3,692,335	2008/09	3,451,000
2010	3,303,692	2009/10	2,858,000
2011	3,224,911	2010/11	2,868,000
2012	3,719,315	2011/12	3,389,000
Till July 2013	1,938,257	2012/13	2,849,000

**Table 10: July 2013 to May 2015 MOP Term**

Calender Year	Production (tonnes)	MOP Financial Year	MOP Provisional Production (tonnes)
From July 2013	2,036,538	2013/14	1,731,697
2014	-	2014/15	2,806,574
2015	-	2015	1,014,562

Variations in the coal production rates are due an increase in productions rate and minor change in mining dimensions (following approval of SMP) resulting in additional coal extraction.

During 2014 development is planned to continue in the 900 district and trial mining area. Following the completion of longwall 980 and associated change over period, longwall

mining will continue in longwall 900W. This information is illustrated in Plan 6101, Appendix 2.

## 2.6 MINERAL PROCESSING

With sized ROM coal sold to all current contracts, there is no coal Washery at Angus Place Colliery. Consequently, the only mineral processing type operation is coal crushing and sizing.

## 2.7 WASTE MANAGEMENT

Angus Place Colliery does not process any coal beyond sizing so there is no processing waste with all run-of-mine considered product.

With no coal rejects being produced by the Colliery, the major waste streams from the mine include water (Section 2.9), coal fines and sludge resulting from surface runoff, packaging, wood, waste oil, oil filters, oily water, oil drums, scrap metal, hoses, sewage effluent, paper and cardboard as well as general rubbish.

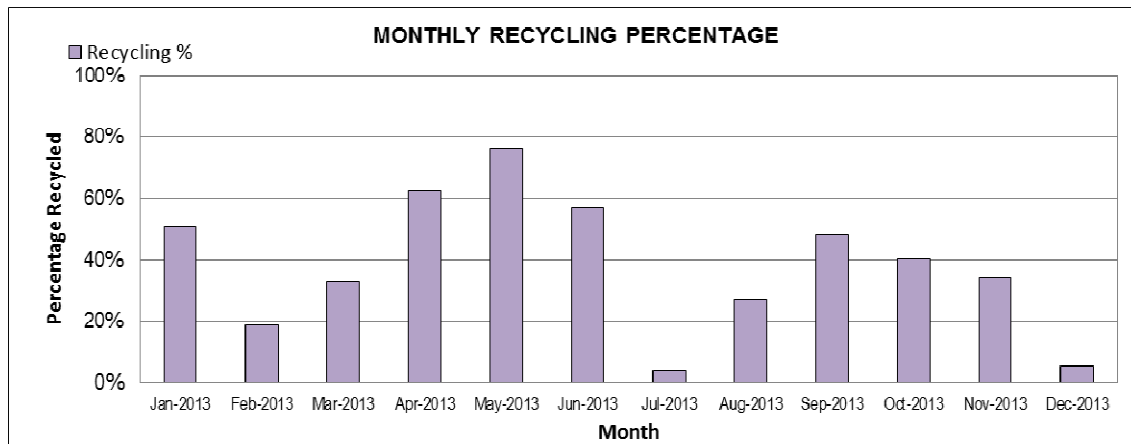
Sediment laden runoff termed 'dirty water' is managed by the site's dirty water management system. Essentially, sediment laden runoff from the stockpile, coal handling plant (CHP) and disturbed areas is captured by the four CHP settling ponds. The residence time provides the ability for particles to drop out of suspension and sink, with clean water cascading over the spill weirs. Clearly this process results in the accumulation of sediment at the base of the pond which is periodically removed and blended with ROM stockpile as saleable product.

General rubbish is disposed of to landfill by licensed waste contractors. Oil drums and filters (after draining) are recycled with other waste metals, and are removed from site by a metal recycling company. Paper and cardboard are also recycled both from bulk packaging from the store and across the various offices on site. Waste oil and oily water are disposed of by licensed waste transporters to a licensed waste treatment plant. Waste effluent is taken via a waste contractor to the Lithgow Sewage Treatment Works.

In 2011 Angus Place changed licensed waste removal contractors. Since the introduction of the colour coding waste system the colliery has demonstrated an increase in recycling rates. An overview of Angus Place waste management is shown in the following figures.



Figure 4: Total Waste volumes during 2013



**Figure 5: Angus Place Recycling rates during 2013**

It is important also to highlight that a printer cartridge recycling station is located within the administration building and co-mingled waste station is established in the kitchen so plastic containers (eg milk, soft drink etc and aluminium cans can be recycled).

Where possible, all quantities of waste or recyclable material are quantified and recorded for benchmarking and continuous improvement purposes as well as reporting in accordance with the National Greenhouse and Energy Reporting Scheme.

## 2.8 ROM AND PRODUCT STOCKPILES

Currently, the nominal capacity of the ROM stockpile is approximately 90,000 tonnes.

The former Kerosene Vale site has an approved stockpile capacity (under the 2006 Project Approval) for up to 500,000 tonnes of coal. The Kerosene Vale stockpile is used to assist with coal handling at the power stations.

The drift coal conveyor feeds ROM coal onto the ROM coal stockpile. Coal is then fed onto a reclaim hopper and conveyed to the sizer at the existing CHP. After sizing, coal is then fed onto the product coal conveyor and sent to the product coal bin to be loaded into haulage trucks. Trucks then haul the product coal to either Wallerawang or Mount Piper power stations along private, sealed haul roads.

In addition to the boundary markers established within the stockpile to assist the colliery in managing the size of the ROM stockpile in 2012 the dozers were fitted with GPS monitoring devices. This allows the location of dozer units to be tracked, and alerts the driver when in the vicinity of the established boundary. It is also noted that a retainment wall has assisted in minimising the amount of coal entering the pit top area and to further direct coal and dirty water runoff from the stockpile a V-drain was installed along the access road to the CHP in 2011.

During the reporting period, Angus Place worked with a land management consultant to identify opportunities to improve mater management associated with the stockpile area.

## 2.9 WATER MANAGEMENT

Potable water at Angus Place is sourced from both Lithgow City Council (used primarily in surface toilets and showers) and Lithgow Valley Springs (bottled drinking water). The majority of process water is sourced from underground, which is used for the underground

fire water system, as well as for both surface and underground dust suppression. Two 60,000L rainwater tanks capture water from the workshop roof area to be used in the vehicle wash down process. The two tanks can also be topped up by mine water supplied by a pipe from underground.

The Angus Place wastewater management system consists of surface (see Appendix 1; Figure 4) and underground infrastructure (indicative plan shown in Appendix 1; Figure 5). Water management systems are as described in the MOP.

In October 2012, a comprehensive sediment basin survey was undertaken to confirm settling pond sizes. This process was repeated in November 2013 at the stockpile, West Wolgan Road, and Kerosene Vale which due to their function are most likely subject to variation from sediment drop out.

**Table 9: Water Storage Volumes at Angus Place**

Water Storage	Volume Held (kL)		
	Start of Reporting Period	End of Reporting Period*	Storage Capacity
<b>Clean Water</b>			
West of Wolgan Rd Dams	3580	1730	5300
Fire Fighting Tanks	375	375	375
LD001 Dams	1900	1900	1900
LDP001 Wetland System	2000	2000	2000
Kerosene Vale Dam	1000	666	5510
Potable Water Tanks	227	227	227
Rainwater Capture Tanks	120	120	120
<b>Dirty Water</b>			
Coal Plant Dams*	2000	1000	1520
Stockpile Dams	1700	2890	3770
Kerosene Vale Dam*	10	10	10
Sewage Ponds*	4080	3500	4080

\* Estimate based on levels

The Stockpile, Wolgan Rd and Kerosene Vale Dams are managed at a lower level to maximise storage capacity at the site during high risk rainfall periods. This is activity dependent upon water quality of the dams. A flocculant is used to assist in the removal of sediment in suspension. Sediment removal activities are also scheduled based on predictive weather forecasts i.e. target winter months due to lower amounts of rainfall received.

All water discharges from the operation are through Licensed Discharge Points (LDP) as detailed in the Angus Place Environment Protection Licence 467. EPL 467 appears as Appendix 4. LDPs as detailed on EPL 467 are as follows:

- LDP001 – discharges excess water pumped to the surface fire tanks or from an underground storage area. This water passes through two settling ponds and two wetland systems which are separated by a series of rock gabions or a portion of water from underground is also directly transferred through a galvanised pipe directly to the weir. LDP001 discharges into Kangaroo Creek (tributary of the Coxs River) adjacent to the Colliery.
- LDP002 – discharges water from the pit top operations to the Coxs River west of the Colliery. Prior to discharge the water from the pit top passes through an oil water separator and settling ponds. Water from the CHP and stockpile is directed through a series of settling ponds designed to reduce the concentration of suspended solids. The flow rate of LDP002 is heavily dependent of rainfall.
- LDP003 – discharges as a result of prolonged rainfall and is situated across the Wallerawang haul road from the decommissioned Kerosene Vale Colliery, which was used as a stockpile site during 2012. Water discharges from LDP003 to the Cox's River. An automated dosing system commissioned in 2010.
- LDP005 – discharges aerated sewage effluent from Angus Place Colliery by spray irrigators to a designated utilisation area. Sewage is pumped from Angus Place Colliery to the top of four oxidation ponds in series. Sewage is then periodically pumped to the series of irrigators for application across the utilisation area. The utilisation area is within the Coxs River catchment. Periodic soil sampling takes place to ensure that the utilisation area does not become saturated resulting in runoff.

In 2013 LDP006 was removed from Angus Place EPL 467. This site was an emergency licensed discharge point from the 940 dewatering bore on the Newnes State Forest. This licensed discharge point is only operated under strict emergency conditions which were previously defined in the sites EPL. During the reporting period when LDP006 was licenced for use, it was not utilised and therefore there were no discharges into the Wolgan River.

Improvements in surface water management are reported in Section 2.92.

The 940 dewatering bore situated on the Newnes State Forest extracts groundwater from the eastern end of the extracted longwall 940. During 2013, all water pumped to the surface at this point was transferred to the Wallerawang Power Station via the Springvale Delta Water Transfer Scheme.

### **2.9.1 Water Supply and Use**

Potable water is supplied to the Colliery from Lithgow City Council via an underground potable water pipeline. This water is primarily used in the bathhouse and administration building. The potable water usage is metered by the Lithgow City Council. Additional drinking water for employees is sourced from a local commercial drinking water supplier, Lithgow Valley Springs.

### **2.9.2 Surface Water Management**

#### **Angus Place**

The surface water management system at Angus Place relies on the separation of clean and dirty water and the treatment of dirty water prior to discharge.

The clean water management system consists of a series of diversion bunds and drains that intercept clean water that would otherwise run across disturbed areas and become

dirty, thus increasing the volume of dirty water to be treated. Appendix 1 (Figure 3) shows the general surface water management system associated with the Pit Top.

The dirty water management system is more extensive than the clean water management system and consists of drains, grit traps, oil separators and settling ponds (Appendix 1 Figure 3). Dirty water from the workshop, washdown bay and pit top areas are directed to the workshop grit trap and oil/water separator prior to delivery to the two settling ponds to the west of Wolgan Road and are discharged through LDP002. Runoff from the Coal Handling Plant and stockpile area is directed to four settling ponds situated adjacent to the stockpile and then through the above two pollution ponds prior to discharge via LDP002.

Proceeding years have seen the introduction of flocculant dosing systems, water transfer stations have seen notable improvements to water quality discharged through LDP002. Managing sediment dams at low levels have assisted in the capture of rainfall events. Ongoing maintenance works on the inlets and sediment control devices was conducted.

The area surrounding the car-park culvert was improved in 2013. This works aimed to improve the water quality of runoff during rainfall work. Components of the work included-

- Tyne up bare areas
- Spreading topsoil over the tyned area
- Reshape culvert to improve water runoff
- Applying a mixture of seed and fertiliser to the areas tread with topsoil



**Figure 6: Carpark Culvert improvement area**

Additionally, in 2013 Angus Place continued to work on water management improvements strategies in 2013. A conceptual design was developed to decrease the catchment area for LDP002 and increase the storage capacity of the sediment dams located at the west of Wolgan road. The development of the design will continue in 2014.

### **Kerosene Vale**

Stormwater run-off from disturbed areas of Kerosene Vale drain to the dirty water system, which is directed through two on-site settling ponds prior to discharge through Licensed Discharge Point 3 (LDP003) (Plan 3209, Appendix 2). The dam collects run off from the Kerosene Vale pit top area, which has been partially rehabilitated. A timer operated flocculant dosing system has been installed in addition to a water clarifier unit and water pumping station. The dam is operated at nominal capacity.

In 2013 the weir at LDP003 also was reconstructed. The reconstruction occurred following a large rainfall event causing instability under around the weir area which resulted in water contained in the weir which was within the EPL criteria being released from site. The PIRMP was activated at the time of the event. The event was attributable to a number

factors including the surrounding soil, operation of the dam at nominal capacity, preceding months of low rainfall conditions and controlled release wall. The wall was temporarily repaired within 3 hours of the incident and EPA attended the site and found that Angus Place had acted in compliance with EPL licence conditions. Images of the new weir constructed are shown below.



**Figure 7: LDP003 new weir**

In 2013 the colliery continued to focus on water management improvements at the site. Targeted soil and sediment control works were conducted around the approved stockpile area. These included the installation of sediment fences, lining draining channels with terra-ferma and gabion rock, installing hay pales and channelling water flow into the final sedimentation dam at LDP003. Examples of the work conducted are shown in the following figures.



**Figure 8: Hay bales in drainage lines**



**Figure 9: Drainage channels lined with terra-ferma and gabion rock**





**Figure 10: Direct water delivery into pipes**



**Figure 11: Installation of sediment fence around stockpile area**

Works in 2014 are planned to continue with the seeding of the earth bund established around the sedimentation dam.

### **2.9.3 Underground Water Management System**

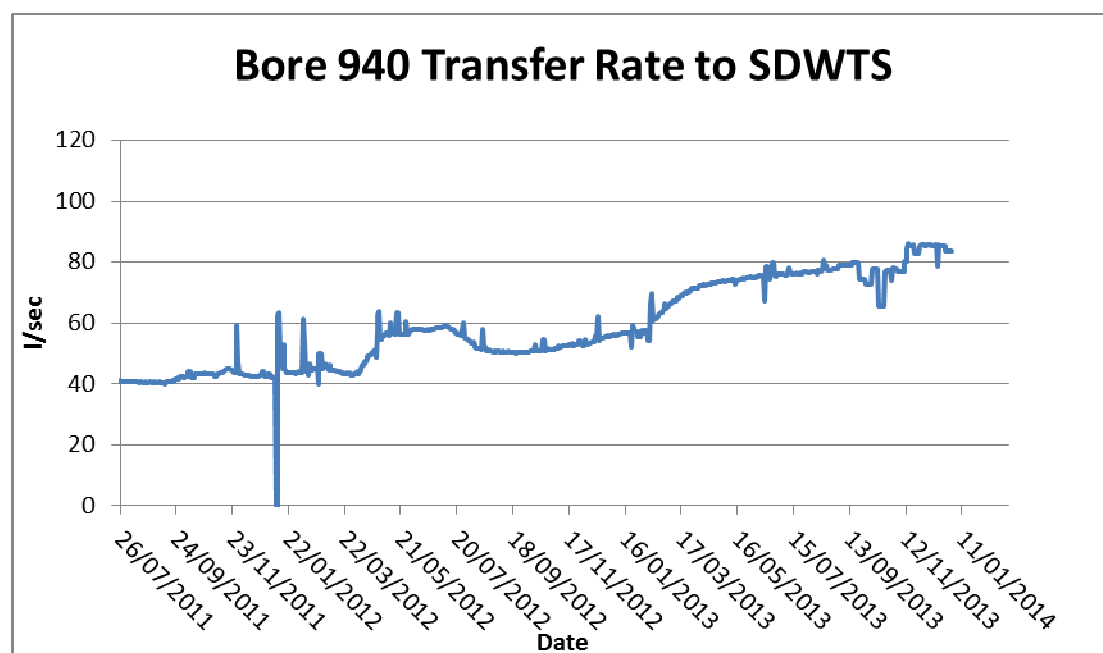
The underground mine water management system is dynamic to adapt to the current mining conditions. In general, the previously mined areas need to be dewatered to prevent flooding of the underground workings.

Water make from underground mine workings collected via potable air pumps which transfer water to portable fish tanks. Water collected within these fish tanks is then pumped to the 930 Dam. The water within the 930 Dam is then delivered to the district 700 and 800 which acts as a storage area to allow fines to settle out. This water is further feed into the 48c/t Dam. From this collection point water a portion pumped to three fire tanks on the surface where underground water is recirculated back underground for firefighting, cooling and dust suppression. A small portion of water is transferred to the Coal Handling Plant (CHP).

Predominantly water is transferred from the firefighting tanks into to two settling ponds which then cascade to two wetland systems (Cumbungi) which are separated by a series of rock gabions prior to discharge. In 2011 additional water management infrastructure was commissioned to enable a second portion of underground water to be directed through a polypropylene and galvanised steel pipe into location slightly upstream of the discharge point. The pipeline was commissioned in November 2011 to manage pH below the 90<sup>th</sup> percentile limit of 8.5. The system is supported by a dosing system. The colliery is unable to use this pipeline to fix water dur to the lower volume discharged at LDP001.

Underground water gravitating in the direction of the coal seam dip (north east) is extracted from the mine via the 940 dewatering bore (which is situated at the lowest point within the extracted workings) where it enters the Springvale – Delta Water Transfer Scheme (SDWTS) at the surface. Appendix 1, Figure 4.13 illustrates the layout of the Scheme. Water was transferred at an average rate of approximately 73.5l/sec (6.35ML/day) in 2013.

Raw data is presented in the following graph as required under the water licence.



**Figure 12: Historic Bore 940 transfer rate to SDWTS**

During abnormal times of shut down or maintenance, Angus Place Colliery is able to discharge water under emergency circumstances in accordance with EPL 467. Discharged water from LDP006 flows into a tributary of the Wolgan River and is monitored and reported in accordance with EPL 467. There were no emergency discharges in 2013. As noted above LDP006 was removed from the EPL in July 2013.

Since 2011 Angus Place Colliery was required to modify its underground pumping regime under a PRP outlined within EPL 467. To achieve this outcome Angus Place proposed to recommission Bore 930 which is linked to the Water Transfer Scheme. During the recommissioning process, a video camera revealed the casing of the borehole was damaged (sheared) and the water hole entry was blocked. Angus Place did however reduce the discharge of underground dewatering by removing in-seam pumping from Longwall 980 and increasing the utilisation of Bore 940 Pump. Cessation of groundwater pumping through LDP001 occurred as required under the previously agreed PRP. Subsequent discussions with the EPA regarding the negative impacts associated with build-up of water underground a discharge limit of 2ML per day was agreed.

#### 2.9.4 Sewage Treatment

Sewage and grey water from the Angus Place Colliery bathhouse and administration buildings is treated at an onsite sewage treatment facility (licensed by DECCW) and disposed of at LDP005 via a spray irrigation network. Sewage is pumped from Angus Place Colliery to the top of four oxidation ponds in series. Sewage is then periodically pumped to a series of irrigators for application across the utilisation area. The utilisation area is within the Coxs

River catchment. Soil moisture at LDP005 is monitored to ensure that the irrigation applied does not result in surface water runoff. Approximately 2179.8kL was discharged via LDP005 during the 2013 reporting year.

During 2012 the sewage flow system was further upgraded to allow flow and power faults to be sent via SMS in addition to daily volumes. The irrigation spray system and filter within the pump have also been put into the sites maintenance work order system.

## **2.10 HAZARDOUS MATERIAL MANAGEMENT**

Following the removal of explosives from site and changes to the dangerous goods legislation, Angus Place no longer requires a Dangerous Goods Licence.

The electronic database "CHEMWATCH" is available onsite as a Material Safety Datasheet (MSDS) database. MSDS hardcopies are also maintained in a site Chemical Data Register, which is maintained in the First Aid room, Store and statutory library. Prior to new chemicals being allowed onsite, their MSDS information is reviewed in terms of potential health, safety and environment issues.

In 2008, a 25,000 litre diesel self-bunded tank was installed for refuelling the coal stockpile dozer. Additionally in 2010, a self bunded diesel tank was delivered and was commissioned in December 2011. The system allows an enhanced level of security against potential diesel spillages. During 2012 bunding was established at the refuelling station to contain and capture a diesel spill. Also during 2012 the previously installed diesel refuelling station was decommissioned.

Solcenic oil is a water soluble oil used as a hydraulic fluid for the longwall roof support equipment. The solcenic oil store contains two tanks (14,000 litres for new solcenic oil and 7,000 litres for waste solcenic oil and contaminated water) in a bunded roofed area. The solcenic fill point is concreted and drains to a sump. Upgrading of the solcenic store occurred in 2008 to improve management and spillage control.

In May 2012 a Dangerous Goods Audit was conducted by the site. Angus Place Colliery was found to be generally compliant with the conditions of AS1940 and AS1596 as required by the collierys Project Approval. 85% of conditions across all storage locations were found to be compliant, with newer sites such as the transtanks being highly compliant (up to 97%). The non-conformances identified were easy to rectify (incomplete signage, additional fire extinguishers) and have been completed where practical.

In 2013 a Bulki Box Relocatable Outdoor Dangerous goods store was purchased for storage of chemicals on site. This will be installed and commissioned in 2014.



### **Figure 13: Bulki-Box Purchased for storage of dangerous goods**

Also during the reporting period a safety eye wash station was established at LDP001 and water treatment chemicals stored outside the pit top area and used intermittently only were relocated to the pit top to prevent accidental misuse or vandalism. Hazardous substances which were required regularly in smaller quantities have also been ordered.



**Figure 14: Eyewash station installed at LDP001**

A spill response trailer was also purchased during 2013.



**Figure 15: Angus Place Spill Response Trailer**

### **2.11 OTHER INFRASTRUCTURE MANAGEMENT**

As required by the Schedule 3 Condition 26 Angus Place must maintain the surface of the haul road to Wallerawang power station to minimise the generation of noise and dust impacts.

To continue to demonstrate compliance with this condition, Angus Place Colliery engaged Downer EDi to undertake maintenance works between the 20/11/2012 and 28/11/2012. The area of the Wallerawang Haul Road targeted was behind noise receptor 2 (R2 is Mason). Approximately 1496m was resurfaced with asphalt.

There are no other major infrastructure management issues that the author is aware of apart from those mentioned in this document.

## **2.12 ENVIRONMENTAL REVIEWS DURING 2013**

Centennial Coal has developed an Environmental Management Strategy supported by an Environmental Policy, Environmental Management System Framework and a series of Corporate Objectives and Targets. These objectives and targets are documented in site based business plans. At the corporate level, the Centennial Coal Environmental Management System (EMS) Framework describes actions required to be undertaken by both Centennial and each site to meet the minimum expectations of Centennial Coal in delivering environmental performance outcomes. These actions are required to ensure environmental performance is measured, monitored, trended, tracked and reported.

As part of the process, Angus Place was required to develop and implement an appropriate EMS in accordance with the requirements detailed in the Centennial Coal EMS Framework and generally in accordance with ISO14001.

It is noted for completeness that the last independent audit of the Angus Place Project Approval was undertaken in 2011. In accordance with the Schedule 5, Condition 10 of the modified Project Approval the audit report is available on the company's website.

As required by Schedule 5 Condition 8 dated August 2011 Angus Place is required to commission an independent audit by December 2013. During the reporting period the Independent Auditors were approved for use by the DOPI. The independent audit is scheduled to be completed in February 2014. The audit will be available on the website once finalised and documented in the 2014 AEMR.

Additionally in 2013 the following strategies and management plans were developed and/or reviewed by the colliery:

- Environment Management Strategy
- Environmental Management Plan
- Noise Monitoring Program
- Air Quality Program
- Construction Environmental Management Plan
- Construction Traffic Management Plan
- Site Water Management Plan
- Flora and Fauna Management Plan
- 900W/910 Extraction Plan (and associated SMP plans)
- Ventilation Facility Rehabilitation Management Plan
- 900W/910 Rehabilitation Management Plan

The latest approved versions of the documents are available on the website where required under the Project Approval.

### **3. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE**

#### **3.1 RISK ASSESSMENT AND MANAGEMENT**

To ensure the continued implementation and improvement of the Angus Place Environmental Management System (EMS), the identification and assessment of site based hazards and risks (aspects and impacts) is undertaken periodically to enhance the EMS risk register and site operations. Several response procedures and standards have been developed and exist under the EMS framework document which aim to manage extreme and high risks such as hydrocarbon spills, dirty water management, airborne pollution etc. Each procedure, standard, monitoring program and management plan has a periodic review timeframe regulated to by the site's controlled document system to ensure the EMS remains effective and current.

The primary objectives of the environmental risk analysis include:

- Identification of potential hazards/impacts;
- Determination of the consequence of the hazard/impact occurring;
- Determination of the likelihood of an event occurring;
- Assessment of the risk by determining the probability (likelihood) and consequence (effect) of each hazard/impact; and
- Identification of the controls/safe guards to mitigate the hazard/impact.

Centennial Coal's Risk Management Standard Risk Matrix is used to calculate the consequence and likelihood of an event to evaluate the subsequent risk level (risk rank). This system operates in accordance with AS/NZS 4360:2004.

A site specific environmental risk assessment was undertaken during early 2013 as part of the business planning process. This is crucial to ensure the ongoing effectiveness of the site's Environmental Management System which facilitates diligent environmental management through the identification of environmental risks and development of procedures to manage and reduce impact levels.

In 2013 the principles of the EMS training undertaken in 2011 continued to be adopted and integrated within the site business management framework. Components addressed included:

- An environmental inspection with the mine manager
- Environmental message deliveries through morning meeting and employee engagement meetings
- Voluntary meeting with regulators
- Participation in community events
- Collaborative inspections with different site disciplines
- Underground visits and representatives
- Participation site HSEC committee
- Undertaking Planned task observations
- Conducting environment business integration sessions

The program continues to heighten environmental awareness at the site.

In 2014, Environmental Management will focus on the following:

- Compliance with approval conditions through the internal audits and continued implementation of management plans/monitoring programs in accordance with Project Approval requirements;
- Continuous improvement with water management;

- Design of noise management systems;
- Managing construction associated with the Ventilation facility project.

### 3.2 METEOROLOGICAL MONITORING

Meteorological data was collected from the Angus Place Colliery weather station, Kerosene Vale weather station and LDP003 rain gauge. Additional rainfall data was also collected from a tipping bucket rain gauge located on the Newnes State Forest. The Lithgow average is collected from the Bureau of Meteorology.

As discussed in the 2011 AEMR, during 2011 Angus Place Colliery upgraded the sites meteorological station addressing the recommendations from the audit conducted in 2010 against the requirements of the *Approved Methods for Sampling of Air Pollutants in New South Wales*. This activity principally aimed to ensure compliance with Schedule 3 Condition 23 of the Angus Place Colliery Project Approval 06\_0021.

In December 2011 Angus Place submitted supporting documenting to the Department for review. On the 6<sup>th</sup> of February Angus Place received approval from the DOPi for the metrological station in accordance with Schedule 3 Condition 23 of the Colliery's Project Approval.

#### 3.2.1 Rainfall

Total annual rainfall for the reporting period at Angus Place Colliery and the Newnes Plateau is presented in the table below.

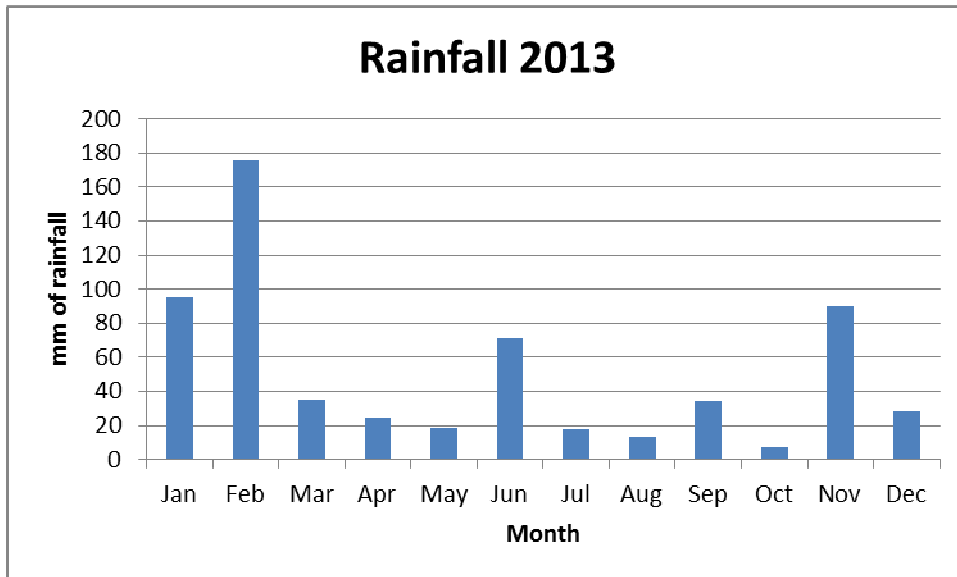
**Table 12: 2013 Rainfall and Wet Day Data for Lithgow and the Newnes Plateau**

Month	Rainfall (mm)			No. of Wet Days		
	Lithgow average	Angus Place	Newnes Plateau	Lithgow average	Angus Place	Newnes Plateau
January	95	95.2	116.2	9	7	8
February	82	175.8	262.8	10	10	15
March	86	35.4	59.4	6	5	6
April	65	24.8	40.4	4	4	7
May	65	18.6	28.6	8	6	8
June	69	71.2	84.0	9	11	10
July	69	17.8	17.5	9	4	3
August	65	13	15.0	12	4	2
September	60	34.4	5.5	5	3	2
October	68	7.2	15.5	8	2	2
November	69	89.6	62.5	10	10	9
December	76	28.6	31.9	11	2	3
<b>Total</b>	<b>868</b>	<b>611.6</b>	<b>739.3</b>	<b>101</b>	<b>68</b>	<b>75</b>

*Wet Days:  $\geq 1$  mm measured precipitation.*

A total of 611.6 millimetres of rainfall was recorded at Angus Place meteorological station during 2013 which is below the Lithgow average of 868 millimetres. The Newnes Plateau received 739.3 millimetres, which is also below the Lithgow average. A comparison between the Newnes Plateau rainfall station and Angus Place Colliery weather station highlights the variation in rainfall within the region.

While the long term average monthly rainfall demonstrates a generally uniformly distributed pattern of the year, there is a tendency for more summer rainfall. This is shown below in Figure 10.



**Figure 16: Rainfall obtained from Angus Place during 2013**

It is noted that the total amount of rain recorded in February, March, April, and May 2013 varies from the monitoring report available on the website due to a spreadsheet error which has since been rectified.

Apart from two peaks in February and June, both plateau and Lithgow rainfall levels for 2013 remained below the Lithgow long term average, and quite significantly so in the latter two thirds of the year.

Along with the February 2012 rainfall, the plateau rainfall in February 2013 is the highest recorded since monitoring began (262.8mm), while the corresponding rainfall at Lithgow during this rainfall event was the highest since June 2007.

The three month period between these peak rainfall events show rainfall levels well below the long term average and along with the 2012 rainfall data for the same period are some of the lowest Autumn levels since 2006.

From July to November rainfall levels dropped to their lowest recorded levels since approximately May 2008. Following the lowest recorded levels for 2013 in November, rainfall levels began to climb to long term average levels for that time of year; however they do not exceed this long term average.

In general 2013 was a very dry year with rainfall events being relatively intense and short lived followed by extended dry periods. Rainfall levels remained well below the long term average throughout the year with the exception of two peaks.

### **3.2.2 Wind Speed and Direction**

The table below provides a summary of predominant winds for the reporting period (both in terms of wind speed and direction).

The long term averages from Lithgow data shows that the predominant wind is from the southeast in summer and autumn, while from the west in winter and spring.



**Table 13: 2013 Wind Data Summary**

Month	Predominant Wind 1		Predominant Wind 2		Calm (%)	% Total
	Direction Sector	% Month	Direction Sector	% Month		
January	SW	16	NNE	4	2.4	22.4
February	SW	16	NNE	4	13.0	33
March	SSW	15	NNE	5	12.0	32
April	S	13	NNE	9	5.7	27.7
May	SSW	18	NNE	9	5.0	32
June	NNE	17	SSW	9	3.7	29.7
July	SSW	19	NE	7	4.0	30
August	NE	12	SSW	11	4.6	27.6
September	SSW	19	NE	6	5.7	30.7
October	SSW	17	NNE	9	4.5	30.5
November	SSW	12	NNE	10	3.3	25.3
December	SSW	19	NE	5	4.4	28.4

As shown in table 13 the predominant wind is generally from the south west 15-20% of the time throughout the month.

### 3.3 ENVIRONMENT PROTECTION LICENCE

Centennial Angus Place has a current Environment Protection Licence (EPL 467), which is administered by the DECCW. EPL 467 has an anniversary date of 1 January and requires submission of the Annual Return within 60 days of the anniversary date. A copy of the EPL appears as Appendix 4.

#### 3.3.1 EPL Variations

During the reporting year 2 licence reviews were executed by the EPA pursuant to Section 58(5) of the *Protection of the Environment Operations Act 1997* (POEO Act, 1997) following consultation with Angus Place Colliery. All proposed changes were accepted by Angus Place Colliery.

**Table14: EPL Licence Variations 2013**

Date	Description
21/5/2013	-The addition of licence conditions that define wet weather circumstances that exceed the storage capability of sediment basins after which discharge quality limits applicable to discharges through LDP3 cease to apply; and -The removal of volume limits and volume monitoring requirements at licence discharge point number two (LDP2).

Date	Description
29/7/2013	<ul style="list-style-type: none"> <li>-The reduction of the volume discharge limit at LDP1 from 30,000 KL/day to 2,000 KL/day;</li> <li>-The amendment of condition U1.1 requiring the licensee to prepare a report that identifies all reasonable and feasible options available to it for the cessation or treatment of groundwater discharge via LDP1; and</li> <li>-The removal of discharge point LDP16 (formally LDP6) - the Newnes Plateau emergency discharge point - from the licence</li> <li>-wet weather conditions applied to LDP2</li> </ul>

It is also noted that in by September 2012 a Pollution Incident Response Management Plan (PIRMP) was developed and implemented at Angus Place to satisfy the requirements of the Protection of the Environment Legislation Amendment Act 2011 (POELA Act) which requires the preparation, implementation and publication of a Pollution Incident Response Management Plan. This is available on the Centennial Coal website. During 2013 the plan was tested.

### 3.3.2 EPA Annual Return

The 2013 Angus Place Annual Return was submitted to the NSW Environment protection Authority prior to the due date of 1 March 2013. The 2014 Angus Place Annual Return is due prior to 1 March 2015.

There were no non-compliances reported against EPL 467 however the activation of the PIRMP is documented on the C2 form attached to the submission.

There was no community complaints received in 2013.

### 3.4 AIR POLLUTION

Dust and noise are the potential air pollutants emanating from Angus Place Colliery as identified in Section 3.1 *Risk Assessment and Management*. The main potential dust sources at the Colliery are unsealed traffic areas, coal stockpiles, ventilation fans, coal haulage trucks, un-vegetated areas and trafficked areas. Dust controls used on unsealed or dirty traffic areas include the use of a water cart, road sweeping and permanent sealing (asphalt seals). Dust emissions from the mine ventilation fan are quite low due to the high humidity and low dust levels within the underground mine. In addition, low emission diesel fuel is used underground to reduce air borne particles. Extracted coal on the stockpiles which is transported by trucks is typically moist (10%), which reduces the likelihood of dust emanating from the stockpiles and haulage operations.

In December 2011 Angus Place received a condition in their EPL to conduct a site specific Best Management Practice determination to identify the most practicable means to reduce particle emissions. This report was submitted to the EPA on the 19<sup>th</sup> of September 2012.

In 2013, a stockpile design for Kerosene Vale was developed. The Kerosene Vale stockpile area has an established earth bund and vegetation area around the site to minimise dust control. This is shown in the figure below. In 2014 this area will be hydromulched to improve erosion from wind and water.



**Figure 17: Earth Bund and Vegetation established in vicinity of Kerosene Vale Stockpile Storage site**

Additionally relocatable water sprinklers were purchased and are in operation on the site. These sprinklers are manually operated to enable their use during dust enhancing weather conditions or when higher vehicle movements are occurring.



**Figure 18: Mounted sprinkler at southern side of Pit Top area**



**Figure 19: Relocatable sprinkler system**

## Dust Monitoring

Depositional dust monitoring occurs at eight sites within the vicinity of the surface operations (Plan 3211, Appendix 2). During the reporting period, dust management systems operated effectively. This is evidenced by all eight gauges demonstrating compliance against the long term impact assessment criteria of 4 g/m<sup>2</sup>/month with an annual averaging period. This is stipulated in the Angus Place Colliery Project Approval 06\_0021 and EPL 467.

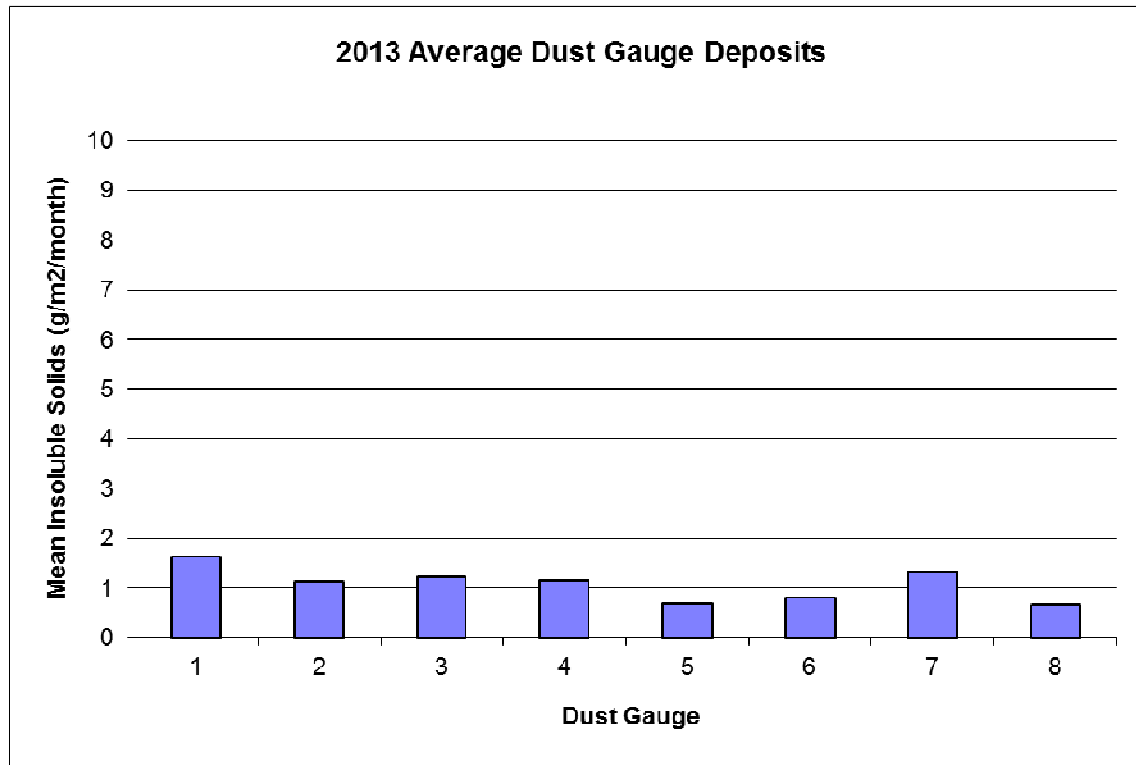


Figure 20: Average Monthly Total Deposited Solid Matter for All Gauges

Table 15: Comparison of Annual Average Deposited Dust Monitoring Results

Dust Gauge Reference	2009 insoluble solids g/m <sup>2</sup> /month	2010 insoluble solids g/m <sup>2</sup> /month	2011 insoluble solids g/m <sup>2</sup> /month	2012 insoluble solids g/m <sup>2</sup> /month	2013 insoluble solids g/m <sup>2</sup> /month	Maximum total deposited dust level g/m <sup>2</sup> /month
DG1	2.26	1.84	0.47	0.42	1.64	4
DG2	2.52	0.75	2.50	1.49	1.12	4
DG3	2.75	0.64	0.99	1.11	1.23	4
DG4	2.81	0.56	0.85	2.32	1.15	4
DG5	2.44	0.63	1.93	0.91	0.68	4
DG6	2.46	1.31	0.76	0.48	0.80	4
DG7	2.56	2.21	0.85	0.78	1.33	4
DG8	2.79	1.56	1.45	0.71	0.65	4
<b>Average</b>	<b>2.50</b>	<b>1.19</b>	<b>1.23</b>	<b>1.03</b>	<b>1.07</b>	<b>NA</b>

A comparison of depositional dust monitoring appears in the above table for the period 2009 to 2013. The 2013 results are generally consistent with the 2010, 2011 and 2012 data. Results obtained in 2009 were heavily affected by the state wide September 2009 dust storm.

The Angus Place high volume air sampler (HVAS) was installed in June 2009, however 2010 was the first year the equipment was fully operational. The HVAS monitors total suspended particles (TSP) and air borne particulate matter less than 10 micrometers ( $\mu\text{m}$ ) ( $\text{PM}_{10}$ ) in accordance with Project Approval 06\_0021 and EPL 467. The table below highlights a summary of the attained monitoring data for 2011 which has been contrasted to the previously reported 2009 to 2012 data for comparative purposes.

**Table 16: High volume air sampling summary results highlighting  $\text{PM}_{10}$  and TSP**

HVAS	2009		2010		2011		2012		2013	
	$\text{PM}_{10}$	TSP	$\text{PM}_{10}$	TSP	$\text{PM}_{10}$	TSP	$\text{PM}_{10}$	TSP	$\text{PM}_{10}$	TSP
<b>Lowest</b>	1	8	0	1	1	1	1	1	1	1
<b>Average</b>	6.56	19.78	6.82	16.19	4.04	11.5	4.38	13.55	7.11	12.12
<b>Highest</b>	11	34	27	41	15	47	12	38	52.5	66

The averages illustrate minor fluctuations between the 2009 and 2013 reporting years in both  $\text{PM}_{10}$  and TSP pollutants. The impact assessment criteria for the HVAS are stipulated within Project Approval 06\_0021 and appears in the table below.

**Table 17: Long term and short term impact assessment criteria for particulate matter**

Long term impact assessment criteria for particulate matter		
Pollutant	Average Period	Criterion
TSP	Annual	$90\mu\text{g}/\text{m}^3$
$\text{PM}_{10}$	Annual	$30\mu\text{g}/\text{m}^3$
Short term impact assessment criteria for particulate matter		
Pollutant	Average Period	Criterion
$\text{PM}_{10}$	24 hour	$50\mu\text{g}/\text{m}^3$

The results obtained from monitoring on the 28<sup>th</sup> of October 2013 revealed elevated results for  $\text{PM}_{10}$  and TSP. Similar results were recorded in other monitoring stations in the region to support that the result reflects the conditions and events experienced at the time of sampling.

To investigate the cause of the elevated results, particles trapped within the filter were viewed under a microscope at 50x and 200x magnification by an independent testing company. After a visual inspection of a number of images from each filter, along with other general observations, the following comments were made:

- Filters are dark greyish-brown in colour;
- Each has a very strong odour of smoke;
- Some insects are present on the filters;

- Some coarse dark and brownish particles are evident; and
- Very fine particles appear to have discoloured the filters.

It was concluded that these elevated results were attributable to bushfires within the Blue Mountain and Lithgow Region.

As stated in Schedule 3 Condition 14 of Angus Place Project Approval 06\_0021 “The proponent shall ensure that the dust emissions generated by the project do not cause additional exceedances of the air quality criteria”.

The exceedances of the criteria were not caused by dust emissions at Angus Place.

### **Comparison against Predictions**

As a component of the Mod 1 Environmental Assessment titled *Modification of Project Approval 03\_0021 Under Section 75W, Part 3A* (RPS 2010) an Air Quality Assessment was undertaken by Heggies Pty Ltd. This assessment outlined that the results of modelling indicate that the operations would generally comply with the relevant criteria. In summary Heggies report that:

- Dust deposition levels are predicted to be below the project air quality criteria at all surrounding dwellings;
- Cumulative annual average PM<sub>10</sub> and TSP concentrations are predicted to be below the project air quality goal at all surrounding dwellings;
- Incremental 24-hour PM<sub>10</sub> concentrations attributable to the modifications are predicted to be well below the project air quality goals set at the majority of surrounding dwellings; and
- Minimal impacts associated with the ventilation fans (odour and particles).

Air quality monitoring undertaken by Angus Place during the 2013 reporting period indicates that observed results are consistent with the predicted air quality for the operations.

Additionally a comparison of 2013 air quality monitoring results against previous years has been included in Appendix 7, Graphs 18 – 25, 27 and 28.

### **3.5 EROSION AND SEDIMENT CONTROL**

Erosion and sediment control activities occur in accordance with the approved Angus Place Erosion and Sediment Control Plan required under Schedule 3 Condition 10 of the Angus Place Colliery Project Approval 06\_0021.

There are several active erosion and sediment controls implemented at the pit top which principally aim to ensure that water discharged off site complies with suspended solids limits detailed in EPL 467. This objective is intrinsic to erosion and sedimentation designs and controls, and is achieved by implementing the following principles:

- Separating undisturbed, ‘clean water’ runoff from disturbed, ‘dirty water’ runoff to minimise and isolate the amount of ‘dirty water’ to be treated and disposed of;
- Directing sediment-laden runoff into designated sediment control retention ponds;
- Diverting ‘clean water’ runoff unaffected by the operations offsite; and
- Maintaining sediment control structures to ensure that the designed capacities are maintained for optimum settling of sediments.

In 2013 with construction activities occurring for the ventilation facility there were several soil and sediment controls established on the site. These include:

- The establishment of sedimentation ponds;

- Installation of clean and dirty water diversions;
- Establishment of sedimentation fences; and
- Installation of hay bales in drainage lines.

Periodic inspections are carried out within the Newnes State Forest in accordance with the Angus Place Subsidence Management Plan approval and site EMS. As part of this process areas susceptible to erosion and sedimentation are identified, with preventative measures taken to proactively resolve any issues. Examples of subsidence related impacts and consequences are ponding along creeks and tributaries, alterations to the surface gradient and topography, topsoil loss or degradation in areas of surface cracking and vegetation dieback causing topsoil exposure. Such issues are managed through the implementation of the Environmental Monitoring Program required under the SMP Approval.

No erosion and sedimentation issues attributable to subsidence were detected during the 2013 reporting year.

There were no exploration drilling activities undertaken in 2013 and therefore no specific soil and sediment controls were required.

### **3.6 SURFACE WATER QUALITY**

Surface water quality monitoring occurs in accordance with the approved Angus Place Colliery Site Water Management Plan required under Schedule 3 Condition 8 of the Angus Place Colliery Project Approval 06\_0021. Compliance is assessed against the prescribed impact assessment criteria detailed in EPL 467 and PA 06\_0021. Response actions are executed in accordance with the Trigger Action Response Plan for surface water monitoring.

LDPs and their associated upstream and downstream monitoring points were sampled monthly during 2013 for pH, TSS, electrical conductivity (EC), turbidity and oil and grease in accordance with the conditions of EPL 467. Turbidity monitoring was introduced to the Angus Place EPL in July 2013. In accordance with the site water management plan additional analysis is undertaken for comparison against ANZECC/ARMCANZ guidelines (2000), monthly metals and nutrient sampling occurred at the LDPs for National Pollution Inventory reporting purposes.

The surface and underground water management systems control the quality of water leaving the site (see Section 2.9). Plan 6261 (Appendix 2) shows the location of Angus Place and Kerosene Vale LDPs.

#### **3.6.1 Review of Water Quality Monitoring Results for 2013**

Monitoring of surface water quality at Angus Place is undertaken in accordance with the Site Water Management Plan. A comparison of the monitoring results obtained during the 2013 reporting period against results obtained for 2010 – 2012 has been provided in Tables 18 – 20.

A comparison of 2013 surface water quality monitoring results against previous years has been included in Appendix 7, Graphs 1 – 17.

## LDP001

**Table 18: Comparison of LDP001 water quality results obtained for previous four years**

Parameter	2010	2011	2012	2013		
	Avg	Avg	Avg	Min	Avg	Max
pH	8.32	8.35	7.92	7.27	7.91	8.38
Oil & Grease (mg/L)	6*	<5	<5	<5	<5	<5
TSS (mg/L)	5.27	6.47	4.25	<5	<5	<5
EC ( $\mu$ S/cm)	962	921	1090	990	1080	1170
Turbidity** (NTU)	N/A	N/A	N/A	1	2.71	6

\*Below detection limit results are not included in the mean calculations. Only one oil and grease result was obtained above the detection limit in 2010.

\*\*Turbidity monitoring required since July 2013.

The pH of water monitored at LDP001 during 2013 ranged between 7.27 and 8.38, with an overall average of 7.91 for the reporting period (Appendix 7, Graph 1). All pH results were compliant with EPL 467 criteria of 6.5 to 9.0 (100 percentile). The pH control system installed and commissioned in 2011 has been effective in controlling pH below the 90<sup>th</sup> percentile range.

The values for 2013 TSS were consistently below the limits of detection (5mg/L) (Appendix 7, Graph 2). There were no exceedances of the EPL criteria.

There were no total oil and grease results detected above the 5mg/L detection limit and therefore all results were below the EPL 467 criteria of 10mg/L (Appendix 7, Graph 3). To this end there were no exceedances during the reporting period.

The values for 2013 electrical conductivity ranged between 990 $\mu$ S/cm and 1170 $\mu$ S/cm (Appendix 7, Graph 4). The average level of electrical conductivity for LDP001 over the period was 1080 $\mu$ S/cm.

The values for 2013 turbidity ranged between 1 nephelometric turbidity unit (NTU) and 6 NTU (Appendix 7, Graph 5). The average level of turbidity for LDP001 over the period was 2.71 NTU.

Over the years all parameters have been relatively consistent with previous observed results.



## LDP002

**Table 19: Comparison of LDP002 water quality results obtained for previous four years**

Parameter	2010	2011	2012	2013		
	Avg	Avg	Avg	Min	Avg	Max
pH	8.04	7.96	7.89	7.39	7.88	7.58
Oil & Grease (mg/L)	8*	<5	<5	<5	<5	<5
TSS (mg/L)	46.75	9.5	14.3	<5	8.95	29
EC ( $\mu$ S/cm)	427	214	356	212	406	747
Turbidity** (NTU)	N/A	N/A	N/A	3	25.3	93

\*Below detection limit results are not included in the mean calculations. Only two oil and grease results were obtained above the detection limit into 2010.

\*\*Turbidity monitoring required since July 2013.

The pH of water discharged from LDP002 in 2013 ranged between 7.39 and 7.58 with an average of 7.88 for the reporting period (Appendix 7, Graph 7). While there were no exceedances of the 100<sup>th</sup> percentile limit of 9.0.

The average TSS result for the 2013 period was 8.95 mg/L, ranging between a minimum of <5 mg/L and a maximum of 29 mg/L. This is shown graphically in Appendix 7, Graph 8.

The values for 2013 electrical conductivity ranged between 212 $\mu$ S/cm and 747 $\mu$ S/cm (Appendix 7, Graph 10). The average level of electrical conductivity for LDP002 over the period was 406 $\mu$ S/cm.

There were no total oil and grease results detected above the 5mg/L detection limit and therefore no exceedances were recorded for the 2013 period (Appendix 7, Graph 9).

The values for 2013 turbidity ranged between 3 NTU and 93 NTU (Appendix 7, Graph 11). The average level of turbidity for LDP001 over the period was 25.3 NTU. A value of 93 NTU was recorded when water was held in the dam not discharging as a result of below average rainfall conditions experienced in the latter half of 2013

## LDP003

The EPL criteria for LDP003 differs slightly from that applicable to LDP001 as monthly water quality monitoring is only required to be undertaken when a discharge occurs. That being so, there were seven months when discharge didn't occur resulting in no data being obtained for these months. This is due to the change in management of the system in 2011 where sediment dam is operated at empty to enable capture of rainfall events, and below average rainfall during the above mentioned months. This point has a Turbidity limit of 50NTU and 100<sup>th</sup> percentile limit for pH of 8.5.

**Table 20: Comparison of LDP003 water quality results obtained for previous four years**

Parameter	2010	2011	2012	2013		
	Avg	Avg	Avg	Min	Avg	Max
pH	7.99	7.86	7.37	6.93	7.42	8.04
Oil & Grease (mg/L)	11.5*	<5	<5	<5	<5	<5
TSS (mg/L)	86.15	63.08	16.55	7	15	24
EC ( $\mu$ S/cm)	153	178.25	235.88	109	190	238
Turbidity** (NTU)	N/A	N/A	N/A	3	28.66	44

\*Below detection limit results are not included in the mean calculations. Only two oil and grease results were obtained above the detection limit.

\*\*Turbidity monitoring required since July 2013.

The pH of water discharged from LDP003 during the 2013 reporting period ranged between 6.93 and 8.04 with an average of 7.42 for the reporting period (Appendix 7, Graph 13). The licence range for LDP003 is 6.5 - 8.5.

The average TSS result for the 2013 period was 15 mg/L, ranging between a minimum of 7 mg/L and a maximum of 24 mg/L. This is shown graphically in Appendix 2 Graph 14.

The values for 2013 electrical conductivity ranged between 109 $\mu$ S/cm and 238 $\mu$ S/cm (Appendix 7, Graph 16). The average level of electrical conductivity for LDP003 over the period was 190 $\mu$ S/cm.

There were no total oil and grease results detected above the 5mg/L detection limit and therefore no exceedances were recorded for the 2013 period (Appendix 7, Graph 15).

The values for 2013 turbidity ranged between 3 NTU and 42 NTU (Appendix 7, Graph 17). The average level of turbidity for LDP001 over the period was 28.67 NTU.

## **LDP006**

Over the 2013 reporting period, LDP006 did not discharge and as such there was no monitoring or reporting conducted. Additionally it is noted that LDP006 was removed from EPL 467 in July 2013.

### **3.6.2 Review of Discharge Volume Monitoring Results for 2013**

#### **LDP001**

Average volume discharged from LDP001 (Appendix 7, Graph 6) was 1579.56kL/day, with a maximum daily discharge of 5882.57kL/day and minimum of 3.42 kL/day. There were 2 volume limits applicable to LDP001 during the reporting period. These were 30000kL/day and 2000kL/day. Angus Place Colliery complied with both limits during the period.

Additionally, the NSW Office of Water regulates bore license 10WA118748 (formally known as 10BL601838) 'Groundwater Collection System'. The license stipulates that the volume of groundwater extracted from the works by this unit shall not exceed 2,701ML.

Total discharge from LDP001 during 2013 was 576.3ML, which complies with the bore license limit of 2701ML per year. For trending and Raw data please review Table 21 *Comparison of Annual Average Discharge Volume over 2008 – 2013 and Appendix 7 Graph 6.*

### LDP002

Volume discharged from LDP002 (Appendix 7, Graph 12) ranges between 0 and 2,690kL/day, with an annual average of 170kL/day. The results show that discharge from LDP002 is within the EPL limit of 5,000kL/day for the 2013 reporting period. This limit was removed in July 2013.

### LDP003

In 2013 there was multiple overflow periods recorded at LDP003.

EPL 467 does not require volumetric monitoring at LDP003 to be undertaken. Monthly water quality monitoring during discharge is still required.

### LDP005

Volumetric sewage monitoring at LDP005 occurs by calculating the flow rate against the operation time. This is recorded daily to determine weekly flow volumes as required under the EPL. Volume discharged from LDP005 ranges between 0 and 386kL/wk, with an annual weekly average of 41.92 kL/wk. No volumetric limit applies to this discharge point.

### LDP006

During the 2013 reporting period there were no discharges from LDP006. In July 2013 LDP006 was removed from EPL 467.

## 3.6.3 Comparison of 2010 - 2013 Volumetric Results

A comparison of annual averages from 2010 and 2013 is presented in the below.

**Table 21: Comparison of Annual Average Discharge Volume over 2010 – 2013**

LDP	Minimum Discharge (kl/Day)				Mean Discharge (kl/Day)				Maximum Discharge (kl/Day)			
	2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013
LDP001	0	454	612	3.42	4650	3380	5329	1579.56	20427	7618	8332	5882.57
LDP002	0	0	0	0	187	106.15	167	170	4799	3624	2568	2690
LDP005*	181.26*	n/a	0	0	181.26*	n/a	55.46	41.91	181.26*	n/a	385.4	386
LDP006	0	0	0	0	0	0	0	0	0	0	0	0

\*LDP005: EPL467 requires weekly during discharge flow monitoring to be presented in kL/week.

The mean volume of water discharge through LDP001 in 2013 is less than previous years due to EPL PRP licence requirements. The volume of water discharge through LDP002 is dependent upon rainfall. The 2013 is relatively consistent with historic data despite below average rainfall conditions. Weekly volumetric monitoring commenced at LDP005 following the upgrades made to the irrigation system in 2011. LDP006 did not discharge throughout the reporting period.

## 3.6.4 Stream Flow Monitoring

In accordance with the requirements under the Angus Place Colliery Project Approval 06\_0021 and SMP Approval, stream flows and standing water levels are monitored at specific sites within the SMP boundary on the Newnes State Forest. Surface water quality monitoring occurs in accordance with the approved Angus Place Colliery Site Water

Management Plan required under Schedule 3 Condition 8 of PA 06\_0021. Such activities also occur in accordance with the Angus Place Environmental Monitoring Program required under the SMP Approval and Project Approval 06\_0021.

The surface water monitoring program for the SMP/Project Approval areas includes fortnightly water quality monitoring of four sites (two sites each at Kangaroo Creek and Narrow Swamp). Surface flow monitoring is undertaken by in-situ weirs: one weir within Kangaroo Creek and two within the drainage line associated with Narrow Swamp. The weirs have level sensors and continually record volumetric flows. The water depth of a waterhole within Kangaroo Creek (upstream of the Swamp) is also continuously monitored. By continuously reviewing and interpreting this information it enables an understanding of the level of impact of the project on surface water and ground water base flows. This information is discussed in the subsequent sections below.

Stream flow monitoring points on the Newnes State Forest are shown in Appendix 1 (*Environmental Monitoring Locations*).

### **Kangaroo Creek Stream Flows and Waterhole**

Kangaroo Creek Weir 1 (KCW1) is located downstream of Kangaroo Creek swamp at the base of Newnes Plateau. KCW1 tends to reflect the prevailing climatic conditions as the weir responds well to rainfall events which are noticeably apparent in Appendix 8, Graph 8.

Only very minor flows were recorded in the lower part of Kangaroo Creek during the review period, due to below-average rainfall. High rainfall on 16 September 2013 resulted in only minor flows (0.0921ML/day), but this was the largest discharge recorded during the period and was very short-lived. The data record demonstrates the highly irregular nature of peak flows in Kangaroo Creek, which are related to rainfall volume and intensity. The data from the current period is consistent with previous observations.

Surface water quality monitoring results obtained downstream of Kangaroo Creek Swamp indicate typical characteristics of NSW upland rivers and tributaries which are close to the catchment water watershed. For the 2013 reporting period the following information was obtained.

**Table 22: Kangaroo Creek Water Quality Summary 2013**

Parameter	Downstream			Upstream		
	Minimum	Maximum	Average	Minimum	Maximum	Average
pH	5.34	6.59	5.89	4.81	6.12	5.64
EC ( $\mu$ S/cm)	26	51	35.72	29	79	53.86
Mn (mg/L)	0.02	0.09	0.05	0.27	1.35	0.69
Fe (mg/L)	0.07	0.1.58	0.39	0.25	1.63	0.69

The downstream pH ranged between 5.34 and 6.59 (average 5.89). This average is slightly lower than the ANZECC & ARM CANZ (2000) default trigger value range for pH (6.5 – 9) however this result is consistent with the site's historic data. The pH at Kangaroo Creek D/S has been shown to be slightly acidic, varying between 5.3 and 6.6 during the review period with an average of 5.9. The pH at Kangaroo Creek U/S has varied between 4.8 and 6.1 during the review period with an average of 5.6. It should be noted that these values are based on 25 downstream samples and 7 upstream samples. The variation in pH is shown in Appendix 8 Graph 10 against daily rainfall and whilst there does not appear to be a strong correlation, the pH does show a slight upward trend whilst rainfall has been relatively low.

The downstream EC results detected were low and ranged between 26 and 51 $\mu$ S/cm (average 35.72 $\mu$ S/cm). The average is far lower than the ANZECC & ARMCANZ default trigger value applicable to NSW upland rivers (350 $\mu$ S/cm). The EC at Kangaroo Creek D/S shows the water to be of good quality with values ranging from 26 to 54 $\mu$ S/cm with an average of 36 $\mu$ S/cm during the current review period. The upstream EC has been measured less frequently but still show the water to be of good quality with a values ranging from 29 to 79 $\mu$ S/cm with an average of 54 $\mu$ S/cm. The variation in EC in Appendix 8 Graph 11 and generally shows that EC gradually increases during period of reduced rainfall and decreases following significant rainfall events.

The manganese analysis at Kangaroo Creek D/S has shown values to range from 0.02 to 0.29mg/L with an average of 0.05mg/L, which represents overall low concentrations, well within the ANZECC guideline value of 1.9mg/L. The upstream values show slightly higher concentrations, ranging from 0.27 to 1.35mg/L with an average of 0.69mg/L, which is still within the ANZECC guideline. When plotted alongside rainfall as shown in Appendix 8 Graph 12; lower filtered Manganese concentrations coincide with wetter periods as would be expected due to dilution and peak concentrations follow prolonged dry spells which are likely due to evaporative concentration.

The iron concentrations at Kangaroo Creek D/S have varied from 0.07 to 3.16mg/L during the review period with an average value of 0.39mg/L. Concentrations at Kangaroo Creek U/S have varied from 0.25 to 1.63mg/L with an average value of 0.72mg/L. There is not an ANZECC guideline value for Iron due to insufficient data. When plotted alongside rainfall as shown in Appendix 8 Graph 12; filtered iron concentrations show a similar pattern to filtered manganese with lower concentrations during wetter periods due to dilution. Peak concentrations follow prolonged dry spells which are likely due to evaporative concentration as the pH hasn't really changed so dissolution is unlikely.

These results show that surface water flows continue to be received downstream of the mining area. The quality of this water appears to be unaffected by any potential mining impact associated with the extraction / subsidence caused by Longwall 980.

Kangaroo Creek Weir 2 (KCW2) was located upstream of the Kangaroo Creek North Swamp, waterhole and spring and as is apparent from Appendix 8 Figure 8 is historically dry. Given the fact that no flow had been detected at the weir since it was commissioned, a decision was made to remove it which was reported in the August 2010 four monthly Subsidence Management Status Report. To this end no data was collected in 2013.

The Kangaroo Creek Waterhole (KWH) is situated below the Kangaroo Creek spring. KWH monitors water depth in a small pool downstream of a spring, which feeds the lower part of the Kangaroo Creek swamp (Appendix 8 Graph 9). The data shows the water depth in the pool to be about 20mm above logger throughout the period, which can be considered at or below the instrument depth as it may be due to relic water around the instrument or due to datum error. During the current review period there has been only one clear response to rainfall in February that was not sustained, and there has not been the seasonal fluctuation as observed in 2011 and 2012. This is most likely due to the drier than average 2012 and 2013 leading to generally low groundwater levels. This would indicate that levels in the waterhole are baseflow driven and require consistent rainfall to maintain saturation.

The waterhole is maintained by a spring in the rock bar. Importantly, the spring was unaltered by the passage of longwall 950 and has been regularly monitored and inspected. An image taken during an inspection is shown below.



**Figure 21: Kangaroo Creek Waterhole November 2013**

### **Drainage Line associated with Narrow Swamp**

As stated above, there are two Narrow Swamp Weirs (NSW). Previous reports have identified 3 weirs however in 2009 the upstream weir which measured flows from Springvale’s emergency discharge point, LDP005 and is located above longwall 980 (this panel was extracted during the 2013 reporting period) was destroyed by vandals. It is noted for completeness that Springvale did not use the emergency discharge point during the reporting period.

NSW1 exists above longwall 940 (which has been extracted) in between Narrow Swamp North and Narrow Swamp South and upstream of Angus Place’s former emergency discharge point, LDP006. NSW2 is just north of longwall 920.

Surface flows were only recorded on two occasions at NSW1 and NSW2 weirs in Narrow Swamp during the current review period (Appendix 8 Graph 14), reflecting below-average rainfall. The data show that flow from Narrow Swamp is strongly dependent on rainfall amount and intensity, as would be expected in a periodically waterlogged swamp.

Previous storm events show that, whereas the maximum flow rate at NSW1 often exceeds that at NSW2 downstream, the flow at NSW2 lasts longer, as the groundwater in the swamp gradually drains downstream. These observations suggest that some surface flow through NSW1 is retained in the swamp sediments, and is not all routed through NSW2. This behavior is consistent with a periodically waterlogged swamp.

Water quality sampling continued to be undertaken where possible due to the weir predominantly being dry during the reporting period. However the following data was obtained.

**Table 23: Narrow Swamp Water Quality Summary 2013**

Parameter	Downstream			Upstream		
	Minimum	Maximum	Average	Minimum	Maximum	Average
pH	5.75	6.64	6.14	5.53	7.26	6.43
EC ( $\mu$ S/cm)	91	213	137.8	45	295	142
Mn (mg/L)	0.01	0.51	0.24	0.01	0.51	0.24
Fe (mg/L)	0.35	1.74	0.97	0.11	2.36	1.16

The pH at Narrow Swamp D/S was measured when there was flow between January and March 2013 and during this time was found to be slightly acidic ranging from 5.8 to 6.6 with an average of 6.1. The upstream pH was measured until July 2013 and values ranged from 5.5 to 7.3 with an average of 6.4. The average pH at both the upstream and downstream sites is lower than the previous review period, where values were 6.7 downstream and 6.5 upstream. The pH data is plotted alongside daily rainfall in Appendix

8 Graph 15 and does not show a strong trend however the increased rainfall during January to March 2013 may have had a slightly neutralising effect.

The EC at Narrow Swamp D/S was measured between January and March 2013 and values ranged from 91 to 213 $\mu$ s/cm with an average of 138 $\mu$ s/cm. The EC data from Narrow Swamp U/S was measured from January to July 2013 and shows values to range from 45 to 295 $\mu$ s/cm with an average value of 142 $\mu$ s/cm. The variation in EC is shown alongside daily rainfall in Appendix 8 Graph 15 and appears to show a reduction in EC following the rainfall during January to March 2013 as would generally be expected.

Filtered Manganese concentrations have been measured at Narrow Swamp D/S from January to March 2013 and values have ranged from 0.01 to 0.61mg/L with an average of 0.20, which is well with the ANZECC guideline value of 1.9mg/L. The upstream data, collected from January to July 2013, shows filtered manganese concentrations to range from 0.01 to 0.51mg/L with an average value 0.24mg/L. When plotted alongside rainfall as shown in Appendix 8 Graph 17; lower filtered Manganese concentrations occur during and after wetter periods as would be expected due to dilution.

Filtered Iron concentrations were measured at Narrow Swamp D/S from January to March 2013 and values have ranged from 0.35 to 1.74mg/L with an average of 0.97mg/L. The upstream data, collected from January to July 2013, shows values ranging from 0.11 to 2.36mg/L with an average of 1.16mg/L. When plotted alongside rainfall as shown in Appendix 8 Graph 18; the same pattern is seen as with Manganese with lower filtered Iron concentrations occurring during and after wetter periods as would be expected due to dilution.

The quality of this water appears to be unaffected by any potential mining impact associated with the extraction / subsidence caused by longwall 980.

### **3.6.5 Water Transfer Scheme**

Angus Place Colliery commenced transferring water extracted by the 940 dewatering borehole into the Springvale Delta Water Transfer Scheme (SDWTS) on 14 April 2006. As such, all data regarding the water transfer is reported in Centennial Springvale's AEMR.

In 2013, the 940 dewatering borehole extracted 2317.855ML (averaged 6.3 ML/day) into the Springvale – Delta Water Transfer Scheme. The extraction rate was below the 10WA118750 (formerly known as bore licence 10BL601851 Bore Hole 940) extraction limit of 2,523ML.

### **3.6.6 Comparison against Predictions**

As a component of the Mod 1 Environmental Assessment titled *Modification of Project Approval 03\_0021 Under Section 75W, Part 3A* (RPS 2010) a Surface Water Assessment was undertaken by GHD. This assessment considered the potential environmental effects of Angus Place operations upon surface water quality and discharge volumes.

The assessment by GHD (2010) reported that predicted impacts to surface water quality at Angus Place would be negligible, which is consistent with the monitoring results outlined in Sections 3.6.1 and 3.6.4.

GHD (2010) also predicted that there will be an increase in discharges to the Springvale delta Water Transfer Scheme from 1,341ML/year to 2,604ML/year. In 2013 Angus Place discharged 2,314.855ML from the 940 Dewatering Borehole to the Springvale Delta Water Transfer Scheme which is in accordance with the approved extraction limit of licence 10WA118750 and the predictions of GHD (2010).

### **3.7 GROUNDWATER CONTAMINATION**

The major potential sources of groundwater pollution are from hydrocarbon storage, dispatch and use. The risk of groundwater pollution from these sources is low, as all bulk storage facilities are aboveground and bunded. Oil and grease monitoring occurs at the LDP001 and the 940 dewatering bores to detect any issues resulting from underground hydrocarbon use.

Although there is a risk of hydrocarbon contamination in the underground operations from significant spillages of solcenic oil and engine oil, this is minimised by having the main storage of these items on the pit top. Engine and transmission oil is only taken underground in 20 litre drums and waste oil is returned to the surface for disposal. Solcenic oil is a water soluble oil used in the longwall hydraulic chocks which support the roof at the longwall face. Underground storage is limited to a specifically designed 2,000 litre pod. Solcenic oil is used in very small concentrations (1-2 ppm) and readily breaks down in sunlight. Monitoring results for total oil and grease from the 940 Dewatering Borehole and LDP001 indicate no issues with contamination from underground sources.

### **3.8 CONTAMINATED LAND**

All fuel and oil storage areas are bunded and are actively managed through periodic inspections and maintenance checks. The bunds are sealed and the material removed as required.

As per the commitments stated in the 2012 AEMR, during 2013 Angus Place undertook additional contaminated land assessments at Kerosene Vale. Two stockpiled areas were characterised and assessed for suitability for use on-site or offsite disposal based upon the EPA guidelines. The independent assessment concluded based on field observations made during the sampling works and reported laboratory results for selected contaminants and assessment of these results against the NEPM 1999 guidelines the material was suitable for reuse on site.

### **3.9 FLORA**

Flora monitoring occurs in accordance with the approved Angus Place Colliery Flora and Fauna Management Plan required under Schedule 3, Condition 24 of the Angus Place Colliery Project Approval 06\_0021.

Flora issues at the pit top site mainly relate to noxious weed control. Major weed threats include Blackberry, Scotch Thistle, St. Johns Wart, which are targeted by the noxious weed control program. This is further outlined in Section 3.12.

As required under MOD 2 PA06\_\_021 a *Persephonea Hindii* Monitoring, Management and Research Program was developed and subsequently approved during the reporting period. Site assessment with earthmoving contractors identified 92 plants that required translocation along the access tracks. Translocation was conducted using the 3 methods outlined with the approved program. Translocation works occurred between the 18<sup>th</sup> and 21<sup>st</sup> of November 2013.

With respect to subsidence impacts, flora monitoring at Angus Place is conducted by the University of Queensland during summer, autumn and spring for vegetation communities described as mapping units MU50 (Newnes Plateau Shrub Swamps), MU51 (Newnes Plateau Hanging swamps) and other minority communities such as MU52 (Newnes Plateau Sedge Snow Gum Heath), MU7 (Newnes Plateau Narrow Leaved Peppermint Mountain Gum Brown Stringybark Layered Forest) and MU 26a (Newnes Plateau Narrow Leaved Peppermint Silvertop Ash Layered open forest).



As per the Angus Place Colliery Flora and Fauna Management Plan, there are currently 12 flora monitoring sites within the Angus Place Colliery Holding Boundary. Two additional sites (East Wolgan 1 and East Wolgan 2) which straddle the Springvale/Angus Place lease are also managed and reported by Angus Place Colliery. An additional 4 sites were added at Angus Place in Twin Gully (TG) and Tri-Star (TRI) swamps. These additional plots provide a greater number of unmined reference sites which brings the total number of vegetation monitoring plots across the Newnes Plateau to 47. The sites, TG01, TG02, TRI01 and TRI02 mapped as MU50, were first described in summer 2011 and monitored again in autumn.

All sites are listed in the following table and are mapped on Appendix 1 (*Environmental Monitoring Locations*).

**Table 24: Summary of Flora Survey Site Locations**

Site	Location	Easting	Northing	Establishment Date
NS01	Narrow Swamp	236015	6305085	July 2004
NS02	Narrow Swamp	235947	6304991	July 2004
NS03	Narrow Swamp	235664	6304448	July 2004
NS04	Narrow Swamp	235797	6304710	July 2004
WW01	West Wolgan Swamp	234499	6304343	March 2002
WW02	West Wolgan Swamp	234510	6304306	August 2002
WW03	West Wolgan Swamp	234513	6304708	July 2004
WW04	West Wolgan Swamp	234447	6304792	July 2004
WW05	West Wolgan lower	234779	6304918	March 2006
WW06	West Wolgan lower	234727	6304863	March 2006
KC03	Kangaroo Creek	233070	6304283	August 2006
KC04	Kangaroo Creek	233050	6304395	August 2006
EW01	East Wolgan	236389	6303977	July 2004
EW02	East Wolgan	236376	6303915	July 2004
TRI01	Tri-Star*	236565	6308755	May 2011
TRI01	Tri-Star*	236439	6308765	May 2011
TG01	Twin Gully*	237378	6306876	May 2011
TG02	Twin Gully*	237212	6307036	May 2011

\*Sites Established Autumn 2011

All sites are permanently marked with 20 x 20m quadrats within which vegetation abundance and condition was measured with the exception of two sites, EW01 and NS01 which are 10 x 40m quadrats. The plots for the latter sites differ to the others as the narrowness of the swamp dictates that a longer, thinner plot is more appropriate.

At each site, vegetation structure, dominant species, estimated cover and height for each stratum, full floristics, estimated cover abundance using a modified Braun-Blanquet scale and condition of common species using a pre-determined condition scale are recorded. During the 2013 reporting year, monitoring for summer was conducted in February and March, for autumn in May and spring in September-October.

### 3.9.1 Flora Monitoring Summary

The objective of the flora monitoring program is to assess indicators which may provide evidence of subsidence impacts. Indicators include:

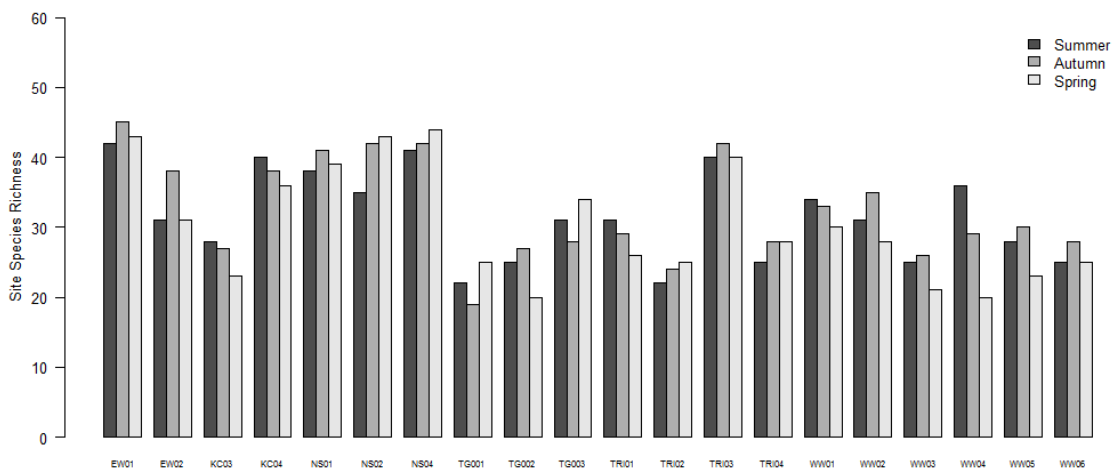
- A decline in diversity and abundance of plant species which typically are associated with water-logging and swampland plant communities;
- An increase in diversity and abundance of plant species which typically occur in forests or woodlands in locations initially supporting species characteristic of swamp communities;

- An increase in diversity and abundance of exotic species or native species favored by disturbance;
- Unusual variation in species diversity; and
- Decline in condition of swamp plant species known to be sensitive to changes in water availability. These species include Coral Fern (*Gleichenia dicarpa*) and Sphagnum (*Sphagnum cristatum*).

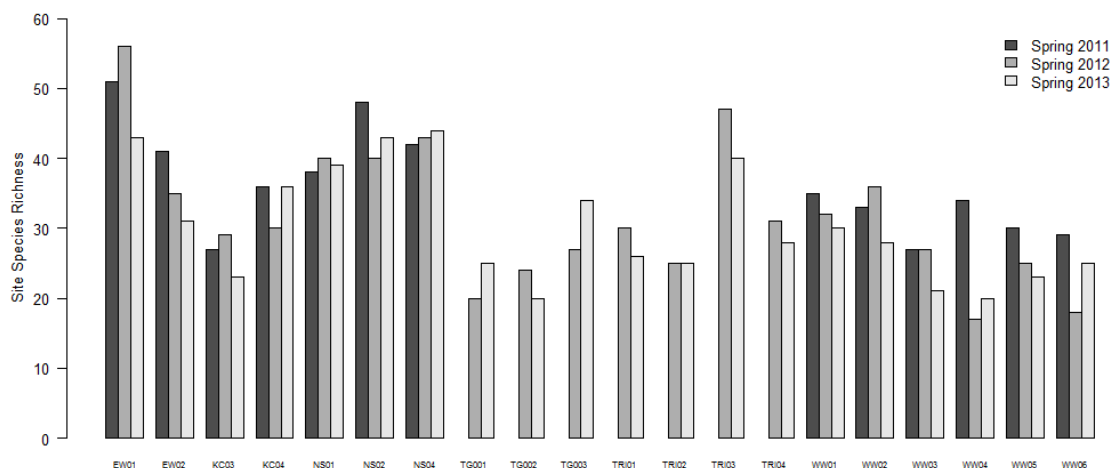
### Species Richness

Species richness assessments allow for a quick measure of a site's complexity and can be compared across both season and year.

As illustrated in Figures 22 and 23, there has been an increase in species richness at sites NS02 and NS04 since the last spring/annual report, with these sites now joining EW01 in showing the highest species richness of all sites throughout the year. This change is due to a combination of a reduction in diversity of non-native 'weedy' species in EW01 and the addition of herbaceous species in NS02 and NS04. WW04 continues to have fewer species than in 2011; many of the species not found in Spring 2013 were grasses, though in addition two shrubs, *Leptospermum continentale* and *L. polygalifolium*, were also not recorded this time (though *L. polygalifolium* was recorded in the Autumn survey). The West Wolgan plots in general had fewer species in spring 2013 than spring 2011. The only site with higher number of species relative to both summer and autumn surveys, and 2011 and 2012 surveys was TG03; at this hanging swamp site two new rushes and a forb were recorded in 2013.



**Figure 22: Species richness in 400m<sup>2</sup> vegetation monitoring plots at Angus Place**



**Figure 23: Comparison of Total species richness on Angus Place lease over time**

### Species Composition

Composition of species at each site was examined using non-parametric multi-dimensional scaling analysis. This analysis shows the movement of sites in relation to their species composition across the seasons within 2013. Results are shown in Figure 24.

Species composition at all sites across Angus Place lease showed a small degree of variability between seasons as expected and as recorded in previous years, due to differences in species life cycles and phenology. However in 2013 a number of plots also changed dramatically in species composition and cover between the autumn monitoring survey and the spring survey, due to the effects of bushfires in September-October this year. The spring survey was delayed until December in 2013 as a consequence of the fires and this may have also had a small effect on the range of species detected. At Angus Place, none of the monitoring plots burned.

Changes between seasons were comparable in magnitude across undermined and reference sites. The largest difference between seasons occurred at plot WW04, between the summer (February 2013) and spring (December 2013) monitoring surveys. This difference was primarily due to the larger number of grass species that were fruiting and therefore able to be identified to genus or species in summer (including *Deyeuxia gunniana*, *Dichelachne inequaliglumis*, *Notochloe microdon* and a *Poa* sp.) at this site. Some low cover forb species were also recorded in summer but not in spring (e.g. *Eucalyptus* seedlings, *Dichondra repens*).

For plots that were not affected by fire, changes between spring monitoring surveys and earlier years at undermined sites were similar in magnitude to those observed at non-undermined reference sites over the same time periods. Reference sites that were not affected by the fires in 2013 had species composition similarity scores between 48% and 97% for comparisons made between the December 2013 survey data and data from previous spring monitoring surveys. In comparison, sites within the potential impact zone that were not burnt had similarity scores ranging from 54% to 83%.

Angus Place  
2013 - similarity in species composition between seasons

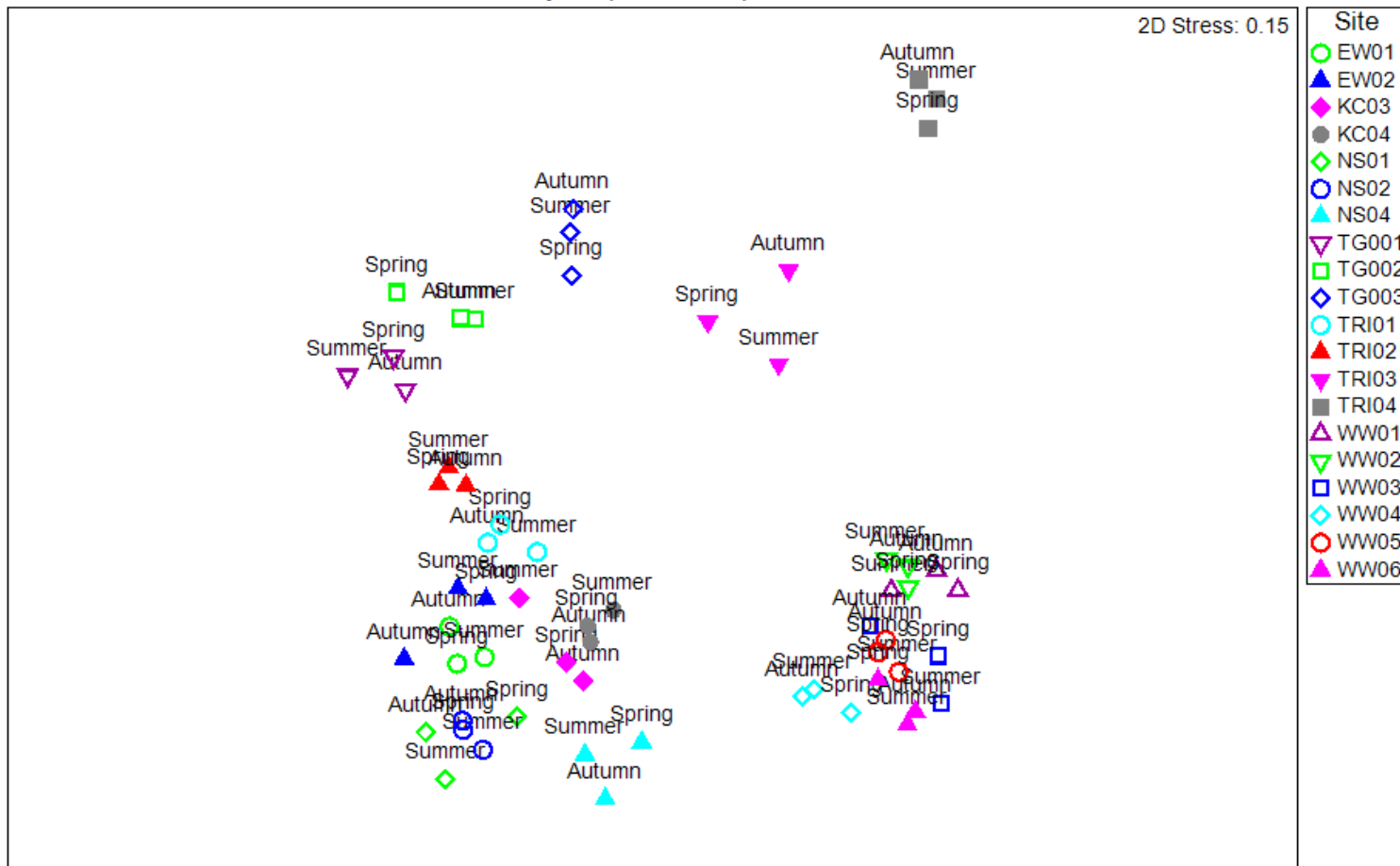


Figure 24: Angus place vegetation monitoring plots species compositional changes in 2013

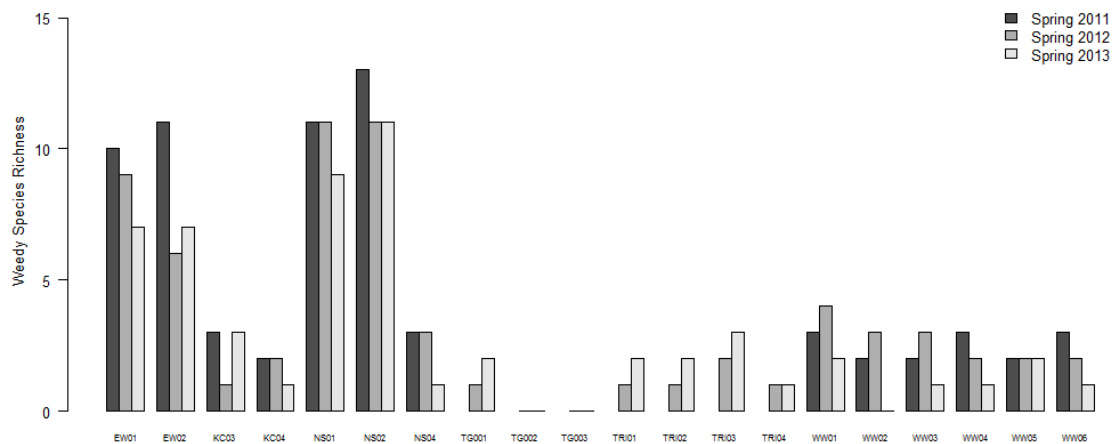
## Exotic Species

Exotic plant species, or weeds, can be used as indicators of ecosystem change as they generally only occur in vegetation that has had some level of disturbance (particularly human mediated). Exotic species are generally rare in the Newnes Plateau EECs but some sites show relatively high levels of exotic species richness. Exotic species are classified as those that are not native to Australia.

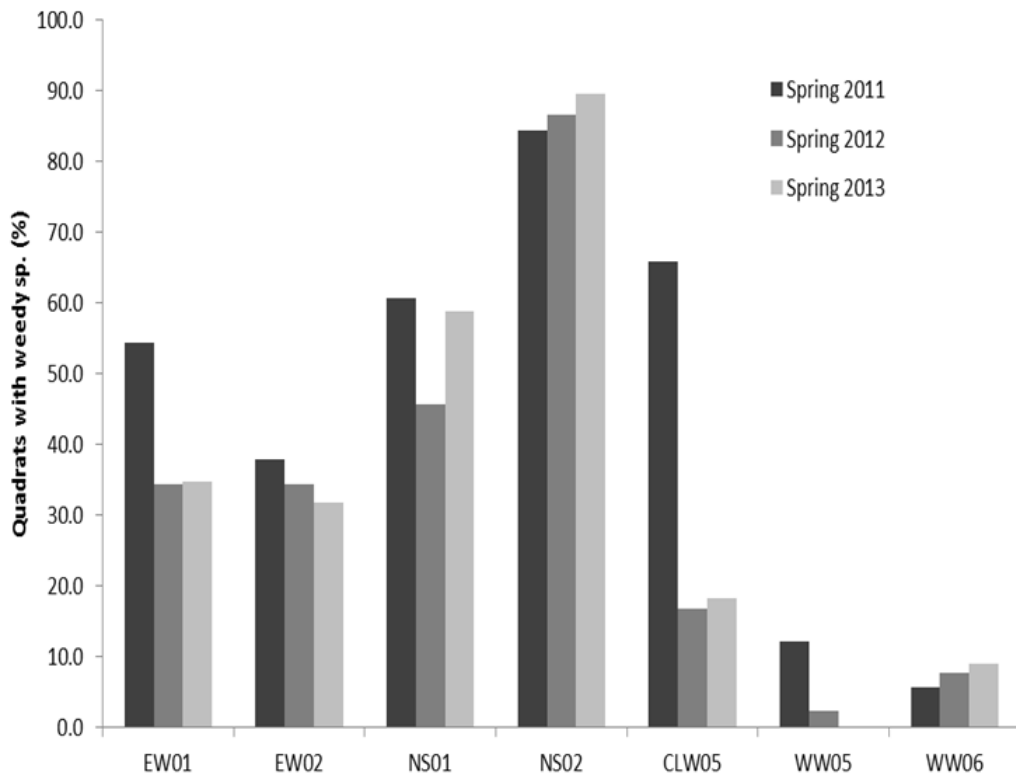
### Exotic species richness

The sites with the highest weedy species richness in 2013 continued to be those impacted by mine water discharge. On the Angus Place lease the plots impacted by mine water discharge, i.e. NS01, NS02, EW01 and EW02 all show a reduction in weedy species richness from previous years but no change in weed abundance was evident from the cover/abundance data (Figure 25). Across the rest of Angus Place, weedy species richness remained low in 2013, similar to previous years. In general three or fewer species were recorded per plot, with no differences between undermined and control plots.

The abundance of weedy species at four mine water discharge impacted sites and three control sites were assessed using the cross-transect method outlined in 3.5. The abundance of weedy species at the mine water discharge impacted plots (EW01 & 02 and NS01 & 02) was lower for all but NS02 which was 4% higher weedy abundance than the previous spring survey (Figure 26).



**Figure 25: Exotic species richness in 400m<sup>2</sup> vegetation monitoring plots at Angus Place**



**Figure 26:** Weedy species abundance at selected plots across Centennial.

To manage the exotic species apparent in Narrow Swamp and East Wolgan Swamp a process of de-heading and removing weeds by hand from these areas is continuing. This process across in accordance with the s95 certificate.

### **Comparison against Predictions and Conclusion**

From the 2006 Environmental Assessment it was noted that the dominant vegetation system in the proposed mining area is Newnes Plateau Woodland. This community exists on relatively deep soil profiles which are not adversely affected by subsidence. It has been subject to previous underground mining and monitoring indicates that there is no evidence that detrimental effects have occurred. From pre and post mining photographic monitoring surveys and periodic inspections, ongoing mining activities have generally been consistent with the initial predictions made.

Prior to 2006, it was noted in the Angus Place 2006 Environmental Assessment that monitoring within Newnes Plateau Shrub Swamps to date has not shown any impact from underground mining. As such an eight-part test was conducted which concluded that the proposed longwall mining operation is not likely to have a significant impact on Newnes Plateau Shrub Swamp and a Species Impact Statement is not required. The nature of the proposed mining operation and experience of longwall mining beneath the Newnes Plateau at Angus Place Colliery indicates that the mining operation proposed will not cause any significant alteration of habitat.

The results presented in this report generally concur with previous annual reports. The condition and cover/abundance scores for most species in most plots were stable throughout 2013. Some notable changes in species cover/abundance, and/or reductions in apparent soil surface moisture were observed for some sites in December 2013 compared to surveys earlier this year. These changes were

observed at both undermined sites (NP007 and KC03) and non-undermined sites (SSE02 and SSSE04). Where large changes occurred, these coincided with fire disturbance. Those sites that had previously experienced mine water discharge (NS01, NS02, EW01 and EW02) continued to demonstrate higher than average weedy species presence. Weedy species abundance at site NS02 is still the highest.

### **3.9.2 Newnes Plateau Shrub Swamps Monitoring Program**

Angus Place Colliery developed a Newnes Plateau Shrub Swamp (NPSS) Management Plan in accordance with the SMP approval for longwall 930 and confirmed in the SMP approval for longwalls 930-980. The NPSS Management Plan additionally satisfies Schedule 3 Condition 4 of the Angus Place Colliery Project Approval 06\_0021. Approval for the Management Plan was received in December 2006.

Angus Place Colliery has undermined West Wolgan Swamp, Narrow Swamp, East Wolgan Swamp and Kangaroo Creek. Newnes Plateau Shrub Swamps are dual listed both at the NSW and Commonwealth levels. Under the NSW *Threatened Species Conservation Act 1995* the swamps are classified as MU50 *Newnes Plateau Shrub Swamps*. At the Commonwealth level under the *Environment Protection and Biodiversity Conservation Act (1999)* they are classified as *Temperate Highland Peat Swamps on Sandstone*. This latter category also encompasses MU51 Newnes Plateau Hanging Swamps. To monitor any changes in these swamps as a result of mining, a comprehensive monitoring program has been put in place. Parameters that are monitored include:

- Groundwater (four shallow piezometers in West Wolgan and two in Narrow Swamp, Kangaroo Creek and East Wolgan Swamp monitoring water levels continuously). There are also two deeper piezometers to a depth of around 50m to monitor groundwater levels in between West Wolgan and Narrow Swamp and in between Narrow Swamp and East Wolgan Swamp) is discussed in Section 3.11;
- Surface water flows and quality (upstream and downstream of the mining area) discussed in Section 3.6;
- Flora (four in West Wolgan and Narrow Swamp and two in East Wolgan Swamp);
- Fauna (one at each swamp) discussed in Section 3.10;
- Subsidence monitoring discussed in Section 3.20;
- Photographic monitoring and regular inspections; and
- Rainfall monitoring on the Newnes Plateau discussed in Section 3.2.

Appendix 1 (*Environmental Monitoring Locations*) shows the location of these monitoring points.

The four monthly Subsidence Management Status Reports contain a summary of all the results from all the monitoring carried out on the NPSS's. These reports were provided to the following stakeholders:

- Bathurst Local Aboriginal Land Council;
- Blue Mountains Conservation Society;
- Centennial Springvale Coal;
- Colong Foundation for Wilderness;
- Forestry Corporation of NSW;
- Gundungurra Tribal Council;
- Lithgow City Council;
- Mine Subsidence Board;



- NSW Department of Environment, Climate Change and Water;
- NSW Department of Trade and Investment, Regional Infrastructure and Services;
- NSW Department of Planning and Infrastructure (now Department of Planning and Environment);
- NSW Office of Water; and
- Sydney Catchment Authority.

Accordingly in 2013 SMSRs were submitted to the above mentioned stakeholders on the 30<sup>th</sup> of April, 28<sup>th</sup> of August and 24<sup>th</sup> of December in 2013.

### **3.9.3 Newnes Plateau Shrub Swamps Photographic Monitoring**

During 2013, scheduled photographic monitoring was undertaken in Narrow Swamp, West Wolgan Swamp and Kangaroo Creek. It is noted that the Longwall position is greater than 200m south from the mentioned swamps.

#### **Narrow Swamp**

All photos were consistent with previous surveys. At the last survey completed in October 2013. Some pooled water was evident at the Northern end of Narrow Swamp. At the centre weir no water was sighted. At the south the drainage line was dry.

#### **West Wolgan Swamp**

No significant changes were identified. At the last survey completed in November 2013. No water flow was observed. No frogs were heard and the wombat hole previously observed holding water was dry.

#### **Kangaroo Creek Swamp**

During the reporting period all photos were consistent with previous surveys. The volume of water held within the Kangaroo Creek Waterhole and Kangaroo Creek Dam continues to depend on climatic conditions.

In summary, photos taken during this reporting period were consistent with previous surveys undertaken and were consistent with the climatic conditions experienced. Additional photographic surveys conducted during the reporting period are contained with the SMSRs.

### **3.10 FAUNA**

There were no fauna issues to the Angus Place Colliery pit top site detected during the reporting year.

Four long term fauna monitoring sites have been established at Angus Place Colliery to identify any potential impacts caused from mining induced subsidence on native fauna within the SMP boundary. The aim of the surveys has been to collect terrestrial fauna baseline data to be used to monitor changes in populations that may occur over time. Information regarding presence of fauna species, species diversity, population numbers and habitat characteristics were also obtained. The table below details the locations of the fauna monitoring sites and Appendix 1 *Environmental Monitoring Locations* illustrates the locations of the fauna monitoring sites.

Four sites were surveyed within the Angus Place Colliery SMP area during autumn, spring and summer 2013. These were:

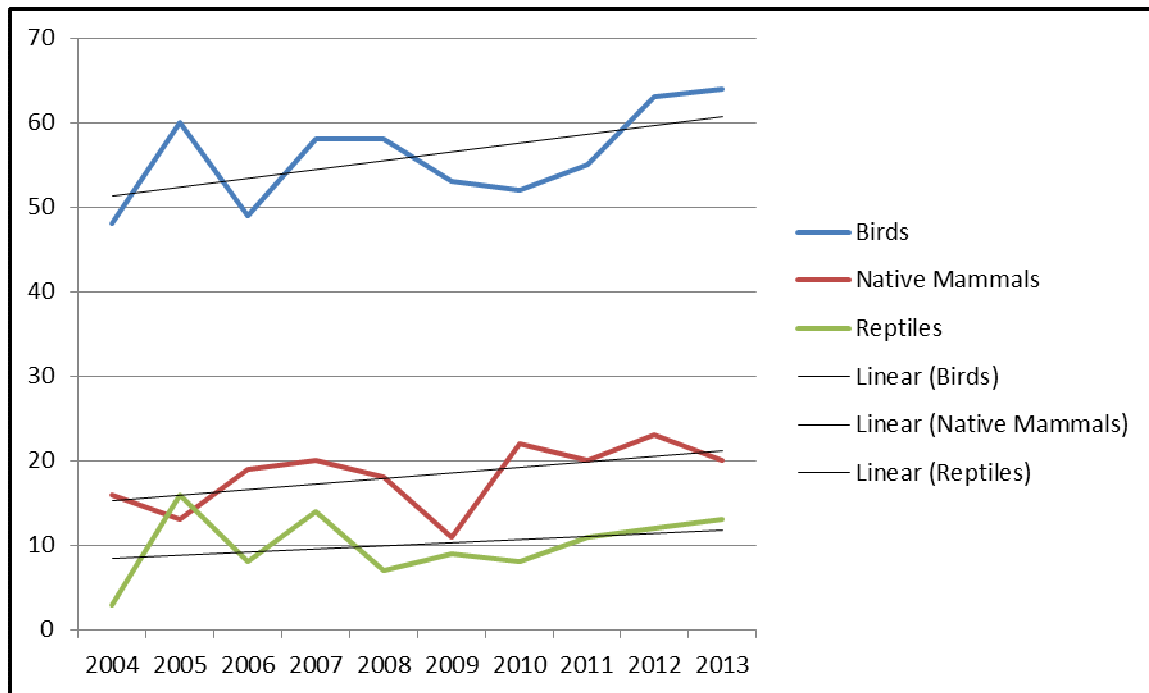
- AP5 - samples Newnes Plateau Clay Swamp and is located at a vegetation monitoring site on West Wolgan Swamp. The site is surrounded by Newnes Plateau Woodland. The main swamp area contains low shrubs, grasses and forbs with a dense ground cover of dead reeds etc. This site has been sampled from 2004 to 2013.
- AP3 – within a swamp on the eastern arm of Wolgan River and sampling Newnes Plateau Shrub Swamp community. The survey site within this area was beside the watercourse and sampled a dense layer of ferns, shrubs and reeds, as well as some of the fringing Newnes Plateau Woodland. This site has been sampled from 2004 to 2013.
- AP4 – within a narrow swamp associated with the central arm of Wolgan River and sampling Newnes Plateau Shrub Swamp community. The survey site within this area was beside the watercourse and sampled a dense layer of ferns, shrubs and reeds, as well as some of the fringing Newnes Plateau Woodland. This site has been sampled from 2004 to 2013.
- Kangaroo Creek – within a narrow swamp formed by Kangaroo Creek. The site is downstream from a road crossing and, although dry within the survey site, it is next to a pool of water that is fed by a spring. The main vegetation is Newnes Plateau Shrub Swamp community comprising a dense layer of ferns, shrubs and reeds, as well as some of the fringing Newnes Plateau Woodland. This site was surveyed from 2006 to 2013.

**Table 25: Locations of the Fauna Monitoring Sites at Angus Place**

Site Name	Swamp Name	Water Course	Site Type
AP3	East Wolgan Swamp	Eastern Arm of Wolgan River	Treatment
AP4	Narrow Swamp	Central Arm of Wolgan River	Treatment
AP5	West Wolgan Swamp	Western Arm of Wolgan River	Treatment
Kangaroo Creek	Kangaroo Creek	Tributary of Cox's River	Treatment

A total of 64 bird, 13 reptile, two amphibian and 14 native (plus four introduced) mammal species were located within Angus Place Colliery SMP Application area during the 2013 surveys. This number of species is similar to that obtained for the last five years and can be considered as typical of that expected from the Central Tablelands. There are several species that are new records for surveys of the area but not for Newnes Plateau. The total numbers of species found in Angus Place SMP Area since 2004 are: birds 107; reptiles 24; native mammals 33, and amphibians 6.

The number of bird and mammal species located within the SMP area has increased over the years, as expected with continued surveys. Changes in species richness and new species between 2004 and 2013 are shown in Figure 27. It is expected that the number of new species located each year will continue to level out and final overall species richness can be calculated from the final slope of the asymptote. The polynomial trend lines for reptiles and mammals have reached their asymptotes, but the trend line for birds is just beginning to level out.



**Figure 27: Species richness over time for the three major faunal groups (non-bat native mammals)**

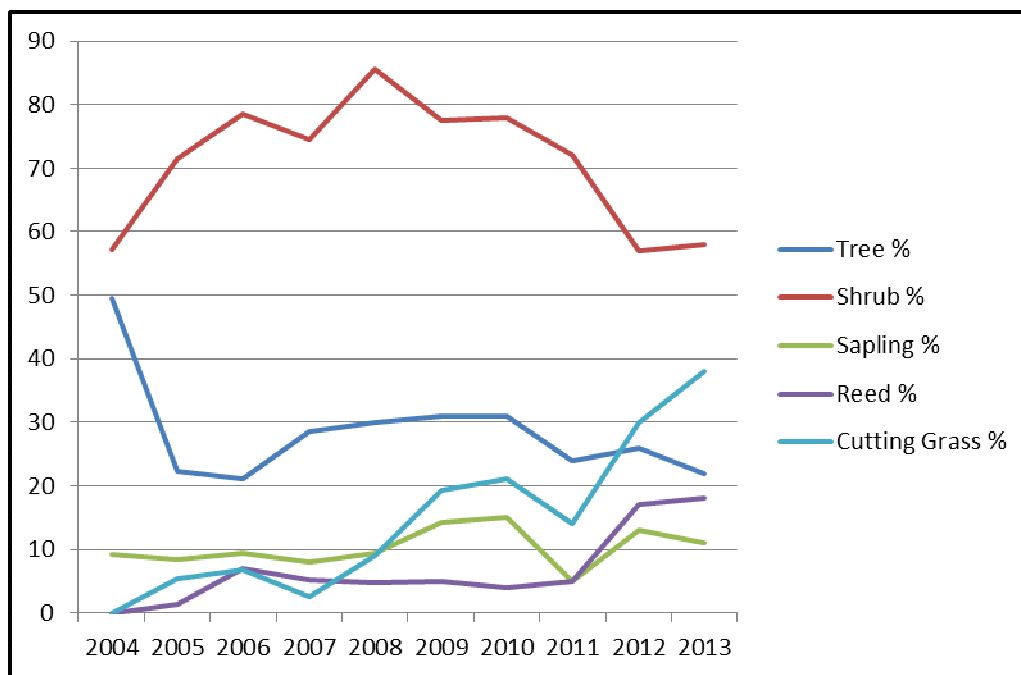
In terms of species richness, the trend lines for all three groups have levelled out over the years but are still increasing. Species richness appears to hover about a constant value for each fauna group i.e. bird species richness about 65, mammal species richness about 20 and reptile species richness about 15. There are some fluctuations from year to year and this is possibly due to varying climatic conditions and natural variations associated with changing survey conditions. There have been no significant changes in species richness values for any of the fauna groups over the ten years of survey. The cumulative species curves show that both native mammal and reptile species are reaching asymptotes and there is a low probability that many new species will be located. It seems that there are still more bird species to be located.

In terms of species richness, the trend lines for all three groups have levelled out over the years but are still increasing. Species richness appears to hover about a constant value for each fauna group i.e. bird species richness about 55, mammal species richness about 20 and reptile species richness about 10. There are some fluctuations from year to year and this is possibly due to varying climatic conditions and natural variations associated with changing survey conditions. There have been no significant changes in species richness values for any of the fauna groups over the eight years of survey

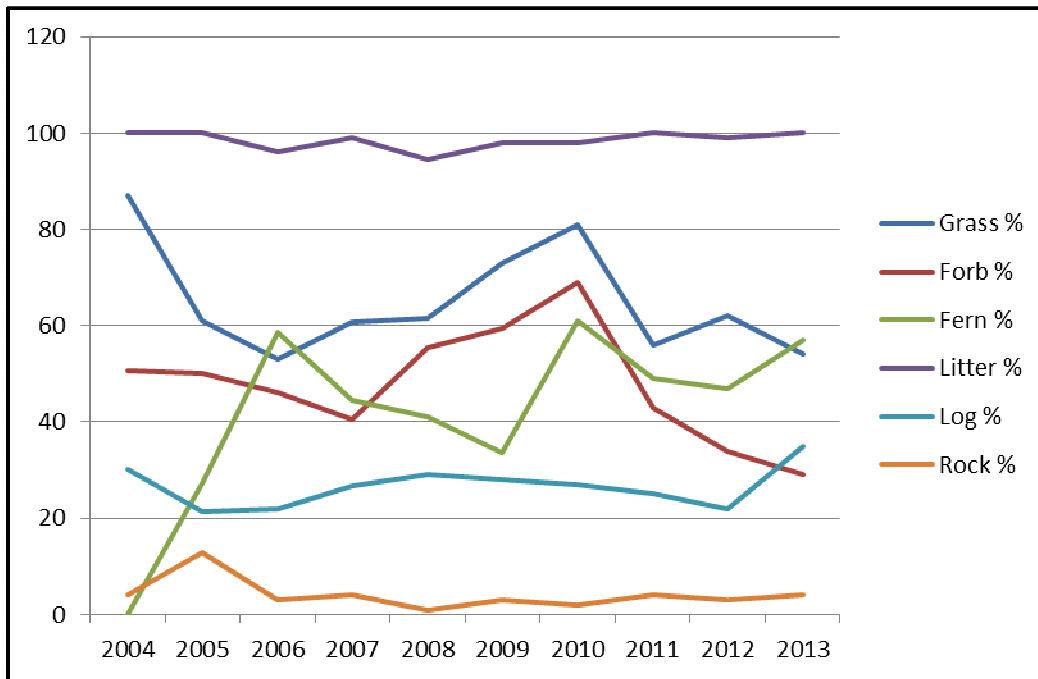
Eighteen threatened species have been located within Angus Place SMP Application Area as a result of the surveys between 2004 and 2013. The Brown Treecreeper, Speckled Warbler, Hooded Robin, Scarlet Robin, Flame Robin and Black-chinned Honeyeater are part of a suite of threatened species (“bushland birds”) that are listed because of their declining population status within the western slopes of NSW. This area (called the sheep-wheat belt) has undergone extensive clearing and much of the woodland habitat preferred by these species has been lost. However, in the Newnes Plateau region woodland habitat has been retained (albeit logged), and such bird species are still to be located. None of these threatened bird species would be directly affected by subsidence-induced changes to their preferred habitat.

The threatened species located during the 2013 surveys were mainly those commonly encountered at Newnes Plateau (although they are still rare). The Little Lorikeet, Gang-gang Cockatoo, Flame Robin, Scarlet Robin, Varied Sittella, Powerful Owl and Eastern Bent-wing Bat were located in 2013. The Little Lorikeet is a new sighting within the Angus Place SMP Area and is only an occasional recorded from Newnes Plateau. As it feeds on blossoms it is dependent upon periods of tree flowering. Searching preferred habitats during the warmer months did not result in a sighting of the Giant Dragonfly, Purple Copperwing Butterfly, nor of the Blue Mountains Water Skink.

Habitat characteristics have been measured within Angus Place SMP Area from results from trap site descriptions. Although there are differences between the amounts of habitat cover between the seasons and between the years, there are no significant differences between the habitat characteristics non-parametric (Kruskal-Wallis One Way Analysis of Variation on Ranks). Overall, the habitat characteristics have been relatively steady over the years with some falloff in shrub, grass and forb cover. Changes in habitat cover characteristics over the years are shown in Figures 28 and 29.

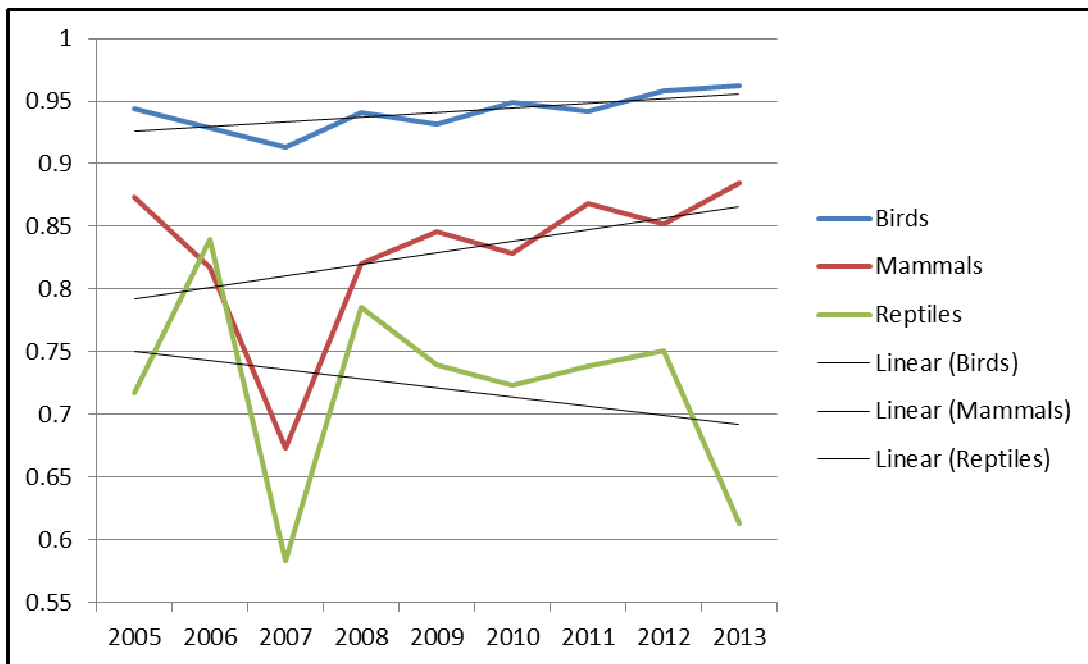


**Figure 28: Upper and Middle Canopy Habitat Characteristics**



**Figure 29: Lower Strata and Ground Cover Habitat Characteristics**

Apart for an overall fall in values in 2007 here has been little change in the Simpson's Index of Diversity over the years for bird and native mammals (trend lines are slightly rising). Reptile diversity appears to be falling, but not in terms of species richness (Figure 30).



**Figure 30: Biodiversity Indices for period 2005 - 20113**

There are no statistical differences over the years for both the Simpson's Index of Diversity and Evenness (ANOVA). The fall in 2007 has been attributed to the dry conditions prevailing at the time.

### **Comparison against Predictions and Conclusion**

Eight Part tests were carried out as part of the 2006 Environmental Assessment process to determine whether or not underground mining activities will have an impact on them or their habitat. The eight part tests concluded that expected implications would be minor if any and that a Species Impact Statement would not be required.

The configuration of survey sites established in previous years adequately samples the two major environments within Angus Place SMP Application Area i.e. woodland and wetland. The survey techniques used have been successful in locating a wide range of species, including new records for the Newnes Plateau region.

There are a number of parameters used to track changes in the biodiversity at Angus Place Colliery. The conclusion from the analysis is that, at present, there appears to be no evidence of potential effects from subsidence upon the fauna diversity at Angus Place Colliery.

### **3.11 GROUNDWATER MONITORING**

Groundwater monitoring occurs in accordance with the approved Angus Place Colliery Groundwater Management Plan required under Schedule 3 Conditions 7, 8, 12 and 13 of the Angus Place Colliery Project Approval 06\_0021 as well as Condition 2 of the applicable bore licenses. Extraction rates for Bore 940 are located in Section 3.6.5.

In accordance with the Groundwater Management Plan, an intensive monitoring program has been implemented on the Newnes State Forest to detect any impacts from underground mining on the groundwater regime, and in particular the Newnes Plateau Shrub Swamps. The monitoring programs include the following main aspects:

- Within the Angus Place SMP approval area, groundwater levels are monitored in three swamps, with a total of ten shallow groundwater observation bores;
- The groundwater level in the upper aquifer zone in the overburden is measured in five piezometers, which have been installed on the ridges between the swamps;
- A trial soil moisture monitoring program is also being undertaken in Narrow Swamp;
- Multi-level piezometer arrays have been installed in three boreholes in the area to the north east of the current workings; and
- A basic weather station provides climatic data for the Newnes State Forest.

Data are downloaded from these installations on site on a two-monthly basis. At this time, the condition of the instruments is checked, as well as the battery levels and the data quality. The subsequent report which is prepared presents the latest data downloaded from the installations, and includes an interpretation of the data which highlights any anomalies. Comments are also included on evidence of any mining-induced impacts, interpreted from the data over the review period, in swamps that are in the vicinity of active mining areas. This information is reported on a four monthly basis to stakeholders through the Subsidence Management Status Reports.

For the purposes of this report, the swamps in the monitoring program have been divided into three types based on the apparent source of groundwater within the swamp. These types are:

- Type A – dependent predominantly on rainfall infiltration (broad, high level swamps)
- Type A\* – dependent predominantly on rainfall infiltration (narrow valley swamps) with some contributions from mine discharge
- Type C – dependent on aquifer water source as well as rainfall contribution (broad valley swamps).

Type A swamps (rainfall dependent) can show large and reasonably rapid variations in groundwater level in response to significant rainfall events, whereas Type C Swamps (groundwater dependent) have a relatively static groundwater level that is largely unaffected by rainfall events. The source of the groundwater in each swamp (and hence the swamp type) has been interpreted solely from the monitoring results to date.

**Table 26: Shrub swamp groundwater monitoring infrastructure**

Swamp/Area	Longwall Number	Well Nos.	Date Installed	Depth (m)	Swamp Type
Kangaroo Creek	LW 940	KC1	2005	1.1	Type C
Kangaroo Creek	LW 950	KC2	2008	1.55	Type A
West Wolgan	LW 930	WW3	2005	2.4	Type A
		WW4	2006	2.07	
West Wolgan	LW 940	WW1	2005	1.8	Type A
		WW2	2005	2.3	
Narrow Swamp	LW 920	NS4	2008	2.4	Type A*
Narrow Swamp	n/a	NS3	2008	2.8	Type A*
Narrow Swamp	LW 950	NS1	2005	2.35	Type A*
		NS2	2005	2.55	

In summary, there was no mining near the above mentioned groundwater piezometers during the reporting period. To this end there was no impact being attributable to mining. Data obtained was relatively consistent with historic data and reflects climatic conditions experienced in 2013.

Data presented in Appendix 8 provides a graphical representation of groundwater monitoring results during the 2013 reporting period against previous years. The data provided for 2013 is to the last download run completed in 2013.

### **Kangaroo Creek**

Kangaroo Creek upper and lower parts of the swamp are categorized as Type A and Type C respectively. The reason why the two parts of the swamp are categorised as different types of swamps is that the lower part (KC1 - Type C) is located downstream of a major spring, which provides a constant source of groundwater, while the upper part (KC2 - Type A) is located in a section of the swamp upstream of the spring, and is periodically waterlogged after heavy rainfall events.

Both KC1 and KC2 are recorded as being dry during the latest monitoring round on 25th November 2013. The stable trends of these bores show that they have been dry throughout the monitoring period and review of historical data indicates the bores have been predominantly dry since June 2008 at KC1 and November 2011 at KC2, only responding to significant rainfall events since this time. The last significant response to rainfall observed at KC1 was in February-March 2013, however this period of rainfall did not illicit a response in KC2 suggesting that water levels at this site were significantly below the logger following a relatively dry year during 2012. Long term results for KC1 and KC2 have been shown in **Appendix 8, Graphs 2 and 3**, respectively.

As water levels in KC1 have been below the base of the bore for almost all of the current review period there are no observable mining impacts in the hydrograph for this bore. KC1 was undermined by LW940 in June 2008.

KC2 was undermined by LW950 in January 2010. LW960 passed about 150 m south of KC2 in late May 2011. There appears to be a datum change around November 2011 when the hydrograph flattens out at a level above previous water level fluctuations. As the bore is infrequently below the water table, any anomalous behaviour is therefore difficult to detect.

As noted in previous monitoring reviews; the continuation of surface flow within Kangaroo Creek may be dependent on prevailing weather conditions, with high rainfall resulting in high flows and subsequent filling of cracks with groundwater.

### **West Wolgan Swamp**

All piezometers in West Wolgan Swamp are located above or immediately adjacent to LWs 930 or 940, and during the current review period, the upper and lower parts of the swamp showed distinct groundwater level responses that were consistent with long-term trends provided in **Appendix 8, Graph 4**.

In the upper part of the swamp, WW1 commenced the review period with water levels at or below the logger depth of 1.8mbgl following a relatively dry 2012. Water levels remained at this level until the rainfall during February and March 2013, which brought water levels back to around ground level before declining back to below the logger level by the end of May. A further series of rainfall events in June led to another water level rise and subsequent decline back below the logger by September where water levels remained.

Water levels at WW2 have shown a very similar response to WW1 with a rapid response to rainfall events, followed by gradual decline during drier periods. Historical data shows this cycle to have occurred on at least two other occasions since early 2011. Despite further rainfall events, rainfall is well below average and by the end of the current review period yet water levels remain below the depth of instrumentation.

In the lower part of the swamp, groundwater levels at WW3 and WW4 have remained at or below logger depth for most of the current review period. Distinct rainfall responses are observed in January and February 2013 with smaller response towards the end of the review period in September and November, with water levels being sustained marginally above the logger depth. In WW4, groundwater levels remained at or below the logger throughout 2013, and have done so since November



2011 with the exception of a brief rise of over 1.5m associated with a large rainfall event in February 2012.

The response to rainfall in these piezometers is typical of a periodically waterlogged swamp with the water levels being influenced strongly by the long-term climatic trends.

WW1, WW2 and WW3 are above LW940 and were all undermined during October 2007. All three boreholes have continued to show a normal response to the prevailing climatic conditions for a periodically waterlogged swamp (similar to the pre-mining period) and there was no evidence of any impact on groundwater behavior from mining activities. The general fluctuation rate in the groundwater levels following rainfall events has been similar to the response measured prior to undermining by LW940 and LW950, which passed under WW1 and WW2 at the end of July 2009. The monitoring results showed no abnormal trends or movements in the groundwater levels which could be attributed to mining.

WW4, above LW930, showed groundwater levels at the base of the bore. These have remained consistent since data collection commenced in 2006, with intermittent rise above the logger depth, prior to undermining in May 2006. There is no evidence of mining impacts on groundwater levels in the data.

### **Narrow Swamp**

The four piezometers associated with Narrow Swamp are classified as Type A\* meaning the swamp is dependent predominantly on rainfall infiltration and during emergency conditions is subjected to mine water discharge. Up until July 2013 both Springvale Colliery (LDP005) and Angus Place Colliery (LDP006) had licensed emergency discharge points that release water into the drainage line associated with Narrow Swamp. During the reporting period there were no emergency discharges into Narrow Swamp. Because of this, the water levels in NS1, NS2, NS3 and NS4 show normal behaviour for this type of swamp, and only respond to some significant rainfall events (**Appendix 8, Graph 5**). In July 2013 LDP006 was removed from EPL 467.

Water levels in NS1 and NS2, which are within the upper reaches of the swamp, have remained below the logger throughout the review period, and historically, have only risen to above logger depth following large or sustained rainfall events.

NS3, located in the mid-section of the swamp, shows more constant water levels above the base of bore; however this is potentially due to the slightly deeper construction of the bore than differing swamp water conditions. An apparent datum shift occurs at the end of May 2013 that needs to be resolved as does the validity of the data prior to this as the apparent increases in water levels from around June 2012 is not consistent with other hydrographs or the historical rainfall responses in this bore. Following May 2013 water levels appear to be below the base of the bore.

At NS4 in the lower part of the swamp, water levels are consistently below the base of the bore, and as with NS1 and NS2, generally only responding to large rainfall events or above average rainfall conditions. The hydrograph for NS4 also appears to dry out at a level above previous lows during 2011, which may be due to a datum error and will be investigated as part of the monitoring review.

None of the groundwater trends in the southern part of the swamp can be attributed to the extraction of LW950, which undermined the two bores in this part of the swamp (NS1 and NS2) during early 2009. However, since the groundwater level in both bores is normally below the logger, any impact would be difficult to detect. The two bores in the northern part of the swamp (NS3 which has not been undermined and

NS4) also showed no apparent impact from previous mining, and continued during the reporting period to show trends consistent with long-term behavior of a periodically waterlogged swamp.

### **Ridge Piezometers**

Angus Place has two deeper piezometers installed on the ridges in between Narrow Swamp and East Wolgan Swamp. The locations of the two piezometers above Angus Place (RNW and REN) are presented in **Appendix 8, Graph 6**. RNW is drilled to a depth of 50.46m and REN is drilled to a depth of 55.1m.

The end of hole at RNW has been measured as 52.19mbgl, which is above previously recorded water levels suggesting that the bore may have collapsed or been otherwise blocked. During the current review period water levels have remained at or below the base of the hole and during the final monitoring round in November 2013 the hole was reported as being dry.

During the current review period water levels at REN have remained steady between 51.1 and 51.34mbgl and have not fluctuated in response to rainfall as has been the case in previous years.

Both holes showed either declining water levels (RNW) or water levels below base of bore (REN) prior to being undermined in 2008/2009. There was no mining activity near any of the bores during the current period. The data show no impacts from mining over time and both bores have demonstrated an overall increase in water levels since mining took place.

### **Soil Moisture Monitoring**

Angus Place Colliery is participating in a trial to assess the value of undertaking soil moisture monitoring within the Newnes Plateau Shrub Swamps. Over Angus Place, there is one soil moisture installation located within Narrow Swamp (referred to as NS3). The location of the soil moisture probe is shown in Appendix 1 *Environmental Monitoring Locations*. The results from the soil moisture monitoring for Narrow Swamp are presented in Appendix 8, Graph 7.

The soil moisture content reflects the climatic conditions experienced throughout the reporting period.

The moisture levels declined slightly at all levels in NS3 during the reporting period. These movements are consistent with trends in groundwater level in the swamp at this location. The emergency discharge, when it was in operation, resulted in a narrow range of moisture trends and a high, generally consistent groundwater level. Large shifts in groundwater level commencing after the cessation of the emergency mine water discharges in early 2009 were followed, after a lag, by much more variable soil moisture levels over a broader band of values. In the latter half of 2013 there is limited data due to a failure of the soil moisture reading unit.

The groundwater level declined by over 1m, and was well below the level of the soil moisture profile. These movements are consistent with the trends in groundwater levels at this location.

### **Multi-level Piezometers**

Piezometers were installed in exploration boreholes located approximately 1.5km north east of longwall 920. Three boreholes were constructed during 2010, and eight during 2011/12 with multi-level vibrating wire piezometers. These boreholes are located northeast of LW920 in an area that may be undermined in the future. Piezometer depths were not available for four of the bores – so these will be reported

in the next report. The boreholes were designed to measure groundwater response, mainly in the lower sequence including the coal measures. These are shown in Appendix 7 Graph 19.

Deeper piezometers AP4PR, AP8PR, and AP9PR show steadily rising groundwater level trends over the past review periods. Over the current review period water levels have increased by approximately 1.5m and the increasing trend has begun to flatten off.

Shallower piezometers AP1PR, AP5PR, and AP10PR maintained relatively shallow water levels in the range 13 to 16mbgl. During the current review period water levels have shown declines of up to 1m in AP1PR and AP10PR and have increased by approximately 1m in AP5PR. The water levels in these holes show only a very small response to rainfall events and fluctuate on a seasonal basis according to average rainfall levels. The currently observed declines or reduced increases are in response to relatively dry 2012 and 2013.

From October 2011, a series of new standpipe piezometers have been installed at Angus Place, these being AP1105, AP1104, AP1110, AP1102 and AP1204.

The record in AP1105 commenced in November 2011 and has shown an overall increasing trend since installation. During the current review period the water level has steadily increased by approximately 1m to 27.50mbgl.

The water level record in AP1104 commenced in February 2012 and levels have steadily increased since this time. During the current review period water levels have increased by approximately 0.4m to 35.23mbgl.

The record in AP1110 commenced on 13 February 2012. Since that time, groundwater levels have remained steady at around 70m depth until November 2012. At that time, the groundwater level rose rapidly by approximately 1m, after which the rate of rise slowed. The reason for this is unclear but may be due to a datum change or change in logger depth and is also witnessed at the same time in AP1204. Despite this step-wise increase in water level, the gradual rise during the current review period is considered natural and consistent with other observed trends in other standpipe piezometers. During 2013 water levels increased by nearly 2m to reach 65.75mbgl by the end of the dataset.

The instrument in AP1102 was installed in March 2012 and has steadily increased since this time. The trend is overprinted by a short period oscillation of up to 1m in amplitude. This fluctuation is difficult to explain at this stage considering it has not been witnessed elsewhere, but it could be an aquifer tidal response, which are influenced by the same gravitational forces that create ocean tides. However, it is not clear why this would be observed at AP1102 and not at other monitoring locations.

The instrument at AP1204 was installed in July 2012, and has generally had a very steady, level trend since that time. The bore displays a couple of small (0.25m and 0.5m) stepped water level increases, one in November 2012, similar to AP1102, and one in January 2013. The water level over the 2013 review period has increased by 0.4m.

### **Comparison against Predictions**

From the 2006 Environmental Assessment, it was anticipated that the proposed mining at Angus Place Colliery is not likely to result in any significant, long-lasting impact on the upper two aquifers.

Groundwater monitoring activities continue to show that areas that have been undermined continue to exhibit pre-mining behavior, with the groundwater levels responding to the prevailing climatic conditions. The monitoring results showed no abnormal trends or movements in the groundwater levels which could be attributed to mining during the reporting period and as such are consistent with the initial predictions made in the 2006 Environmental Assessment.

### **3.12 WEEDS**

Major weed threats include Blackberry, Scotch Thistle, St. Johns Wart, which are targeted by the noxious weed control program within the monthly surface maintenance program.

During the reporting a specialist contractor was engaged to undertake additional weed spraying works around Angus Place. This work was conducted in January and April. The program was highly successful with minimal follow up spraying required to be completed. Due to the timing of the work being completed some weeds had already seeded and therefore it was recommended the program be undertaken earlier in the following year. This targeted spraying and monitoring program will continue in 2014.

A s95 certificate has been granted by OEH to enable weed control works (including hand removal of weeds) to be undertaken. A suitably qualified contractor (Bush Doctor) continued to undertake these works in 2013.

The field for the works conducted by the Bush Doctor targeted the removal of thistles using the crowning technique. This technique is useful for weeds which have their growing points below the surface of the soil.

It was noted that eucalypts continued to regenerate the area along with tea tree and the native regeneration is being hindered by grazing of the areas by kangaroos, wallabies and wombats.

Approximately 195 hours have been spent undertaking the work between the 1st of September 2012 and 26th of August 2013.

### **3.13 BLASTING**

No blasting is carried out at Angus Place and no explosives are stored on site.

### **3.14 OPERATIONAL NOISE**

Potential noise sources from the pit top facility include machinery operations on the pit top (predominantly the Coal Handling Plant), coal sizing and coal loading at the Coal Handling Plant, and coal transportation to the Wallerawang and Mount Piper Power Stations on dedicated coal haul roads.

Noise mitigation controls include the establishment of buffer zones around the surface operations, the restriction of operating hours for major material deliveries and coal loading and haulage operations, the site conveyor and coal handling upgrade and the complete enclosure of the Coal Handling Plant.

The Angus Place Project Approval (06\_0021) contains noise impact assessment criteria (Schedule 3, Condition 16 – Table 27)

**Table 27: Noise Impact Assessment Criteria dB(A) L<sub>Aeq</sub> (15 minute intervals)**

“From no later than 28 February 2007, the Proponent shall that the noise generated by the project, including the Proponent’s operation of the haul road to the Wallerawang Power Station, does not the noise impact assessment criteria presented in Table 6 at any residence on privately-owned land.

Land	Day	Evening	Night
<b>Sharpe</b>	<b>42</b>	<b>38</b>	<b>36</b>
<b>Mason (West) and Wolgan Road rural properties<sup>1</sup></b>	<b>41</b>	<b>37</b>	<b>35</b>
<b>Lidsdale village residents</b>	<b>44</b>	<b>40</b>	<b>35</b>

Notes:

- a) *For more information on the references to land in this condition, see ‘Property Details’ figure of the EA.*
- b) *The noise criteria do not apply where the Proponent and the affected landowner have reached a negotiated agreement in regard to noise, and a copy of the agreement has been forwarded to the Director-General and DEC.*
- c) *Noise from the project is to be measured at the most affected point or within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary, to determine compliance with the L<sub>Aeq(15 minute)</sub> noise limits in the above table. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DEC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.*
- d) *The noise emission limits identified in the above table apply under meteorological conditions of:*
  - *Wind speeds of up to 3 m/s at 10 metres above ground level; or*
  - *Temperature inversion conditions of up to 3°C/100m, and wind speeds of up to 2 m/s at 10 metres above ground level.”*

In addition, the Project Approval required the preparation and implementation of a Noise Monitoring Program (Schedule 3, Condition 22). This program was approved by the Department of Planning on the 12 June 2007. The latest reviewed and approved program is from October 2013.

During 2013 Angus Place installed in the vicinity of the CHP (where trucks are loaded from Angus Place Colliery), a solar powered traffic control system to assist in the distribution of coal trucks along the Wallerawang Haul Road. This system currently operates on a timer. Further upgrades to the system are currently underway and will continue into 2014.



**Figure 31: Traffic Management system installed on Wallerawang Haul Road**

Noise monitoring surveys were undertaken for the quarters ending April, July, October and January 2013. Full monitoring reports appear as Appendix 11. The table below provides overall Angus Place noise contributions measured during 2013 against the Project Approval limit criteria.

**Table 28: Angus Place overall noise contributions measured during 2013**

	Limit	Apr	July	Oct	Jan
<b>Day</b>					
<b>Sharpe</b>	42	41	44	34	<30
<b>Mason</b>	41	40	41	32	<30
<b>Neubeck</b>	44	40	41	34	<30
<b>Evening</b>					
<b>Sharpe</b>	38	38	39	30	33
<b>Mason</b>	37	38	36	30	35
<b>Neubeck</b>	40	37	41	34	<30
<b>Night</b>					
<b>Sharpe</b>	36	34	<30	<30	35
<b>Mason</b>	35	30	<30	<30	30
<b>Neubeck</b>	35	<30	<30	<30	<30

\* monitoring for the quarter ending January 2014 was undertaken in December 2013.

The graphs below illustrate the above results against the Project Approval limit criteria. Results below the practical quantitation level (30dBa) have been graphed at practical quantitation level.

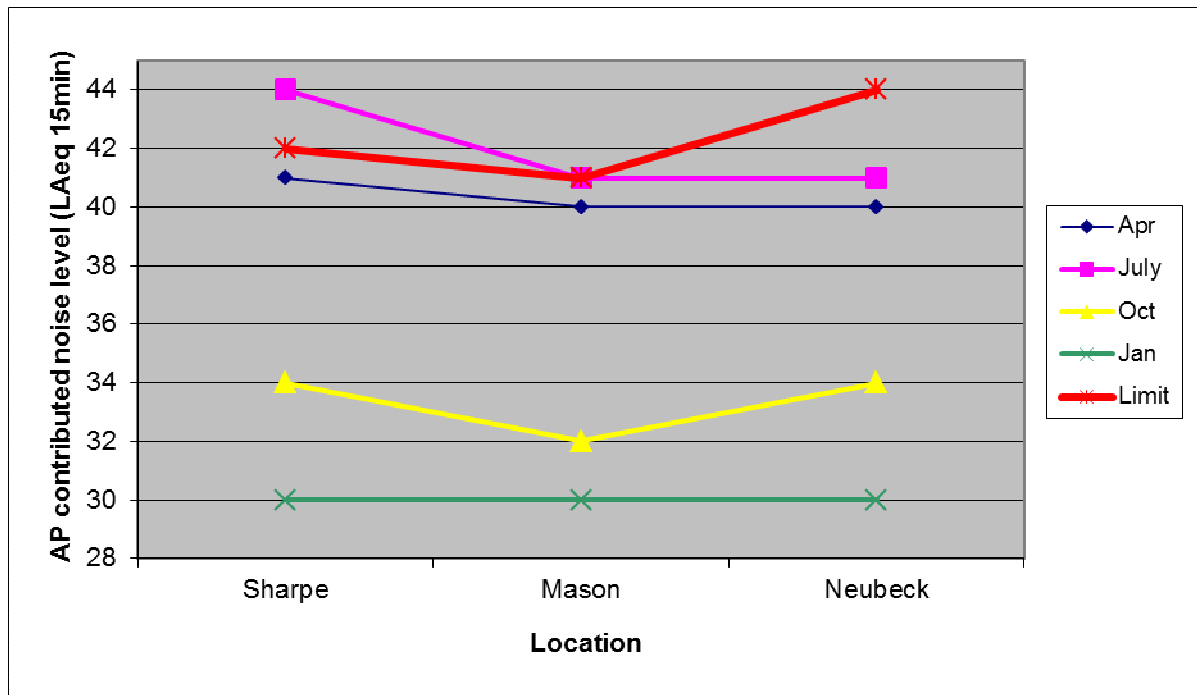


Figure 32: Daytime noise modelling results (7:00am – 6:00pm)

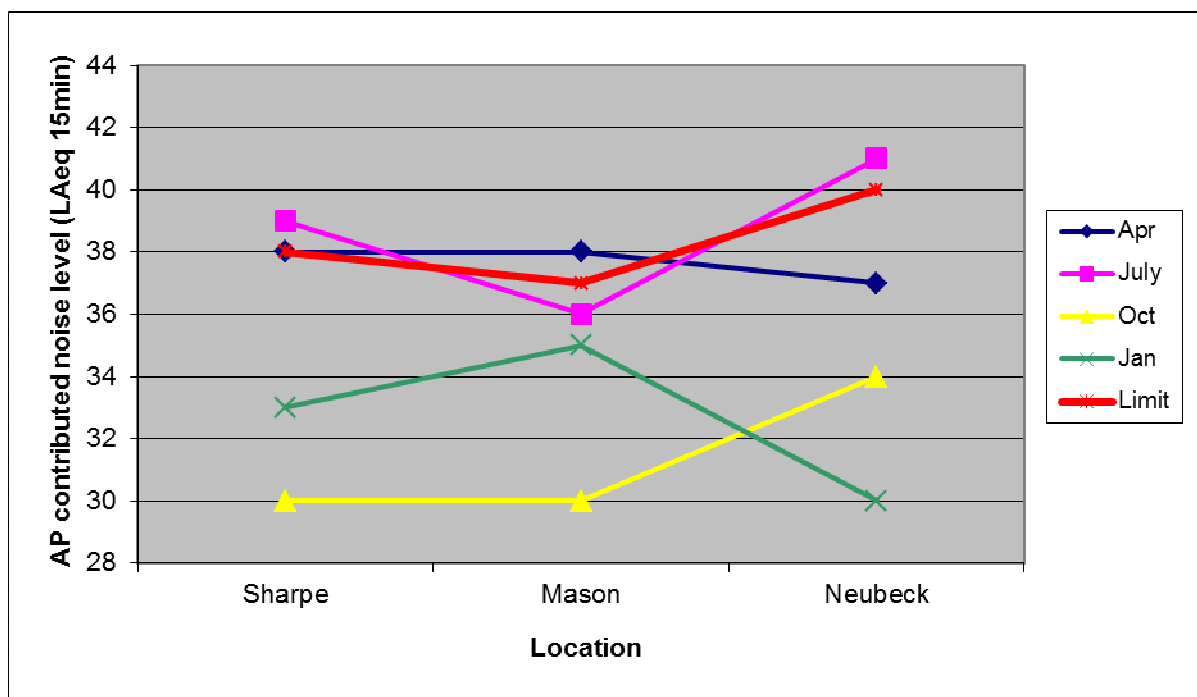
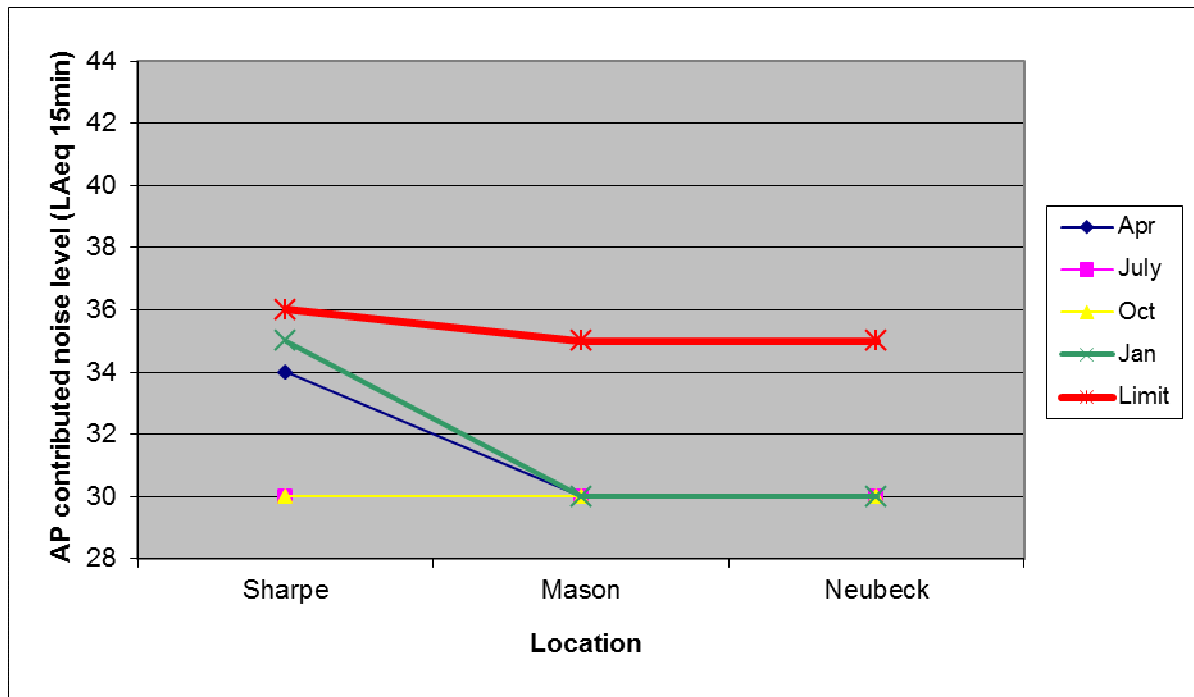


Figure 33: Evening noise modelling results (6:00pm – 10:00pm)



**Figure 34: Night time noise modelling results (10:00pm – 7:00am)**

The site noise monitoring results based on the Colliery’s activities, as well as localised and distant noise sources have been assessed to determine Angus Place Colliery contributions.

The EPL Criteria was exceeded on 2 occasions during the reporting period and Reported to the EPA and DOPi however in accordance with Chapter 11.1.3 of the Industrial Noise Policy (INP), “A development will be deemed to be in non-compliance with a noise consent or licence limit condition if the monitored noise level is more than 2 dB above the statutory noise limit specified in the consent or licence condition”. All results outlined above which exceeded the criteria during the June monitoring are not more than 2dB limit outlined within the INP.

The exceedance at Mason in March is believed to be due to the following contributing factors:

- 4 movements along the haul road with 2m/s ENE wind conditions and
- Enhanced engine/exhaust noise

Exceedances recorded at Sharpe in July in the day and evening were recorded when the average wind speed during the 15minute period at 10m above the ground at the metrological station installed at Angus Place was greater than 10m/sec. As stated within the PA and EPL, the noise criteria do not apply under these conditions. The exceedance at Neubeck was within 2dBA of the EPL criteria as defined by the INP.



**Table 29 Weather Conditions during July 2013 monitoring at Sharpe form Angus place Weather Station**

Receptor	Monitoring Period	Criteria	Result	Time	Average Wind Speed over 15 min at 10m
Sharpe	Day	42dBA	44 dBA	12:33 on the 26/6/2013	13.39m/s
	Evening	38dBA	39 dBA	18:04 on the 26/6/2013	11.99m/s

All other noise monitoring results obtained during the reporting period were in compliance with the criteria in the EPL and PA.

### Comparison against Predictions

Table 30 highlights the initial noise predictions documented in the 2006 Environmental Assessment and provides a comparison against the highest results obtained during the 2013 reporting year.

**Table 30: Angus Place overall noise contributions measured during 2013 against EA predictions**

Reference	2006 EA predictions (max)		2013 actual (max)	
	Day	Evening	Day	Evening
<b>Sharpe</b>	45	45	44	39
<b>Mason</b>	44	44	41	38
<b>Neubeck</b>	47	47	41	41

Angus Place Colliery produced lower noise levels during 2013 with respect to the initial predictions made in the 2006 Environmental Assessment.

A comparison of 2013 noise monitoring results against previous years has been provided in Appendix 7.

### 3.15 VISUAL STRAY LIGHT

Visual stray light is not considered to pose adverse environmental impacts at Angus Place Colliery due to surface footprint, locality and the distance to neighbouring properties. There have been no complaints received in the operating life of the colliery in relation to visual stray light.

As outlined in 2011 AEMR it was identified the installation of lights was not undertaken according to the lighting plan supplied due to infrastructure restriction. In 2012 Angus Place Colliery engaged a lighting consultant Pierlite to produce a lighting design which complied to the above mentioned lighting condition. These light designs were received on the 2<sup>nd</sup> of March 2012. Joe Inzitratri Electrical subsequently

undertook the electrical works at the colliery in accordance with the design supplied by Pierlite. Following completion of this work Pierlite attended Angus Place Colliery on the 5<sup>th</sup> of December to confirm that the lighting had been installed as per the provided lighting design.

This evidence was reviewed by the Department of Planning and Infrastructure and subsequently the colliery was notified of compliance with Schedule 3 Condition 30 of Project Approval 06\_0021 on the 20<sup>th</sup> of December 2012.

### **3.16 ABORIGINAL HERITAGE**

#### **Exploration Assessments**

There were no exploration activities conducted in 2013. There are currently no sites planned to be drilled for Angus Place Colliery in 2014.

#### **Ventilation Facility Project**

No skeletal remains have been identified within the ventilation Facility Project in 2013.

#### **Aboriginal Group Consultation**

During 2013 one meeting was facilitated in July 2013 between Angus Place, Springvale and Clarence Collieries and the Gundunguura Native Title Claimants Group regarding the above mentioned Centennial western region operations.

Presentations were conducted by Centennial Western Region representatives to inform the group of current mine activities. Angus Place provided an update on current longwall position and proposed mining for remainder of the year, approvals with a focus on the recently approved Ventilation Facility Project, an environmental activity update and community relations update including status of the new integrated SMP/ Extraction plan for 900W/910N.

In November 2013, Centennial Coal representatives participated in Cultural Training. This was an educational program organized through Muggadah Indigenous Tours for Environment and Community Representatives from Centennial western region mines. The outcomes of the program included:

- Overview of Gundungurra culture, heritage, spirituality and connection to country;
- Learning different aspects of traditional life of Gundungurra people, language, and the importance of clan groups and kinship
- Gaining a greater sense of the importance of plants/animals and environment to Gundungurra people
- Gaining knowledge, appreciation and skills of cultural artwork, weapon making, artefacts, story-telling, dance, bush tucker and medicinal purposes of plants and
- Raising a stronger awareness and appreciation of Gundungurra people and their traditional lands through cultural awareness

The program with highly informative and valued by all participants.



**Figure 35: Centennial Representatives at Cultural Training**

Consultation regarding the Angus Place Mine Extension Program is documented within the EIS.

### **3.17 NATURAL AND EUROPEAN HERITAGE**

#### **European Heritage**

During 2013 Angus Place did not undertake any specific study or review of European Heritage.

#### **Land Use**

The Newnes State Forest occupies the area above the Angus Place underground coal leases and is managed by Forests NSW, who regularly undertake logging activities. In addition to logging activities, tracks are maintained by Forests NSW which attracts 4WD and trail bike enthusiasts. The area is also very popular for campers and bushwalkers.

#### **Flora, Fauna and Habitat Types**

Threatened flora and fauna were discussed in Sections 3.9 and 3.10 respectively.

Vegetation communities are important because they indicate fauna habitat areas. Such vegetation communities also add to the natural heritage value of an area. The vegetation communities associated with the mining activities of the Angus Place are presented in the table below.

**Table 31: Habitat Types and Vegetation Communities above Angus Place**

<b>Habitat Types</b>	<b>Vegetation Communities</b>
Woodland/Forest	Montane Gully Forest
	Newnes Plateau Woodland
Heath	Montane Heath
Wetland	Shrub Swamp
Cliffline	Pagoda Complex

Newnes Plateau Shrub Swamps are listed under State and Federal legislation (Section 3.9.1). Angus Place has three swamps above its SMP Approval area located on the Newnes State Forest. In addition, populations of endangered and vulnerable species, as identified under the *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999*, have

been identified during previous assessments and are managed in accordance with the applicable management plans.

Prior to any form of land clearance, permission is sought in accordance with the requirements stipulated under the *NSW Environmental Planning and Assessment Act 1979*. REFs prepared and executed during 2009 and 2010 determined that any impacts to natural heritage items would be within an acceptable level of tolerance as a result of land preparation required for the exploration programs previously discussed.

During 2013, there were no areas of World Heritage significance, specifically, the Gardens of Stone National Park sandstone pagodas, escarpments and clifflines undermined by Angus Place mining activities. In 2014 it is not proposed to undermine any World Heritage areas.

### **3.18 SPONTANEOUS COMBUSTION**

The Lithgow coal seam has a low propensity for spontaneous combustion, with spontaneous combustion issues in relation to *in-situ* or processed Lithgow seam coal being rare. The highest risk of spontaneous combustion in relation to Lithgow seam coal appears to be during stockpiling for greater than approximately 2 years. Coal at Angus Place Colliery is stockpiled on average for 1-2 days due to the fixed long-term contracts the mine has secured. There have been no incidents of spontaneous combustion in the history of Angus Place Colliery.

### **3.19 BUSHFIRE**

Bushfire management is undertaken in consultation with the Rural Fire Service (RFS) and Forests NSW. No controlled burns were deemed necessary with respect to the Angus Place Colliery pit top surface operations during 2013. Fire management and controlled burns within the Newnes State Forest is the responsibility of Forests NSW.

Firefighting measures on the pit top are restricted to the use of fire extinguishers and fire hydrants for use of fighting fires associated with infrastructure. The RFS will be requested to assist with bushfire events in close proximity of the pit top.

In October 2013 the Lithgow/Blue Mountains region was affected by fires. Centennial provided assistance to the rural Fire Service in Lithgow by way of drinks and food times as well as providing volunteers to help out each evening at the canteen.



**Figure 36: Fire Fighters helping protect the Lithgow community**

### **3.20 MINE SUBSIDENCE**

If not adequately managed, mine subsidence can result in adverse impact to the environment in which we operate and subsequently affect our social license to

operate by generating adverse perceptions amongst the community and our stakeholders. Mine subsidence impacts have been highly publicised (particularly within the Southern Coalfields) resulting in elevated community, non-government organisation and government interest.

As noted in the 2011 AEMR minor hairline cracking was identified during photographic monitoring on July 28<sup>th</sup> 2011 on Kangaroo Creek Road during the extraction of Longwall 960. The natural process of sedimentation has filled the cracks. There has been no evidence of new cracking within the surveyed area. To this end, no action was required to be undertaken by Angus Place to mitigate the effects of minor subsidence.



**Figure 37: Longwall 960 Crack self-healed**

As noted in the 2012 AEMR minor cracking was detected to the west of Kangaroo Creek Road. A geotechnical report was prepared and submitted with the Longwall 970 End of Panel Report. In the subsidence effects review it was noted that the subsidence Profile along the H Line has been affected by the Kangaroo Creek Valley, with the inflexion point located a further 50m in-bye from its usual position. The increase appears to be associated with the decrease in loading acting on the cantilever from the end of the panel which allowed that strata to span further out from the goaf edgeroad. Several photographic monitoring sites show some cracks have filled in completely with debris with no cracks visible.

Weather conditions continue to move soil and surrounding debris. Angus Place will continue to monitor this area for changes. Angus Place will continue to monitor this area for changes.



**Figure 23: Surveying the changes at Crack A1**

Longwall 980 commenced on the 29<sup>th</sup> of November 2012. Periodic monitoring occurred throughout this time and was reported accordingly in the four monthly SMSRs. No private infrastructure was undermined during 2012.

On the Newnes Plateau, subsidence monitoring has been carried out using the following subsidence lines (see Appendix 1 for locations):

Table 27 provides a comparison of predicted subsidence effects against the observed subsidence effects for the subsidence monitoring lines relevant to Longwall 980.

**Table 27: Maximum Predicted and Observed Subsidence Tilts and Strains for Longwalls 970 and 980**

Monitoring Line	Type	Maximum Subsidence (mm)	Maximum Tilt (mm/m)	Maximum Tensile Strain (mm/m)	Maximum Compressive Strain (mm/m)
B Line	Observed	689	4.8	1.8	1.7
	Predicted	1030	6	4 (6)	5 (10)
M Line	Observed	989	9.1	2.4	8.4
	Predicted	1740	16	6 (12)	8 (24)
H Line	Observed	1144	22.9	5.7	16.3
	Predicted	1810	21	14	27

Note: Strain predictions are for 'smooth' or continuous profiles. Predictions considering localised strain concentrations due to discontinuous strata behaviour have been provided in brackets.

### Comparison against Predictions

Table 27 provides a comparison of the predicted maximum subsidence, tilt and strains for subsidence monitoring lines relevant to Angus Place secondary extraction during the 2013 reporting period. The subsidence predictions have been taken from a report titled Subsidence Prediction and Impact Assessment Review of LWs 920 to 980 at the Centennial Angus Place Colliery, Lidsdale which was prepared by DgS (2010). It is evident from this comparison that the observed subsidence effects at Angus Place are consistent with the predictions of DgS (2010) with the exception of one tilt measurement along the H Line during 2013. The reading of 22.9 was slightly higher than the predicted maximum tilt at this location which was 21. It is expected that this measurement was attributed to either survey accuracy limitations or discontinuous movements caused by interaction between geological structures within the valley and bending due to subsidence.

No surface impacts from the extraction of Longwall 980 have been identified during the reporting period. The observed subsidence impacts for Longwall 980 are consistent with the predictions of DgS (2010).

### 3.21 HYDROCARBON CONTAMINATION

Self bunded Transtanks have been installed on site to improve diesel storage and reduce the risk of contamination. This was commissioned in December 2011. The new unit allows an enhanced level of security against potential diesel spillages. Additionally the tank will improve the quantification of diesel usage to enhance greenhouse reporting systems. The previously used diesel tank was removed from site in 2012.

The installation of the oil water separator which was installed in 2011. A schedule has been established to ensure the unit is maintained. Water passing through the oil water separator reports to LDP002. All results during the reporting period were below the detection limit (5mg/L).

Additionally during 2012 contaminated land assessments were conducted at both Commonwealth Colliery, and Angus Place Pit Top. Additionally studies were also undertaken at kerosene vale and Vale of Clwydd No 2 to identify hydrocarbon contamination

For information regarding contaminated land assessments refer to Section 3.8 *Contaminated Land*.

### **3.22 METHANE DRAINAGE/VENTILATION**

The Lithgow coal seam is extremely low in methane gas content and therefore no active management such as methane drainage is required. Methane monitoring in mine ventilation gases is undertaken however for mine safety reasons. Methane monitoring has shown that there is very little methane production from the underground activities at Angus Place.

### **3.23 PUBLIC SAFETY**

Public safety risks associated with the pit top, Kerosene Vale and the coal haulage roads are largely associated with public trespass. Regular security patrols are carried out around these areas to minimise public trespass. Public signage has been installed at Angus Place, Kerosene Vale and Commonwealth Collieries to warn the public against entry to the site.

Angus Place Colliery has an approved Public Safety Management Plan in accordance with the requirements of the Angus Place SMP approval. Issues detailed within the Public Safety Management Plan mainly relate to subsidence caused issues such as surface cracking, particularly that located along public forest roads. In accordance with the approved plan, Angus Place Colliery installed signs to warn the public of potential dangers resulting from subsidence. Signs were erected adjacent to the various roads and tracks as they approached the mining zone. Regular inspections are carried out to check on these signs as some have been defaced or removed by persons unknown.

During 2013 the locations of subsidence warning signs in 900W/910N area were determined. These are scheduled to be installed in 2014.

### **3.24 OTHER ISSUES AND RISKS**

Other minor environmental risks have been identified during the review of the Angus Place Environmental Risk Assessment; however, the existing controls should be adequate to manage any exposure.

### **3.25 FERAL ANIMALS**

There was no feral control programs carried out by Angus Place in 2013. Feral animals are not considered a significant environmental risk.

### **3.26 GREENHOUSE**

Angus Place is required to report on investigations undertaken to reduce greenhouse gas emissions generated by the project (Project Approval 06\_0021 Schedule 3, Condition 31(c)) and report on the investigations in the AEMR. Angus Place, as part of Centennial Coal, became a signatory to the Greenhouse Challenge Program in 2006.

Of the six greenhouse gases identified in the Kyoto Protocol, Angus Place produces four of these, including methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>), nitrous oxides (NO<sub>x</sub>) and Sulphur hexafluoride (SF<sub>6</sub>). Previous reporting obligations by Centennial Coal under the Greenhouse Challenge Plus program precluded the reporting of NO<sub>x</sub> and SF<sub>6</sub> until the introduction of the National Greenhouse and Energy Reporting Act 2007. As such, no historical data is available for these gases.

Angus Place monitors the emissions of methane and carbon dioxide from electricity consumption, fugitive methane and carbon dioxide from underground coal mining

activities and diesel consumption. The table below summaries greenhouse gas emissions over the past 4 financial years

**Table 33: 2009 – 2013 Emission Summary greenhouse data**

	<b>09/10</b>	<b>10/11</b>	<b>11/12</b>	<b>12/13</b>
CH <sub>4</sub>	1,273	2,871	1,813	635
CO <sub>2</sub>	1,014	1,044	1,229	1,203
Electricity	2,886	3,049	3,056	3,203
Diesel	133	149	157	198
<b>CO2 -eT / Mth</b>	<b>5,306</b>	<b>7,114</b>	<b>6,255</b>	<b>5,238</b>

Overall the 2012– 2013 financial resulted in electricity consumption accounting for 61% of the overall greenhouse gases emitted. Diesel emissions accounted for 4%. carbon dioxide accounted for 23% and methane accounted for 12%.

Scope 1 emissions: refers to the greenhouse gas emissions released to the atmosphere through activities conducted at the site. These emissions can be controlled and managed by the Colliery.

Scope 2 emissions: refers to the greenhouse gases emitted by a secondary facility. For the 2013 AEMR the scope 2 emissions are directly related to the amount of electricity used at the Colliery.

Projects proposed for the Energy Savings Action Plan (ESAP) continued to be implemented throughout the 2013 year. These projects included:

- LED Workshop Lighting
- Compressed Air Optimisation
- Power Factor Correction Ventilation Fan
- Winder Non-Destructive Testing
- Longwall Face Water
- Off Mine Dewatering
- Stockpile Bull Dozer Optimisation

The effectiveness of these projects in reducing energy usage will continue to be monitored to determine the effectiveness of these strategies.



## 4 COMMUNITY RELATIONS

### 4.1 ENVIRONMENTAL COMPLAINTS

There was no community complaints received at Angus Place during the reporting period. The table below shows community complaints over the past five years.

**Table 34: Community Complaints over a Five Year Period**

	2009	2010	2011	2012	2013
<b>Complaints</b>	0	1	0	0	0
<b>Subject</b>	-	Noise	-	-	-

### 4.2 COMMUNITY LIAISON

#### **Subsidence Community Consultation Program**

During 2006, Angus Place Colliery developed a Subsidence Community Consultation Process (SCCP) as required under the SMP Approval. The SCCP refers specifically to how Angus Place Colliery will consult with the relevant stakeholders regarding the management and reporting of subsidence impacts. The SCCP was reviewed in 2010 and subsequently Industry and Investment NSW did not object with its content.

Consultation during the preparation of the 900W and 910 Extraction Plan has been undertaken as outlined within the Project Approval and is documented in Appendix 8 of the Extraction Plan submitted in November 2013.

#### **Community Consultative Committee**

Schedule 5, Condition 8 of the Angus Place Colliery Project Approval 06\_0021 required the establishment of a Community Consultative Committee (CCC). Nominated members of the Angus Place CCC were approved by the Director General (DoP) on 13 December 2006 and the first meeting was held on 5 February 2007.

As outlined in the 2012 AEMR Angus Places established CCC was combined with Springvale Coal to facilitate a single channel of communication about current operations in the area.

During the reporting period CCC meetings were held in April and October 2013. Minutes from the meeting are available on the Centennial Coal website and at Wallerawang Library.

In March and October the CCC members and Council representatives were invited to the mine rescue station and taken on a tour around the Newnes State Forest.

Meetings will continue in 2014.

#### **Donations**

During the reporting period, Angus Place sponsored many community events and programs including:

- Lithgow Flash gift
- Central West Supported Playgroups
- NAIDOC Week
- Celebrate Lithgow
- Rydal Show
- Community and Drug Action team

- Lithgow Tidy Town Committee
- Centennial Coal Cup Rugby League Competition



**Figure 39: Graduates dressed in the underground clothes at Celebrate Lithgow**

### **Newsletters**

Throughout 2013 Angus Place Colliery contributed to the Centennial Coal Western news page, which appears monthly in the Lithgow Mercury. The news page provides the regional community with an update of Centennial's western operations, as well as activities taking place within the community. Also featured were the community information telephone lines specific to each operation.

### **Non-governmental Organisation Consultation**

Centennial personnel engage with regional non-governmental organisations such as the Colong Foundation for Wilderness and the Blue Mountains Conservation Society through the SMSR.

## **5 REHABILITATION**

### **5.1 BUILDINGS**

During the reporting period, no buildings were removed. It is anticipated that no buildings will be removed from the site until mining operations are completed.

### **5.2 REHABILITATION OF DISTURBED LAND**

#### **5.2.1 Kerosene Vale**

The decision not to open cut Kerosene Vale was finalised during 2010. Angus Place has undertaken both Phase 1 (2010), Phase 2 (2011) and additional studies as part of contaminated land assessments at the site to enable rehabilitation activities to commence. It is noted that most of the site will remain active for storage of ROM coal.

Works planned in 2014 focus around the removal of stockpiled material at the site.

#### **5.2.2 Newnes Plateau**

During 2013, the remaining exploration drill hole was rehabilitated in accordance with the Angus Place rehabilitation standard which was drafted by Angus Place in consultation with Forests NSW during December 2009. The standard requires consultation with the Landowner (Forests NSW) to determine an appropriate

timeframe for rehabilitation activities to adhere to. The following job steps are required under the standard:

- Once exploration has been completed the site must be inspected by the Angus Place Environmental Officer (or their delegate) to ensure that there is no risk of land contamination, apparent refuse and examine the level of soil compaction.
- The initial stage requires that the dirty water sump is to be filled in without the risk of water loss. It is also important that the surface soil and sub-surface soil is not blended.
- Prior to spreading stockpiled vegetation the 30 x 30 drill site must be 'ripped' along the topographic contours to allow enhanced germination and soil aeration. This process should also be applied to any access tracks where soil compaction is evident.
- Stockpiled topsoil and vegetation should then be respread across the site and over all access tracks.
- Quarterly monitoring of sites should be conducted by the Angus Place Environmental Officer (or their delegate) to assess rehabilitation progress. This process should include observations of endemic species density and any level of soil disturbance. Photographic evidence should be taken to record findings and observations.
- If natural revegetation appears to need acceleration the following rehabilitation techniques should be implemented:
  - Mulch cover applied over site for soil protection
  - Brush matting used to import seed onto cleared areas
  - Open weave jute mesh pegged in by steel pins
  - Brush harvesting from the nearby area
  - Ripping of compacted wheel tracks (a herring bone pattern with an excavator mounted ripper)
  - Cross drains may also be required along long slopes on access tracks.

It is important that the above processes are undertaken in consultation with the landowner(s) with evidence of a written authority to undertake these tasks.

Inspections indicate minimal disturbance at the borehole locations. Strategically placing windrowed trees in the entry of the sites prevented vehicle access to the area after the exploration program was completed.



**Figure 40: AP1108 Regrowth at exploration site**

Presently there are very few exotic species identified in the proximity of the boreholes indicating hygiene and machine wash down methods adopted during the program were successful in preventing the introduction of weedy species.

Angus Place is continuing monitor the progress of rehabilitated sites to meet the standard required. This rehabilitation process will continue throughout the 2014 reporting period.

### 5.2.3 Angus Place Pit Top

Minor rehabilitation works were conducted around the pit top area during the reporting period primarily focusing on the area within the LDP001 catchment to improve soil and sedimentation control. A number of different techniques were use including:

- Hand-seeding
- Sediment fencing
- Sand bagging
- Weed matting
- Tube stock planting and directional log position

An example of the work conducted is shown below in Figure41



**Figure 41: Rehabilitation near LDP001**

Tree screening works were also undertaken at the fenceline behind the new carpark near the Wolgan Road ponds to improve visual amenity of the area.



**Figure 42: Wolgan Road Tree screening**

Angus Place also undertook minor rehabilitation works in the vicinity of the carpark and culvert area.

A Mine Closure Strategy is required under the 2006 Project Approval at least three years before mining ceases (Schedule 3, Condition 36). Currently has approximately 85.4 million tonnes of coal within the mining lease. Angus Place Colliery is currently seeking approval for the Angus Place Mine Extension Project which utilises this coal reserve.

#### 5.2.4 Ventilation Facility Project

During the reporting period a Rehabilitation Management Plan for the Ventilation Facility was prepared and subsequently approved for the site. The area will be partially rehabilitated following the establishment of final landform. Inspections on the site show sign of growth were cleared material have been stockpiled to create an earth bund.

### 5.3 OTHER INFRASTRUCTURE

Dam maintenance were undertaken at LDP002 and LDP003 during 2013. No other significant rehabilitation activities were undertaken during the 2013 reporting period apart from those outlined above.

### 5.4 REHABILITATION TRIALS AND RESEARCH

There were no rehabilitation trials or research carried out during the reporting period.

A summary of rehabilitation activities found in Table 35 and maintenance requirements on rehabilitated land found in Table 36.

### 5.5 REHABILITATION COST ESTIMATE

The updated Rehabilitation Cost Estimates (December 2013) for Angus Place are located in Appendix 10. This cost estimate includes Kerosene Vale, Commonwealth and Vale of Clwydd No 2 Collieries.

**Table 35: Rehabilitation Summary**

A: MINE LEASE AREA	Area Affected/Rehabilitated (hectares)		
	To Date	Last Report	Next Report (estimated)
A1: Mine Lease(s) Area	10,278	10,278	
<b>ANGUS PLACE COLLIERY</b>			
<b>B: Disturbed Areas</b>			
<b>B1: Infrastructure area</b> (other disturbed areas to be rehabilitated at closure including facilities, roads)	35	35	38.64
<b>B2: Active Mining Area,</b> (excluding items B3-B5 below)	0	0	0
<b>B3: Waste emplacements</b> (active/unshaped/in or out-of-pit)	0	0	0

<b>B4: Tailings emplacements,</b> (active/unshaped/in or out-of-pit)	0	0	0
<b>B5: Shaped waste emplacement</b> ( awaits final vegetation)	0	0	0
<b>ALL DISTURBED AREAS</b>	35	35	52.3
<b>C: REHABILITATION PROGRESS</b>			
<b>C1: Total Rehabilitated Area</b> (except for maintenance)	5	5	0
<b>D: REHABILITATION ON SLOPES</b>			
<b>D1: 10 to 18 degrees</b>	0	0	0
<b>D2: Greater than 18 degrees</b>	0	0	0
<b>E: SURFACE OF REHABILITATED LAND</b>			
<b>E1: Pasture and grasses</b>	0	0	0
<b>E2: Native forest/ecosystems</b>	5	5	0
<b>E3: Plantations and crops</b>	0	0	0
<b>E4: Other</b> (include non-vegetative outcomes)	0	0	0
<b>KEROSENE VALE</b>			
<b>B: Disturbed Areas</b>			
<b>B1: Infrastructure area</b> (other disturbed areas to be rehabilitated at closure including facilities, roads)	11.7	11.7	15.86
<b>B2: Active Mining Area,</b> (excluding items B3-B5 below)	0	0	0
<b>B3: Waste emplacements</b> (active/unshaped/in or out-of-pit)	0	0	0
<b>B4: Tailings emplacements,</b> (active/unshaped/in or out-of-pit)	0	0	0
<b>B5: Shaped waste emplacement</b> ( awaits final vegetation)	0	0	0
<b>ALL DISTURBED AREAS</b>	11.7	11.7	15.86
<b>C: REHABILITATION PROGRESS</b>			
<b>C1: Total Rehabilitated Area</b> (except for maintenance)	0.5	0.5	7.8
<b>D: REHABILITATION ON SLOPES</b>			
<b>D1: 10 to 18 degrees</b>	0	0	0
<b>D2: Greater than 18 degrees</b>	0	0	5.44
<b>E: SURFACE OF REHABILITATED LAND</b>			

<b>E1: Pasture and grasses</b>	0.5	0.5	7.8
<b>E2: Native forest/ecosystems</b>	0	0	0
<b>E3: Plantations and crops</b>	0	0	0
<b>E4: Other</b> (include non vegetative outcomes)	0	0	0
<b>COMMONWEALTH COLLIERY</b>			
<b>B: Disturbed Areas</b>			
<b>B1: Infrastructure area</b> (other disturbed areas to be rehabilitated at closure including facilities, roads)	29.7	29.7	29.75
<b>B2: Active Mining Area,</b> (excluding items B3-B5 below)	0	0	0
<b>B3: Waste emplacements</b> (active/unshaped/in or out-of-pit)	0	0	0
<b>B4: Tailings emplacements,</b> (active/unshaped/in or out-of-pit)	0	0	0
<b>B5: Shaped waste emplacement</b> (awaits final vegetation)	0	0	0
<b>ALL DISTURBED AREAS</b>	29.7	29.7	29.75
<b>C: REHABILITATION PROGRESS</b>			
<b>C1: Total Rehabilitated Area</b> (except for maintenance)	8.0	8.0	5.1
<b>D: REHABILITATION ON SLOPES</b>			
<b>D1: 10 to 18 degrees</b>	0	0	0.11
<b>D2: Greater than 18 degrees</b>	0	0	2.14
<b>E: SURFACE OF REHABILITATED LAND</b>			
<b>E1: Pasture and grasses</b>	8.0	8.0	5.08
<b>E2: Native forest/ecosystems</b>	0	0	0
<b>E3: Plantations and crops</b>	0	0	0
<b>E4: Other</b> (include non vegetative outcomes)	0	0	0
<b>VALE OF CLWYDD NO 2</b>			
<b>B: Disturbed Areas</b>			
<b>B1: Infrastructure area</b> (other disturbed areas to be rehabilitated at closure including facilities, roads)	7.7	7.7	0.5
<b>B2: Active Mining Area,</b> (excluding items B3-B5 below)	0	0	0
<b>B3: Waste emplacements</b> (active/unshaped/in or out-of-pit)	0	0	0

<b>B4: Tailings emplacements,</b> (active/unshaped/in or out-of-pit)	0	0	0
<b>B5: Shaped waste emplacement</b> ( awaits final vegetation)	0	0	0
<b>ALL DISTURBED AREAS</b>	7.7	7.7	0.5
<b>C: REHABILITATION PROGRESS</b>			
<b>C1: Total Rehabilitated Area</b> (except for maintenance)	2.0	2.0	0
<b>D: REHABILITATION ON SLOPES</b>			
<b>D1: 10 to 18 degrees</b>	0	0	0
<b>D2: Greater than 18 degrees</b>	0	0	0
<b>E: SURFACE OF REHABILITATED LAND</b>			
<b>E1: Pasture and grasses</b>			
<b>E2: Native forest/ecosystems</b>	0	0	0
<b>E3: Plantations and crops</b>	0	0	0
<b>E4: Other</b> (include non vegetative outcomes)	0	0	0

**Table 36: Maintenance Activities on Rehabilitated Land**

NATURE OF TREATMENT	Area Treated (ha)		Comment/control strategies/ treatment detail
	Report Period	Next Period	
<b>Additional erosion control</b> (drains re-contouring, rock protection)	0.1	0.2	2013-Kerosene Vale drainage 2014-LDP002 weir, LDP002 Inlet, CHP drain
<b>Re-covering</b> (detail-further topsoil, subsoil sealing etc.)	0	0	NIL
<b>Soil Treatment</b> (detail-fertiliser, lime, gypsum etc)	0	0	NIL
<b>Treatment/Management</b> (detail-grazing, cropping, slashing etc)	0	0	NIL
<b>Re-seeding/Replanting</b> (detail-species density, season etc)	0.1	0.0	2013-LDP001 areas, Carpark area, Wolgan Road Tree screening 2014- Hydro mulching



			Kerosene Vale earth bund near stockpile
<b>Adversely Affected by Weeds</b> (detail-type and treatment)	0.4	0.4	Hand Weed removal works to continue on Newnes Plateau with a focus on Narrow Swamp.
<b>Feral animal control</b> (detail – additional fencing, trapping, baiting etc)	0	0	NIL

## 6. ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

**Table 37: Activities proposed for the 2014 reporting period**

	<b>Activities Proposed for 2014</b>
1	Undertake Independent Audit in accordance with PA__0021 schedule 5 Condition 8.
2	Install and commission for use the relocatable bulki-box for hazardous materials.
3	Removal and re-use on site stockpiled material at Kerosene Vale.
4	Hydro-mulch the earth bund on the western side of the kerosene vale stockpile area.
5	Continued to investigate and undertake water management improvements.
6	Continue to develop upgrades to a traffic management system on Wallerawang haul road with noise consultant.



# Centennial Coal

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