Environmental Assessment

Angus Place Colliery, NSW

Modification of Project Approval 06_0021 Under Section 75W, Part 3A

Volume 1: Environmental Assessment Report

Prepared by:

RPS Australia East Pty Ltd

Level 12, 92 Pitt Street
Sydney NSW 2000
PO Box 4401, SYDNEY NSW 2001

T: 612 8270 8300
F: 612 8270 8399
E: sydney@rpsgroup.com.au
W: www.rpsgroup.com.au

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Prepared for:

Centennial Angus Place Pty Ltd

Level 18, BT Tower,
1 Market Street,
Sydney NSW 2000

RPS Australia East Pty Ltd (ABN 44 140 292 762)

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EXECUTIVE SUMMARY

Introduction

Centennial Angus Place Pty Ltd operates the Angus Place Colliery, located approximately 15 kilometres northwest from the city of Lithgow in the western coalfield of NSW. The Colliery is situated approximately 150 kilometres west of Sydney and near the community of Lidsdale. The principal components of Angus Place Colliery are an underground longwall mine, associated development panels and supporting surface infrastructure.

In 2006 Centennial Angus Place Pty Limited applied, under Part 3A of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act), for continued mining operations. Project Approval (PA 06_0021) was granted by the NSW Department of Planning (DoP) in September 2006. The supporting document for PA 06_0021 is the Angus Place Colliery Proposed Mining and Coal Transport Environmental Assessment. The approval granted Angus Place Colliery the ability to extend mining operations, specifically the development and extraction of additional longwall panels 920 to 980 and installation of key mining infrastructure comprising a services borehole, upcast ventilation facility and downcast ventilation facility.

On behalf of Centennial Angus Place Pty Limited[1], RPS Australia East Pty. Ltd. (RPS) have prepared this Environmental Assessment (EA) to support an application for Project Modification Approval under Section 75W of Part 3A of the EP&A Act. The purpose of the application is for the proposed modification of the current Angus Place Colliery Project Approval (PA 06_0021). Centennial Angus Place Pty Limited proposes to extend its operations through the development and extraction of two additional longwall panels, as well as development of the required supporting surface infrastructure.

Angus Place Colliery currently extracts approximately 3 million tonnes per annum (Mtpa) and has current approval to extract up to 3.5Mtpa. Under the current approval, Angus Place Colliery is scheduled to complete development by October 2012, with longwall mining operations due for completion by June 2014. Approval for continued mining, as per the proposed modifications, is therefore sought to enable continued operations at Angus Place Colliery and sustain the supply of coal to established markets up to 2016.

Information about the proposed modifications was prepared in February 2010 and submitted to the Director General together with a request for the Director General's Requirements for the EA. Subsequently, the Director General's Requirements were issued in June 2010 and these have formed the terms of reference for the EA.

The Proposed Modifications

Environmental issues have been taken into account in determining the size and location of each longwall and in relation to the associated infrastructure. This has enabled the avoidance of potential adverse environmental effects where feasible. Centennial has operated mining activities at Angus Place Colliery since 2002 and this together with information compiled for the previous approval and a number of

[1] Centennial Angus Place Pty Limited manages and operates the Angus Place Colliery. Centennial Angus Place Pty Limited is the manager of Angus Place Colliery, for and on behalf of the owners of Angus Place Colliery, namely Centennial Springvale Pty Limited and Springvale SK Kores Pty Limited, pursuant to the Springvale Joint Venture Agreement.

environmental management plans at the mine has contributed to a sound understanding of the relevant environmental constraints and issues.

The proposed modifications are:

- the development and extraction of two longwall panels - Longwalls 910 (options 1 and 2) and 900 west (900W);
- an additional dewatering borehole located at the eastern end of longwall 910 and associated infrastructure comprising:
  - widening of an existing track (leading from Black Fellows Hands Road);
  - a new section of track from the existing track to be widened to the proposed new dewatering bore;
  - powerline extension (either under or overground) along the access track to supply electricity to the dewatering bore;
  - extension of the Springvale Delta Water Transfer Scheme comprising an underground pipeline along the access track. This would enable the continued transfer of extracted groundwater to Wallerawang Power Station; and
- an increase in production limit from 3.5Mtpa to 4Mtpa to make provision for 12 consecutive months of production in the event that Angus Place Colliery does not have a eight week shutdown due to a longwall changeover;
- modifications to improve the dirty water management system at the pit top resulting from an assessment of the current Angus Place Colliery water management infrastructure together with continued use of the existing surface facilities at the pit top (consistent with the Project Approval of 2006); and
- an increase in full time staff from 215 to 225. There is also provision for up to 75 temporary contractors to assist with development activities over an approximate 15 month period.

Longwall 910 is orientated in an east – west direction and is located to the north of the extracted 920 panel. There are two options for Longwall 910. This is because there may be a potential resource area situated to the north east of the proposed longwall area and, if this is the case, future access to this resource would be most efficient if it is accommodated within this proposed modification. A geological and geotechnical investigation, as well as a preliminary feasibility assessment, will be undertaken and the findings will inform the choice of option. The two options for Longwall 910 are:

- Option 1: In the event that future opportunities identified above are not considered viable, Longwall 910 would be approximately 200m wide and 2,500m in length and allow the development of two mains headings. It is anticipated to produce approximately 2,620,720 tonnes of coal.
- Option 2: In the event that future opportunities identified above are considered viable, Longwall 910 would be approximately 120m wide and 2,500m in length to allow the development of four mains headings to enable future access to the resource in the north east. It is anticipated to produce approximately 1,855,600 tonnes of coal.

Longwall 900W is located directly west of the currently approved 900 district main headings with a north - south orientation. Development of longwall 900W would extend from the existing 900 district. This longwall panel is planned to be approximately 284m wide and approximately 2,080m in length. It is anticipated that this longwall would produce approximately 3,009,810 tonnes. Longwall 900 west is located partially within the Centennial Springvale Mining Lease (ML1326) and, accordingly, a sub-lease (or equivalent) from Centennial Springvale will be required to enable full extraction of the resource.

The Site

Angus Place Colliery is located approximately 15 kilometres north-west of Lithgow and approximately 5 kilometres to the north of the village of Lidsdale. The site is accessed via the Wolgan Road from the Castlereagh Highway and is bordered by Baal Bone Colliery (Xstrata), Invincible Colliery (CET Resources), Centennial Springvale Colliery, the Wolgan Valley and Newnes State Forest.

The surface lands adjacent to and above Angus Place Colliery underground workings consist of land that is located on the Newnes State Forest and comprises 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. Flattened crests, spurs and accessible ridgelines occur regularly and streams, such as Kangaroo Creek and the Wolgan River and their tributaries can be found in the vicinity.

There are areas of shrub swamp and hanging swamp at and within proximity to Angus Place Colliery. These are classified as Endangered Ecological Communities under the Threatened Species Conservation Act 1995.

Angus Place Colliery includes the watershed between two catchments; the Wolgan-Colo River catchment to the north and the Coxs River catchment to the west and there are aquifers in the area.

Existing Operations and Environmental Management

Angus Place Colliery is currently approved to operate 24 hours a day, 7 days a week. Panels are extracted from the Lithgow coal seam using longwall mining techniques, with Continuous Miners used to mine development headings and access roadways. The coal is fed to the surface via a conveyor system where it is stockpiled and sized at the pit top and then dispatched to the product supply bin for transportation to either Wallerawang or Mount Piper power stations via sealed private haul roads.

A number of management plans and monitoring regimes are already in place for the existing activities at Angus Place Colliery and in response to conditions under the existing Project Approval. These include:

- Environmental Management Strategy, November 2007.
- Flora and Fauna Management Plan, November 2007.
- Site Water Management Plan, November 2007.
- Newnes Plateau Shrub Swamp Management Plan, March 2006.
- Environmental Monitoring Program, November 2007
- Noise Monitoring Program, May 2007
- Air Quality Monitoring Program, March 2007
- Subsidence Management Plan, May 2005 and variations approved by the Department of Industry and Investment in October 2005, October 2006 and March 2008.

Proposed Modifications Environmental Issues

In accordance with the Director General's Requirements, assessments have been undertaken to address the following:

- Subsidence
- Soil and Water
- Biodiversity

- Traffic & Transport
- Noise and Vibration
- Air Quality
- Greenhouse Gases
- Aboriginal Cultural Heritage
- Hazards
- Socio-economic
- Cumulative Impacts

An outline of the key findings from the specialist assessments undertaken to address the above are presented within Table 1.

Table 1 Outline of the Key Findings

Environmental Issue in DGR	Specialist Assessment Undertaken	Outline of Key Findings
Subsidence	Subsidence Prediction and Assessment	The predictions are as follows: ▪ Minor surface cracking and shearing ranging in width from 1mm to 20mm. ▪ Tapered vertical cracks of up to 90mm in width where surface rock exposures exist. ▪ Known cliff lines exist outside the angle of draw and therefore, it is unlikely that cracking of cliff lines would occur. ▪ Increase or decrease of surface gradients of up to 0.5% along water courses or gullies above the proposed longwalls with a minor increase in erosion and sedimentation along creek beds. ▪ Gully stormwater or groundwater seepage flows may be rerouted to sub-surface flow paths via surface cracking. It is understood that system losses are very low, and would likely to recover in the long term. ▪ Ponding depths of < 0.1m may develop along creeks and flatter areas beneath the proposed longwalls. Increases in existing ponded areas and creation of new ponds may occur although these would be in-channel and unlikely to cause significant environmental impacts. ▪ Due to the high depth of cover and proposed mining geometry, it is very unlikely that there a direct hydraulic connection would develop between the surface to the mine due to fracturing. The presence of the Mount York Claystone unit between the Burra Moko Head and Narrabeen sub-groups are also likely to reduce groundwater seepages. ▪ Existing tracks above the proposed longwalls are likely to be subsided and may also be affected by vertical cracking and shearing. Typically these would be between 1mm and 20 mm with a worst case of 90 mm. Approximately 50 m to 100 m of road above each longwall may be impacted by cracking. ▪ The poles of the existing suspended 66kV powerline may be subject to subsidence of between 0.5m and 1m, tilts of <5.5 mm/m and strains of +/- 2 mm/m. ▪ The proposed pipeline and powerline above proposed longwall 910 is likely to be subsided.

Environmental Issue in DGR	Specialist Assessment Undertaken	Outline of Key Findings
Soil and Water		
	Surface Water Assessment	▪ Standard mitigation measures would be employed to protect surface water during construction of the bore and associated infrastructure. ▪ An in-rush management plan has been developed to manage seepage (in-rush) between the old and proposed workings for longwall 910. In-rush is unlikely to occur at longwall 900W. ▪ No impact on Coxs River. ▪ Minor surface cracking and deformation is anticipated to occur within the Kangaroo Creek tributaries. ▪ The tributary of Wolgan River, referred to as West Wolgan Creek, that lies over longwall 910 would be subject to grade changes although this is not expected to have a significant impact on erosion rates. ▪ Minor ponding may occur towards the downstream extent of the section of West Wolgan Creek overlying longwall 910 although the impact is considered to be negligible. ▪ The impact on re-direction of surface flow to sub-surface flow is considered to be minimal due to limited cracking of the near surface rocks. ▪ The results of the water balance assessment show that there would be an increase in discharges to the Springvale Delta Water Transfer Scheme or through LDP001. ▪ The impact on water quality would be negligible. ▪ The dirty water management system would be upgraded and therefore a reduced effect on receiving waters.
	Hydrogeological Assessment	▪ The extraction of the additional panels would only have a marginal additional impact on the existing hydrogeological regime in the strata below the Mount York Claystone. ▪ The predicted minor surface cracking and shearing would not affect the aquifers due to their depth. ▪ The hydrogeological regime has not been impacted to any degree by the extraction of the existing longwall panels at Angus Place Colliery. ▪ The extraction of the two additional panels is unlikely to have any additional impact on the Narrabeen Group strata above the Mount York Claystone and therefore there would be no impact on the aquifers in the Banks Wall Sandstone, and hence there would be no impact on the quality or quantity of the available groundwater resources in this rock unit. ▪ The potential for adverse hydrogeological impacts from longwall 910 on swamps is minimal. ▪ It is very unlikely that a direct hydraulic connection would develop between the mine and the surface due to fracturing and the presence of Mount York Claystone is likely to reduce groundwater seepages. ▪ No impacts are predicted on the quality or quantity of groundwater flows discharging to the Wolgan River or Kangaroo Creek.

Environmental Issue in DGR	Specialist Assessment Undertaken	Outline of Key Findings
		▪ Because the two proposed longwall panels are within an area that has been subject to mining for several decades, any impacts on the hydrogeological regime would have already occurred. It is therefore highly unlikely that there would be any significant additional impacts on the local hydrogeological regime from the extraction of longwalls 910 and 900W.
	Soils and Land Resources	▪ Changes to surface gradients may lead to minor terrain adjustment through erosion and sedimentation where soils are exposed to stormwater runoff. ▪ There may be topsoil loss or degradation in areas of surface cracking; exposure of unstable (sodic or saline) subsoils resulting in increased erosion potential; increased potential for surface erosion due to localised changes in topography and surface hydrology; and a reduction in potential productivity of the land due to topsoil loss and modification of surface topography/hydrology. These potential impacts can largely be managed through the implementation of appropriate controls. ▪ Any increases of existing ponded areas or development of new ponds are unlikely to cause significant impact ▪ Cracks in public roads would need to be repaired and warning signs erected as appropriate. ▪ Mitigation measures would be implemented to avoid soil erosion during construction.
	Rehabilitation	▪ A rehabilitation strategy for the areas of disturbed land would be implemented.
Biodiversity	Flora and Fauna Assessment	▪ The proposed dewatering bore and associated infrastructure would comprise 4.2ha of clearing within an area of vegetation that is of a type common on the Newnes Plateau and the direct impact would be minimal. ▪ The proposed longwall panels would have a potential indirect impact on the ecology of the site via the expected subsidence and modified subsurface hydrology. The projected subsidence predictions are considered unlikely to have a significant adverse impact upon the ecological attributes because of the cracking is predicted to be minor and the anticipated self healing due to sedimentation during storm events. ▪ The proposed modifications are unlikely to cause significant adverse impacts on threatened species recorded within the Study Area or those that might potentially occur on an intermittent basis. ▪ There are no significant swamp areas directly over the two proposed longwall panels although there are small areas of NPSS located within the subsidence areas predicted for Longwall 910. Hydrogeological changes due to subsidence are not expected to alter the habitats and condition of the overlying vegetation communities or other components of biodiversity including terrestrial threatened species or populations, associated habitats and endangered ecological communities or Groundwater Dependent Ecosystems. ▪ The subsidence is not expected to result in any substantial alteration of fauna and its habitat.

Environmental Issue in DGR	Specialist Assessment Undertaken	Outline of Key Findings
		▪ Discharges from emergency Licensed Discharge Point 6 to the Wolgan River. All discharge events occur in accordance with the Angus Place Environment Protection License and will continue to operate in accordance with it. This is not considered likely to impact significantly upon any of the downstream shrub swamp vegetation.
Traffic and Transport	Traffic Impact Assessment	▪ The increase in staff and therefore vehicle movements on the local road network is not anticipated to change local road conditions significantly. ▪ All parking for staff would continue to be provided on site and additional parking for contractors would be made available within the western car park. ▪ The proposed increase in the mining production limit is to provide for those occasions when a changeover period may be avoided enabling sustained production. Angus Place Colliery would rely on a mix of both 50 tonne and 80 tonne truck fleets to transport the coal via the private haul roads and any additional production within a 12 month period would be hauled without any additional truck movements beyond the daily allowable movements which are established by the noise limitations applying to the haul roads. Haulage would not take place on the local road network. ▪ It is not anticipated that the number of general heavy vehicles trips via Wolgan Road would increase.
Noise and Vibration	Noise Impact Assessment	▪ An additional 0.5Mtpa of coal can be produced and handled at the pit top without any change to existing coal handling operations and pit top infrastructure. Existing handling operations at the pit top have been found to be in compliance with noise assessment criteria based on the results of established and ongoing noise monitoring. ▪ The sound power levels of 50 and 80 tonne trucks are similar. ▪ To comply with project noise levels along the Wallerawang haul road the predicted maximum number of allowable truck movements is 10 per hour (each way and therefore 20 per hour) during the day and 8 per hour (each way and therefore 16 per hour) during the evening. No truck movements are permitted on the Wallerawang haul road during the night between 10.00pm and 7.00am. ▪ To comply with project noise levels along the Mount Piper haul road the predicted maximum number of allowable truck movements is 8 per hour (each way and therefore 16 per hour) during the day, 8 per hour (each way and therefore 16 per hour) during the evening and 5 per hour (each way and therefore 10 per hour) during the night. ▪ All coal produced as a result of the proposed modifications is able to be transported without change to the existing haulage movements. ▪ The nearest residential location is approximately 180m from the haul roads and vibration levels are predicted to be below levels of human perception and therefore a negligible effect.
Air Quality	Air Quality Assessment	▪ Dust deposition levels are predicted to be below the project air quality criteria at all surrounding dwellings.

Environmental Issue in DGR	Specialist Assessment Undertaken	Outline of Key Findings
		▪ Cumulative annual average particulates (PM_{10} and Total Suspended Particulates [TSP]) concentrations are predicted to be below the project air quality goal at all surrounding dwellings. ▪ Incremental maximum 24-hour PM_{10} concentrations attributable to the modifications are predicted to be well below the project air quality goals at the majority of surrounding dwellings. ▪ Minimal impacts associated with the ventilation fans (odour and particles) ▪ The results of the modelling indicate that the concentrations of particulate matter and dust deposition attributable to the proposed modifications would be within the current NSW DECCW air quality goals at all surrounding residences.
Greenhouse Gases	Air Quality Assessment	▪ Total emissions are estimated to be 1,023,210 tonnes CO_2-e per annum, an increase of approximately 440,640 tonnes per annum compared to existing operations. ▪ Of the total emissions, the modified mine would attribute 0.63% of the NSW 2007 greenhouse gas emission total and 0.17% of the Australian 2007 greenhouse gas emission total.
Aboriginal Cultural Heritage	Cultural Heritage Assessment	▪ A Rock Shelter with Potential Archaeological Deposit (PAD) has been identified although this is outside the subsidence area. Also, other sites previously registered on the AHIMS database are located outside the Study Area. Therefore, the proposed modifications are unlikely to impact upon the Aboriginal cultural heritage sites. ▪ No items of European historical significance were found within the Study Area. ▪ The subsidence report has found that it is very unlikely that cracking of cliff lines would occur due to mine subsidence, as all known cliff lines fall outside the predicted area of subsidence.
Hazards	Bushfire Management	▪ The existing Angus Place Bushfire Management Procedure would be revised to include measures for the overhead powerline.
Socio-economic		
	Social Impact Assessment	▪ There would be a beneficial effect due to a continuation of existing employment comprising 215 jobs plus the additional 10 jobs and 75 contractor jobs. People can remain in employment within their current communities and social networks. ▪ The increase in the number of employees is small and therefore the population increase would be negligible. There would not be a significant impact on local community services. ▪ Up to 75 contractors would be employed during the 15 month construction period. This is not likely to lead to significant effects on housing and services in the local area due to the short duration. ▪ Impacts on local people resulting from traffic noise, dust and traffic generation are likely to be negligible.

Environmental Issue in DGR	Specialist Assessment Undertaken	Outline of Key Findings
	Economic Assessment	▪ The proposed modifications would provide employment of 225 full time staff during the extended mine life and 75 contractors. ▪ Mining would yield 4.9 Mt or 5.6 Mt of coal. ▪ Wallerawang and Mount Piper power stations could continue to obtain thermal coal from a nearby source. ▪ The proposed modification would have estimated net production benefits of $73M or $93M. The environmental impacts associated with greenhouse gas emissions and ecological habitat are valued at $6.1M, significantly less than the estimated net production benefits. ▪ Gillespie reports that the net production benefits of the proposed modifications are distributed between a range of stakeholders. ▪ There would be an extension of the period over which the mine would provide a stimulus to the Lithgow and Bathurst economy and the annual regional economic impacts associated with the additional years of operation of Angus Place are estimated at $204M in annual direct and indirect regional output or business turnover; $106M in annual direct and indirect regional value added; $47M in annual direct and indirect household income; and 440 direct and indirect jobs. ▪ There would also be a stimulus to the regional economy from additional expenditures on contractor mining services and these impacts are estimated at: $26M in annual direct and indirect regional output or business turnover; $17M in annual direct and indirect regional value added; $8M in annual direct and indirect household income; and 76 direct and indirect jobs.
Cumulative Effects		
	Cumulative effects of proposed modifications with existing/approved mine	▪ The proposed modifications include improvements to water management at the pit top and also further links to the Springvale Delta Transfer scheme, the combined impact of the additional works would provide an overall improvement to the treatment of surface water and therefore be a benefit for the receiving environment. ▪ There would be a minor effect in relation to grade changes and ponding on West Wolgan Creek due to an increase in subsidence over longwall 920. ▪ The soils and land capability assessment has found minimal potential temporary disturbance, with no long term impacts predicted. The environmental controls, monitoring and repair measures proposed for impacts that may occur as a result of activities associated with the project will ensure no long term impacts are experienced. ▪ There would be an increase in greenhouse gas emissions as a result of the existing mine with the proposed modifications. ▪ The combined impact of the socio-economics of the proposed modifications is considered positive. The modification works would result in the continued employment of workers to 2016 which provides ongoing economic multiplier benefits for the region.

Environmental Issue in DGR	Specialist Assessment Undertaken	Outline of Key Findings
	Cumulative effects of modified Angus Place Colliery with other surrounding activities	▪ The security of employment resulting from this proposal combined with the surrounding mining operations would continue to support the strong social cohesion of the region, as demonstrated by the large proportion of home-ownership and home-purchasing and large number of family households, particularly households with children. ▪ Cumulative impacts on surface water, and particularly Coxs Creek, are associated with this proposal and other activities in the area. This proposal includes improvements to the existing water management system at Angus Place Colliery, which would result in an improvement to the quality of water leaving the site. ▪ As existing mining and other industrial operations within the Coxs River catchment expand and update, water quality management and monitoring continues to improve. This is evident within the Coxs River catchment, where two current Part 3A proposals for activities at existing facilities include improvements to the water management system. These proposals and the potential for associated cumulative impacts are discussed further below. ▪ There is potential for cumulative impacts associated with atmospheric pollution from Angus Place Colliery together with other mines in the vicinity.

The specialist assessments have recommended mitigation measures for the proposed modifications. Many of these are already undertaken by Angus Place Colliery under one or more of their existing management plans and monitoring regimes and/or under the Statement of Commitments for the approved scheme. It is proposed that the following existing management plans, processes and protocols be amended:

- Infrastructure Management Plan
- Environmental Management Strategy
- Subsidence Management Plan
- Subsidence Community Consultation process
- Subsidence monitoring and Reporting Program
- Flora and Fauna Management Plan
- Contractor Environmental Management Plan
- Bushfire Management Procedure and Management of Bushfire Assets procedure
- Erosion and Sediment Control Plan

The measures for the Statement of Commitments are:

Desired Outcome	Action
1. Rehabilitation	

Desired Outcome	Action
To ensure that any land disturbed due to exploration or mining activities is rehabilitated to an appropriate standard.	▪ A Rehabilitation Strategy as set out in Appendix 7.6 of the EA will be developed and adopted within 6 months of obtaining approval
2. Soil and Land	
Establishment of localised sediment control measures for the areas of disturbance associated with the construction of the bore and associated infrastructure.	▪ The Contractor Environmental Management Plan will be updated with mitigation measures within 6 months of approval.
3. Flora and Fauna	
Vegetation clearance to minimise impacts on flora and fauna.	▪ Within 6 months of obtaining approval and prior to the commencement of any construction, measure to be communicated to construction contractor via the Contractor Environmental Management Plan and adopted.
4. Cultural Heritage	
Vegetation clearance and construction works to be undertaken to minimise impacts on aboriginal heritage.	▪ Within 6 months of obtaining approval, the Environmental Management Plan will be revised to require ongoing liaison with the Aboriginal Community as per the DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 during the proposed works, should any matters relating to Aboriginal heritage occur.
5. Surface Water	
To improve understanding of water quality impacts from approved license discharge to Coxs River.	▪ Within 6 months of obtaining approval develop a Water Management Plan for the pit top area that takes into account mitigation measures identified in Appendix 7.3 Surface Water Assessment.
6. General	
To ensure the existing management plans, procedures and protocols are reviewed to include the measures identified in the EA (Table 8.1, Section 8 of the EA).	▪ Within 6 months of obtaining approval relevant management plans (Table 8.1, Section 8 of the EA) will be reviewed and updated as required.
To ensure the proper and orderly management of car parking during operations.	▪ Within 6 months of approval the formalisation of the western car park in accordance with AS2890.1:2004 will be investigated and constructed to provide a minimum of 40 car parking spaces. ▪ In consultation with Lithgow City Council, additional signage will be installed to direct contractors to the contractor car park within 6 months of obtaining approval.

STATEMENT OF CERTIFICATION

As author of the Environmental Assessment, I confirm that the information contained in this Environmental Assessment is considered to be a true and accurate reflection of the Angus Place Colliery modification and is not considered to be either false or misleading.

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Katherine Hayward
Principal Environmental Planner
RPS Australia East Pty Ltd

ABBREVIATIONS

Abbreviation	Meaning
AEMR	Annual Environmental Management Report
CCL	Consolidated Coal Lease
CO^2	Carbon dioxide
DECCW	Department of Environment and Climate Change and Water
DEWHA	Department of the Environment, Water, Heritage and the Arts (now known as SEWPAC)
DGR	Director General Requirements
DII	Department of Industry and Investment
DoP	Department of Planning
EA	Environmental Assessment
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environmental Protection Licence
GDE	Groundwater Dependant Ecosystem
GHG	Greenhouse Gas
KTPs	Key Threatening Processes
LDP	Licensed Discharge Point
ML	Megalitres
ML	Mining Lease
Mtpa	Million tonnes per annum
NPSS	Newnes Plateau Shrub Swamp
PAD	Potential Archaeological Deposit
ROM	Run of mine (coal yield)
SEWPAC	Department of Sustainability, Environment, Water, Population and Communities
SWMP	Site Water Management Plan

GLOSSARY

Term	Meaning
Angle of draw	The angle to the vertical from the sides or ends of an extracted longwall block and the line drawn from the limits of extraction at seam level to the 20 mm subsidence contour at the surface. The 20 mm subsidence contour is an industry defined limit and represents the practical measurable limit of subsidence.
Aquifer	Underground water storage within either disturbed or undisturbed strata.
Aquitard / Aquiclude	Less permeable strata, not permeable enough to yield economic quantities of water.
Bore	A constructed connection between the surface and a source of underground water that enables the underground water to be transferred to the surface either naturally or through artificial means
Chain pillar	The pillar of coal left between adjacent longwall panels. This forms a barrier that allows the goaf to be sealed off and facilitates tailgate roof stability.
Clean water	Waters on the premises that have not come into physical contact with coal, or mined carbonaceous material.
Cliff line	Refers to sub-vertical rock slopes with heights > 20 m in the context of the CAPC Mining Lease. They are also usually longer than their height.
Coal Handling Plant	A facility where coal is screened and prepared for transport off-site.
Continuous miner	The electric powered cutting machine used to remove coal from the working face and load it into the shuttle car. It is also used to form mine roadways and extract coal pillars.
Community Enhancement Fund	Established by Centennial Coal under the existing Project Approval. A structured approach to supporting community activities and involves guidelines for funding and a panel made up of local representatives to assess applications.
Dewatering	Transfer of water from underground workings to the surface.
Development activities	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 bolt and dust the face (two major components of servicing) whilst cutting coal.
Dirty water	Water on the premises that has come into physical contact with coal, mined carbonaceous materials or otherwise contains an elevated sediment load.
Hanging Swamp (Newnes Plateau)	This vegetation community occurs in gully heads and ridge-top sites where groundwater seepage travelling through permeable rock layers is directed laterally by impermeable layers. These form wet peaty soils in which a range of swamp heath flora species grow.
Inbye	An underground coal mining term used to describe the relative position of some feature or location in the mine that is closer to the coal face than the reference location.
Licensed Discharge	A location where Angus Place Colliery discharges water in accordance with

Point	conditions stipulated within the site Environment Protection License.
Longwall	Longwall mining is a form of underground coal mining where a block of coal is mined using a longwall shearer. The longwall mining method is supported by roadway development, mined using a continuous miner unit.
Maingate	Refers to the tunnels or roadways down the side of a longwall block which provides access for mine operations personnel, power, materials and clean air to the longwall face. It is usually located on the side of the longwall panel adjacent to unmined panels or solid coal.
Project Area	The area of the proposed modifications
Rock formations	Individual rock features > 5 m and < 20 m high which are not cliff lines. They are also known as sandstone pagodas or micro-buttes and are usually higher than their width.
Run of Mine	Raw coal production (unprocessed).
Secondary abstraction	This refers to the extraction of coal following the first workings (such as road ways and headings).
Springvale Delta Water Transfer Scheme	This scheme was originally established between Centennial Springvale and Delta Electricity to improve the management of water at Springvale Colliery and to reduce the extraction of water by Delta Electricity from the Coxs River supplies. It has been extended to include transfers from the dewatering bore at Angus Place Colliery. A proportion of underground water from Angus Place Colliery is transferred to the scheme via infrastructure that links both Springvale and Angus Place Colliery to Wallerawang Power Station for consumption at the cooling towers. The scheme operates under two scenarios, normal and abnormal. Under normal circumstances all water is transferred to Wallerawang Power Station. Under abnormal/emergency circumstances water is discharged through LDP006.
Study Area	Area used by specialist assessors for assessment purposes. This varies from topic to topic.
Subsidence	The difference between the pre-mining surface level and the post- mining surface level at a point, after it settles above an underground mining area.

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1 INTRODUCTION

1.1 Background

Angus Place Colliery is an existing operational coal mine. It commenced production in 1979, after being developed as an extension of the Newcom Mine at Kerosene Vale. Coal is extracted from the Lithgow Seam primarily by the operation of a longwall shearer and is used for domestic power generation at nearby Wallerawang and Mount Piper power stations.

This EA has been prepared on behalf of Centennial Angus Place Pty Limited (the proponent). Centennial Angus Place Pty Limited manages and operates the Angus Place Colliery. Centennial Angus Place Pty Limited is the manager of Angus Place Colliery, for and on behalf of the owners of Angus Place Colliery, namely Centennial Springvale Pty Limited and Springvale SK Kores Pty Limited, pursuant to the Springvale Joint Venture Agreement.

The location of Angus Place Colliery is shown in Figure 1.1. It is situated to the west of the Blue Mountains in New South Wales approximately 5km to the north of the village of Lidsdale, 8km north east of the township of Wallerawang and 15km north west of the city of Lithgow. Angus Place Colliery is bordered by Baal Bone Colliery and Invincible Colliery to the north, Centennial Springvale Colliery to the south and the Wolgan Valley and Newnes Plateau to the north east.

Project Approval 06_0021 was issued to Angus Place Colliery by the Department of Planning on 13th September 2006 to increase the mining area and annual production to 3.5 million tonnes per annum (Mtpa). Development activities within the current approval area are scheduled to be completed by October 2012 with longwall operations within the current extraction area planned to be completed by June 2014. At present, extraction of longwalls 920 to 950 has been completed, the extraction of 960 is approximately one third completed and 970 to 980 are yet to be extracted. Modifications are now proposed to allow operations at Angus Place Colliery to continue to 2016, providing coal to the domestic energy sector along with ongoing regional employment and economic benefits. This Environmental Assessment (EA) has been prepared in support of an application for Project Modification Approval under Section 75W of Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The proposed modifications comprise:

- the development and extraction of two longwall panels:
  - Longwall 910 (options 1 and 2); and
  - Longwall 900 west (900W);
- an additional dewatering borehole located at the eastern end of longwall 910 and associated infrastructure comprising:
  - widening of existing track (track off Black Fellows Hands Road)2;
  - new section of track from the existing track to be widened to the proposed new dewatering bore;

[2] Black Fellows Hands Road is currently in the process of a change of name to Mayiny-gu Marra-gu.

  - powerline extension (either under or overground) along the access track to supply electricity to the dewatering bore;
  - extension of the Springvale Delta Water Transfer Scheme comprising an underground pipeline along the access track. This would enable the continued transfer of extracted groundwater to Wallerawang Power Station;
- an increase in production limit from 3.5 Mtpa to 4 Mtpa to make provision for 12 consecutive months of production in the event that Angus Place Colliery does not have a eight week shutdown due to a longwall changeover;
- modifications for the improvement of the dirty water management system at the pit top resulting from an assessment of the current Angus Place Colliery water management infrastructure and a proposed stock pile area. Continued use of the existing surface facilities at the pit top (consistent with the Project Approval of 2006); and
- An increase in full time staff from 215 to 225. There is also provision for up to 75 temporary contractors to assist with development activities over an approximate 15 month period.

Detailed information about the proposed modification is provided in Chapter 3.

For the purposes of the EA, the Project Area for the proposed modification comprises the following:

- surface area above the two proposed longwalls 910 (Options 1 and 2) and 900W on Newnes Plateau, the dewatering borehole and supporting infrastructure, access track, powerline and pipeline;
- the pit top; and
- continued use of the existing private haul roads for the transportation of coal by truck to Wallerawang and Mount Piper Power Stations. Whilst there are no proposed physical modifications to the haul roads, the proposed increase to the coal production limit has potential implications for truck movements along the haul roads.

These areas are shown on Figure 1.2. This is based on a conceptual mine plan and the final mine layout will be approved under an Extraction Plan and clause 88 of the Coal Mine Health and safety Regulations 2006 and SMP approval.

The specialist reports have each identified their own Study Areas for assessment purposes, as appropriate for their topics, and these are identified in the reports.

1.2 Objectives of the Development

The objectives of the proposed modifications are to:

- provide additional coal resources to ensure continued operations at Angus Place Colliery and continuous employment within the region;
- continue the supply of high quality coal to established markets;
- conduct operations that prioritise avoidance, minimisation, and mitigation strategies.
- maintain the established goodwill and relations with the local community; and
- continue to contribute to the local, regional and state economies through capital expenditure, employment, training and the Community Enhancement Fund.

1.3 The Environmental Assessment Process

Potential environmental issues have been taken into account by Angus Place Colliery during the design stage of the modifications. Such issues have influenced the siting and layout of the proposed two longwalls to enable potentially adverse environmental impacts to be avoided where feasible. Angus Place Colliery has developed a reliable and detailed understanding of the environmental constraints as a result of experience from operating the site over many years and from the environmental management and monitoring regimes. Further information about the alternatives considered is provided in section 3.

Prior to assessment work, an environmental risk assessment was undertaken which produced a list of recommended controls to guide the scope of the specialist studies.

Angus Place Colliery advised the Department of Planning in writing of the proposed modification on 17th February 2010. This included a detailed description of the proposed modifications and a request for the Director General to provide the Director General's Environmental Assessment Requirements.

The Director General's Requirements (DGR) were issued on 1st June 2010 and these have set the terms of reference for the EA. The way in which the DGRs have been addressed is set out in Section 7.

1.4 Format of this Environmental Assessment

Volume 1 comprises the main environmental assessment report including figures and Volume 2 contains the appendices. Within Volume 1, Chapter 2 provides a description of the existing colliery including the Project Area for the proposed modifications. A description of the proposed modifications, that are the subject of this EA and also the subsidence predictions, is provided in Chapter 3. Chapter 4 sets out the consultation undertaken so far. The statutory planning context, applicable to the proposed modifications, is set out in Chapter 5. Chapter 6 outlines the environmental risk assessment. Chapter 7 describes the EA process that has been undertaken and outlines the key findings of the specialist assessment reports (that are appended) in terms of impacts, consequences and mitigation measures. Chapter 8 identifies the Statement of Commitments. The conclusions of the findings of the EA are described in Chapter 9. Volume 2 comprises the appendices, including the specialist assessment reports.

NORTH

RYLSTONE

KANDOS

CESSNOCK

RAYMOND TERRACE

NEWCASTLE

MOUNT PIPER POWER STATION

ANGUS PLACE COLLIERY

LIDSDALE

WALLERAWANG POWER STATION

BATHURST

LITHGOW

GOSFORD

WOY WOY

RICHMOND

OBERON

KATOOMBA

HORNSBY

PENRITH

CHATSWOOD

MANLY

SYDNEY

BANKSTOWN

CAMBELLTOWN

RPS

NOT TO SCALE

LOCATION PLAN

FIGURE 1.1

DATE : OCTOBER 2010

DWG NAME : 104424-FIG1-1

NORTH

BEN BULLEN STATE FOREST

NEWNES STATE FOREST

COXS RIVER

LAMBS CREEK

WOLGAN RIVER

CASTLEREAGH HWY

ANGUS PLACE PIT TOP

MOUNT PIPER POWER STATION

MOUNT PIPER COAL HAUL ROAD

BLACKMANS FLAT

CASTLEREAGH HWY

WOLGAN ROAD

WALLERAWANG COAL HAUL ROAD

KEROSENE VALE WORKINGS

KANGAROO CREEK

SUBLEASE OR EQUIVALENT

BEN BULLEN STATE FOREST

LIDSDALE

NEWNES STATE FOREST

WALLERAWANG POWER STATION

TO LITHGOW

LEGEND

- Power Station
- Colliery Holding Boundary
- Project Area
- Existing Mine Workings

RPS

SCALE 1 : 60000 @ A3

0 1000 2000 3000

THE PROJECT AREA

FIGURE 1.2

DATE : OCTOBER 2010 DWG NAME : 104424-FIG1-2

2 THE EXISTING COLLIERY

2.1 Introduction

This chapter describes the existing colliery in terms of:

- the site and the situation;
- the existing approval;
- an overview of operations;
- existing consents, leases, titles and licenses;
- existing surface facilities;
- coal handling and transport; and
- mining operations.

It then describes Angus Place Colliery's risk based approach to operations at the mine and the existing environmental management and monitoring regimes.

2.2 The Existing Colliery

2.2.1 Site and Situation

Angus Place Colliery is located approximately 15 kilometres north-west of Lithgow and approximately 5 kilometres to the north of the village of Lidsdale (see Figure 1.1). The site is accessed via the Wolgan Road from the Castlereagh Highway and is bordered by Baal Bone Colliery (Xstrata), Invincible Colliery (CET Resources), Centennial Springvale Colliery, the Wolgan Valley and Newnes State Forest.

The surface lands adjacent to and above Angus Place Colliery underground workings consist of land that is located on the Newnes State Forest and comprises 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. Flattened crests, spurs and accessible ridgelines occur regularly and streams, such as Kangaroo Creek and the Wolgan River and their tributaries can be found in the vicinity.

The soils of the area are variable depth sandy loams and skeletal sandy soils over Hawkesbury Sandstone. There are some sandstone outcroppings (pagodas) and escarpments associated with the deeper drainage lines.

The area overlying Angus Place Colliery forms part of the Newnes Plateau, northeast of Lithgow. The underlying strata comprise mostly sandstones of the Triassic Narrabeen Group. The surface strata belong to the Grose Sub-group, and include the Banks Wall Sandstone, the uppermost part of which is deeply weathered and generally very friable. The sandstone, which is up to 200 metres thick in this region, is underlain by the Mt York Claystone, a thin, fine-grained stratum that limits vertical infiltration of groundwater from the overlying strata (Aurecon, 2010).

The vegetation across the top of the Plateau consists of woodland areas dominated by *Eucalypt* species, which have been subject to selective timber harvesting activities for a sustained period of time. Based on visual evidence, some sections of the area have recently been impacted by bushfire. As a consequence

large areas of forest canopy across the plateau exhibit a relatively young to moderately aged cohort of canopy trees, with only a low to moderate density of mature hollow-bearing trees and a natural density of juvenile to immature canopy species in the understorey strata.

Where shrub layers are present they represent a somewhat low diversity, likely due to a combination of disturbance and context in relation to elevation and soil composition. Ground-cover layers exhibit a relatively diverse assemblage of grasses, herbs and prostrate shrubs in areas not exhibiting recent disturbance. Generally those areas of vegetation occurring off the Plateau, where forest harvesting activity has not been undertaken, remain intact with a natural complement of native flora species.

There are areas of shrub swamp and hanging swamp at and within proximity to Angus Place Colliery. These are classified as Endangered Ecological Communities under the Threatened Species Conservation Act 1995. The locations of the swamps are shown on Figure 2.1.

Angus Place Colliery includes the watershed between two catchments; the Wolgan-Colo River catchment to the north and the Coxs River catchment to the west, as shown in Figure 2.2.

There are a number of aquifers in the area and these and the anticipated hydrogeological strata at Angus Place Colliery is shown in Figure 2.3[3]. Angus Place Colliery is situated within the southern portion of the Western Coalfield. The extracted and proposed longwall panels are located within the combined Lithgow/Lidsdale Seam of the Illawarra Coal Measures. The strata units (in ascending order) above the mine workings include (Aurecon, 2010):

- The Lidsdale and Lithgow Seams are immediately overlain by 4 to 6 m of the Long Swamp Formation, which consist of interbedded coal, shale and mudstone with low to moderate material strength.
- Approximately 31 m to 47 m of interbedded siltstone, sandstone and minor coal of the Newnes, Glen Davis and Denman Formations form the interburden (Units 2 and 3) up to the 7 to 16 m thick Gap Sandstone (Unit 4) and 10 m thick Katoomba / Little Riverdale Seams. Thinly bedded sandstone and siltstone of the Triassic Narrabeen Groups's Caley Formation exist above the Katoomba Seam.
- The 74 to 79 m thick Burra-Moko Head Unit is thickly bedded to massive conglomeratic sandstone with minor shale beds and overlys the thinly bedded strata some 114 m to 116 m above the workings.
- The Mount York Claystone is a 4 to 11 m thick unit of medium to high strength claystone (Unit 3) which separates the Burra-Moko Head Unit from the overlying Banks Wall Sandstone.
- The Banks Wall Sandstone is 75 to 99 m thick and consists of thickly bedded to massive conglomeratic sandstone with minor shale beds and is 192 m to 206 m above the workings.

The first 50 to 60 m of overburden at the surface consists of a shallow residual or alluvial sandy soil cover to a depth 1 to 5 m overlying highly weathered sandstones of the Burralow Formation with low to very low strength (UCS <20 MPa). The known regional geological structure in the area of the mine consists of normal and reverse faulting (Aurecon, 2010).

[3] This figure is based on work by CSIRO at Springvale Colliery and it is considered likely that there will be similarities with strata over Angus Place (Aurecon, 2010).

2.2.2 Existing Approval

Project Approval 06_0021 was granted by the Minister for Planning on 13th September 2006 for the extension of the underground operations at the mine by seven longwall panels, increasing the coal production limit from 2.3 to 3.5 million tonnes a year and continuing the use of existing surface facilities at the mine.

A table with the schedule of land for the Project Approval is contained in Appendix 2.1. This table lists the individual parcels of land to which the Project Approval applies. Lease areas ML1424 and CCL704 are shown on Figure 2.4.

2.2.3 Overview of Operations

In 1961 Wallerawang power station was commissioned and Newcom Collieries supplied approximately 450,000 tonnes of coal per annum to the power station from the Lidsdale workings, located to the south of Angus Place Colliery.

Additional generating units were installed at Wallerawang during the 1970s. To meet the increased demand for fuel due to the additional generating units, additional coal resources were required. An Environmental Impact Statement was prepared for Angus Place Colliery with a production rate of 1.3 million tonnes per annum. Angus Place Colliery has been operating since 1979, following Development Consent granted by the former Blaxland Shire Council. Operations have been ongoing at the site since this time.

Angus Place Colliery was purchased from Powercoal Pty Ltd in August 2002 by Centennial Coal Company Ltd. The main components of the site are an underground longwall mine and associated development units, supporting surface infrastructure, a coal stockpile area (identified as Kerosene Vale) and a haul road to Wallerawang power station. A second haul road to Mount Piper power station is owned by Coal Link Pty Ltd and operated by Angus Place Colliery.

Angus Place Colliery is currently approved to operate 24 hours a day, 7 days a week. Panels are extracted from the Lithgow coal seam using longwall mining techniques, with Continuous Miners used to mine development headings and access roadways. The coal is fed to the surface via a conveyor system where it is stockpiled, sized and then dispatched to the product supply bin for transportation to either Wallerawang or Mount Piper power stations via sealed private haul roads. As the run-of-mine (ROM) coal does not require washing, no washery tailings or reject material is generated at Angus Place Colliery.

Access to the mine pit top is via the sealed Wolgan Road, while access to the Newnes State Forest is via forest tracks, four wheel drive tracks and mining infrastructure access tracks (such as powerlines and dewatering bores).

Figure 2.5 illustrates the existing colliery.

Approximately 215 personnel are directly employed by the mine. The mine also deals directly and indirectly with a large number of local businesses and industries.

2.2.4 Existing Consents, Leases, Titles and Licences

The relevant existing consents, leases, titles and licences are identified in Table 2.1 below.

Table 2.1 Existing Consents, Leases, Titles and Licenses

Consent/Lease/ Title/License	Description	Details/Status
Consent	Project Approval (06_0021) – increase mining area and annual production.	A condition requires that all prior Consents were to be surrendered within 6 months of approval. The original Development Consent of 1975 was surrendered in 2007. A Statement of Commitments was established with the Project Approval. This outlines the ongoing community commitments and consultation measures, environmental management, mitigation, monitoring and reporting measures that will be implemented with the approved mining operations. A copy of the 2006 Project Approval including the Statement of Commitments is contained in Appendix 2.2.
Consent	Haul Road	Consent 105/92 from the Council of the City of Greater Lithgow to Coal Link Pty Ltd.
Lease	Consolidated Coal Lease – CCL 704	Transferred from Powercoal Pty Ltd in 2003. Renewed in 2006 for another 21 years. Location shown in Figure 2.4.
Lease	Mining Lease – ML1424	Transferred from Powercoal Pty Ltd in 2003. Renewed in March 2005 with an extension to 18 August 2024. Location shown in Figure 2.4.
Lease	CCL 702	Portion held by Angus Place Colliery via a sublease agreement with Coalpac Pty Ltd.
License	Exploration licences	Exploration Licenses EL6856 and EL6293 are administered by the NSW Department of Industry and Investment – Mineral Resources (DII-MR). Exploration licenses permit the undertaking of exploration activities in accordance with DII-MR guidelines. Under this license, exploration programs are subject to a Part 5 Approval under the EP&A Act 1997 requiring a Review of Environmental Factors.
Title	Mining title	Angus Place Colliery currently hold approximately 10,278 hectares under mining title, 175 hectares of this is surface title, which includes the colliery pit top and surface infrastructure. This also includes the Kerosene Vale site.
License	Environment Protection Licence (EPL)	EPLs are under the Protection of the Environment Operations Act (1997). Licences are designed to control and limit pollution levels and are issued and regulated by the NSW DECCW. At Angus Place Colliery EPL No. 467 covers the pit top area, Kerosene Vale operations and Newnes Plateau (emergency discharge point). Five utilisation / discharge points are authorised under the licence and the annual renewal date of the licence is 1st January.
License	Groundwater Licences	In 2006, Angus Place Colliery applied to the then Department of Natural Resources (DNR) to have all bores associated with groundwater licensed under Part 5 of the Water Act 1912. These included the 930 (10BL601852) and 940 (10BL601851) Dewatering Boreholes, groundwater monitoring bores (10BL601829) and the groundwater collection system (10BL601838). Licences were issued for these sites in August and September 2007. The 930 dewatering bore has since been decommissioned. In 2009 and 2010 two additional licenses were sought from the NSW Office of Water (former Department of Water and Energy/Department of Natural Resources) regarding groundwater monitoring bores (piezometers) AP1PR to AP6PR (10BL603236) and AP8PR to AP12PR (10BL603802).
License	Radiation Licences	Under the Radiation Control Act 1990. Licences are issued to allow usage of radioactive substances. In 2006 Angus Place Colliery applied and was granted a Radiation licence (registration number RR11830) for the Fixed Radiation gauge, as well as a license to sell/posses radioactive

Consent/Lease/ Title/License	Description	Details/Status
		substances.
Permit	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. Occupation Permit (PB 28362) is held by Angus Place Colliery and this covers all surface facilities associated with the Colliery that are located on State Forest land. Occupation Permit (PB 03797) extends into the Ben Bullen Forest to the west of the pit top.
Consent	Subsidence Management Plan Approval	Subsidence Management Plan, May 2005 and variations approved by the Department of Industry and Investment in October 2005, October 2006 and March 2008.

2.2.5 Existing Surface Facilities

The current pit top covers a total area of approximately 30 hectares. Existing surface facilities at the pit top include the following:

- mine entries;
- coal processing facilities including coal sizing, stockpiling, stacking and reclaim facilities;
- 2000 tonne final product bin and truck loading facilities;
- workshop, stores, fuel and oil storage systems;
- enclosed and open bulk material and equipment store;
- air compressors;
- high tension electrical switchyard;
- surface water management ponds and pollution control infrastructure;
- bath house;
- sewerage treatment facility;
- office, car park and administration buildings;
- ventilation facilities, both upcast and downcast; and
- dewatering bores.

Other surface related infrastructure can be found away from the pit top, these include;

- dewatering bores;
- monitoring bores;
- emergency licensed discharge point;
- the decommissioned Newcom Colliery pit top and coal storage area at Kerosene Vale;
- Mt Piper Haul road (owned and managed by CoalLink); and
- Wallerawang Haul Road.

Figure 2.6 illustrates the existing surface facilities at the pit top.

2.2.6 Coal Handling and Transport

The coal handling process at Angus Place Colliery is illustrated in Figure 2.7.

Mined coal is placed on a conveyor system that brings the coal to the surface where it is sent to a reclaim / stackout stockpile. The reclaim stockpile has underground feeders, which enables coal to be loaded onto the reclaim conveyor through a tunnel under the stockpile. The coal is crushed and sized by the site coal handling plant. Coal from the ROM stockpile is conveyed to the coal handling plant, sized and then transferred to the trucks. A dozer is used to manoeuvre coal to keep it within the boundaries of the stockpile. Coal that is not captured by the reclaim chute can be loaded onto the conveyor.

The coal is then conveyed to the truck loading hopper, which then loads haulage trucks to transport the product along private sealed haul roads to either Wallerawang or Mount Piper power stations.

Wallerawang Haul Road has approval to operate from 7am to 10pm, while the Mt Piper Haul Road has approval to operate 24 hours a day / 7 days a week. It should be noted however, that truck movements are restricted as discussed in section 2.2.7.

Centennial Coal Pack owns Mount Piper Haul Road and Angus Place Colliery operates Wallerawang Haul Road.

2.2.7 Mining Operations

There is a current limit to production of up to 3.5 million tonnes per annum from the Lithgow seam.

Underground mining at Angus Place Colliery utilises longwall mining methods as the primary form of extraction. Longwall mining is supported by continuous miner development operations.

Development roadways are mined using single pass continuous miner units. The continuous miner cuts the coal and simultaneously feeds it onto shuttle cars, which then transport and load the cut coal into the conveyor feeder, where it is conveyed out of the mine and deposited onto the ROM stockpile. The continuous miner then reverts to installing roof and rib supports.

Mine scheduling ensures that roadway development and the panel installation faces are fully accessible prior to the full extraction of the previous block. This aims to reduce longwall changeover periods facilitating continuity. Once the preceding panel has been fully extracted, the longwall shearer, hydraulic roof supports (chocks) and relevant utility services are installed at the takeoff point on the new longwall. Longwall mining is a cyclical process and on average one panel takes approximately 18 months to mine. Longwall changes occur at the completion once every 18 months.

Angus Place Colliery uses the retreat longwall mining technique, whereby the longwall shearer commences operations at the far end of the panel roadway, advancing inbye to finish at the access headings. The longwall shearer cuts laterally across the longwall face and transports cut coal to the conveyor system for travel to the surface and sizing.

This method of mining would continue with no alterations under this application.

Under the existing Project Approval, at present, extraction of longwalls 920 to 950 has been completed, the extraction of 960 is approximately one third completed and 970 to 980 are yet to be mined. There are also previously mined longwalls to the north and north east as shown on Figure 2.5.

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

Coal is crushed on-site at the Angus Place Colliery Coal Handling Plant (CHP). No reject material is generated as the coal is not washed.

As Angus Place Colliery is a well established underground mine, with adequate supporting infrastructure minimal land preparation occurs. In recent years, minor land preparation has been undertaken to facilitate the Angus Place Colliery resource exploration program. This program is due to continue during 2010.

Infrastructure and support facilities at Angus Place Colliery generally includes infrastructure for mine access and ventilation, coal handling, preparation and transport, maintenance and administration, water management and pollution control.

Coal is loaded into trucks, from the final product bin after stockpiling and sizing. The trucks transport the coal along two private haul roads to either Wallerawang or Mount Piper Power Stations. The Mount Piper haul road development consent (development consent number 105/92 issued by Council of the City of Greater Lithgow in September 1992 to Coal Link Pty Ltd) allows for trucking 24 hours/day, 7 days a week – within a limit of 5 loaded trucks per hour between 21:30 and 07:00. Wallerawang haul road is only to be used during the hours of 07:00 to 22:00.

The surface water management system at Angus Place Colliery 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 minimising the volume of dirty water to be treated. 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.

Given that Angus Place Colliery exists as an underground coal mine which tends not to alter in footprint, rehabilitation activities are generally limited to those within the Newnes State Forest following the cessation of exploration activities.

2.3 Angus Place Colliery's Risk Based Approach to Operations

The Angus Place Colliery utilises a risk based framework to identify environmental, safety and business risks to its operation. This process involves its employees (and contractors where appropriate) identifying existing controls and recommending any necessary additional controls for risks identified. The focus is on the inter-relationship between people, machinery, methods of work, the environment and the community. From an environmental management perspective, this process is guided by the overarching Centennial Environmental Policy which clearly outlines key environmental commitments and Centennial's role with regard to sustainable development. The Policy aims to manage its businesses to achieve balanced environmental, economic and social aspects. The Policy also states Centennial's commitment to minimising environmental impacts and to continual improvement in environmental management and performance.

To achieve the goals stipulated within the Centennial Environmental Policy at site level, Angus Place Colliery developed and implemented an Environmental Management System (EMS) during 2009. The process required the identification and assessment of site based hazards and risks (aspects and impacts) and was developed generally in accordance with ISO14001. In order to facilitate the effective management of the risks contained within the EMS risk register, several response procedures and standards have been developed and exist under the EMS framework document. Key response procedures aim to manage extreme and high risks such as hydrocarbon spills, dirty water management, airborne pollution etc. Each procedure 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 compilation of this EA was undertaken through a risk based and consultative approach. The primary objective of the risk assessment process was to identify those issues relating to the proposed modification where further information or investigation would address any existing knowledge gaps or any potential needs

for improving existing mitigation and management measures to ensure the residual risk for the proposed modifications is acceptably low.

2.4 Existing Environmental Management and Monitoring

A number of management plans and monitoring regimes are in place for the existing activities at Angus Place Colliery and in response to conditions under the existing Project Approval. These include:

- Environmental Management Strategy, November 2007.
- Flora and Fauna Management Plan, November 2007.
- Site Water Management Plan, November 2007.
- Newnes Plateau Shrub Swamp Management Plan, March 2006.
- Environmental Monitoring Program, November 2007
- Noise Monitoring Program, May 2007
- Air Quality Monitoring Program, March 2007
- Subsidence Management Plan, May 2005 and variations approved by the Department of Industry and Investment in October 2005, October 2006 and March 2008.

Environmental Management Strategy

This describes the components of the overall environmental management strategy. There are individual management plans covering Site Water Management, Air Quality, Noise and Flora and Fauna. Also, there is an Environmental Management Program.

The colliery's environmental management is implemented through a process of identifying and evaluating environmental aspects, potential impacts and developing mitigation measures to minimise potential impacts. An inspection and monitoring program is used to assess the effectiveness of environmental management and procedures have been developed to respond to any non-compliances or emergencies.

An Annual Environmental Management Report (AEMR) is prepared on an annual basis and lodged with I&I NSW.

Flora and Fauna Management Plan

The purpose is to protect threatened species and communities, minimise impact on native flora and fauna, manage clearing on the site, control weeds, control access to environmentally sensitive areas and manage any potential conflicts between flora and fauna and Aboriginal heritage.

Monitoring is undertaken and the results (available to relevant stakeholders on request) are reported on every 3 months.

Procedures are set out for vegetation clearing including hollow-bearing tree management; weed control; access to environmentally sensitive areas; managing conflicts between flora and fauna and aboriginal heritage.

Site Water Management Plan

The purpose is to manage water within the entire Angus Place Colliery lease area in an efficient and sustainable manner whilst protecting surrounding water bodies and their dependant ecosystems in both the short and the long term.

Water Management

Angus Place Colliery draws water from three separate sources. Potable water for use at the colliery (at the bathhouse and administrative buildings) is sourced from Lithgow City Council, drinking water is supplied in bottles from Lithgow Valley Springs and any process water is taken from mine groundwater. There are also two 60,000L tanks that capture runoff from the workshop roof for use in the vehicle wash down process. Angus Place Colliery has approved water management plans, which address both surface and underground water, as well as the associated management protocols for each.

A proportion of underground water is transferred to underground storage for use either for dust suppression and fire fighting or discharged through LDP001. The remaining underground water is transferred to the Delta Water Transfer Scheme via infrastructure that links both Springvale and Angus Place Colliery to Wallerawang Power Station for consumption at the cooling towers. This scheme was originally established between Centennial Springvale and Delta Electricity to improve the management of water at Springvale Colliery and to reduce the extraction of water by Delta Electricity from the Coxs River supplies. It has been extended to include transfers from the dewatering bore at Angus Place Colliery. The scheme operates under two scenarios, normal and abnormal. Under normal circumstances all water is transferred to Wallerawang Power Station. Under abnormal/emergency circumstances water is discharged through LDP006.

As outlined previously the site has five licensed discharge points (LDP) under EPL 467, they are as follows:

- LDP001 – discharges water from underground mining operations into Kangaroo Creek (tributary of the Coxs River) adjacent to the colliery.
- LDP002 – discharges water from the Colliery pit top surface operations into the Coxs River downstream from the Colliery.
- LDP003 – discharges water from the Kerosene Vale site (coal storage facility) into the Coxs River.
- LDP005 – discharges treated sewage effluent from Angus Place Colliery by spray irrigators to a designated utilisation area. These discharges are only minor, occurring after heavy rainfall events. 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.
- LDP006 – is an emergency discharge point from the 940 dewatering bore on Newnes Plateau. This licensed discharge point is only operated under emergency conditions. Emergency conditions are considered to exist when the bore water cannot be fed into the Springvale Delta Water Transfer Scheme. The emergency discharge point was developed as a contingency and is licensed accordingly. Water is discharged to the Wolgan River from LDP006 via Narrow Swamp North. All discharge events occur in accordance with the Angus Place Colliery Environment Protection License with a report sent to the NSW Department of Environment, Climate Change and Water as stipulated in Condition E1.5 of the Angus Place Colliery EPL.

Surface Water Management

The existing water management system at Angus Place Colliery was developed in accordance with EPL 467, the conditions of Project Approval PA 06_0021 and the “Statement of Commitments” which were committed to as part of the previous Lease Extension Project Approval Process.

The primary objectives for this system include:

- The separation of clean and dirty water.
- Maximising water recirculation.

Diversion of clean water runoff around the pit top, to avoid contamination, reduces the volume of water reporting to the dirty water management system. The Site Water Management Plan (SWMP) also addresses

the inclusion of a range of other measures to achieve these objectives including sedimentation ponds, wetlands, oil water separators, regular monitoring of water quality and identification of potential risks to water quality.

Within the water management system there are five categories of water including underground water, dirty water, clean water, waste and potable water that contribute to either the surface or underground water system.

Underground Water Management

The underground water management system is required to dewater the underground mine. Mine water is used as process water or transferred to Wallerawang Power Station or discharged through Licensed Discharge Point 6.

Dewatering bore 940 removes water from the lower areas of the mine. Then an underground pumping station pumps water from the mine to the Springvale Delta Water Transfer Scheme This then delivers water to Wallerawang Power Station.

Sewage Treatment

Angus Place Colliery has its own sewage treatment facility, with sewage and grey water from the bathhouse and offices treated onsite. The Environment Protection Licence authorises the treatment of sewage on site and onsite disposal via irrigation to a designated utilisation area.

The Sewage Treatment System consists of a masticator pump pit. Sewage and grey water gravitate by a pumping system from the bathhouse and offices to four oxidation ponds in series. From the final oxidation pond, treated effluent is pumped to a series of irrigators which spread the treated sewage evenly across the utilisation area.

Periodic soil sampling takes place to ensure that the utilisation area does not become saturated resulting in runoff.

Newnes Plateau Shrub Swamp Management Plan

The purpose is to measure and manage potential subsidence impacts on the Newnes Plateau Shrub Swamps.

Monitoring includes the effects of subsidence, groundwater level monitoring, vegetation monitoring, fauna monitoring and photographic monitoring.

Environmental Monitoring Program

This consolidates all monitoring requirements under the existing Project Approval.

Noise Monitoring Program

This sets out procedures for monitoring and assessing noise impacts from Angus Place Colliery to acceptable levels for residential neighbours and regulatory stakeholders. A key outcome is that the Noise Monitoring Program needs to demonstrate compliance with the noise level criteria set out in the existing Project Approval.

Quarterly monitoring is undertaken at residential properties, colliery surface plant and the haul road and additional noise monitoring is undertaken in response to noise complaints.

Air Quality Monitoring Program

Potential dust sources at the mine include unsealed or dirty traffic areas, coal stockpiles, ventilation fans and coal being conveyed.

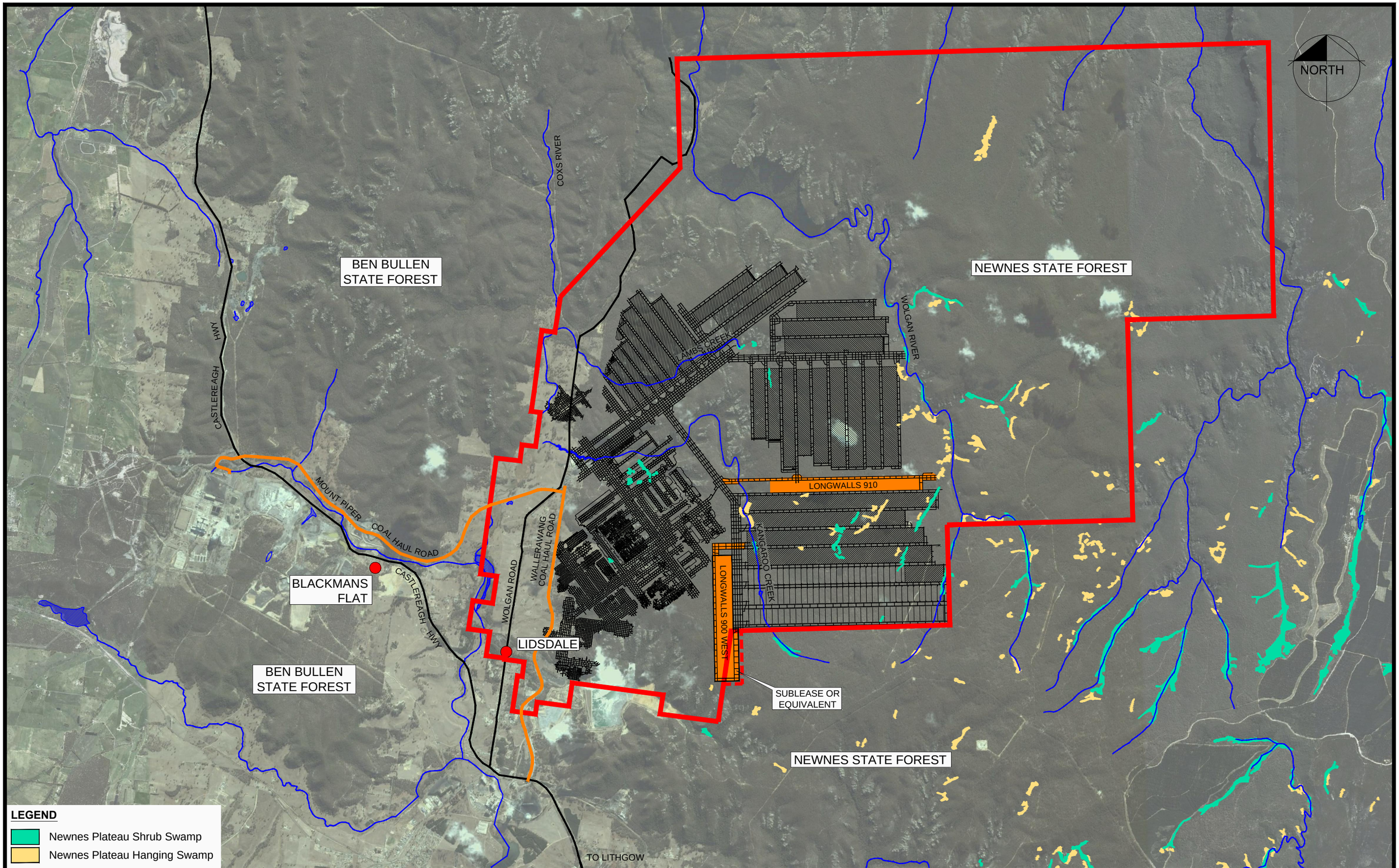
Current dust controls for unsealed or dirty traffic areas include the use of water carts, water cannons/sprinklers and regular road sweeping. Covers are fitted to overland conveyors. 'Low emission' fuels are used underground to reduce airborne particulates.

The Air Quality Monitoring Program sets out methods of monitoring dust generated from Angus Place Colliery.

Subsidence Management Plan, May 2005

Variations of the Subsidence Management Plan were approved by the Department of Industry and Investment in October 2005, October 2006 and March 2008.

This was undertaken in accordance with a condition of the mine lease and with the I&I guidelines.



RPS

SCALE 1 : 60000 @ A3

0 1000 2000 3000

LOCATION OF SWAMPS

FIGURE 2.1

DATE : NOVEMBER 2010 DWG NAME : 104424-FIG2-1

NORTH

BEN BULLEN STATE FOREST

NEWNES STATE FOREST

COXS RIVER

CASTLEREAGH HWY

LAMBS CREEK

BLACKFELLOWS HANDS ROAD

WOLGAN RIVER

SUNNY SIDE RIDGE ROAD

WOLGAN ROAD

KANGAROO CREEK

CASTLEREAGH HWY

BEN BULLEN STATE FOREST

NEWNES STATE FOREST

LEGEND

- Colliery Holding Boundary
- Roads
- Watercourse
- Coxs River Catchment
- Wolgan River Catchment
- State Forests

RPS

SCALE 1 : 60000 @ A3

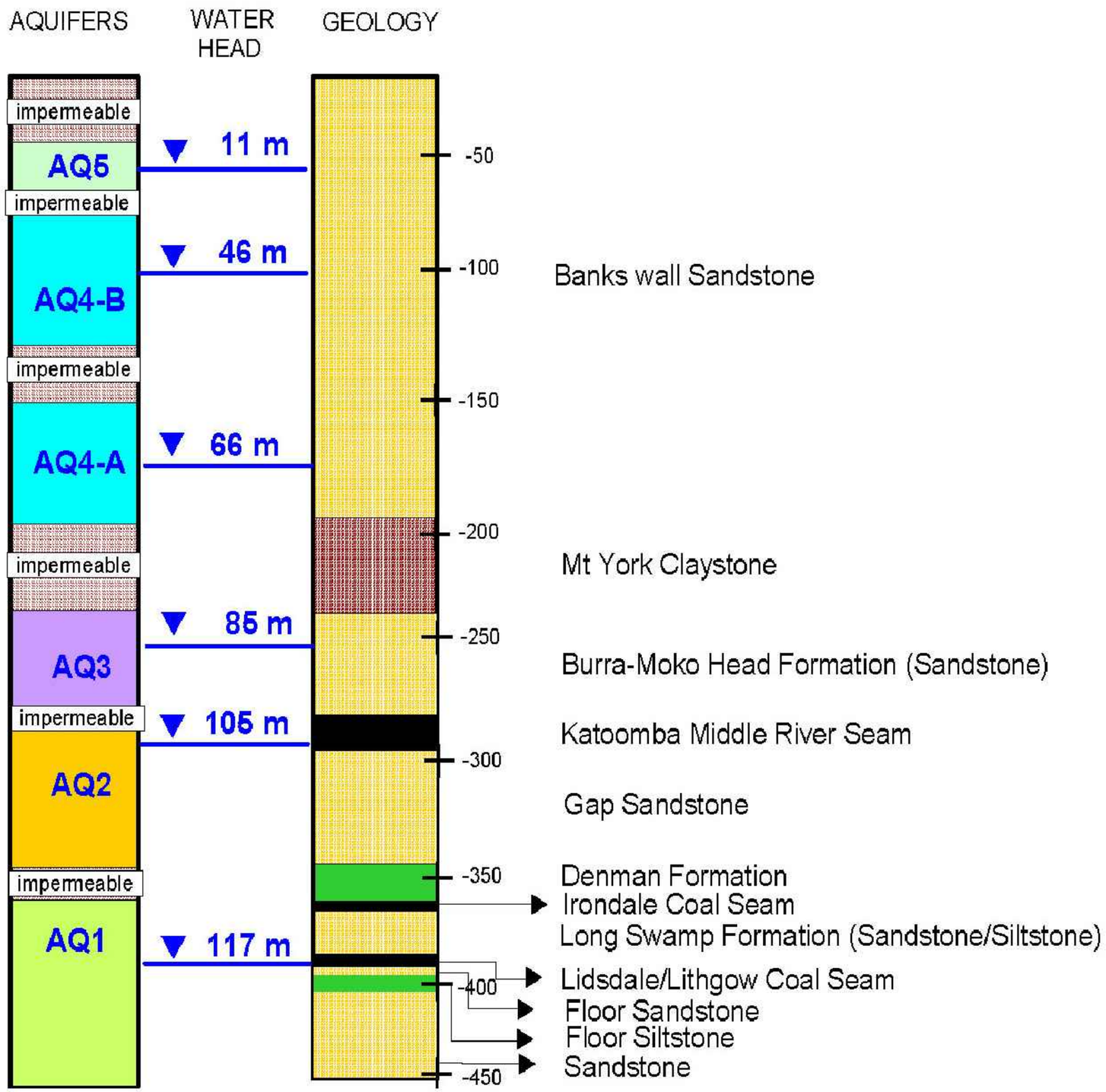
0 1000 2000 3000

RIVER CATCHMENT AREAS

(SOURCE: GHD)

FIGURE 2.2

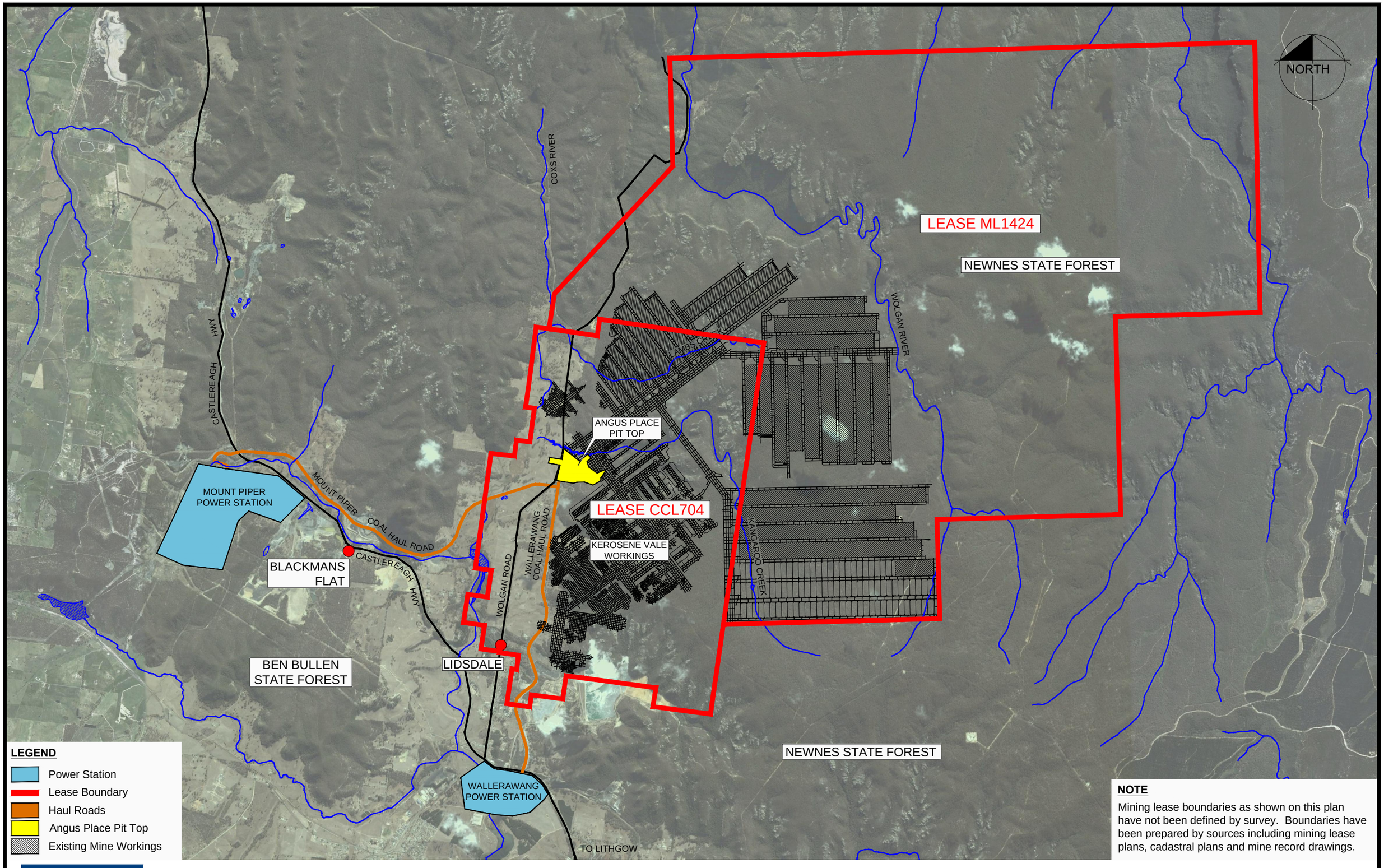
DATE : NOVEMBER 2010 DWG NAME : 104424-FIG2-2



INFERRED HYDROGEOLOGICAL SECTION

(SOURCE: CSIRO - FROM AURECON HYDROGEOLOGICAL ASSESSMENT 2010)

FIGURE 2.3



RPS

SCALE 1 : 60000 @ A3

0 1000 2000 3000

MINING LEASE AREAS

FIGURE 2.4

DATE : OCTOBER 2010 DWG NAME : 104424-FIG2-4

NORTH

BEN BULLEN STATE FOREST

NEWNES STATE FOREST

COXS RIVER

WOLGAN RIVER

CASTLEREAGH HWY

ANGUS PLACE PIT TOP

MOUNT PIPER POWER STATION

MOUNT PIPER COAL HAUL ROAD

BLACKMANS FLAT

CASTLEREAGH HWY

WOLGAN ROAD

WALLERAWANG COAL HAUL ROAD

KEROSENE VALE WORKINGS

KANGAROO CREEK

LAMBS CREEK

BEN BULLEN STATE FOREST

LIDSDALE

WALLERAWANG POWER STATION

TO LITHGOW

NEWNES STATE FOREST

LEGEND

- Power Station
- Colliery Holding Boundary
- Haul Roads
- Angus Place Pit Top
- Existing Mine Workings

RPS

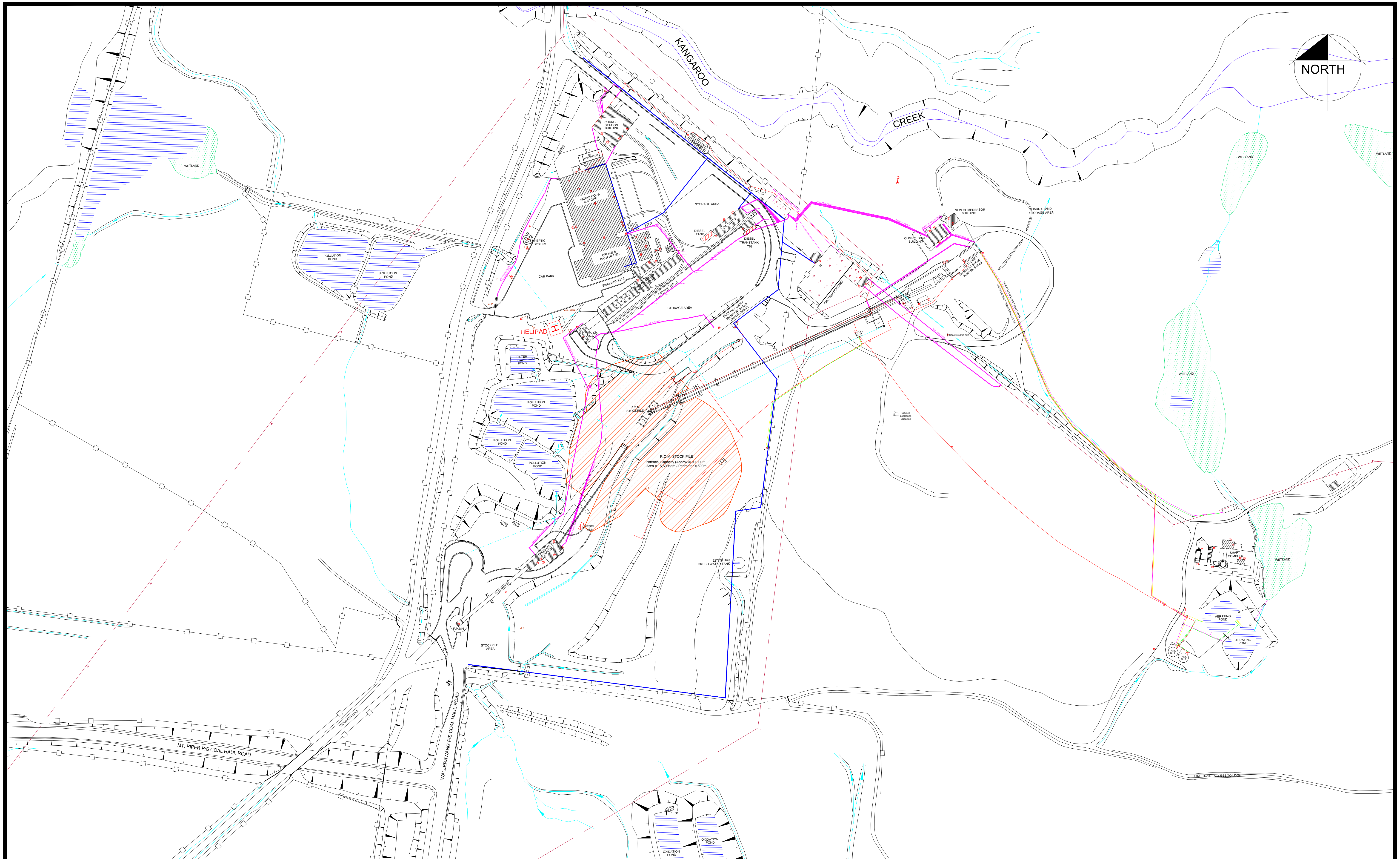
SCALE 1 : 60000 @ A3

0 1000 2000 3000

EXISTING ANGUS PLACE COLLIERY HOLDING

FIGURE 2.5

DATE : OCTOBER 2010 DWG NAME : 104424-FIG2-5


NORTH
KANGAROO
CREEK
WETLAND
WETLAND
WETLAND
WETLAND
WETLAND
POLLUTION POND
POLLUTION POND
FILTER POND
POLLUTION POND
POLLUTION POND
POLLUTION POND
CHARGE STATION BUILDING
WORKSHOPS & STORE
OFFICE & BATH HOUSE
SEPTIC SYSTEM
CAR PARK
HELIPAD
STORAGE AREA
DIESEL TANK
STORAGE AREA
NEW COMPRESSOR BUILDING
HARD STAND STORAGE AREA
COMPRESSOR BUILDING
R.O.M. STOCKPILE
R.O.M. STOCK PILE
DIESEL TANK
FRESH WATER TANK
STOCKPILE AREA
F.P. BIN
SHAFT COMPLEX
AERATING POND
AERATING POND
OXIDATION POND
OXIDATION POND
MT. PIPER P/S COAL HAUL ROAD
WALLERAWANG P/S COAL HAUL ROAD

SCALE 1 : 3000 @ A3

0 50 100 150

EXISTING PIT TOP INFRASTRUCTURE

FIGURE 2.6

DATE : OCTOBER 2010 DWG NAME : 104424-FIG-2-6

NORTH

STOCKPILE
CRUSHER
COAL BIN
KEROSENE VALE WORKINGS
KEROSINE VALE STOCKPILE

DISTRICT 500
DISTRICT 400
DISTRICT 400A
DISTRICT 200A
DISTRICT 200
DISTRICT 100
DISTRICT 300
DISTRICT 900
LONGWALL 1
LONGWALL 2
LONGWALL 16
LONGWALL 17
LONGWALL 18
LONGWALL 19
LONGWALL 20
LONGWALL 21
LONGWALL 22
LONGWALL 23
LONGWALL 24
PANEL 910
LONGWALL 920
PANEL 920
LONGWALL 930
PANEL 930
LONGWALL 940
PANEL 940
LONGWALL 950
PANEL 950
LONGWALL 960
PANEL 960
PANEL 970

LEGEND

- Conveyor
- Haul Road

CONVEYOR LENGTHS

C001 - 107m (surface)
C101 - 149m (surface)
C301 - 270m (to surface)
C302 - 1692m
C303 - 1994m
C900 - 2004m
C960 - 2585m
C970 - 1852m
Total = 10.7km

RPS

SCALE 1 : 20000 @ A3

0 250 500 750 1000

COAL HANDLING PROCESS

FIGURE 2.7

DATE : OCTOBER 2010

DWG NAME : 104424-FIG-2-7

3 THE PROPOSED MODIFICATIONS

3.1 Introduction

This section describes the proposed modifications that have been subject to environmental assessment. The need for the proposed modification is outlined below. This is followed by an overview of the proposals. The alternatives considered are then identified including the way in which environmental issues have been taken into account in determining the nature of the modifications and the Do Nothing Scenario. The detailed description of the proposed modifications follows with respect to the Project Area that comprises:

- the two proposed longwalls, dewatering bore and associated infrastructure;
- the proposed modifications at the pit top; and
- continued use of the existing private haul roads for the transportation of coal by truck to Wallerawang and Mount Piper Power Stations.

3.2 Need for the Proposed Modification

As stated above, development activities within the current approval area are scheduled to be completed by October 2012 with longwall operations within the current extraction area planned to be completed by June 2014. At present, extraction of longwalls 920 to 950 has been completed, the extraction of 960 is approximately one third completed and 970 to 980 are yet to be mined. The proposed modifications are required to allow operations at Angus Place Colliery to continue to 2016.

Angus Place Colliery has a large mining tenement and during this period will undertake exploration activities to identify potential future mining areas that will provide an opportunity to continue operations. Future resource investigations are linked to the proposed Longwall 910 (see 3.5.1 below).

3.3 Overview of Proposed Modifications

Centennial Angus Place Pty Limited is applying under Section 75W of Part 3A of the EP&A Act for Project Modification Approval. The proposed modifications are:

- the development and extraction of two longwall panels including associated access headings:
  - Longwall 910 (options 1 and 2); and
  - Longwall 900 west (900W).
- an additional dewatering borehole located at the eastern end of longwall 910 and associated infrastructure comprising:
  - widening of an existing track (track leading to Black Fellows Hands Road4);

[4] Black Fellows Hands Road is currently in the process of a change of name to Mayiny-gu Marra-gu.

  - new section of track from the existing track to be widened to the proposed new dewatering bore;
  - powerline extension (either under or overground) along the access track to supply electricity to the dewatering bore;
  - extension of the Springvale Delta Water Transfer Scheme comprising an underground pipeline along the access track. This would enable the continued transfer of extracted groundwater to Wallerawang Power Station;
- increase in production limit from 3.5 Million tonnes per annum (Mtpa) to 4 Mtpa to make provision for 12 consecutive months of production in the event that Angus Place Colliery does not have a eight week shutdown due to a longwall changeover;
- modifications for the improvement of the dirty water management system at the pit top resulting from an assessment of the current Angus Place Colliery water management infrastructure and a proposed stock pile area. Continued use of the existing surface facilities at the pit top (consistent with the Project Approval of 2006); and
- An increase in full time staff from 215 to 225. There is also provision for up to 75 temporary contractors to assist with development activities over an approximate 15 month period.

Centennial Coal is in the process of consulting with Lithgow City Council about a Voluntary Planning Agreement for a potential fund for local community projects and local road maintenance. This would be in addition to the sum already available under the existing Project Approval.

Apart from the increased rate of coal production associated with not having a changeover period, operations at Angus Place Colliery would not alter from current regimes. Longwall and development mining equipment currently operating within Longwalls 960-980 would be re-deployed in the modification area.

Figure 3.1 shows the proposed modifications together with the existing mine.

The alternatives considered are outlined below and this is followed by the detailed description of the proposed modifications in Sections 3.5 to 3.7.

3.4 Alternatives Considered and the Do Nothing Scenario

The following types of alternatives have been considered by the proponent:

- Alternative location and size of longwalls
- Alternative extraction method
- Alternatives at the pit top
- Alternative method of coal transportation

These are outlined below together with the consideration of environmental issues that has been taken into account in determining the precise details of the proposed modifications. This has enabled the avoidance of potential adverse environmental effects where possible. Angus Place Colliery has been operated by the proponent since 2002 and during this time an EA was produced for the proposal that was subsequently approved in 2006 and a range of environmental management and monitoring plans have been established. This has resulted in a sound understanding of environmental issues and constraints in the area of the mine.

This is followed by an outline of the anticipated 'Do Nothing Scenario'.

3.4.1 Alternative Location and Size of Longwalls

Environmental issues have been taken into account in determining the size and location of each longwall (areas of secondary extraction) and the location of the dewatering bore and its associated infrastructure. In order to access the coal to the north of existing Longwall 920 a new Longwall 910 needed to be identified. The location and size of Longwall 910 has been adjusted and refined to avoid potential impacts. A rock formation was identified at the endpoint of Longwall 910. As a result, the endpoint was moved eastwards by approximately 100m from the old end point and also from the mains due west. Angus Place Colliery estimates that this has reduced the potential coal yield from this longwall by approximately 90,000 tonnes that would be sterilised.

A rock formation was identified due south of the area identified for Longwall 900W. As a result, the longwall's secondary extraction area was designed to ensure that the rock was beyond the subsidence area as an impact mitigation strategy. Furthermore Longwall 900W was reduced by approximately 46m from the northern end to enhance underground ventilation arrangements in the proposed workings. Angus Place Colliery estimates that this reduction has reduced the potential coal yield from this longwall by approximately 82,000 tonnes that would be sterilised.

The location of the proposed dewatering bore was identified as it is within proximity of existing infrastructure. The new bore requires a new access track, widening of an existing track, pipeline and power line connection to existing infrastructure. Disturbance associated with the construction of this new infrastructure has been minimised by making use of the route of an existing track with some widening and extended by 445m.

The objective is to access coal and therefore the consideration of alternative locations for the longwalls is limited by the location of the coal. The exact locations of the longwalls have been adjusted where feasible to take account of environmental issues. Whilst these adjustments have resulted in avoiding potential environmental effects they also result in areas of coal becoming inaccessible.

3.4.2 Alternative Extraction Method

As a means of assessing alternative mining methods suitable for utilisation at Angus Place Colliery, the viability of Bord and Pillar partial extraction mining was assessed by Strata Engineering (Australia) Pty. Ltd. during July 2010. Bord and Pillar partial extraction is often perceived as an alternative to the longwall method of mining, however is dependant on geological conditions as well as coal seam depth. As Angus Place Colliery extracts the Lithgow seam, which is typically greater than cover depths of 300m across the current SMP Approval area, the Bord and Pillar method is not considered viable. Essentially, Bord and Pillar mines require a stable roof to enable the delayed installation of roof support. Mine depth and stress, attributable to varying geological strata, have a significant impact on whether this is achievable. Stable cases within Australia generally range from 50m to 300m depth of cover. Strata Engineering has found that favourable Bord and Pillar conditions exist at a depth of cover <200m, with roof failure almost certain beyond this limit. Furthermore, it was concluded that there is no known precedent for a viable partial extraction operation under such circumstances in Australia. As a result the Bord and Pillar partial extraction method is not considered viable as an alternative to longwall mining in the current Project Area at Angus Place Colliery.

3.4.3 Alternatives at the Pit top

The proposed modifications to the stockpile area are to improve the management of dirty water (as described in Section 3.4) and approval is sought for a footprint that is no larger than existing.

The alternative to the proposed modifications would be the continuation of the existing water management system at the pit top. The proposed modifications are preferred because the improvements proposed

regarding the pit top stockpile would reduce Total Suspended Solids (TSS) concentrations at LDP002 due to increased retention time, allowing suspended particles to settle prior to being discharged.

3.4.4 Alternative Method of Coal Transportation

There are no proposed works to the existing haul roads. They form part of this modification because they are part of the ongoing mine life which is associated with the proposed new longwalls. The introduction of 80 tonne trucks to mix with the 50 tonne trucks results in efficiencies with hauling and ensures that existing compliance with noise limitations can be maintained. The increase in production limit does not necessitate increased truck movements beyond the daily allowable movements which are established by the noise limitations applying to the haul roads.

The haul roads were purpose built. There is no feasible alternative to the use of trucks for the transportation of coal to the two power stations that would result in reduced environmental effects.

3.4.5 The Do Nothing Scenario

Development activities within the current approval area are scheduled to be completed by October 2012, with longwall operations within the current extraction area planned to be completed by June 2014. In the event that the proposed modifications do not proceed, the following scenario is considered likely at this time.

It is likely that discussions would be held with the Department of Planning and/or further applications will be made in order to extend the mining operations and continue to supply coal to established markets. Whilst this occurs (beyond 2014) it is likely that operations, production and workforce would be scaled down.

3.5 Description of the Proposed Longwalls, Dewatering Bore and Associated Infrastructure

The location of the proposed longwalls, dewatering bore and associated infrastructure and the existing mine workings are shown on Figure 3.2.

3.5.1 Longwall 910

Longwall 910 is orientated in an east – west direction and is located parallel to the north of the existing 920 panel and is shown in Figure 3.3. Longwall 910 is located predominantly within ML 1424 and partially within CCL 704.

Two options are proposed for Longwall 910. This is because there may be a potential resource area situated to the north east of the proposed longwall area and, if this is the case, future access to this resource would be most efficient if it is accommodated within this proposed modification. A geological and geotechnical investigation, as well as a preliminary feasibility assessment, will be undertaken and the findings will inform the choice of option.

The two options for Longwall 910 are:

- Option 1: In the event that future opportunities identified above are not considered viable, Longwall 910 would be approximately 200m wide and 2,500m in length and allow the development of two mains headings (as shown on Figure 3.2). It is anticipated this would produce approximately 2,620,720 tonnes.
- Option 2: In the event that future opportunities identified above are considered viable, Longwall 910 would be approximately 120m wide and 2,500m in length to allow the development of four mains

headings (as shown on Figure 3.2) to enable future access to the resource in the north east. It is anticipated this would produce approximately 1,855,600 tonnes.

There is potential for seepage or in-rush to occur between the existing and proposed workings. An in-rush management plan has been developed that would be adopted during longwall development.

Longwall 910 maingate roadways would intersect the previously driven maingate roadways of Longwall 18. There is the possibility of localised water storage in Longwall 18 maingate roadways, which would be managed in accordance with the Angus Place Colliery Inrush Management System (as required under the Coal Mine Health and Safety Regulations, 2006). Due to the general seam dip to the north-east, known floor levels throughout the mine, and existing dewatering infrastructure in 300 Panel, it is not expected that additional long term dewatering infrastructure would be required to manage the interaction with these old workings.

3.5.2 Longwall 900 West

Longwall 900 West (900W) is located directly west of the existing 950-980 panels and is orientated perpendicular to these panels in a north - south orientation as shown in Figure 3.4. Development of longwall 900W would extend south beyond the 980 panel. Longwall 900W is located predominantly in CCL 704, with a small portion within ML 1424 and it would extend partially into Centennial Springvale's ML 1326.

Longwall 900W is planned to be approximately 284m wide and 2,080m in length. It is anticipated this longwall would produce approximately 3,009,810 tonnes. Longwall 900 west is located partially within the Springvale Mining Lease and, accordingly, a sub-lease (or equivalent) from Springvale will be required to enable full extraction of the resource.

3.5.3 Subsidence Predictions for Proposed Longwalls 910 and 900W

Mine Subsidence

The term 'subsidence' generally refers to the deformation of the ground mass surrounding a mine due to the mining activity. The term is a broad one, and includes all mining-induced ground movements, including both vertical and horizontal displacement, tilt, strain and curvature (NSW DoP, 2008).

The following sections provide an overview of mine characteristics, planning and design, and subsidence predictions for the current mining method used at Angus Place Colliery, which is proposed to be continued by this proposed modification. This includes discussion of the following aspects:

- Existing geological and geotechnical conditions for the mine;
- The risk-based and conservative approach to mine planning and design to prevent or minimise potential subsidence;
- Previous subsidence monitored in adjacent mined areas (using the current mining method);
- Subsidence predictions for proposed mining areas by the specialist subsidence consultant (Ditton Geotechnical Services) – the full Subsidence Prediction and Assessment report is provided in Appendix 3.1.

Existing Environment and Mine Design Constraints

The current and proposed workings are located within the Lithgow seam, which forms the lower 3.0 to 3.3m of the combined Lidsdale/Lithgow seam. The Lidsdale and Lithgow seams together form a full thickness of 7m. The depth of cover from the surface typically ranges from 300 to 350m, below a series of key strata units. Generally, the surface consists of a shallow residual or alluvial sandy soil cover to a depth of 1 to 5m overlying highly weathered sandstones of the Burralow Formation with low to very low strength. Massive, high strength sandstone units of the Narrabeen Group's Banks Wall and Burra-Moko Head Formations exist between depths of 50 to 200m and are likely to reduce subsidence to some degree (DGS, 2010).

Of primary interest within the strata is the Mount York Claystone, which is a 4 to 11m thick unit of medium to high strength claystone which separates from Burra-Moko Head unit from the overlying Banks Wall Sandstone. Importantly from a groundwater perspective, the Mount York Claystone forms a semi-impermeable aquitard between the lower aquifers present in the Narrabeen Group's Banks Wall Sandstone and those above in the Claystone within the Burra-Moko Head formation and Farmers Creek Formation (DGS, 2010). This is explored further in the hydrogeological section below.

In their work of July 2010, Strata Engineering (see 3.4.2), found that from a geotechnical perspective, the Angus Place roof rating is classed as weak due to the fact that the Lidsdale coal seam is situated directly above the Lithgow seam proposed for extraction. Also, coal is softer than most rock types and tends to attract less horizontal stress resulting in rapid failure following extraction. The Marrangaroo Conglomerate exists directly below the proposed extraction area.

Faults

DGS find that no major structures or lineaments have been identified above the proposed panels. Fault structures may reduce the ability of the overburden to span across the goaf areas, resulting in greater levels of subsidence. Previous experience in the current SMP Approval area has determined the presence of a known fault line known as the Wolgan Lineament, which exists at the eastern extent of longwalls 920 to 980. Compared to the observed subsidence of 1.1 m to 1.3 m that has occurred on the Newnes Plateau, a further 0.4 to 0.6 m of subsidence has developed along the Wolgan Lineament Zone at the eastern extent of the previously extracted longwalls 920 to 950.

Hydrogeology

Previous monitoring and assessments within the current SMP Approval area has determined the following sub-surface aquifers within the strata (AQ1 – AQ5) (Aurecon, 2010). They appear below in ascending order:

- AQ1 – The Lithgow Seam;
- AQ2 – Sandstone, coal and siltstones of the Farmers Creek Formation (include the Gap Sandstone Member, Middle River and Katoomba Coal Seams);
- AQ3 - Conglomeratic Sandstone in Narrabeen Group's Burra-Moko Head Formation;
- AQ4 – Conglomeratic Sandstone in lower Narrabeen Group's Banks Wall Sandstone; and
- AQ5 – Conglomeratic Sandstone in upper Narrabeen Group's Banks Wall Sandstone.

Aquifers AQ1 to AQ4 are defined as confined aquifers with the AQ5 defined as an unconfined aquifer. The Mount York Claystone forms a semi-impermeable aquitard between the AQ4 and AQ5 aquifers, and is approximately 200m above the Lithgow Seam. There are currently no privately owner groundwater extraction bores in the study area.

Sensitive Surface Features

The proposed panels exist below a portion of the Newnes State Forest, which is mainly vegetated by eucalypt tree species and shrubs where the terrain is gently undulated. Ephemeral drainage lines contributing to both the Wolgan River and Kangaroo Creek exist within the zero subsidence lines applicable to the two longwalls and are assessed in the Surface Water Assessment (Appendix 7.3).

An extensive fauna and flora monitoring program, as required under the current SMP Approval, has detected a number of Endangered Ecological Communities, and threatened species across the Newnes State Forest. Existing mitigation and monitoring strategies exist to manage the interactions between these significant surface features and mining activities.

The Newnes State Forest also exhibits sandstone cliff lines (>20m) and significant rock formations (pagodas), as well as several sites of aboriginal significance.

Existing infrastructure across the current SMP Approval area consists of forest access tracks, 66kV power lines and mine dewatering installations.

Previous Experience and Mine Design Development

Angus Place Colliery has undertaken an extensive array of subsidence modelling and assessment having already completed longwalls 920 to 950 within the current SMP Approval area, which is adjacent to the two study areas applicable to longwalls 910 and 900W. As such, the data obtained to date from longwalls 920 to 950 has aided the development of the subsidence predictions for longwalls 910 and 900W. To that end, the subsidence predictions presented in the report (Appendix 3.1) represent the credible worse-case scenarios for impact assessment and management strategy development.

Risk Based Planning Approach

Centennial utilises a risk-based approach with regard to the identification, assessment and management of potential subsidence impacts at Angus Place Colliery. The identification of potential hazards/impacts as part of the risk analysis were derived from Angus Place Colliery's extensive previous mining experience and through consideration of the issues raised during the original environmental assessments for Longwalls 920-980. Specifically with regard to subsidence, each mining area is the subject of specialist subsidence investigations and risk assessments to identify significant surface features, assess the adequacy of existing controls, and identify any additional mitigation or management measures required. Further details appear in Section 6.

Geological and Geotechnical Conditions

The longwall panels 900W and 910 have been designed to have nominal void widths of 293m and 210m respectively in the 3.25m thick Lithgow seam. Both the longwall mining and development heights in the panels will be equal to the seam thickness. The depth of cover ranges from 300 to 350m, giving critical panel width/cover depth ratios from 0.84 to 0.98 for longwall 900W and subcritical width/cover depth ratios of 0.6 to 0.68 for longwall 910. Additionally, Longwall 910 has been specifically designed to avoid the Wolgan Lineament Zone which has affected subsidence levels in the current SMP Approval area.

The geometries of Longwalls 910 and 900W are more confined than those longwalls within the existing SMP Approval area (i.e. 920 to 980). The design criteria have been strongly influenced by the existing underground workings, as well as the presence of significant surface features.

Hydrogeology

Although there has been drainage of coal measure strata in the area, the impact of previous mining on the groundwater regime in the overlying Banks Wall Sandstone Formation above the Mount York Claystone

appears to be negligible (Aurecon, 2010). This is because the Mount York Claystone is above the overburden fractured zone and acts as an aquiclude, preventing any drainage downwards into the mine. The subsidence assessment for the proposed modifications (Appendix 3.1) has confirmed that the zone of continuous fracturing above the mine would not reach the Mount York Claystone. The proposed longwall panels 910 and 900W are located adjacent to and between areas that have been previously extracted, so that the extraction of the additional panels would only have a marginal additional impact on the existing hydrogeological regime in the strata below the Mount York Claystone.

Sensitive Surface Features

The Subsidence Predictions and Impact Assessment by Ditton Geotechnical Services – see Appendix 3.1 - involved predicting the site specific levels of subsidence associated with the intentionally low impact design of longwalls 910 and 900W. Subsidence modelling enabled the development of a zero subsidence line, which exists as a surface boundary delineating between subsidence affected and non-affected areas. This is a powerful modelling tool when used in a risk based context with respect to identified sensitive surface features. Importantly from an impact assessment perspective, the zero subsidence line determined the study area of applicable specialist assessments.

The design of Longwalls 910 and 900W aimed to exclude any impact on Newnes Plateau Shrub Swamps based on the zero subsidence line. Whilst this was achieved, pockets of Newnes Plateau Hanging Swamp do exist within the zero subsidence line, however, predictions indicate that subsidence levels and associated impacts will be minor (DGS, 2010).

Existing infrastructure within the zero subsidence line areas include forest access tracks, a 66kV power line suspended above an area of longwall 900W as well as the proposed dewatering infrastructure required for the 910 borehole. Similar installations have historically been undermined without incident.

Subsidence Predictions

Predictions of worst case subsidence and potential impacts to existing and proposed surface features have been modelled by DGS based on site specific data and the Modified ACARP, 2003 empirical model. The predicted cumulative maximum final subsidence for the proposed panels ranges from 0.69 m to 1.09 m above longwall 910 and from 0.80 m to 1.47 m above longwall 900W, depending on cover depth. The subsidence predictions represent 21% to 45% of the assumed mining height of 3.25m. Based on supercritical longwall mining experience in the NSW western coalfields, maximum subsidence is unlikely to exceed 60% of the mining height or 1.95m. This scenario represents 'non-bridging' behaviour of the overburden.

DGS find that the surface above the previously extracted longwalls 920 and 930 is expected to subside a further 0.15 m to 0.7 m due to compression of chain pillars after the extraction of longwall 910. The associated tilts and strains are not expected to increase by more than 10 % and may decrease due to the reduction in differential subsidence.

Specific subsidence related impacts are discussed further with respect to relevant key environmental issues which appear in Section 7.

A Subsidence Management Plan application relevant to the proposed new longwalls will be made.

DGS predict the following impacts:

- Minor surface cracking and shearing ranging in width from 1mm to 20mm.
- Tapered vertical cracks of up to 90mm in width where surface rock exposures exist.
- Known cliff lines exist outside the angle of draw and therefore, it is unlikely that cracking of cliff lines would occur.

- Increase or decrease of surface gradiants of up to 0.5% along water courses or gullies above the proposed longwalls with a minor increase in erosion and sedimentation along creek beds.
- Gully stormwater or groundwater seepage flows may be rerouted to sub-surface flow paths via surface cracking. It is understood that system losses are very low, and would likely recover in the long term.
- Ponding depths of < 0.1 m may develop along creeks and flatter areas beneath the proposed longwalls. Increases in existing ponded areas and creation of new ponds may occur although these would be in-channel and unlikely to cause significant environmental impacts.
- Due to the high depth of cover and proposed mining geometry, it is very unlikely that there a direct hydraulic connection would develop between the surface to the mine due to fracturing. The presence of the Mount York Claystone unit between the Burra Moko Head and Narrabeen sub-groups are also likely to reduce groundwater seepages.
- Existing tracks above the proposed longwalls are likely to be subsided and may also be affected by vertical cracking and shearing. Typically these would be between 1mm and 20 mm with a worst case of 90 mm. Approximately 50 m to 100 m of road above each longwall may be impacted by cracking.
- The poles of the existing suspended 66kV powerline may be subject to subsidence of between 0.5m and 1m, tilts of <5.5 mm/m and strains of +/- 2 mm/m.
- The proposed pipeline and powerline above proposed longwall 910 is likely to be subsided. Therefore, this would be taken into account in the design of the pipeline and powerline and there would be regular inspections.

Combined effects of both the existing coal mine together with the proposed modifications

The Subsidence Prediction and Assessment Report (DGS, 2010) at Appendix 3.1 provides drawings showing:

- Cumulative contours for the approved longwalls and proposed modifications (Figure 17a in Appendix 3.1)
- Subsidence contours for the approved longwall layout only (Figure 17b in Appendix 3.1)
- Subsidence contours for proposed longwalls (Figure 17c in Appendix 3.1 - showing the difference between 17a and 17b)

The cumulative effect of the subsidence associated with both the existing/approved and proposed longwalls shows an extended overall area of subsidence of up to 1.0 m to the north and south west of the existing subsidence area. There is also an increase in the predicted subsidence over longwall 920, and ranged from 1.1m (due to the existing longwalls) to 1.5m (both existing and proposed).

Ponding depths of < 0.1 m may develop along creeks and flatter areas beneath the proposed longwalls (DGS, 2010).

Environmental Impacts from the Subsidence Predictions

The predictions from the subsidence report have been used by the specialist assessors to determine the environmental impacts and consequences that would result from the predictions. Table 3.2 below identifies the links between the subsidence predictions and the specialist assessments that are summarised in Section 7 Environmental Assessment (with the detailed reports appended).

Table 3.2 Links Between Subsidence Predictions and Specialist Assessments

Subsidence Prediction	Surface Water	Hydrogeology	Soils and Land	Rehabilitation	Biodiversity	Cultural Heritage	Other
Modelled area of subsidence	✓	✓	✓	✓	✓	✓	
Minor surface cracking and shearing	✓	✓	✓	✓	✓		
Tapered vertical cracks		✓	✓				
Cracking of cliff lines						✓	
Increase or decrease of surface gradiants along water courses or gullies	✓	✓	✓				
Erosion and sedimentation along creek beds	✓		✓				
Rerouting of gully stormwater or groundwater seepage flows	✓	✓					
Ponding	✓		✓		✓		
Fracturing		✓			✓		
Vertical cracking and shearing of existing tracks			✓	✓			
Subsidence of poles of the existing suspended 66kV powerline.							Regular inspections recommended
Subsidence of proposed pipeline and powerline							Detailed design of pipeline and powerline and regular inspections recommended

The subsidence report (DGS, 2010) also identifies the mitigation measures. These are identified in Table 3.3 below together with the way in which these have been taken forward.

Table 3.3 Subsidence Mitigation Measures and How Taken Forward

Subsidence Mitigation Measure	How Taken Forward
Repairs to wider and deeper cracks within roads and public access areas in consultation with Forests NSW.	Relevant existing management plans, processes and protocols to be reviewed as set out in Section 8 Statement of Commitments.
Warning signs should be erected for areas that will be subsided.	Relevant existing management plans, processes and protocols to be reviewed as set out in Section 8 Statement of Commitments.
In the event of a worst case scenario, remediation of dry creek beds where cracking causes instability or loss of flows may be necessary.	The Surface Water Assessment (GHD, 2010) explains that the cracks would be temporary as sediments are deposited in cracks during storm events. Therefore, it is unlikely that remediation would be necessary.

Subsidence Mitigation Measure	How Taken Forward
Regular inspections and surveys of the suspended 66kV powerline poles and conductors.	Relevant existing management plans, processes and protocols to be reviewed as set out in Section 8 Statement of Commitments.
Provision of appropriate flexible sheaving to powerline poles to control tension in the conductors during and after mining impacts.	Relevant existing management plans, processes and protocols to be reviewed as set out in Section 8 Statement of Commitments. In particular, design measures to be taken into account.
Design of proposed pipeline and powerline to consider the predicted deformations in relation to flexible couplings, joint strengths and strain transfer characteristics of protective sheathing.	Relevant existing management plans, processes and protocols to be reviewed as set out in Section 8 Statement of Commitments. In particular, design measures to be taken into account.
Regular inspections of the proposed pipeline and powerline.	Relevant existing management plans, processes and protocols to be reviewed as set out in Section 8 Statement of Commitments.
Surface monitoring lines should be installed at relevant locations to provide accurate measurements of subsidence.	Relevant existing management plans, processes and protocols to be reviewed as set out in Section 8 Statement of Commitments.
A monitoring program is proposed as set out in the Subsidence Prediction and Assessment Report (DGS, 2010) in Appendix 3.1, Section 10.2.	Relevant existing management plans, processes and protocols to be reviewed as set out in Section 8 Statement of Commitments.

3.5.4 Installation of an Additional Dewatering Bore, Power Line and Access Track

To effectively manage the groundwater in the proposed longwall workings, it is necessary for an additional dewatering bore to be established at the eastern end of Longwall 910. Water from this dewatering bore would be managed in a similar fashion to other underground water. This ensures a settling period prior to it being pumped to the surface and directed into the existing Springvale Delta Water Transfer Scheme.

The location for the bore would be at E236165 N6305834. The installation of the dewatering bore would require the drilling of a bore using a drill rig, the lining of the bore and fitment of the appropriate bore casing, installation of a suitable pump, construction of a secure compound, and connection to a power source. The area required for the proposed dewatering bore is 2,796m^2. An appropriate groundwater license would be sought from the NSW Office of Water.

The dewatering bore would require associated infrastructure comprising access track, a powerline to the site to supply the pump and other equipment and a pipeline to link to the Springvale Delta Water Transfer scheme. The location of the dewatering bore compound and the route of the access track, powerline and pipeline are shown in Figure 3.5. The route selected for the track, pipeline and powerline has been chosen to minimise environmental impact due to clearing and soil disturbance. It follows an existing access track, which runs off Black Fellows Hands Road, for most of the route (approximately 1.4km) and this would need to be widened from approximately 5m to 25m. A new section of track would need to be constructed from the widened track to the borehole and this would be 445m in length and 25m in width. The total length of the existing plus proposed section of track would be approximately 1.9km and the width 25m. The new and existing track would be located within a 50m corridor as shown on Figure 3.5.

The areas that would require clearing of vegetation are therefore as follows:

- Compound for dewatering bore – 2,796m^2
- New track - 445m length x 25m width = 11,125m^2

- Widening of existing track:
  - existing southern track 177m length x 20m (25m less 5m existing track) = 3,540m^2
  - existing northern track 1,232m length x 20m = 24,640m^2
  - Total area of widening of existing track = 28,180m^2

It is proposed to extend the existing pipeline to the proposed dewatering bore from LDP6 enabling water pumped to the surface to be additionally transferred via the Springvale Delta Water Transfer Scheme. A trench for the placement of a poly pipeline would be excavated approximately 0.5 - 1m in depth along the access route. The powerline would either be under or overground and the area of clearance identified above relates to the widest area.

The track would need to be kept open after construction to allow access for maintenance of the bore. Construction of the track would be in accordance with Forests NSW guidelines and technical bulletin for the construction of access tracks in State Forests and would be subject to approval from Forests NSW.

Centennial Angus Place Pty Limited will seek a modification to existing occupation permit for Angus Place Colliery.

3.6 Description of the Proposed Increase in Production Limit from 3.5Mtpa to 4Mtpa

As part of this modification application, it is proposed to increase the annual allowable production limit from 3.5Mtpa to 4Mtpa. This increase would be effective immediately upon approval.

Due to the cyclical nature of longwall mining, this would allow for those years which experience continuous extraction of the coal resource due to no longwall change over period. A typical longwall changeover takes 8 weeks. If this downtime can be avoided, a larger amount of coal is produced within a 12 month period. It is not anticipated that production would increase due to process improvements.

There would be an increase in the quantity of coal transported to Wallerawang and Mount Piper power stations during those years which do not experience a longwall changeover. The increase in coal volume would not result in an increase in truck movements although a mix of 50 and 80 tonne trucks would be used (50 tonne trucks are used at present). All trucks would continue to travel the private haul roads and would not use the local road network.

The Noise Impact Assessment (Heggies, 2010b) has identified the limit to the number of truck movements in order for haulage to comply with noise limitations identified within the existing approval and haul road consent. These are:

- From Angus Place Colliery to Wallerawang on the Wallerawang haul road:
  - Daytime (7.00 to 18.00) – 10 loads per hour.
  - Evening (18.00 to 22.00) – 8 loads per hour.
  - Night-time (22.00 to 7.00) – No truck movements permitted.
- From Angus Place Colliery to Mount Piper on the Mount Piper haul road:
  - Daytime (7.00 to 21.30) – 8 loads per hour.
  - Night-time (21.30 to 7.00 – 5 loads per hour.

Existing haulage does not exceed the above truck movements.

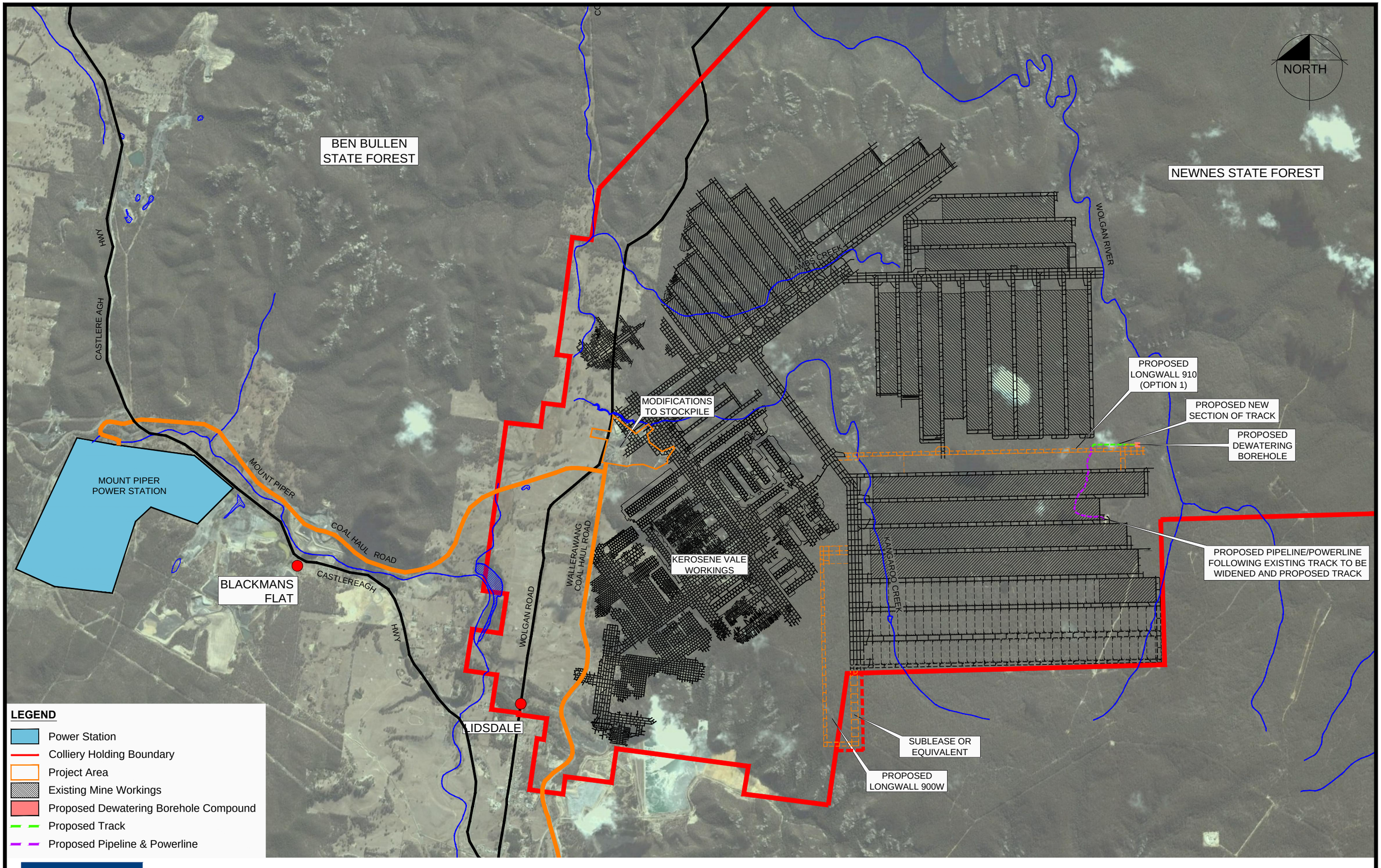
3.7 Description of the Proposed Modifications at the Pit Top

The pit top surface infrastructure has the capacity to accommodate the increased limit to production within a twelve month period. However, it is proposed that the dirty water management system at the pit top be improved and that a stockpile area be identified.

From an existing assessment, a specific issue has been detected to occur at the ROM stockpile. At present, contaminated runoff from the stockpile, as a result of heavy rainfall, is channelled through the car park drainage system directly to two shallow sediment ponds prior to discharge via Licensed Discharge Point 002. The solution identified comprises a specific modification to the pit top dirty water management system that aims to ensure that all contaminated stockpile runoff will be diverted to the CHP sediment ponds, increasing residence time and enhancing settling ability. This would better control dirty water and improve the standard of water leaving the stockpile.

The works comprise the demolition and replacement of the existing spillways as well as raising of sections of the existing embankments. In addition to the pollution pond upgrade works, it is proposed to construct a dirty water diversion along the northern boundary of the ROM stockpile area. This dirty water diversion would include a trapezoidal dish drain and a series of impermeable barriers to contain sediment laden water within the ROM stockpile area. This diversion drain would then direct the dirty water to the primary pollution ponds. It is also proposed to re-align the existing clean water diversion to the west.

The stockpile area is shown on Figure 3.6. This would be maintained through operational efficiencies in coal handling and management and would allow an increase in production without encroachment into the proposed diversion drains.



RPS

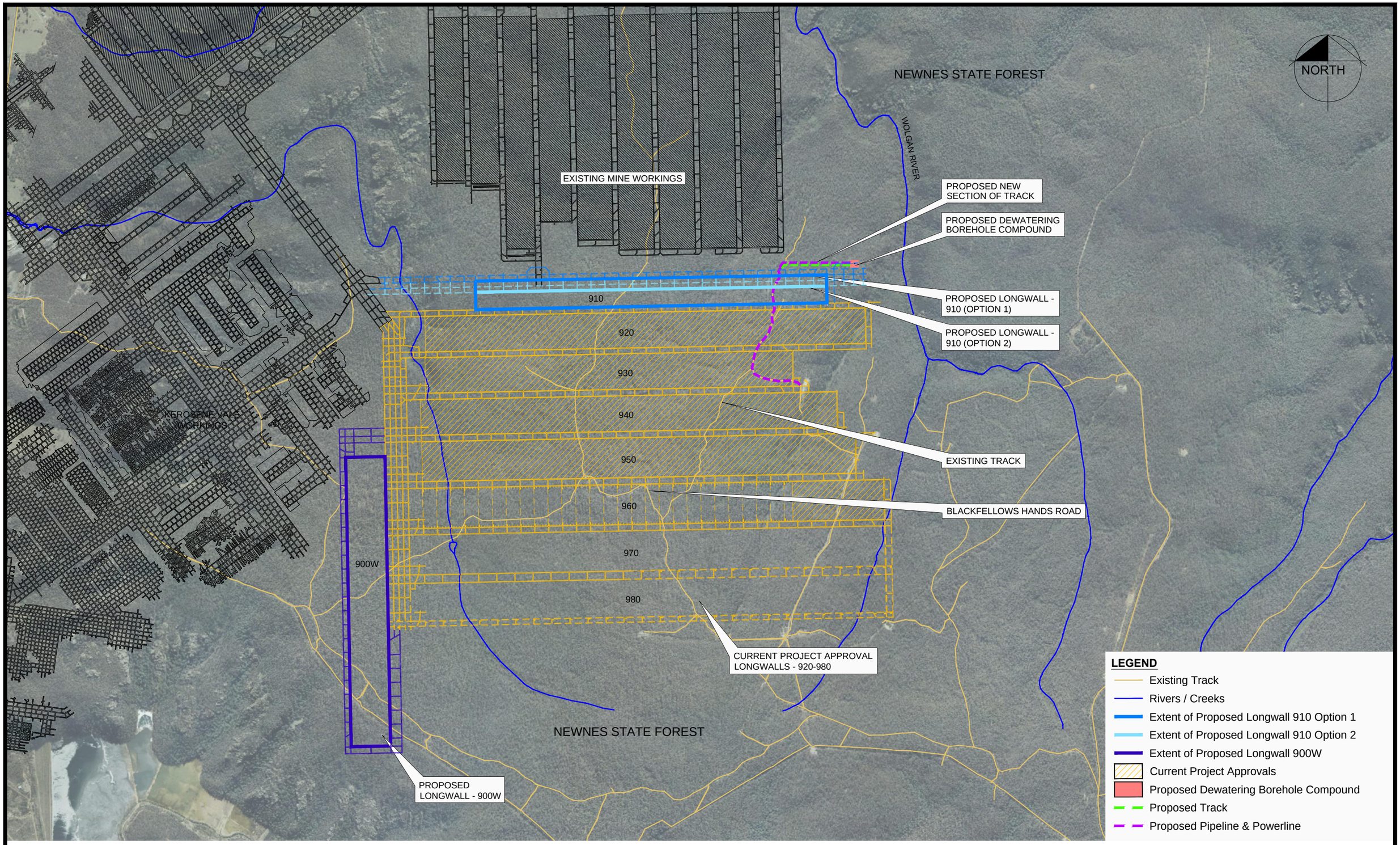
SCALE 1 : 40000 @ A3

0 500 1000 1500 2000

EXISTING MINE WITH PROPOSED MODIFICATIONS

FIGURE 3.1

DATE : OCTOBER 2010 DWG NAME : 104424-FIG3-1



RPS

SCALE 1 : 25000 @ A3

0 250 500 750 1000

DATE : OCTOBER 2010 DWG NAME : 104424-FIG3-2

PROPOSED LONGWALLS, DEWATERING BORE & ASSOCIATED INFRASTRUCTURE

FIGURE 3.2

EXISTING MINE WORKINGS

NORTH

WOLGAN RIVER

910

PROPOSED LONGWALL - 910 (OPTION 1)

PROPOSED LONGWALL - 910 (OPTION 2)

KANGAROO CREEK

KEROSENE VALE WORKINGS

900W

LEGEND

- Existing Track
- River/Creek
- Tributary
- Extent of Proposed Longwall 910 Option 1
- Extent of Proposed Longwall 910 Option 2
- Extent of Proposed Longwall 900W

RPS

SCALE 1 : 15000 @ A3

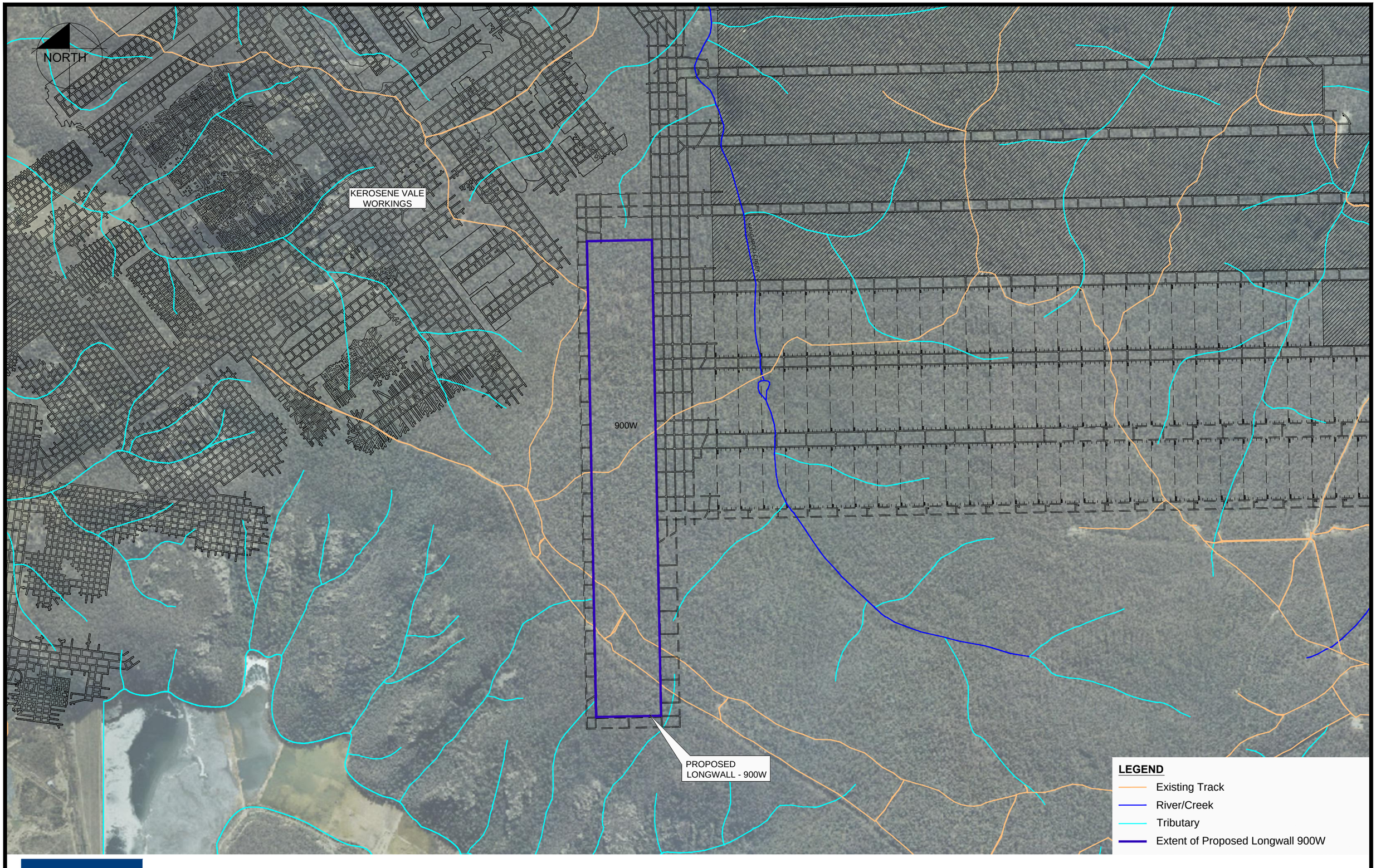
0 200 400 600 800

PROPOSED LONGWALL 910

FIGURE 3.3

DATE : OCTOBER 2010

DWG NAME : 104424-FIG3-3



RPS

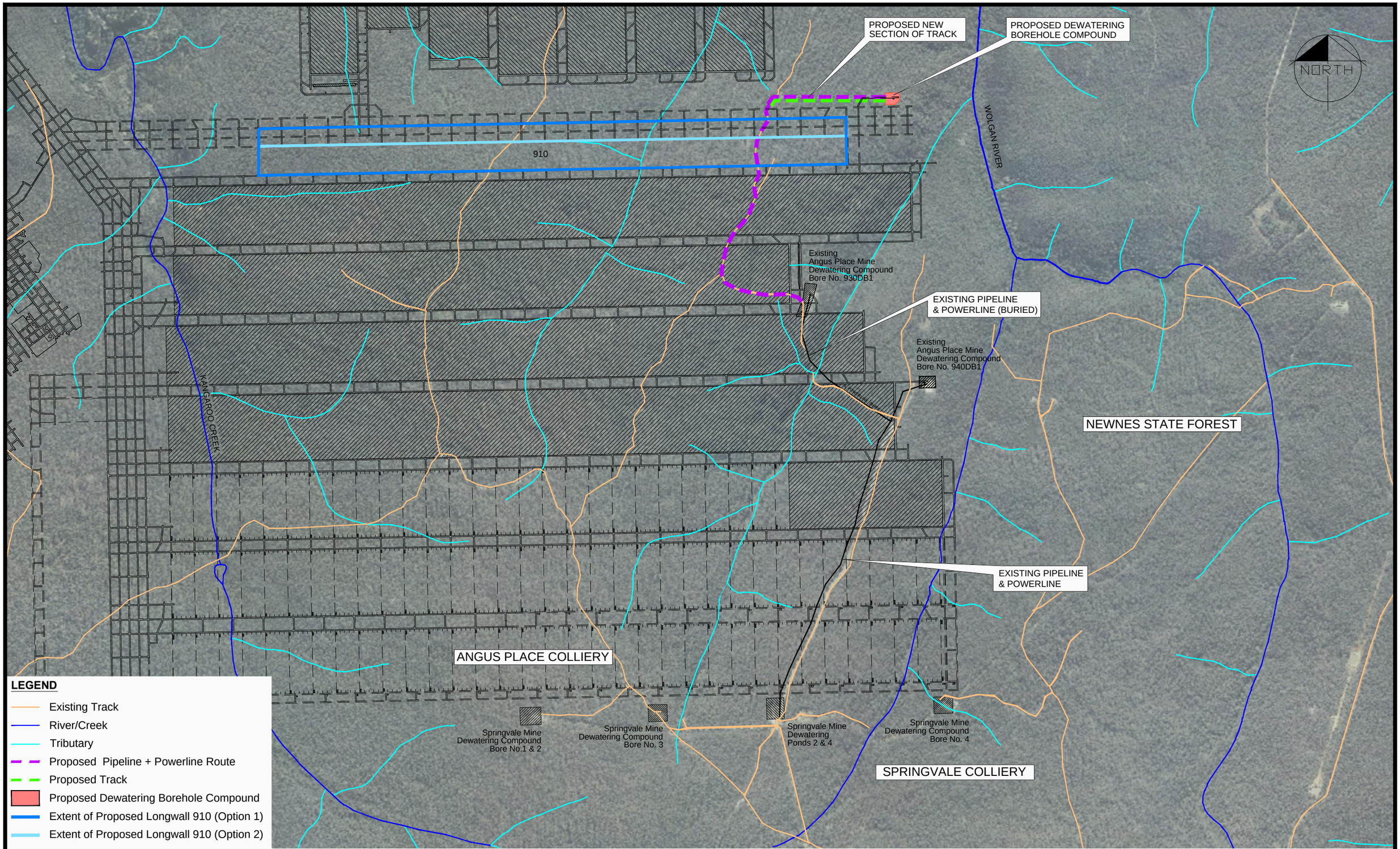
SCALE 1 : 15000 @ A3

0 200 400 600 800

PROPOSED LONGWALL 900W

FIGURE 3.4

DATE : OCTOBER 2010 DWG NAME : 104424-FIG3-4



RPS

SCALE 1 : 15000 @ A3

0 250 500 750

PROPOSED DEWATERING BOREHOLE & ASSOCIATED INFRASTRUCTURE

FIGURE 3.5

DATE :OCTOBER 2010 DWG NAME : 104424-FIG3-5

NORTH

LP

WIND SOCK

HELIPAD

WINDER BUILDING

M & M DRIFT

STORAGE AREA

BELT No.1 DRIFT
Surface RL 913.85
Seam RL 849.43

66K

912.5

FILTER POND

POLLUTION POND

POLLUTION POND

POLLUTION POND

R.O.M. STOCK PILE
Potential Capacity (Approx)= 90,000 t
Area = 15,590sqm / Perimeter = 690m

920

DIESEL TANK

922.5

CRUSHER BUILDING

227250 litres
FRESH WATER TANK

P

LEGEND

Stockpile Area

RPS

SCALE 1 : 1000 @ A3

0 10 20 30 40 50

PIT TOP - STOCKPILE AREA

FIGURE 3.6

DATE : OCTOBER 2010

DWG NAME : 104424-FIG3-6

4 CONSULTATION

A Stakeholder Engagement Plan has been drafted and implemented for the modification proposal. The Stakeholder Engagement Plan has three principle aims:

- Raise awareness of the proposal within the Councils, Government Agencies, key stakeholders and the local community;
- Provide opportunities for all Government Agencies, stakeholders and interested parties to comment on and provide feedback; and
- Provide opportunities for Centennial Coal to interact with the Council, Government Agencies, key stakeholders, adjacent residents and the local community.

The objectives of the consultation were to provide accurate information to the Councils, Agencies, community, and relevant stakeholders, and to provide an information pathway to the community and stakeholders utilising the established Community Consultation Committee and the regional Centennial west news page featured monthly in the Lithgow Mercury.

4.1 Community Consultation

The current operations at Angus Place Colliery were subject to Project Approval in 2006 and are detailed in the Environmental Assessment document *Angus Place Colliery – Proposed Mining and Coal Transport – Environmental Assessment January 2006* prepared by International Environmental Consultants Pty. Ltd. As part of the application process relevant stakeholder groups including government and private organisations were consulted and had the opportunity to provide feedback and comment on the proposal. The comments that were received from this consultation process were considered and where appropriate the development was modified to reflect the comments and advice of the government and the wider general public. In addition to this, Angus Place Colliery established a Community Consultation Committee and now publishes articles regularly in the monthly Centennial west news page featured monthly in the Lithgow Mercury.

Community consultation for this modification application has extended from the outcomes of the current Part 3A approval, with the community advised of the proposed modification through the Angus Place Community Consultation Committee (see Table 4.1 Consultation Schedule below) and regional news page.

Furthermore, Centennial has engaged with the wider regional community by including an article outlining the Project in the June edition of the Lithgow Mercury.

A newsletter will also be produced to be provided to local community members, informing them of the proposed modifications, as well as the approval pathway and supporting Environmental Assessment process. The newsletter will be distributed, door to door, to residents in the immediate vicinity of Angus Place Colliery.

4.2 Agency Consultation

Angus Place Colliery formally advised the Department of Planning in writing of the proposed modification in correspondence dated 17th February 2010. The correspondence provided an overview of current Angus Place Colliery operations, the proposed modification, advised of the consultation that had commenced with relevant stakeholders and requested the Director General's Requirements for the environmental assessment in relation to the proposed modification.

Consultation with the relevant agencies is set out in Table 4.1 below. Consultation in relation to the findings of the environmental assessment is ongoing.

Table 4.1 Consultation Schedule

Agency	Date of Consultation	Type or From/To	Topics
Angus Place Community Consultative Committee	02/12/09	Meeting Centennial to APCCC	Preliminary discussion about the 75W modification
	28/07/10	Meeting	Presentation of proposed modification components – revised project description
Bathurst Local Aboriginal Land Council	05/01/10	Letter RPS to BLALC	Stage 1 archaeology letter
	25/01/10	Letter RPS to BLALC	Stage 2 ICCR letters sent with map and field survey methodology
	03/02/10	BLALC to RPS	Expression of interest to be involved in survey.
	15/02/10	Letter BLALC to RPS	Notification stating that BLALC have no objections to the proposals
Commonwealth Department of Environment, Water, Heritage and the Arts	17/02/10	Letter Centennial to DEWHA	Notification of proposed modification
	01/07/10	Meeting	DEWHA initial view is that the proposed modification is not part of the original 2006 State Approval and therefore not part of a larger action. Centennial to prepare a referral on this basis
Department of Environment, Climate Change and Water NSW	05/01/10	Letter RPS to DECCW	Stage 1 archaeology
	14/01/10	DECCW to RPS	Response to Stage 1 archaeology
	17/02/10	Letter Centennial to DECCW	Notification of proposed modification
	06/09/10	Meeting	Presentation of 75W major components.
Department of Planning	17/02/10	Letter Centennial to DoP	Notification of proposed modification and request for Environmental Assessment Requirements
	24/03/10	Telephone DoP to Angus Place Colliery	Request for additional information about the proposed modification
	15/04/10	Letter Centennial to DoP	Project application submission
	01/06/10	Letter	Provision of Director general's

Agency	Date of Consultation	Type or From/To	Topics
		DoP to Centennial	Requirements. Letters from agencies consulted also enclosed.
Forests NSW	17/02/10	Letter Centennial to Forests NSW	Notification of proposed modification
	09/07/10	Telephone Forests NSW to Angus Place Colliery	Discussion about issued DGRs
Gundungurra Tribal Council Aboriginal Corporation	13/08/10	Meeting	Presentation of 75W major components
Industry and Investment NSW	17/02/10	Letter x 2 Centennial to I&I	Notification of proposed modification
	09/06/10	Meeting	Presentation of 75W major components
Lithgow City Council	05/01/10	Letter RPS to LCC	Stage 1 archaeology
	12/01/10	Letter LCC to RPS	Response to Stage 1 archaeology
	17/02/10	Letter RPS to LCC	Notification of proposed modification
	02/08/10	Meeting	Introduction to proposed modification project and initial discussion on a voluntary planning agreement.
	08/09/10	Meeting	Discussion on voluntary planning agreement.
	15/09/10	Letter Centennial to LCC	Confirmation of VPA discussions held during 8 September meeting.
Mine Subsidence Board	20/09/10	Letter Centennial to MSB	Notification regarding proposed modification..
Mingaan Aboriginal Corporation	25/01/10	Letter RPS to MAC	Stage 2 ICCR letters sent with map and field survey methodology
	28/01/10	Letter RPS to MAC	Outline of project methodology and map of study area
	01/02/10	Telephone call MAC to RPS	Expression of interest to be involved in the survey
	17/02/10	Letter MAC to RPS	Notification stating that MAC have no objections to the proposal
NSW Office of Water	17/02/10	Letter Centennial to NSW Office of Water	Notification of proposed modification
	09/06/10	Meeting	Presentation of 75W major components
Pine Dale Mine Management	23/09/10	Meeting	Presentation of 75W major components

Agency	Date of Consultation	Type or From/To	Topics
			and discussion
Sydney Catchment Authority	17/02/10	Letter Centennial to SCA	Notification of proposed modification
Warrabinga Native Title Claimants Aboriginal Corporation	25/01/10	Letter RPS to WNTCAC	Stage 2 ICCR letters sent with map and field survey methodology
	03/02/10	Telephone call WNTCAC to RPS	Expression of interest to be involved in the survey

Any consultation undertaken for the specialist assessments is identified within the reports that are appended to section 7.

Centennial will continue to seek ongoing dialogue to support the proposed modification and will include outcomes of consultation with the EA.

5 PLANNING CONTEXT

5.1 Commonwealth Legislation

5.1.1 The Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DEWHA).

Under the EPBC Act, approval by the Environment Minister is required for any action that may have a significant impact on matters of national environmental significance. The relevant provision of this legislation relates to potential impacts on migratory species, threatened species, or ecological communities listed under the EPBC Act.

A separate referral will be made under the Environment Protection and Biodiversity Conservation Act 1999 as appropriate.

5.1.2 National Greenhouse and Energy Reporting Act 2007

The National Greenhouse and Energy Reporting Act 2007 (NGER Act) came into effect on 29 September 2007 and introduces a single national reporting framework for the reporting and dissemination of information about greenhouse gas emissions, greenhouse gas projects and energy use, and production of corporations. The first annual reporting period began on 1 July 2008 (DCC, 2008). The NGER Act makes registration and reporting mandatory for corporations whose energy production, energy use or greenhouse gas emissions meet specified thresholds. Centennial reports emissions from the corporation which includes those from the Angus Place Colliery.

5.1.3 Native Title Act 1993

The Native Title Act (NTA) recognises that Aboriginal people can have rights and interests to land which derives from their traditional laws and customs. Native title rights can include rights to: live on the land, access the land for traditional purposes, protect important places and sites, collect food and medicinal resources from native plants, hunt and fish, teach traditional law and customs, and to have input into landuse practices and development planning. Native title can be negotiated in three ways; through a Native Title Claim (applications and determinations), through an Indigenous Land Use Agreement (ILUA), or future act agreements.

An ILUA is an agreement between a native title group and other parties who use or manage the land and waters. The ILUA process allows for negotiation between indigenous groups and other parties over the use and management of land and water resources, as well as providing a means for coming to a formal agreement. ILUA are binding once they have been registered on the Native Title Tribunal's Register of Indigenous Land Use Agreements.

Lands within the Project Areas are subject to an ILUA which was entered into on the 31 January 2003 by the Gundungurra Native Title Claim Group, the Gundungurra Tribal Council Aboriginal Corporation and Centennial Springvale Pty Ltd, Springvale SK Kores Pty Ltd, Coalex Pty Ltd, Centennial Coal Company Ltd, Centennial Angus Place Pty Ltd and Ivanhoe Coal Pty Ltd. As such, these Centennial Companies are bound by the terms of the ILUA which are set out in the Master Deed.

Clause 5 and 6 of the Master Deed outline Centennials obligations. The Deed is subject to a confidentiality clause (being clause 18) and as such detailed commentary regarding the Deed, between the Wonnarua people and Centennial, are not provided in this document.

5.2 Environmental Planning and Assessment Act 1979

Project Approval (06_0021) for the extraction of Longwalls 920 to 980 at Angus Place Colliery was approved under the provisions of Part 3A of the EP&A Act in 2006. Centennial Angus Place Pty Limited is now seeking to amend this project approval under Section 75W of the EP& A Act. This Environmental Assessment has been prepared to accompany the Section 75W modification.

5.2.1 Section 75W Approval Process

Section 75W of Part 3A of the EP&A Act relates to "Modification of Ministers Approval". This section of the EP&A Act is detailed below and outlines the process that is being implemented for this application.

1) In this section, "Ministers approval" means an approval to carry out a project under this Part, and includes an approval of a concept plan. "Modification of an approval" means changing the terms of a Minister's approval, including:

a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and

b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.

2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.

3) The request for the Minister's approval is to be lodged with the Director – General. The Director - General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.

4) The Minister may modify the approval (with or without conditions) or disapprove of the modification.

5.3 Ecologically Sustainable Development (ESD)

Ecologically Sustainable Development (ESD) has emerged as a primary objective of environmental protection in NSW. ESD is an objective of the EP&A Act under Section 5(a)(vii) and is defined under Section 4 of the EP&A Act as having the same meaning as Section 6(2) of the Protection of the Environment Administration Act 1991 being:

> *6(2) for the purposes of subsection (1)(a), ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:*
>
> *(a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation...*

(b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services….

The overall objectives of ESD are to use, conserve and enhance natural resources. This ensures that ecological processes are maintained facilitating improved quality of life, now and into the future.

Angus Place Colliery has shown a commitment to the principles of ESD and understands that social, economic and environmental objectives are interdependent. Angus Place Colliery acknowledges that a well designed and effectively managed operation will avoid significant and/or costly environmental impact or degradation. The risk adverse mine plan and the suite of existing environmental management plans have been developed to appropriately identify, mitigate and manage environmental risk. These demonstrate environmental due diligence and provide procedures for on-going management and monitoring of the operation in line with the objectives of ESD.

5.3.1 The Precautionary Principle

The Precautionary Principle, in summary, holds that where there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

A precautionary and conservative mine plan has been employed to prevent or minimise potential subsidence impacts to the surface environment and infrastructure, including the following:

- reduction in the size and location of each longwall to take into consideration sensitive surface features such as rock formations;
- specialist subsidence assessment by Ditton Geotechnical Services Pty Ltd (Appendix 3.1) for the proposed longwalls;
- location of proposed dewatering bore to minimise environmental impacts;
- detailed surface water assessment for the Pit Top to improve the management of water at the site; and
- a risk-based approach to subsidence impact assessment and management including specialist environmental studies for key environmental aspects as outlined below.

A detailed understanding of the issues and potential impacts associated with the proposed modification has been obtained via consultation and assessment to a level of detail commensurate with the scale of the scheme, industry standards and the legislative framework under which the scheme is permitted. Specialist assessments, including the use of engineering and scientific modelling, have been undertaken for the design of the mine and for impacts relating to, groundwater, surface water, Aboriginal heritage, traffic and transport, subsidence, European heritage, noise, air quality (including greenhouse gas), and flora and fauna. Assessment has also been undertaken for other issues, including hazards and socio-economic considerations. To this end, there has been careful evaluation undertaken in order to avoid, where possible, serious or irreversible damage to the environment.

5.3.2 Social Equity, Inter-Generational Equity

Intergenerational Equity is centred on the concept that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. There is a moral obligation to ensure that today's economic progress, which will benefit both current and future generations, is not offset by environmental deterioration.

The primary objective of the proposed modifications is to allow continued operations of the existing Angus Place Colliery and maintain continuity of coal production from existing and proposed mining areas, optimising resource recovery for the life of mine in an environmentally and socially responsible manner. The various consultation activities that have been undertaken (see Section 4) and the engagement of suitably qualified and experienced consultants have ensured that the planning, design and environmental assessment phases of the proposed modifications have been transparent. The contents of this EA report (including appendices), combined with the consultation activities, has enabled the Angus Place Colliery to understand the potential implications of the proposed modifications, and therefore identify the required management strategies, mitigation measures and monitoring activities to ensure potential for impact is appropriately minimised.

The management strategies, mitigation measures and monitoring programs have been identified to minimise adverse impact upon the local environment and the nearby communities of Lidsdale and Blackman's Flat Villages. Emphasis has been placed on anticipation and prevention of potential impacts, as opposed to undertaking later remedial action.

These actions and initiatives will assist in ensuring that current and future generations can enjoy equal and equitable access to social, environmental and economic resources through the maintenance of the health, diversity and production of the environment.

5.3.3 Conservation of Biological Diversity and Ecological Integrity

The principle of Conservation of Biological Diversity and Ecological Integrity holds that the conservation of biological diversity and ecological integrity should be a fundamental consideration for development proposals.

The potential environmental impacts of the proposed modifications, including upon ecological communities and habitat values, and measures to ameliorate these potential impacts are detailed within this EA. The Angus Place Colliery has sought to avoid and minimise potential impacts on ecological values through a risk based approach that eliminates or minimises surface subsidence impacts on the surrounding ecology. A specialist ecological investigation was undertaken for the proposed modifications (including identification and assessment of any Endangered Ecological Communities (EEC)), which indicated that there were no significant impacts identified on vegetation communities, threatened flora and fauna, or to the connectivity of habitats (Appendix 7.7).

Notwithstanding this, in accordance with obligations under the EPBC Act (Commonwealth legislation), the proposed modifications will be referred to the Federal Department of Environment, Water, Heritage, and the Arts (DEWHA) for determination.

5.3.4 Improved Valuation and Pricing of Environmental Resources

The principle of Improved Valuation, Pricing and Incentive Mechanisms deems that environmental factors should be included in the valuation of assets and services. The cost associated with using or impacting upon an environmental resource is seen as a cost incurred to protect that resource.

Whilst clear and widely accepted standards have not yet been established for the application of this principle (to date there are few widely accepted methods by which monetary values are attributed to environmental

factors), Angus Place Colliery acknowledges and accepts the financial costs associated with all the measures required for the mine to avoid, minimise, mitigate and manage potential environmental and social impacts for the proposed modifications.

Furthermore, if the extraction of approximately 5 million tonnes of coal resources is not recovered by Angus Place Colliery as part of the proposed modifications, the likelihood of the resource being extracted in the future is considered low. The high cost of re-establishing within the site, compared to the additional coal quantity, would likely result in that resource being isolated and sterilised. Angus Place Colliery will optimise the valuation and pricing of the coal resources through continued use of existing infrastructure for the Project (including coal handling and preparation facilitates and existing off road transportation facilities).

5.4 Mining Act 1992

Under the *Mining Act 1992* Section 73 – Rights under mining lease, Centennial Angus Place Colliery has the following rights:

1) The holder of a mining lease granted in respect of a mineral or minerals may, in accordance with the conditions of the lease:

(a) prospect on the land specified in the lease for, and mine on that land, the mineral or minerals so specified, and

(b) carry out on that land such primary treatment operations (such as crushing, sizing, grading, washing and leaching) as are necessary to separate the mineral or minerals from the material from which they are recovered, and

(c) carry out on that land any mining purpose.

The proposed modifications are consistent with the rights of Angus Place Colliery in accordance with this Act.

5.5 Protection of the Environment Operations Act 1997 (POEO Act)

The POEO Act is administered by the Department of Environment, Climate Change and Water (DECCW) and requires licensing for environmental protection, including waste generation and disposal, water, air, and noise pollution. Angus Place Colliery currently operates under Environment Protection Licence 467 (EPL467) and would continue to do so for the life of the project. A variation to EPL467 may be sought for inclusion of any relevant changes under the project.

5.6 Water Management Act 2000 and Water Act 1912

The Water Act 1912 and Water Management Act 2000 contain provisions for the licensing of water capture and use. It is understood that a formal Water Sharing Plan recognised under the Water Management Act 2000 is not currently in place for the area of the project. Subsequently, the Water Act 1912 is relevant to the project with respect to potential licensing requirements.

The project may require approvals and/or water licences under the Water Act 1912, administrated by NSW Office of Water, for groundwater and surface water extraction, where applicable. These would be obtained, as required, in accordance with the prescriptions of the Act following approval.

5.7 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are produced by the Department of Planning to provide guidance on significant issues for NSW. A review of current SEPPs was undertaken and the SEPPs relevant to this modification are addressed below.

5.7.1 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

SEPP – Mining, Petroleum Production and Extractive Industries lists development that is considered complying, exempt and requiring approval. The aims of the SEPP state:

In recognition of the importance to New South Wales of mining, petroleum production and extractive industries:

(a) to provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State, and
(b) to facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources, and
(c) to establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources.

Section 7 -Development permissible with consent states that:

(1) Mining - Development for any of the following purposes may be carried out only with development consent:
(a) underground mining carried out on any land,

Accordingly, the proposed modification to the current Project Approval (the consent) for two additional longwalls and associated underground roads and infrastructure is consistent with this SEPP.

Section 12 - Compatibility of proposed mine, petroleum production or extractive industry with other land uses states:

Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:

(a) consider:
(i) the existing uses and approved uses of land in the vicinity of the development, and
(ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and
(iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and

(b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii), and

(c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).

The existing use of the surface land is outlined in Section 2 of this EA. Considering that a Project Approval has been granted for the current underground mining operations, taking into account the matters listed under Section 12 of the SEPP, the proposed modification is considered consistent with the aims and objectives of the SEPP.

Section 16 Transport requires consideration to be given to the transport of materials, including:

- the transport of some or all materials not to be by public road;
- limiting truck movements in residential areas or near schools and
- the preparation of a code of conduct for the transport of materials on public roads.

Angus Place Colliery uses private haul roads for the transport of coal to the power stations and is therefore considered to be consistent with the SEPP in this respect.

5.7.2 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

The Department of Planning through the project assessment process for the current Project Approval was satisfied that the project did not comprise potentially hazardous or offensive development and was generally consistent with the aims, objectives and requirements of the SEPP. The proposed modifications do not introduce any new activities that would alter nature of the existing proposal or result in it comprising hazardous or offensive development.

5.7.3 State Environmental Planning Policy No. 44 – Koala Habitat Protection

The subject site is located within Greater Lithgow LGA which is listed within Schedule 1 of State Environmental Planning Policy 44 (SEPP 44) – 'Koala Habitat Protection'. Therefore SEPP-44 applies to the land.

Schedule 2 of the State Environmental Planning Policy 44 (SEPP 44) – 'Koala Habitat Protection' lists 10 tree species that are considered indicators of 'Potential Koala Habitat'. The presence of any of the species listed on a site proposed for development triggers the requirement for an assessment for 'Potential Koala Habitat'. SEPP 44 defines potential Koala Habitat as:

"areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component".

No Schedule 2 feed tree species were recorded within the site, therefore the site does not constitute Potential Koala Habitat and no further provisions of this policy apply.

5.7.4 State Environmental Planning Policy No.55 – Remediation of Land

SEPP 55 - Remediation of Land regulates contamination by requiring all consent authorities to consider any contamination when deciding a development application. The assessment undertaken for the original Project Application concluded that the subject land was not at significant risk of being contaminated due to the nature of previous land uses. This assessment remains valid for this proposal and no further investigation is considered necessary. The site is considered to be suitable for the proposed mining land use.

5.7.5 Drinking Water Catchments Regional Environmental Plan No 1

From 1 July 2009 the Drinking Water Catchments Regional Environmental Plan No 1 is deemed to be a State environmental planning policy. Pursuant to Clause 25 of the Plan:

(1) Any development or activity proposed to be carried out on land to which this plan applies should incorporate any current recommended practices and performance standards endorsed or published by the Sydney Catchment Authority that relate to the protection of water quality ("the Authority's current recommended practices and standards").

(2) If any development or activity does not incorporate the Authority's current recommended practices and standards, the development or activity should demonstrate to the satisfaction of the consent authority or determining authority how the practices and performance standards proposed to be adopted will achieve outcomes not less than the Authority's current recommended practices and standards.

A portion of the land to which this project modification application applies drains to Kangaroo Creek. Kangaroo Creek is within the Sydney drinking water catchment and consequently the Drinking Water Catchments Regional Environmental Plan No 1 is relevant to the modification proposal. In accordance with Clause 25 of the Plan, the proposal should incorporate any current recommended practices and performance standards endorsed or published by the Sydney Catchment Authority (SCA) that relate to the protection of water quality.

These issues were also considered as part of the assessment of the original application. During the original assessment, the Department of Planning was satisfied that the water discharged from the site would not significantly impact the water quality of the receiving water within the Sydney drinking water catchment.

To provide further information about the potential impacts from the modification surface water and hydrogeological assessments have been undertaken. These assessments conclude that there will be no impacts (and negligible consequences) associated with water discharge from the site. In combination with the approved Site Water Management Plan already in place for Angus Place Colliery, these assessments provide the appropriate measures and mechanisms to ensure that the site operates a manner that prevents, reduces and/or controls pollution of waters in accordance with the requirements of the site Environment Protection License.

The SCA has advised that it requires the comprehensive consideration of water quality issues and that this document establishes appropriate assessment criteria. As part of the surface water assessment, an assessment of water quality data in relation to the Drinking Water Catchment Regional Environmental Plan No 1 has been undertaken. The impact on water quality is found to be negligible – see section 7.

5.8 Lithgow City Council Local Environmental Plan

The surface area above the proposed longwalls and pipeline infrastructure is zoned 1(f) – Rural (Forestry) under the Lithgow City Council Local Environmental Plan 1994 (LEP). The objectives of the zone are:

(a) to identify land managed by the Forestry Commission under the Forestry Act 1916,
(b) to preserve existing forests within the City of Lithgow, while allowing compatible development, and
(c) to prevent pollution of water supply catchments and water quality in major water storages.

The modification of the current Project Approval to include two additional longwalls is considered consistent with the objectives of the zone, as the land is managed by Forestry NSW and underground mining is a

compatible development that would not impact on the preservation of the existing forest. Mining is permissible within consent in this zone.

6 ENVIRONMENTAL RISK ASSESSMENT

An Environmental Risk Assessment was undertaken at the commencement of the project and consequently a number of specialist consultants were engaged to undertake specific assessments to determine the potential effects resulting from the proposed modifications. The identification of potential hazards/impacts as part of the risk analysis were derived from Angus Place Colliery's extensive previous mining experience and through consideration of the issues raised during the original environmental assessments for Longwalls 920-980.

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;
- Identification of the controls/safe guards to mitigate the hazard/impact; and
- Reassessment of the risk by determining the probability(likelihood) and consequence (effect) of each hazard/impact with the implementation of mitigation measures.

Centennial Coal's Risk Management Standard Risk Matrix was 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.

Through the risk analysis process, the potential environmental impacts were prioritised. The risk assessment is limited to direct environmental impacts and excludes business, legal and other factors which are already addressed in the existing Newnes Plateau and Surface Environmental Risk Assessments. The risk assessment's boundaries were confined to the specific project description of this modification proposal. The outcome of the risk assessment was a list of recommended controls that then guided the development of specialist studies for the proposed modification. A copy of the Environmental Risk Assessment appears as Appendix 6.1. Table 6.1 lists the environmental considerations, their risk ranking, whether they have been identified for assessment by the DGRs and how the issue has been addressed in the EA.

Table 6-1: Angus Place Colliery Modification Risk Ranking of Environmental Considerations

Environmental Considerations	Risk Rank	Identified in DGRs?	How Addressed in EA
Subsidence	Moderate	Yes	Prediction and assessment undertaken
Surface Water	Significant - Moderate	Yes	Assessment undertaken
Groundwater / Hydrogeology	Significant - Moderate	Yes	Assessment undertaken
Soil, Land Capability & Rehabilitation	Low	Yes	Assessment undertaken for soils and land and rehabilitation strategy prepared
Flora and Fauna	Significant - Moderate	Yes	Assessment undertaken

Environmental Considerations	Risk Rank	Identified in DGRs?	How Addressed in EA
Traffic and Transport	Low	Yes	Assessment undertaken
Noise	Low	Yes	Assessment undertaken
Air Quality	Moderate	Yes	Assessment undertaken
Greenhouse Gas	Significant	Yes	Assessment undertaken
Aboriginal Cultural Heritage	Low	Yes	Assessment undertaken
Socio economic	Low	Yes	Assessment undertaken
Contaminated Sites	Low	No	Not required by DGRs. No additional assessment undertaken as the risk identified as low in original application and additional assessment therefore not considered necessary.
Visual Impact	Low	No	Not required by DGRs. No assessment undertaken as the modifications will not result in significant additional visual impacts.
Bushfire	Low	Yes	Management strategy prepared
Cumulative	Low	Yes	Assessment undertaken

7 ENVIRONMENTAL ASSESSMENT

7.1 Application of Part 3A

In 2006 Centennial Angus Place Pty Limited applied, under Part 3A of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act), for continued mining operations. Project Approval (PA 06_0021) was granted by the NSW Department of Planning (DoP) in September 2006. The supporting document for PA 06_0021 is the Angus Place Colliery Proposed Mining and Coal Transport Environmental Assessment (EA). The approval granted Angus Place Colliery the ability to extend mining operations, specifically the development and extraction of additional longwall panels 920 to 980 and installation of key mining infrastructure: a services borehole, upcast ventilation facility and downcast ventilation facility.

On behalf of Centennial Angus Place Pty Limited, RPS Australia East Pty. Ltd. (RPS) has prepared this Environmental Assessment (EA) to support an application for Project Modification Approval under Section 75W of Part 3A of the EP&A Act. The application proposes modification of the current Angus Place Colliery Project Approval (PA 06_0021).

7.2 The Director General's Requirements

The Director General's Requirements were issued in June 2010 and these are provided in Appendix 7.1. The key issues and reference to where they are addressed within this EA are set out in Table 7.1 below. Detailed responses to the matters raised are provided in the specialist assessment reports that are appended.

Table 7.1: Director General's Requirements

Director General's Requirements	Reference within the EA
General Requirements	
▪ an executive summary;	At the front of this EA.
▪ a detailed description of: ▪ historical operations on the site; ▪ existing and approved operations and infrastructure on site, including a copy of all statutory approvals that apply to these operations and infrastructure; and ▪ the existing environmental management and monitoring regime on site;	Section 2 The approvals are identified in Section 2, Table 2.1. The Project Approval of 2006 is provided in Appendix 2.2 and the approvals for the haul road and Subsidence Management Plan are provided in Appendix 7.2. Section 2
▪ a detailed description of the proposed modification, including: ▪ need for the proposed modification; and ▪ alternatives considered, including justification for the modified mine plan.	Section 3
▪ a risk assessment of the potential environmental impacts of the proposed modification, identifying the key issues for further assessment;	Section 6
▪ a detailed assessment of the key issues specified below, and any other significant issues identified in the risk assessment	Specialist assessment reports in Appendices 7.3 to 7.13 and outlined in Section 7.

Director General's Requirements	Reference within the EA
(see above), which includes: ▪ a description of the existing environment, using sufficient baseline data; ▪ an assessment of the potential impacts of the proposed modification, including any cumulative impacts, taking into consideration any relevant guidelines, policies, plans and statutory provisions (see below); and ▪ a description of the measures that would be implemented to avoid, minimise and if necessary, offset the potential impacts of the proposed modification, including detailed contingency plans for managing any significant risks to the environment;	Mitigation measures are addressed in Section 8.
▪ a statement of commitments, outlining all the proposed environmental management and monitoring measures;	Section 8
▪ a conclusion justifying the proposed modification on economic, social and environmental grounds, taking into consideration whether the project is consistent with the objects of the Environmental Planning & Assessment Act 1979; and	Sections 9 and 10
▪ a signed statement from the author of the Environmental Assessment, certifying that the information contained within the document is neither false nor misleading.	At the front of this EA.
Key Issues	
▪ **Subsidence** - including: ▪ accurate predictions of potential subsidence effects (both systematic and non-systematic) including cumulative effects and a sensitivity analysis;	Appendix 3.1, summary in Section 3.
▪ identification of sensitive receptors potentially affected by subsidence (such as environmental features and infrastructure) and an assessment of significance of those receptors;	Specialist assessments for surface water, hydrogeology, soil and land, flora and fauna and cultural heritage within appendices 7.3 to 7.8 and outlined in Section 7.
▪ assessment of the potential impacts of subsidence effects on the natural and built environment, with particular reference to sensitive receptors;	Specialist assessments for surface water, hydrogeology, soil and land, flora and fauna and cultural heritage within appendices 7.3 to 7.8 and outlined in Section 7.
▪ identification of how mine design has been or would be used or adapted to manage and/or mitigate subsidence impacts;	Section 3.1 – description of the environmental considerations in determining the proposed modifications and Section 3.6 alternatives considered.
▪ identification of how subsidence impacts would be rehabilitated, including methodologies and response times; and	Rehabilitation Strategy in Appendix 7.6
▪ identification of further research required to address any uncertainties or information gaps.	Further monitoring work is identified in the Surface Water Assessment in Appendix 7.3.
▪ **Soil and Water** - including: ▪ detailed modelling of potential surface and groundwater impacts;	Surface Water Assessment in Appendix 7.3 and Hydrogeology Assessment in Appendix 7.4.

Director General's Requirements	Reference within the EA
▪ a revised site water balance;	Surface Water Assessment in Appendix 7.3
▪ a detailed assessment of potential impacts on: ▪ the quality and quantity of surface water and groundwater resources; and	Surface Water Assessment in Appendix 7.3 and Hydrogeology Assessment in Appendix 7.4.
▪ groundwater dependent ecosystems.	Hydrogeology Assessment in Appendix 7.4 and Flora and Fauna Assessment in Appendix 7.7.
▪ a detailed description of the proposed modification to the mine's water management system, water monitoring program and measures to mitigate surface and groundwater impacts.	Surface Water Assessment in Appendix 7.3. No mitigation measures are proposed for hydrogeology.
▪ **Biodiversity** - including: ▪ a detailed assessment of potential impacts on any terrestrial and aquatic threatened species or populations, associated habitats and endangered ecological communities or groundwater dependent ecosystems; and ▪ a detailed description of the measures that would be implemented to avoid or mitigate impacts on biodiversity.	Flora and Fauna Assessment in Appendix 7.7 and outlined in Section 7
▪ **Traffic & Transport** - including impacts to Blackmans Flat and Lidsdale.	Traffic Impact Assessment in Appendix 7.12 and outlined in Section 7.
▪ **Noise & Vibration** - including a cumulative assessment of traffic noise.	Noise Impact Assessment in Appendix 7.13 and outlined in Section 7
▪ **Air Quality**	Air Quality Impact Assessment in Appendix 7.11 and outlined in Section 7.
▪ **Greenhouse Gases** - including: ▪ a quantitative assessment of the potential scope 1, 2 and 3 greenhouse gas emissions of the proposed modification; ▪ a qualitative assessment of the potential impacts of these emissions on the environment; and ▪ an assessment of all reasonable and feasible measures that could be implemented on site to minimise the greenhouse gas emissions of the project and ensure it is energy efficient.	Air Quality Impact Assessment in Appendix 7.11 and outlined in Section 7.
▪ **Aboriginal Cultural Heritage**	Cultural Heritage Assessment in Appendix 7.8 and outlined in Section 7
▪ **Hazards** - including bushfires.	Bushfire Management Procedure outlined in Section 7.
References	
The environmental assessment of the key issues listed above must take into account relevant guidelines, policies, and plans. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this project.	Guidelines, policies and plans are referred to in the specialist assessments as appropriate. The general planning context is outlined in Section 5.
Consultation	

Director General's Requirements	Reference within the EA
During the preparation of the Environmental Assessment, you should consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with the: ▪ Department of Environment, Climate Change and Water, including the NSW Office of Water; ▪ Industry and Investment NSW; ▪ Mine Subsidence Board; ▪ Lithgow City Council; and ▪ relevant Catchment Management Authorities. The consultation process and the issues raised must be described in the Environmental Assessment.	Section 4 and as specified in the specialist assessments.

The individual requirements of each government agency have been addressed where appropriate (and referred to in the relevant specialist reports), in particular in response to letters from the Sydney Catchment Authority, Department of Environment, Climate Change and Water, Hawkesbury Nepean Catchment Management Authority, Industry and Investment NSW and NSW Office of Water.

7.3 The Environmental Assessment Team

The Environmental Assessment Team is set out in Table 7.2 below.

Table 7.2 The Environmental Assessment Team

Role	Company
Proponent	Centennial Angus Place Pty Limited
EA Project Management	RPS Sydney
Subsidence	Ditton Geotechnical Services Pty Ltd
Surface Water	GHD
Hydrogeology	Aurecon
Soils and Land Resource	GSS Environmental
Rehabilitation	GSS Environmental
Flora and Fauna	RPS Newcastle
Traffic and Transport	Stapleton Transportation and Planning
Noise	Heggies Pty Ltd
Air Quality	Heggies Pty Ltd
Greenhouse Gas	Heggies Pty Ltd
Cultural Heritage	RPS Newcastle
Social	RPS Sydney
Economic	Gillespie Economics
Hazards (Bushfire)	RPS Newcastle
Cumulative Effects	RPS with input from the specialist assessors

7.4 General Assessment Methodology

The specific assessment methodologies adopted for each of the environmental disciplines relevant to this EA are set out in the specialist reports that are appended. These methodologies include an identification of the way in which the relevant DGR issues are addressed, any relevant legislation, the Study Area and a description of any consultation undertaken. Study Areas vary according to the discipline and an identification of the Study Area used for each specialist assessment is provided within the specialist reports appended.

A number of the specialist assessments address the effects of subsidence (as predicted in the Subsidence Prediction and Assessment Report in Appendix 3.1 and summarised in Section 3.2). The Study Areas for these assessments have been informed by the predicted area of subsidence. Initially a preliminary subsidence area was determined based upon mathematical calculations of the angle of draw. Subsequently, the size and location of the two longwalls were adjusted and geological modelling (in accordance with the DII's preferred approach) was used to determine the modelled subsidence areas for the purposes of the EA (see Appendix 3.1 Subsidence Prediction and Assessment, Figure 17c). The preliminary subsidence areas and the modelled subsidence areas for proposed longwalls 910 and 900W are shown in Figure 7.1.

Proposed longwall 910 has two options as set out in Section 3. The assessments have mainly focussed upon Option 1 as this option comprises the larger area and therefore Option 2 would lead to lesser subsidence and environmental effects than Option 1.

7.5 Key Environmental Issues

Assessments have been undertaken in order to address the key environmental issues identified in the DGRs. The reports of these assessments are provided in Appendices 7.3 to 7.13 and the key findings are outlined below, presented in relation to the following components of the Project Area:

- The two proposed longwalls, the dewatering borehole and supporting infrastructure, access track, powerline and pipeline.
- The pit top.
- Continued use of the existing private haul roads for the transportation of coal by truck to Wallerawang and Mount Piper Power Stations.

The key findings set out in this section are informed by the specialist assessment reports. Each section outlines the following:

- Presentation of the specialist assessment;
- The existing situation;
- The impacts and consequences from the proposed modifications;
- Mitigation; and
- Residual consequences.

The key findings of the specialist assessments are followed by a section on cumulative impacts that describes:

- the combined effects of the proposed modification together with the existing/approved mine.
- the cumulative effects of a modified Angus Place Colliery together with other surrounding activities

7.6 The Proposed Longwalls, Dewatering Borehole, Access Track, Powerline and Pipeline

The environmental issues specified in the DGRs are set out below together with the impact assessments that have been undertaken in relation to the proposed longwalls, dewatering bore, access track, powerline and pipeline (impacts associated with the pit top and the haul roads are addressed below in sections 7.7 and 7.8 respectively):

- Soil and Water:
  - Surface Water Assessment – see Appendix 7.3.
  - Assessment of Hydrogeological Impacts – see Appendix 7.4.
  - Soils and Land Resource Assessment – see Appendix 7.5.
  - Rehabilitation Strategy – see Appendix 7.6.
- Biodiversity:
  - Flora and Fauna Assessment - see Appendix 7.7
- Aboriginal Cultural Heritage
  - Cultural Heritage Assessment – see Appendix 7.8
- Socio-economics:
  - Social Impact Assessment – see Appendix 7.9.
  - Economic Assessment – see Appendix 7.10.
- Hazards
  - Bushfire Management

A number of the assessments identified above have been informed by the predictions from the Subsidence Predictions and Assessment Report (DGS, 2010) that are set out in Section 3 with the full report in Appendix 3.1. These predictions have been used to identify the environmental effects as set out in Table 3.2.

7.6.1 Surface Water Assessment

The Specialist Assessment

GHD has prepared a surface water assessment of the proposed extension to Angus Place Colliery and a full copy of this report is provided at Appendix 7.3. The purpose of this assessment was to assess the existing conditions in relation to surface water management and to determine the potential impacts the proposed modification could have on surface water and associated management strategies. The report was also to prescribe any suitable mitigating measures that could be implemented should some form of impact be predicted. A Water Balance Assessment has also been undertaken and is provided in Appendix 7.3.

The key findings with respect to the proposed longwalls, dewatering bore and associated infrastructure from the report in Appendix 7.3 are outlined below (surface water impacts associated with the pit top area are outlined at Section 7.7).

Existing Situation

Angus Place Colliery is located in the upper reaches of the Coxs River catchment upstream of existing water storages including Lake Wallace, Lake Lyell and Warragamba Dam (all artificial dams). The colliery holding boundary also extends into the Wolgan River catchment, as shown in Figure 2.2. There are a number of

watercourses that either originate in or pass through Angus Place Colliery including Kangaroo Creek and the Wolgan River. The alignment of Longwall 910 is overlain by West Wolgan Creek (a second order stream) while Longwall 900W is overlain by two first order tributaries of Kangaroo Creek (GHD, 2010 – Appendix 7.3). Figure 2.2 shows the watercourses and the river catchment areas.

Angus Place Colliery's Environmental Protection License (EPL 476) includes both volumetric and concentration limits for the discharge of water off site. There are five Licensed Discharge Points (LDPs) which are regulated in accordance with EPL 467(GHD, 2010 – Appendix 7.3):

- LDP001 - Discharge of mine water make and runoff into Kangaroo Creek through wetlands.
- LDP002 - Discharge of surface water from the Angus Place Colliery pit top facilities into the Coxs River through settling ponds.
- LDP003 – Rainfall event based discharge of surface water from the old Kerosene Vale Colliery site into the Coxs River through a settling pond.
- LDP005 - Discharge of treated sewage effluent from Angus Place Colliery via a spray irrigation network to a designated utilisation area.
- LDP006 - Emergency discharge location for the 940 dewatering bore on the Newnes Plateau. This is situated in the Wolgan/Colo Catchment.

There are numerous underground water transfers that occur at Angus Place Colliery. These include the transfer of underground water collected at the working face, either to an underground storage area (old workings) or for transfer to the Springvale Delta Water Transfer Scheme. The underground water that is transferred to an underground storage area (known as the 300 district) prior to transfer to the surface is then either stored within fire tanks for re-use for dust suppression underground or discharged through LDP001 (GHD, 2010 – Appendix 7.3).

The underground water that is transferred to the Springvale Delta Water Transfer Scheme occurs via the 940 dewatering bore and with a surface location on the Newnes Plateau. The pipeline has a theoretical maximum capacity of 30ML/day.

During times of shut down or maintenance, Angus Place Colliery is licensed to discharge water under emergency circumstances into a tributary of the Wolgan River via LDP006.

Water quality has been determined through monitoring at the following 9 locations (GHD, 2010 – Appendix 7.3):

- LDP001
- LDP002
- LDP003
- LDP005
- LDP006
- Kangaroo Creek upstream
- Kangaroo Creek downstream
- Coxs River upstream
- Coxs River downstream

The majority of monitoring points have data dating back to January 2001. The 80th percentile of analytes nominated within EP467 were found to be within the nominated concentration limits with the exception of EC. The elevated EC concentrations are considered to be high for upland rivers but on the lower end of brackish. Elevated iron and zinc concentrations were also identified in the discharge waters however this was found to be indicative of the natural catchment conditions (GHD, 2010 – Appendix 7.3).

A detailed operational water balance was developed by GHD giving consideration to a broad range of data including rainfall, evaporation and water transfer rates and is provided in Appendix 7.3. The water balance was developed for the existing conditions and calibrated against pumping data to the Springvale Delta Water Transfer Scheme and pumping from the 300 District to the fire tanks. The calibrated model was then amended to reflect the proposed modifications.

The results of the water balance assessment for existing on-site conditions are presented below in Table 7.3.

Table 7.3 Existing Conditions Water Balance Results (GHD, 2010 – Appendix 7.3)

	Average Year (2003)	Dry Year (2006)	Wet Year (1990)
Total Rainfall/Runoff Input - megalitres per year (ML/year)	57	13	132
Potable Water Input (ML/year)	28	28	28
Outputs (Evaporation) (ML/year)	22	22	22
Discharge through LDP001 (ML/year)	1387	1381	1406
Discharge through LDP002 (ML/year)	55	37	89
Discharge through LDP003 (ML/year)	19	3	42
Discharge through 940 Bore (ML/year)	1341	1341	1341
Discharge via irrigation from Maturation Ponds	26	24	27

Impacts and Consequences

The construction of the 910 dewatering bore and associated infrastructure may have a potential impact on surface water although standard mitigation measures would be implemented (GHD, 2010 – Appendix 7.3) – see Mitigation below.

There would be no impact on Coxs River from the proposed modifications as there are no proposed amendments to the discharges from Angus Place Colliery and neither of the longwalls are beneath this watercourse (GHD, 2010 – Appendix 7.3).

Minor surface cracking and deformation (predicted at between 0m and 100m) is anticipated to occur within the Kangaroo Creek tributaries as a result of mining (DGS, 2010 – Appendix 3.1). However, the long term geomorphologic impacts, as a result of changes to longitudinal gradients and surface cracking, are expected to be negligible (GHD, 2010 – Appendix 7.3) and therefore no consequences.

The only significant drainage line in the impacted areas is the tributary of Wolgan River, referred to as West Wolgan Creek, that lies over longwall 910. Based on pre and post mining terrain change analysis, the Subsidence Prediction and Assessment report (DGS, 2010 - Appendix 3.1) estimates that the section of West Wolgan Creek that overlies longwall 910 would be subject to grade changes of +0.1% to -0.6%. Predictions also include additional subsidence of between 0.15m and 0.25m over longwalls 920 and 930 as a result of the extraction of coal associated with longwall 910 (DGS, 2010 – Appendix 3.1). The existing grade of this section of creek is relatively steep (approximately 3%) and the degree of these grade change

estimates would not have a significant impact on existing erosion rates (GHD, 2010 – Appendix 7.3) and therefore no consequences.

In order to mitigate erosion and sedimentation of creek beds a range of standard mitigation measures would result in these works having minimal impact on surface water within Angus Place Colliery and therefore minimal consequences on downstream receiving waterways.

The ponding predictions documented within the subsidence report (DGS, 2010 – Appendix 3.1) indicated that some minor ponding to a depth of 0.1m may occur towards the downstream extent of the section of West Wolgan Creek overlying longwall 910. The estimated volume of predicted ponding, based on this depth, is 0.05 megalitres (ML) and the impact on flow transfers downstream is considered to be negligible (GHD, 2010 – Appendix 7.3) and therefore no consequences.

Consideration was also given to valley 'closure' and 'uplift' identified by DGS (2010) (Appendix 3.1). Uplift movements at other locations within Angus Place Colliery of between 30 and 50 mm have previously occurred. Similar movements could occur above longwall 910 and 900W however, as the valleys are wider, the uplift and closure movements are likely to be lower than previously observed. Therefore, the impact on re-direction of surface flow to sub-surface flow is considered to be minimal due to limited cracking of the near surface rocks (GHD, 2010 – Appendix 7.3).

The results of GHD's water balance assessment in Table 7.4 below show that there will be an increase in discharges to the Delta Water Transfer Scheme. In the event that discharges to the Delta Water Transfer Scheme cannot occur due to infrastructure failures, underground water can be discharged through the emergency discharge point LDP006. To provide greater operational flexibility in the event that neither of these discharge options can occur, the existing underground infrastructure for water management enables the transfer of additional water to LDP001.

Table 7.4 Proposed Conditions Water Balance Results (GHD, 2010 – Appendix 7.3)

	Average Year (2003)	Dry Year (2006)	Wet Year (1990)
Total Rainfall/Runoff Input (ML/year)	57	13	132
Potable Water Input (ML/year)	28	28	28
Outputs (Evaporation) (ML/year)	22	22	22
Discharge through LDP001 (ML/year)	1387	1381	1406
Discharge through LDP002 (ML/year)	55	37	89
Discharge through LDP003 (ML/year)	19	3	42
Discharge through 940/910 Bores (ML/year)	2604	2604	2604
Discharge via irrigation from Maturation Ponds	26	24	27

Therefore, there will be a potential increase in discharges from Angus Place Colliery to the Delta Water Transfer Scheme as a result of extension of the life of mine with a potential for increases in discharge through LDP001 to also occur (GHD, 2010 – Appendix 7.3). The capacity of the Delta Water Transfer Scheme is sufficient to cater for the predicted increase and therefore the consequence is limited to an increase in transfer of water to the Wallerawang Power Station water system. This has the potential to reduce the volume of water extracted by the Power Station from the Coxs River (GHD, 2010 – Appendix 7.3). GHD consider that in the event that an increase in discharge through LDP001 occurs, this would be

under rare emergency conditions and there is a potential short term consequence on Kangaroo Creek due to high flow rates. The consequences include higher levels of inundation of along the creek line resulting in temporary exposure of some vegetation to higher salinity water and an increased potential for erosion. GHD consider that these consequences would however only occur for the duration of the discharge.

GHD reports that the impact on water quality would be negligible (GHD, 2010 – Appendix 7.3).

Mitigation

There are no anticipated impacts on surface water however it is recommended that the existing monitoring program for stream flows be continued (GHD, 2010 – Appendix 7.3). The following measures are recommended by GHD as part of a broader subsidence management plan to monitor and manage subsidence impacts on drainage lines:

- Undertake pre and post mining inspections and survey to identify cracking and/or erosion along West Wolgan Creek. The results to be communicated to the relevant stakeholders.
- Where subsidence occurs along drainage lines, assessment the potential to undertake re-contouring to minimise interruption to surface flows.
- Any observed impact to be communicated to Forests NSW and any remediation undertaken in accordance with Forests NSW.
- Review and appraise changes to drainage paths in areas of potential ponding.
- Assess and consult with the relevant government agencies to determine any need for repairs to cracking or stabilisation works.

To mitigate impacts on surface water from the construction of the dewatering bore and associated infrastructure, a range of standard mitigation measures would be implemented in accordance with 'Managing Urban Stormwater: Soils and Construction' (GHD, 2010 – Appendix 7.3).

Residual Consequences

There are no residual consequences on surface water.

7.6.2 Assessment of Hydrogeological Impacts

The Specialist Assessment

Aurecon conducted an assessment of potential hydrogeological impacts and the requirement for any associated mitigation measures – see Appendix 7.4. The key findings are outlined below.

Existing Situation

The area overlying Angus Place Colliery forms part of the Newnes Plateau, northeast of Lithgow. The underlying strata comprise mostly sandstones of the Triassic Narrabeen Group. The near the surface strata belong to the Grose Sub-group, and include the Banks Wall Sandstone, the uppermost part of which is deeply weathered and generally very friable. The sandstone, which is up to 200 metres thick in this region, is underlain by the Mt York Claystone, a thin, fine-grained stratum that limits vertical infiltration of groundwater from the overlying strata. The underlying Burra- Moko Head Sandstone and Caley Formation comprise the remainder of the Narrabeen Group. The Illawarra Coal measures are beneath the Narrabeen Group rocks. These comprise claystone, siltstone, sandstone and coal seams. The Lithgow Seam (this would be extracted under the proposed modifications) is the lowermost seam of the coal measures (Aurecon, 2010 – Appendix 7.4).

Work by CSIRO at Springvale Colliery has identified a series of aquifer zones (as shown in Figure 2.3). Although no detailed testing has been carried out and it is not certain whether these zones extend over the Angus Place workings it is likely there will be some similarities in the hydrogeological properties of the strata over Angus Place and Springvale (Aurecon, 2010).

Investigations have identified near-surface aquifers in the Banks Wall Sandstone as a critical local natural water resource. One of these aquifers, which is limited to the area east of Farmers Creek, is the major source of potable water tapped by numerous bores in the Clarence village, about 10 km east of Angus Place Colliery. In addition, the aquifers in the Banks Wall Sandstone can provide base flows to some of the large shrub swamps, which also occur to the east of Angus Place Colliery, but are largely absent from above the Angus Place Colliery lease area (Aurecon, 2010 – Appendix 7.4).

There are a range of swamp types in the area that differ in terms of the amount of relative contributions to groundwater. 'Permanently waterlogged swamps' have a relatively large groundwater contribution are more resistant to natural variations that may occur in local rainfall patterns. Whereas 'periodically waterlogged swamps' have a relatively poor groundwater contribution and are most sensitive to natural variations in rainfall patterns. Available botanical mapping and hydrogeological monitoring strongly suggest that the hydrogeological regime over Angus Place Colliery is different to the conditions that exist further to the east over Springvale and Clarence Collieries. While a number of NPSS have been identified in this area, the investigations show that there are no major permanently waterlogged swamps over the area that has been undermined in the Angus Place Colliery to date, apart from one small swamp located in Kangaroo Creek (Aurecon, 2010 – Appendix 7.4). This swamp is located just downstream of a spring, which provides a continuous supply of groundwater. There are also only two periodically waterlogged NPSS (West Wolgan and Narrow Swamps) and several hanging swamps over the approved and existing workings (longwalls 920 to 980). Vegetation mapping over the area has also shown that there are no NPSS over the two proposed longwall panels (longwalls 910 and 900W), although the northern end of the Narrow Swamp and two small NPSS lie just within the area around Longwall 910 that may experience some subsidence (DGS, 2010 – see Appendix 3.1).

The lack of any major permanently waterlogged swamps over Angus Place Colliery suggests that the aquifers in the near surface Banks Wall Sandstone formation may not be as well developed in this area. The seeps and springs that feed Kangaroo Creek provide the one exception to this. Even though there are no swamps located over longwalls 910 and 900W, there would probably be some minor aquifers in the upper sandstone sequence in this area (Aurecon, 2010 – Appendix 7.4).

Underground mining in this region has been carried out for over a century and Aurecon conclude that there has been at least some impact on the local hydrogeological regime, particularly in the coal measure strata. The extraction of the longwall panels in Angus Place Colliery has had the greatest influence on the local hydrogeological regime in the vicinity of the proposed longwall panels 900W and 910.

Experience and ongoing monitoring indicate that the coal measure strata above the Lithgow Seam have already been depressurised and partially drained of groundwater by previous longwall mining in the area. There are no regional hydrological impacts from this drainage, since the water-bearing zones in the coal measures provide a negligible contribution to stream flow and vegetation support in the region, due to their depth and the lack of any upwards groundwater flow to local creeks. Groundwater contribution to stream flow comes from aquifer zones in the Narrabeen Group strata which discharge from the escarpments and in the local creek channels (Aurecon, 2010 – Appendix 7.4).

Although there has been drainage of coal measure strata in the area, the impact of previous mining on the groundwater regime in the overlying Banks Wall Sandstone Formation above the Mount York Claystone appears to be negligible. This is because the Mt York Claystone is above the overburden fractured zone and acts as an aquiclude, preventing any drainage downwards into the mine. The subsidence assessment for the proposed modifications (DGS, 2010 – Appendix 3.1) has confirmed that the zone of continuous fracturing

above the mine would not reach the Mount York Claystone. Data from groundwater monitoring in the Sunnyside Swamp at Springvale has also confirmed that the groundwater regime in the Banks Wall Sandstone has not been affected by longwall mining at that mine (Aurecon, 2010 – Appendix 7.4).

Impacts and Consequences

The proposed longwall panels 910 and 900W are located adjacent to and between areas that have been previously extracted, so that the extraction of the additional panels would only have a marginal additional impact on the existing hydrogeological regime in the strata below the Mount York Claystone (Aurecon, 2010 – Appendix 7.4).

Aurecon considers that the minor surface cracking and shearing and the tapered vertical cracks predicted in the DGS subsidence report (DGS, 2010) would have no impact on the aquifers in the Banks Wall Sandstone because they are at depth and are well below the surface cracking zone.

Although there are three swamps within the area that may be influenced by the extraction in Longwall 910 such as from cracking, Aurecon consider that there will be no adverse subsidence-related impacts on the swamps. This is because the predicted incremental surface movements at the swamps are insufficient to cause any significant surface fracturing. There are two small NPSS on the southern side of longwall 910 that are in the potential influence zone of the longwall however these swamps have already been undermined by longwall 920 so that any additional impacts should be minimal (Aurecon 2010). Similarly, Narrow Swamp is just on the edge of the zone of influence where the ground movements will be negligible when compared to the subsidence from longwall 920. There is also one NPSS that is located to the east of longwall 920, but this swamp is outside the area of any significant ground surface movement, cracking or induced surface strains, so that the potential for any impact is negligible (Aurecon 2010).

Aurecon considers that the predicted changes in gradients along water courses or gullies predicted in the DGS subsidence report (DGS, 2010) would have no permanent impact on the aquifers because the hydraulic gradiant would readjust itself following undermining to its pre-mining gradiant. Also, as there are no NPSS along the watercourses in the area where the change in gradiant is likely and therefore Aurecon do not anticipate an impact on NPSS from this.

The DGS subsidence report predicted the potential re-routing of sub surface flow paths via surface cracking. Aurecon consider that there would not be an impact on the aquifers in this respect due to their depth and there are no NPSSs in the areas along the gullies where this might occur.

Aurecon has confirmed DGS's prediction that it is very unlikely that a direct hydraulic connection would develop between the mine and the surface due to fracturing and that the presence of the Mount York Claystone unit between the Burra Moko Head and Narrabeen sub-groups are also likely to reduce groundwater seepages.

Aurecon report that the available data suggest that the hydrogeological regime in the Narrabeen Group strata above the Mount York Claystone has not been impacted to any degree by the extraction of the existing longwall panels at Angus Place Colliery. Consequently, the extraction of the two additional panels is unlikely to have any additional impact on these strata. Therefore, there would be no impact on the aquifers in the Banks Wall Sandstone, and hence there would be no impact on the quality or quantity of the available groundwater resources in this rock unit (Aurecon, 2010 – Appendix 7.4).

The DGS report (2010 – Appendix 3.1) addresses the issue of valley closure. It has been concluded that while there may be some additional (but lower) upsidence in the creek valleys, "the movements, if they occur, are very unlikely to result in more damage than the minor cracking predicted for normal subsidence development of the near surface rocks". As a result, Aurecon considers the probability of any additional impact on the hydrogeological regime from valley closure effects is also very low. In addition, there are no

major geological structures that cross the two proposed longwall panels (DGS, 2010), so that the potential for unexpected abnormal impacts from geological structures is considered to be negligible.

Aurecon report that the additional groundwater inflows are likely to be minimal, since the area has been depressurised by the existing longwall panels, and the additional groundwater drainage from the overburden strata will be minimal. In addition, Aurecon find that since there are no registered water bores or other groundwater users in the vicinity of the project area, there will be no impact on third parties from the extraction of the proposed longwall panels.

Aurecon predict that there would be no impacts on the quality or quantity of groundwater flows discharging to the Wolgan River or Kangaroo Creek from the extraction of longwalls 910 and 900W..

Because the two proposed longwall panels are within an area that has been subject to mining for several decades, any impacts on the hydrogeological regime would have already occurred. It is therefore highly unlikely that there would be any significant additional impacts on the local hydrogeological regime from the extraction of longwalls 910 and 900W (Aurecon, 2010 – Appendix 7.4).

Mitigation

There are no recommended mitigation measures in relation to hydrogeology.

Residual Consequences

There are no residual consequences arising from the identified impacts because all subsidence impacts on hydrogeology are either minimal or nil.

7.6.3 Soils and Land Resource Assessment

The Specialist Assessment

GSS Environmental prepared a soil and land assessment – see Appendix 7.5. The major objectives of the assessment were to:

- assess areas to be disturbed by the Angus Place Colliery modification at a sufficient level of detail to satisfy the requirements of the Department of Industry and Investment (DII);
- assess pre and post mining rural land capability and class assessment in accordance with Department of Environment, Climate Change and Water (DECCW) guidelines; and
- assess pre and post mining agricultural suitability in accordance with DII guidelines.

The key findings are outlined below.

Existing Situation

A soil map was developed by GSS using several resources and techniques including aerial photographs and topographic maps, previous soil survey results and a desktop assessment of soils. Five soil landscape units are found within the Study Area. These are the Newnes Plateau, Warragamba, Wollangambe, Mount Sinai and Deanes Creek.

The land capability assessment of the Study Area was conducted in accordance with DECCW's rural land capability classification system. The system consists of eight classes, which classify land on the basis of an increasing soil erosion hazard and decreasing versatility of use. It recognises three types of land uses, which are: land suitable for cultivation, land suitable for grazing; and land not suitable for rural production. The area has a modified land capability classification of 'State Forest' due to the land use zoning of State Forests, which overrides the general capability of the land for this assessment. For the purposes of the

assessment, the Study Area typically reflects Class VII land which owing to its high soil erosion hazard and sever site limitations should remain under green timber (GSS, 2010a – Appendix 7.5).

The agricultural suitability assessment of the Study Area was conducted by GSS in accordance with the DII's agricultural suitability classification system. The system consists of five classes, providing a ranking of lands according to their productivity for a wide range of agricultural activities with the objective of determining the potential for vegetative growth within certain limits. The Study Area consists of Class 4 and 5 lands which are marginal lands not suitable for cultivation and with low to very low productivity for grazing.

Impacts and Consequences

The subsidence report in Appendix 3.1 predicts surface cracking and fractures. The majority of soils above proposed longwalls 910 and 900W include Newness Plateau, Warragamba and Wollangambe soil landscape units. A small portion of the Mount Sinai soil landscape unit lies in the eastern portion above longwall 910. The soils that form these soil landscapes are generally stable, however, the Wollangambe soil landscape is considered an erosional landscape. The landscape is particularly susceptible to sheet erosion following clearing whilst severe rill and sheet erosion are commonplace along poorly designed access tracks (from King, 1993 – Appendix 7.5).

Ponding is expected to occur along creeks and tributaries above the proposed longwall panels with gentle slopes and low lying areas (DGS, 2010 – Appendix 3.1). Ponding depths of < 0.1m may develop along creeks and flatter areas beneath the proposed longwalls, based on post-mining surface level contour predictions. Any increases of existing ponded areas or development of new ponds are unlikely to cause significant impact to the existing environmental conditions (DGS, 2010 – see Appendix 3.1).

The publicly accessible access tracks above the proposed panels are unsealed roads managed by Forests NSW. The roads are likely to be subsided by up to the maximum panel values presented earlier and may also be affected by vertical cracking or low angle compressive shearing. The typical crack widths are estimated to range between 1 mm and 20 mm across the road where it passes through the tensile and compressive strain zones above each longwall panel. Worst-case crack widths of up to 90 mm may occur if surface rock exists below the road and near the strain peaks. (DGS, 2010 – Appendix 3.1). Post mining inspections of Forests NSW roads over the previously extracted longwalls have only found 'hairline' cracking (<1 mm wide) which quickly self heals following a rainfall event or grading activity (GSS, 2010a – Appendix 7.5).

During construction, activities that pose a risk of accelerating natural erosion processes include vegetation clearance, track construction, and bore construction. Vegetation clearance activities may disturb the land surface (GSS, 2010a – Appendix 7.5) and mitigation is set out below.

Given the small area surrounding the proposed dewatering borehole to be disturbed and the areas associated with the new section of access track and existing track to be widened, and with the mitigation measures implemented as described below no significant impacts on soils or the resulting impacts of erosion and sedimentation are anticipated (GSS, 2010a – Appendix 7.5).

The potential for acid generation from the topsoil and subsoil (regolith) within the Study Area is low. Acid Sulphate Soils, which are the main cause of acid generation within the soil mantle, are commonly found less than 5m above sea level, particularly in low-lying coastal areas such as mangroves, salt marshes, floodplains, swamps, wetlands, estuaries, and brackish or tidal lakes. There has been little history of acid generation from regolith material in the Central West Region (which is located approximately 160 km from the coast) (GSS, 2010a – Appendix 7.5).

Changes to surface gradients may lead to minor terrain adjustment through erosion and sedimentation where soils are exposed to stormwater runoff.

Other potential subsidence impacts may include:

- topsoil loss or degradation, in areas of surface cracking;
- exposure of unstable (sodic or saline) subsoils, resulting in increased erosion potential;
- increased potential for surface erosion due to localised changes in topography and surface hydrology; and
- reduction in potential productivity of the land due to topsoil loss and modification of surface topography/hydrology.

These impacts may be magnified where subsidence occurs in areas of concentrated surface flow, such as gullies and drainage lines. These potential impacts can largely be managed through the implementation of appropriate controls, as described in Mitigation below (GSS, 2010a – Appendix 7.5).

A worst case assessment predicts that approximately 50 m to 100 m of the road above each longwall may be impacted by cracking. Any necessary repairs to tensile cracking or compressive shear failures through the road after mining of each panel is completed would be carried out in consultation with Forests NSW. It is recommended by GSS that appropriate warning signage be erected adjacent to the point where roads enter/exit a subsided area.

The mechanical disturbance of the topsoil and underlying subsoil may temporarily reduce the abilities of the soil to resist the dislodgement of particles from raindrop impact and surface water flow during rainfall events, and also more susceptible to wind erosion (GSS, 2010a – Appendix 7.5).

Mitigation

The following measures are identified by GSS to mitigate the potential impact of subsidence upon soils:

- Where the subsoil is exposed, measures should be taken to divert surface run-off away from drainage lines.
- Surface cracks should be remediated.
- Localised increases in surface gradients due to subsidence should be assessed through periodic surveys to ensure that erosion potential has not been increased and the potential for surface flow has not been interrupted.
- Mitigation measures set out in the existing Angus Place Land Management Plan should continue to be applied.
- Appropriate erosion and sedimentation control structures such as catch drains and sedimentation dams should be established prior to surface disturbance to prevent degradation of downstream watercourses.
- Undertake pre-mining and post-mining inspections along the creek with results communicated to relevant stakeholders;
- Any observed impact caused by subsidence would be communicated to Forests NSW and any remediation required undertaken in accordance with their requirements.

The following measures are identified by GSS to mitigate the potential impact associated with erosion and for sediment control:

- Where land disturbance occurs measures identified in the Land Management Plan would continue to be applied.
- For smaller areas of disturbance, such as the construction of access tracks and boreholes, localised sediment control measures such as sediment fencing, catch drains and sediment traps should be established prior to ground disturbance.

- For broader areas of disturbance, such as treatment of larger subsidence areas, erosion and sediment control should be integrated into landform and rehabilitation design.
- During the construction phases of the dewatering bore and access tracks the natural topsoil will be stripped and stockpiled for use in rehabilitation following completion of construction.
- Areas of subsoil may also be disturbed during construction. All erosion and sediment control works will generally be undertaken in accordance with the Blue Book (Managing Urban Stormwater: Soils and Construction Vol. 1 & Mines and Quarries Vol.2E) and with the Angus Place Land Management Plan & the Erosion and Sediment Control Plan.
- The erosion and sediment control measures will include, but not be limited to the following:
  - creation of a sump and sediment fencing on the down slope of the borehole;
  - reducing vehicular movements and the correct storage of soil stockpiles; and
  - cleared topsoil and subsoil will be selectively managed and reused in the rehabilitation of the borehole site, which will be undertaken as soon as practical upon completion of the works.
- Temporary erosion and sedimentation control measures may be implemented to reduce the likelihood and severity of erosion and sedimentation within and around the construction site. These measures may include the use of sediment fences for non-channelised flow over disturbed areas, and sand bags, rip rap etc or any combination of those materials. Also measures may include restricted access during wet weather or to areas under rehabilitation, reporting of erosion and sediment hazards or incidents and regular checking and maintenance of structures.

Residual Consequences

There are no residual consequences arising from the identified impacts because the impacts can be ameliorated by the identified mitigation measures above.

7.6.4 Rehabilitation Strategy

The Specialist Assessment

GSS prepared a rehabilitation strategy establishing objectives for the rehabilitation of disturbed land and this is provided at Appendix 7.6. The strategy is outlined below (impacts, consequences and recommended mitigation are not identified because the document comprises a strategy as opposed to an assessment).

The Strategy

Angus Place Colliery is required, where necessary, to return any land disturbed due to exploration or mining activities, to a capacity which was present pre-mining. The current rehabilitation objectives are as follows:

- Rehabilitation and the outcomes will be consistent with the Environmental Assessment which formed the basis for any approvals;
- Rehabilitation will be based on mine closure criteria and outcomes developed through stakeholder consultation;
- Compliance with the relevant regulatory requirements and that regulatory consensus is attained on the successful closure and rehabilitation of the site;
- Rehabilitation of native vegetation will be integrated with undisturbed native vegetation to provide consolidated areas and wildlife corridors where possible;
- The site will be rehabilitated to an agreed final land use compatible with the surrounding land fabric and land use requirements;

- The rehabilitation process will address limitations of land capability that may arise as a consequence of mining;
- The rehabilitation will be sustainable in terms of selected final land use;
- The rehabilitated site will be stable with permanent landforms with soils, hydrology and ecosystems having maintenance needs no greater than those of the surrounding land;
- Waste substances that have the potential to affect land use or result in pollution will be secured and safely contained;
- The rehabilitated site will not present a hazard to persons, stock or native fauna;
- The site will be clean and tidy and any remaining structures will be left in a condition that provides for the safety of the public; and
- Mine closure works are completed as quickly and cost effective as possible whilst providing that the above objectives are achieved.

Rehabilitation would be targeted to areas that cease to be used for mining or mining-related activities as soon as practical. Results from current successful rehabilitation across the site, would be used to refine the proposed rehabilitation methods including aspects such as the selection of appropriate drainage measures / structures and plant species for re-establishment. Notwithstanding this, in some areas it would only be possible to undertake temporary rehabilitation due to either difficult access to the site or that mining is still occurring. Therefore, rehabilitation would generally be limited to sowing associated with erosion and sediment control and stabilisation until mining has moved through a particular area (GSS, 2010b – Appendix 7.6).

The detailed approach to the revegetation of subsidence areas and the construction associated with the proposed dewatering bore, access tracks, pipeline and powerline and also the proposed monitoring methodology is set out in Appendix 7.6.

7.6.5 Biodiversity

The Specialist Assessment

RPS prepared a Flora and Fauna Assessment for the modification proposal at Angus Place Colliery and a full copy of the report is provided at Appendix 7.7. The assessment examined the likelihood of the proposal to have a significant effect on any threatened species, populations or ecological communities listed under the Threatened Species Conservation Act 1995 (TSC Act 1995). The report recognises the relevant requirements of the Environmental Planning and Assessment Act 1979 (EP&A Act 1979) as amended by the Environmental Planning and Assessment Amendment Act 1997. Assessment is also made with regard to those threatened entities listed federally under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999).

In consideration of Matters of National Environmental Significance under the EPBC Act with respect to the Temperate Highland Peat Swamps on Sandstone (a federally listed EEC) a referral is to be submitted to the Department of Sustainability, Environment, Water, Population and Communities.

The key findings of the Flora and Fauna Assessment are outlined below.

Existing Situation

Field surveys were undertaken by RPS during January and February 2010. They comprised:

- flora surveys;

- vegetation mapping;
- habitat assessment;
- fauna surveys – this initially comprised the production of an Expected Fauna Species List and an assessment of potential use by threatened fauna species. Field surveys included:
  - Terrestrial and arboreal trapping
  - Bat trapping
  - Bat echolocation call recording
  - Avifauna survey
  - Herpetofauna survey
  - Spotlighting

A literature review was also undertaken by RPS and sources included:

- Aerial Photograph Interpretation (API) and literature reviews to determine the broad categorisation of vegetation within the site;
- Review of the Vegetation of the Western Blue Mountains – including the Capertee, Coxs, Jenolan and Gurnang Areas (DEC 2006 [see Appendix 7.7]);
- Review of fauna and flora records contained in the Department of Environment, Climate Change and Water (DECCW) Atlas of NSW Wildlife (accessed 24th January 2010) within a 10km radius of the site;
- Department of the Environment, Water, Heritage and the Arts (DEWHA) EPBC Act 1999 Protected Matters Search within a 10km radius of the site;
- DECCW Threatened Species, Populations and Ecological Communities website (http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/);
- Birdata (web version of Birds Australia's New Atlas of Australian Birds);
- Review of the Angus Place Colliery Proposed Mining and Coal Transport Environmental Assessment written by International Environmental Consultants Pty Ltd (2006);
- Review of the Angus Place Annual Environmental Monitoring Reports (AEMRs), Annual 2009 Flora Report for Angus Place, Springvale and Clarence mines, Lithgow, NSW, University of Queensland (2010), and the assessment of Hydrological impacts by Aurecon (2010) and GHD (2010);
- A review of Geographic Information System (GIS) data including (but not limited to) aerial photography, topographic maps, State Environmental Planning Policy (SEPP) Mapping, Soil Landscapes and Acid Sulphate Soil Potential; and
- Collective knowledge gained from extensive work in the area.

Ground truthing of the Study Area by RPS has identified the following nine vegetation communities:

1. MU 7 - Newnes Plateau Narrow-leaved Peppermint – Mountain Gum – Brown Stringybark Layered Forest;
2. MU 8 – Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest;
3. MU 26 – Newnes Plateau Narrow-leaved Peppermint – Silvertop Ash Layered Open Forest;
4. MU 26a – (= Variant of MU26) with Brittle Gum, Scribbly Gum and Mountain Gum;
5. MU 43 – Pagoda Rock Sparse Shrubland;
6. MU 44 – Sandstone Plateau Tea Tree – Dwarf Sheoak – Banksia Rocky Heath;

7. MU 50 – Newnes Plateau Shrub Swamp;
8. MU 51 – Newnes Plateau Hanging Swamp; and
9. Cleared areas.

One Endangered Ecological Community (EEC) was observed within the subject site (RPS, 2010a – Appendix 7.7). This EEC was Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion as listed in the Threatened Species Conservation Act 1995 (referred to in this EA as the TSC Act). This EEC corresponds to vegetation communities MU50 - Newnes Plateau Shrub Swamp and MU 51 – Newnes Plateau Hanging Swamp as described and mapped within the Vegetation Mapping of the Western Blue Mountains by DEC in 2006. These communities also correspond to the federally listed Endangered Ecological Community under the Commonwealth Environment protection and Biodiversity Conservation Act 1999 (referred to in this EA as the EPBC Act) known as Temperate Highland Peat Swamps on Sandstone.

Two threatened flora species were observed on site during the flora surveys (RPS, 2010a – Appendix 7.7), these species were:

- *Derwentia blakelyi* (listed as Vulnerable under the TSC Act); and
- *Persoonia hindii* (listed as Endangered under the TSC Act).

Broad habitat types recorded within the site included; open forest areas, riparian/damp areas characterised by swampy vegetation and exposed rocky areas.

A range of mammals were recorded by RPS including a number of macropods. A single terrestrial mammal species, *Antechinus agilis (Agile Antechinus)*, was recorded during trapping over the site.

A diverse assemblage of Microchiropteran bats were recorded during nocturnal surveys by RPS, including three threatened species, namely *Chalinolobus dwyeri* (Large-eared Pied Bat – identified as Vulnerable under the TSC Act and EPBC Act), *Falsistrellus tasmaniensis* (Eastern False Pipistrelle – identified as Vulnerable under the TSC Act) and *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat – identified as Vulnerable under the TSC Act). Due to their mobility and the presence of abundant suitable habitat within the site and the wider vicinity it is likely that a number of other threatened Microchiropteran bats may also use the area on at least an intermittent basis (RPS, 2010a – Appendix 7.7).

An immature *Cercartetus nana* (Eastern Pygmy Possum – identified as Vulnerable under the TSC Act) was observed on Beecroft Track to the east of panel 900W within open forest habitat (RPS, 2010a – Appendix 7.7).

Dasyurus maculatus (Spotted-tailed Quoll) a species listed under the TSC Act as Vulnerable and under the EPBC Act as Endangered was not observed during targeted surveys, however RPS considers that habitat in the west of proposed Longwall 910 is of sufficient quality and isolation to support this species (RPS, 2010a – Appendix 7.7).

A moderate diversity of open forest birds including those characterising elevated habitats were observed across the site by RPS. A number of threatened bird species were recorded across the site including *Petroica multicolour* (Scarlet Robin - identified as Vulnerable under the TSC Act), *Petroica phoenicea* (Flame Robin - identified as Vulnerable under the TSC Act), *Daphoenositta chrysoptera* (Varied Sittella - identified as Vulnerable under the TSC Act) and *Callocephalon fimbriatum* (Gang-Gang Cockatoo - identified as Vulnerable under the TSC Act). There are no Allocasuarina tree species within the site suited to the foraging requirements of *Calyptorhynchus lathami* (Glossy Black-Cockatoo - identified as Vulnerable under the TSC Act) and few hollows of sufficient size to provide breeding opportunities for this species (RPS, 2010a – Appendix 7.7).

No forest owl species were observed however RPS consider it likely that the site represents a portion of the local foraging range of both Masked and Powerful Owls, both listed within the NSW TSC Act as Vulnerable, due to the presence of terrestrial and arboreal mammals, which are the respective prey of these owl species.

Targeted searches were also undertaken by RPS for Eulamprus leuraensis (Blue Mountains Water Skink – listed under the TSC Act and EPBC Act as Endangered and only a number of non-threatened common skink species were recorded, including two related species, *E. heatwolei* (Yellow-bellied Water Skink) and *E. quoyii* (Eastern Water Skink) (RPS, 2010a – Appendix 7.7).

Surveys were also conducted for *Petalura gigantea* (Giant Dragonfly – listed under the TSC Act as Endangered), but this species or suitable habitat were not observed by RPS during the fauna survey over the site.

Ongoing annual fauna monitoring over the Newnes Plateau has recorded a number of other threatened fauna species, including *Petaurus norfolcensis* (Squirrel Glider – listed under the TSC Act as Vulnerable), *Climacteris picumnus* (Brown Treecreeper - listed under the TSC Act as Vulnerable), *Chthonicola sagittata* (Speckled Warbler - listed under the TSC Act as Vulnerable) and *Tyto tenebricosa* (Sooty Owl - listed under the TSC Act as Vulnerable). Comprehensive surveys over the site by RPS did not encounter these species and habitats occurring within the site are considered to provide only marginal opportunities for the three bird species, due to the relative scarcity of local records, although habitat within the site was assessed as providing shelter and foraging opportunities for Squirrel Glider (RPS, 2010a – Appendix 7.7).

Impacts and Consequences

The relevant key thresholds assessment criteria within Draft Guidelines for Threatened Species Assessments for Part 3A applications by DEC/DPI in 2005 have been taken into account (RPS, 2010a – Appendix 7.7).

The Threatened Species and Communities Assessment set out in Appendix 7.7, section 4 finds that all impacts on plants, herpetofauna, Insects, Avifauna, Mammals and Endangered Ecological Communities are likely to be 'Low'.

The proposed dewatering bore and associated infrastructure would comprise 4.2ha of clearing within an area of vegetation that is of a type common on the Newnes Plateau and the direct impact to threatened species such as Scarlet Robin and Gang-gang Cockatoo would be minimal (RPS, 2010a – Appendix 7.7). A slight regional reduction in vegetation cover will occur along a linear impact zone. However, given the expanse of the affected vegetation / habitat types in the immediate and broader locality, this is considered unlikely to lead to a realised reduction in biodiversity.

The proposed longwall panels would have a potential indirect impact on the ecology of the site via the expected subsidence and modified subsurface hydrology. The projected subsidence predictions are considered unlikely to have a significant adverse impact upon the ecological attributes because of the cracking is predicted to be minor and the anticipated self healing due to sedimentation (RPS, 2010a – Appendix 7.7) during storm events.

The ponding predicted in the subsidence report is likely to be in-channel and unlikely to cause significant impact on the existing environmental conditions (DGS, 2010).

The proposed modifications are unlikely to cause significant adverse impacts on threatened species recorded within the Study Area or those that might potentially occur on an intermittent basis (RPS, 2010a – Appendix 7.7).

The flora species *Derwentia blakelyi* and *Persoonia hindii* are located over 200m from the proposed works and the proposals are not expected to have an adverse impact on these species (RPS, 2010a – Appendix 7.7).

There are several areas within and adjacent to the site containing the Newnes Plateau Shrub Swamp (NPSS), which is an EEC. There are no significant swamp areas directly over the two proposed longwall panels although there are small areas of NPSS located within the subsidence areas predicted for Longwall 910 (RPS, 2010a – Appendix 7.7). Aurecon (2010) report that although there are three swamps within the area that may be influenced by the extraction in Longwall 910, there will be no adverse subsidence-related hydrogeological impacts on the swamps, as the predicted incremental surface movements at the swamps are insufficient to cause any significant surface fracturing. There are two small hanging swamps on the southern side of longwall 910 that are in the potential influence zone of the longwall, but these swamps have already been undermined by Longwall 920 so that any additional impacts should be minimal. Similarly, Narrow Swamp is just on the edge of the zone of influence where the ground movements would be negligible when compared to the subsidence from longwall 920. There is also one hanging swamp that is located to the east of longwall 920, but this swamp is outside the area of any significant ground surface movement, cracking or induced surface strains, so that the potential for any impact is negligible. Therefore, hydrogeological changes due to subsidence are not expected to alter the habitats and condition of the overlying vegetation communities or other components of biodiversity including terrestrial threatened species or populations, associated habitats and endangered ecological communities or Groundwater Dependent Ecosystems (RPS, 2010a – Appendix 7.7). Additionally, the Surface Water assessment by GHD (2010) reports that the impact on water quality from the proposed modifications would be negligible.

Map Unit 50 – Newnes Plateau Shrub Swamp occupies a total of approximately 394 hectares within the area mapped by DEC in 2006 for the 'Vegetation of the Western Blue Mountains'. RPS (2010a) reports that the negligible impacts upon this community will not have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

A rapid assessment of the Groundwater Dependant Ecosystems (GDEs) in accordance with NSW Groundwater Dependant Ecosystem Policy of DLWC in 2002 has been undertaken and is described in Section 7.3 of Appendix 7.7, an outline from this follows. Both NPSSs and Newnes Plateau Hanging Swamps (NPHS) are classified as GDEs. The vulnerability and value of the GDEs has been assessed by RPS. Management tools are identified including those for retention, buffering and monitoring within Newnes State Forest that are utilised by NSW Department of Primary Industries (Forestry) and a number of underground mining companies. Angus Place itself has a comprehensive water table monitoring program and regular monitoring of flora and fauna. Management actions comprise retention, monitoring, research and planning for minor impacts as a result of subsidence from longwall mining. Longwalls 910 and 900W have avoided locations beneath NPSS or NPHS (RPS, 2010a – Appendix 7.7).

The subsidence is not expected to result in any substantial alteration of fauna and its habitat (RPS, 2010a – Appendix 7.7).

LDP006 is an emergency discharge point from the 940 dewatering bore on Newnes Plateau and is only operated under emergency conditions. Water is discharged to the Wolgan River from LDP006 via Narrow Swamp North. All discharge events occur in accordance with the Angus Place Environment Protection License and will continue to operate in accordance with it. While GHD (2010) indicated some parameters for the discharge water were elevated, discharge from this point only occurs on an emergency basis. This is not considered likely to impact significantly upon any of the downstream shrub swamp vegetation (RPS, 2010a – Appendix 7.7).

Mitigation

The following measures are identified by RPS (2010a):

- The amount of clearing should be kept to a minimum, particularly within areas that contain hollow-bearing trees.

- Where the removal of hollow bearing trees is unavoidable, inspection should be undertaken prior to and during clearing by a suitably qualified ecologist to ensure the removal and relocation of animals if required can occur in accordance with the following protocols:
  - A qualified ecologist shall supervise the removal of the hollow-bearing trees to ensure the protection of native fauna;
  - Trees shall be soft-felled to minimise impacts upon any fauna inside; and
  - Felled habitat trees shall be left for two days to allow fauna inside to escape unless the absence of fauna can be confirmed at an earlier time.

- A staged approach to clearing of any hollow-bearing trees will be undertaken to enable arboreal fauna (particularly gliders and possums) to safely leave the work area.
- Once felled the trees will be examined for the presence of fauna by a qualified ecologist, who will examine potential shelter sites (hollows, nests, termitaria, epiphytes, decorticating bark, crevices).
- When an animal is detected in a tree, clearing activities are directed elsewhere to allow fauna time to leave, or the animal will be carefully removed from the tree. After fauna are observed to leave or are removed safely from the tree, the habitat tree will be disturbed again and placed carefully in the direction of remaining trees (care will be taken to ensure trees are not pushed into the 'Exclusion Zone').
- Any fauna disturbed during clearing procedures will first be permitted to escape into adjacent habitat. Where this does not occur or where fauna appear to be shocked or injured, fauna will be carefully captured and held in appropriate circumstances and a local wildlife rescue organisation will be contacted if required.
- Appropriate temporary housing for fauna is species-dependent. An appropriate large safe container will be used for capture of koalas, which are then transferred into a thick sack. Gliders, possums, snakes and frogs will be similarly held individually in a calico bag until release in adjacent habitat. Nesting birds and eggs will be placed in a covered cardboard box equipped with soft cloth. Rescued fauna will be protected from exposure to heat and removed from the area undergoing clearing activities to minimise exposure to noise. Any fauna which cannot be released immediately or by the evening of the day clearing occurred will be passed onto a wildlife rescue organisation/carer.
- Measures should be implemented to avoid impacts upon waterways and associated vegetation resulting from soil disturbance, namely adequate erosion and sedimentation controls.
- Measures should be employed to ensure that machinery working within the site does not bring materials (soils etc.) onto the sites that may infect onsite vegetation with Phytophthora cinnamomi; and
- Ongoing weed monitoring should be instituted and potential weed infestations be appropriately managed to ensure surrounding communities (particularly hanging swamps) are protected from invasive species.

Centennial Angus Place Pty Limited will discuss with DECCW and DOP, if necessary, the potential activities that may be undertaken to offset the impacts of clearing 4.2 hectares of Newnes Plateau forest vegetation which is common throughout the Newnes Plateau area. If offsets are determined through this consultation to be necessary, these activities will take into consideration the DECCW Principles for the Use of Biodiversity Offsets in NSW.

Residual Consequences

There are no residual consequences provided the mitigation identified above is implemented.

7.6.6 The Aboriginal Cultural Heritage

The Specialist Assessment

RPS prepared the Cultural Heritage Assessment – see Appendix 7.8. The key findings are outlined below.

Existing Situation

The assessment comprised a detailed background review which involved reviewing previous archaeological reports for the area, the history of Lithgow LGA and Aboriginal Heritage Management Information System (AHIMS) database search results.

An archaeological pedestrian survey was conducted over four days in February 2010.

RPS finds that one Aboriginal Cultural Heritage Site was identified within the Study Area. A Rock Shelter with PAD is located within the western section of the proposed Longwall 910 (RPS, 2010b – Appendix 7.8). A site card has been submitted to the NSW Department of Environment, Climate Change and Water (DECCW) for registration on the AHIMS database.

Centennial Angus Place Pty Limited is subject to an Indigenous Land Use Agreement (ILUA) entitled the Centennial Coal Projects Ancillary Deed (CCPAD 2003). This document requires Centennial Angus Place Pty Limited to consult with the Gundungurra Native Title Claim Group (GNTCL). To this end a Cultural Heritage Management Plan (CHMP) (Schedule 7 of the CCPAD 2003) was developed for implementation by Centennial Angus Place Pty Limited in order to avoid or minimise (where appropriate) the potential impact on Aboriginal sites. The requirements for specific situations which require Aboriginal cultural heritage survey undertaken in conjunction with the GNTCL are defined in clause 2 of the CHMP.

As such, Centennial Angus Place Pty Limited, will comply with the notification protocols set out in Section 2 of Schedule 7 of the CHMP. This requires that prior to carrying out any surface ground breaking work that is likely to impact upon Aboriginal sites in the project area, notice be given in writing 10 business days with a six day right of reply for GNTCL. It should be noted that the proposed works do not impact on any Aboriginal sites or places.

Impacts and Consequences

No subsidence is predicted in the area of the Rock Shelter with PAD. Also, other sites previously registered on the AHIMS database are located outside of the Study Area. Therefore, the proposed modifications are unlikely to impact upon the Aboriginal cultural heritage sites (RPS, 2010b – Appendix 7.8).

The subsidence report (DGS, 2010 in Appendix 3.1) considers that it is very unlikely that cracking of cliff lines would occur due to mine subsidence, as all known cliff lines fall outside the predicted area of subsidence.

Mitigation

The following measure shave been identified by RPS for Aboriginal Cultural Heritage:

- Aboriginal Community Consultation. Liaison established with the Aboriginal Community as per the DECCW Interim Community Consultation Requirements for Applicants (2005) during this project should be maintained during the proposed works should any matters relating to Aboriginal heritage occur.
- Aboriginal Archaeological Management. One Aboriginal cultural heritage site was located and recorded during the survey. The site was recorded as a Rock Shelter with PAD. There was no subsidence predicted in the area of RS PAD1 (DGS April 2010 – see Appendix 3.1). However, it is recommended that during the general course of the project the site could be monitored for the effects of cracking or movement and ongoing management of the site could include monitoring. Monitoring of the Rock

Shelter with Pad would include pre and post mining inspections to assess and quantify any impact.

- During the project, ensure that disturbance associated with the proposed mining operations is limited to the boundaries of the Study Area identified in this report. If works are planned outside of the Study Area, new and subsequent European and Aboriginal archaeological investigations would need to be initiated.
- During the project, if it is suspected Aboriginal Cultural Heritage Material has been encountered, work should cease immediately in that locale. If Aboriginal site/s are identified in the Study Area, then all works in the area should cease, the area cordoned off and contact made with DECCW Enviroline 131 555, a suitably qualified archaeologist and the relevant Aboriginal stakeholders, so that it can be adequately assessed and managed.
- During the project, in the event that skeletal remains are uncovered, work is to stop in the vicinity immediately and the relevant command area of the NSW Police contacted. If skeletal remains are deemed to be of Aboriginal origin, then all works in the area should cease, the area cordoned off and contact made with DECCW Enviroline 131 555, a suitably qualified archaeologist and the relevant Aboriginal stakeholders, so that it can be adequately assessed and managed.

The following measures are recommended by RPS for European Cultural Heritage

- No European cultural heritage sites were located during the survey of the Study Area. If, during the course of clearing works, significant European cultural heritage material is uncovered, work should cease in that area immediately. The NSW Heritage Branch should be notified and works only recommence when an appropriate and approved management strategy instigated.

Residual Consequences

There are no impacts predicted and therefore no consequences provided the above mitigation is implemented.

7.6.7 Social Impact Assessment

The Specialist Assessment

RPS prepared the Social Impact Assessment (SIA) – see Appendix 7.9. The key findings are outlined below.

Existing Situation

Centennial Coal Company and Angus Place Colliery have a number of social and community measures in place as part of the existing operations. These include a monthly news page appearing in the local newspaper, a Community Enhancement Fund and a Community Consultative Committee who provide a closer link to the local community.

Angus Place Colliery is also required under current Project Approval conditions to prepare an Annual Environmental Management Report (AEMR). This report is prepared to identify the standards and performance measures that apply to the development, describe the works carried out in the last 12 months, describe the works that would be carried out in the next 12 months, include a summary of the complaints received during the past year, and compare this to the complaints received in the previous years, include a summary of the monitoring results for the development during the past year and include an analysis of these monitoring results. The AEMR is made publicly available via the Centennial Coal website.

The SIA has been based on a desk top analysis using a range of data sources such as the analysis of Place of Usual Residence Census data from the Australian Bureau of Statistics, review of Lithgow City Council Social Plan and relevant strategic and statutory planning documents. Information about the demographic

profile, health, crime, social and community infrastructure and community issues has been compiled. RPS has been found that the existing social environment is characterised by:

- a high proportion of the local population employed in mining;
- a relative lack of diversity in housing stock, at the local and regional level, with the stock overwhelmingly separate houses;
- lower levels of households in the local area renting and a higher proportion purchasing;
- a high proportion of people in the local area in "family households";
- a majority of employees of Angus Place Colliery that live in the regional centre (Lithgow) with about 35% living in the townships in the local area;
- social infrastructure predominantly located at the regional level;
- significant health differences between region (Lithgow LGA) and NSW: levels of "overweight and obesity", number of smokers, rates of new cancers and hospitalisations; and
- high rates of reported crime in the region (Lithgow LGA), which is not reflected at the local level.

Impacts and Consequences

The proposed modifications comprise an additional 10 staff and 75 temporary contractors and in the longer term the continuation of existing employment.

Up to 75 contractors would be employed over a 15 month period. This is not likely to lead to significant effects on housing and services in the local area due to the short duration and hence workers more unlikely to seek out permanent accommodation.

The increase in the number of employees is relatively small and therefore the population increase would be negligible (RPS, 2010c – Appendix 7.9). There would not be a significant impact on local community services.

There is potential for impacts on local people resulting from noise, dust and traffic for which information is drawn from the Air Quality Assessment (Heggies, 2010a – Appendix 7.11), Traffic Impact Assessment (STAP, 2010 – Appendix 7.12) and Noise Impact Assessment (Heggies, 2010b – Appendix 7.12). Although there have been few reported complaints regarding the operation of the mine, the main operational impacts relate to noise, particularly from vehicles using the haul roads. The Noise Impact Assessment (Heggies, 2010b) identifies limits to truck movements in order to comply with project noise levels at residential receptors. A mix of 50 tonne and 80 tonne trucks would be used to transport the coal along the private haul roads and these vehicles are found to have similar noise levels. Any additional production within a 12 month period, resulting from the proposed modification, would be hauled without any additional truck movements beyond the daily allowable movements established by the noise limitations applying to the haul roads. The Air Quality Assessment (Heggies, 2010a) reports on the effects of dust and particulates at residential receptors. Dust and particulates are predicted to be below the air quality criteria for the project. The Traffic Impact Assessment (STAP, 2010) finds that the increase in traffic generation due to additional staff would not significantly alter existing traffic levels on local public roads.

As outlined in Section 2, Angus Place Colliery is currently consulting with Lithgow City Council for a Voluntary Planning Agreement for funds to go towards the local community and local roads.

Overall, it is anticipated that the proposed modifications would have the positive impacts of continuing existing employment at the mine and consequently the maintenance of a local community (RPS, 2010c – Appendix 7.9).

Mitigation

The following are mitigation and management methods are recommended by RPS:

- Maintain existing operational procedures designed to minimise impacts of noise, dust, etc to the local community.
- Maintain existing community consultation to recognise and address any operational or social impacts.
- Maintain existing complaints handling procedures.

Residual Consequences

The additional employment and continuation of existing employment is a significant positive impact. People can remain in employment within their current communities and social networks. Strong connections to the established local communities are evidenced by the large proportion of home-ownership and home-purchasing and large number of family households, particularly households with children. This stability could be disrupted if the mine extension did not proceed (RPS, 2010c – Appendix 7.9).

7.6.8 Economic Assessment

The Specialist Assessment

Gillespie Economics have undertaken the economic assessment – see Appendix 7.10. The assessment provides an evaluation of the economic efficiency of the proposed modifications, an identification of the distribution of impacts between stakeholder groups, a regional economic impact assessment of the proposed modification and a consideration of the impacts associated with mine cessation. The key findings are outlined below.

Assessment

Gillespie has considered the following two aspects of the proposals:

- the economic efficiency of the Modification (i.e. consideration of economic costs and benefits); and
- the regional economic impacts of the Modification (i.e. the economic stimulus that the project would provide to the regional economy).

Gillespie states that the main decision criterion for assessing the economic desirability of a project to society is its net benefit that is the sum of the discounted benefits to society less the sum of the discounted costs. A positive net benefit indicates that it would be desirable from an economic perspective for society to allocate resources to a proposal, because the community as a whole would be better off. In this case, the benefits to society of mining relate to the net production and employment benefits, while the economic costs to society relate to any environmental impacts (Gillespie, 2010).

The proposed modifications would provide employment of 225 full time staff during the extended mine life and 75 contractors. The mining of the two additional longwalls would yield 4.9 Mt or 5.6 Mt of coal depending on whether option 1 or 2 is adopted for Longwall 910. Also, Wallerawang and Mount Piper power stations could continue to obtain thermal coal from a nearby source (Gillespie, 2010).

Approximately $2.6M of decommissioning costs that would have been incurred in 2014 following cessation of the mine would be deferred and therefore this would be an economic benefit of the proposed modifications (Gillespie, 2010).

Gillespie reports that $25M of residual capital value and $2.5M of residual land value that would have been realised in 2014 would be deferred, representing an additional cost of the proposed modifications.

There would be no incremental capital costs because additional mining equipment would not need to be purchased. However, there would be additional costs associated with temporary contractors to assist with development activities over an approximate 15 month period. These costs are estimated at $32M per annum (Gillespie, 2010).

Gillespie considers there are two main economic benefits of the proposed modification, the first relates to the direct value of the coal and the second, that without the proposed modifications export coal from other Centennial Mines would be required to supply Wallerawang and Mount Piper power stations.

Gillespie estimates that the proposed modification would have net production benefits of $73M or $93M, depending on which option is adopted for mining of longwall 910. However, because the potential incremental employment benefits and environmental impacts of the proposed modification have not been valued, this net production benefit represents a minimum threshold value that the value of any environmental impacts of the proposed modification, after mitigation, would need to exceed to make the proposed modifications questionable from an economic efficiency perspective (Gillespie, 2010).

The main environmental impacts of the proposed modifications are those associated with greenhouse gas generation and the clearing of 4.2ha of native vegetation. Using a carbon value of $30/t CO2-e, Gillespie has valued the incremental greenhouse gas emissions of the proposed modifications at $2M present value. Using non-market values for vegetation conservation from Gillespie (2009), vegetation clearing impacts are valued by Gillespie at $4.1M. These environmental impacts of the proposed modifications are therefore valued at significantly less than the estimated net production benefits (Gillespie, 2010).

Gillespie reports that the net production benefits of the proposed modifications are distributed between a range of stakeholders including Centennial Angus Place Pty Ltd and its shareholders in the form of net profits, the NSW government in the form of royalties, the Commonwealth Government in the form of company tax and the local region from the establishment of a Voluntary Planning Agreement to fund local community projects. The State Government also receives additional income by way of payroll tax while the Commonwealth Government would receive additional revenues in the form of income tax.

There would be an extension of the period over which the mine would provide a stimulus to the Lithgow and Bathurst economy and the annual regional economic impacts associated with the additional years of operation of Angus Place are estimated at (Gillespie, 2010):

- $204M in annual direct and indirect regional output or business turnover;
- $106M in annual direct and indirect regional value added;

- $47M in annual direct and indirect household income; and
- 440 direct and indirect jobs.

Gillespie report that the proposed modifications would also provide stimulus to the regional economy from May 2011 from additional expenditures on contractor mining services to assist with development activities and these impacts are estimated at:

- $26M in annual direct and indirect regional output or business turnover;
- $17M in annual direct and indirect regional value added;
- $8M in annual direct and indirect household income; and
- 76 direct and indirect jobs.

7.6.9 Hazard - Bushfire Management

The Specialist Assessment

RPS has considered the approach to bushfire management.

Existing Situation

Angus Place has an existing Bushfire Management Procedure that would continue to be implemented.

The potential for the proposed modifications to start or influence a fire that could spread across the landscape is considered low, however, it is prudent to assess this risk and manage any potential issues that could influence the risk. Bushfire risk management involves identifying the risk posed by fire to assets and life and establishing management strategies to reduce the level of risk and offer an increased level of protection. The development of risk management strategies, in accordance with the appropriate legislation, policies and statutory documents, is a tool widely recognised as instrumental in the protection of life and property from the threats posed by bushfire.

Impacts and Consequences

The impact of a bushfire on the surface infrastructure would be limited. Bushfires can burn very hot and can move quickly. Consequently there is potential that a fire would be sufficiently hot, or burn for a long enough period, for it to have an impact on the surface infrastructure, such as the borehole compound. Some damage may be expected to the exterior of the compound facilities or if the fire is large enough, the facilities may be burnt completely.

Strategies to reduce the risk of fire include management of the vegetation onsite around the borehole compound and the provision of adequate services such as access and water supply for use during a bushfire emergency. With the implementation of such measures, the potential for the surface infrastructure to start or influence the pattern of fires should be ameliorated.

Fire is a risk that needs to be considered in any construction activity and the construction of surface infrastructure is no different. Dealing with risks is relatively well understood and can be appropriately managed through construction occupational health and safety management plans.

The following information provides guidelines for vegetation management around the borehole compound. This information can be used to manage the site in a manner that affords an adequate level of protection to both assets and life. For vegetation management and fuel reduction purposes for the surface infrastructure two management options are recommended. These are:

- Asset Protection Zone (APZ) around the borehole compound; and
- Access roads should be suitable as fire trails.

Electrical incidents such as fallen powerlines can cause a bushfire. If overhead powerlines are not inspected and maintained, they can clash or be brought down by strong winds, falling trees and branches, or broken poles and fittings, creating a serious safety and bushfire risk. It is the responsibility of the utility company to maintain the powerlines and poles that it owns.

Mitigation

During construction of the surface infrastructure, the following measures are recommended:

- no smoking on site;
- all vehicles to carry emergency communication equipment;
- all vehicles to carry fire extinguisher or fire fighting equipment;
- implement Asset Protection Zones around the borehole compound;
- provide and Maintain Suitable Access;
- minimum trafficable width of access road to 4 – 5 metres; and
- minimum vertical distance of 6 m to overhanging obstructions

During operation of the powerline:

- Trees and other vegetation too close to powerlines may cause fires or other safety risks such as fallen live wires. Trees need to be trimmed to provide a safety clearance from powerlines (in bush fire prone areas, 2.5 metres around uninsulated wires and one metre around insulated wires), as well as allowing for regrowth. All overhanging limbs and branches should also be removed in bush fire prone areas. Tree trimming near live powerlines must only be done by an authorised tree trimmer. All power lines to remain clear of vegetation.
- Regular inspections (preferably once a year before the start of the bushfire season– normally October 1)- checking defects in power poles and wires.
- Access to the powerline is available at all times.

Residual Consequences

There are no consequences arising from the impacts, all of which can be resolved with the ongoing implementation of the Angus Place Bushfire Management Procedure and the identified mitigation measures.

7.7 Pit Top

The environmental issues specified in the DGRs are set out below together with the impact assessments undertaken to address them in relation to the proposed modifications at the pit top:

- Soil and Water:
  - Surface Water Assessment – see Appendix 7.3
- Air Quality:
  - Air Quality Assessment – see Appendix 7.11
  - Greenhouse Gas – see Appendix 7.11. This includes direct and indirect impacts of coal extraction,

particularly with regard to climate change and the effects of climate change.

- Traffic and Transport:
  - Traffic Impact Assessment – see Appendix 7.12
- Noise and Vibration:
  - Noise Impact Assessment – see Appendix 7.13

The pit top infrastructure has the capacity to handle any additional coal that may be produced, up to 4 million tonnes within a 12 month period, without any change to the existing infrastructure and handling arrangements.

Impacts on hydrogeology at the pit top are not addressed because there is no new potential source of groundwater contamination and therefore no additional risk to groundwater associated with the proposed pit top modifications. The upgrades to the existing settlement ponds comprise repairs and other minor drainage work that would not impact on hydrogeology.

Impacts on soils and land resources are not addressed for this part of the Project Area because the pit top area is previously disturbed and no areas of previously undisturbed land would be used. Similarly, flora and fauna and cultural heritage are not addressed for the proposed modifications at the pit top.

7.7.1 Surface Water

The Specialist Assessment

GHD have prepared the Surface Water Assessment. The full report is provided in Appendix 7.3 and an outline of the key issues with respect to the pit top is provided below (surface water issues associated with the proposed longwalls, dewatering bore and associated infrastructure is provided at section 7.6.1 above).

Existing Situation

The overall components of the water system that were investigated included clean water management, dirty water management, underground water management, overall site water balance and water quality.

The water management system was developed in accordance with EPL 467, the conditions to the existing Project Approval and its Statement of Commitments. It comprises the separation of clean and dirty water and the treatment of dirty water prior to discharge.

There are two surface water management areas used by Angus Place Colliery at the:

- Pit top; and
- Kerosene Vale site (south of Angus Place Colliery) as shown on Figure 2.5.

At the pit top, the clean water system involves a series of diversion bunds and drains that intersect clean water run off before it enters disturbed areas. This enables a reduction in dirty water run off. Dirty water run off from areas such as the workshop, washdown bay and pit top is directed to the workshop grit trap and oil water separator before being directed to the two settling ponds that are located on the western side of Wolgan Road. Dirty water from the coal handling plant and upper stockpile area passes through four pollution ponds before also being directed to the settlement ponds. These ponds discharge through LDP002. Dirty water is also treated through the addition of flocculants prior to discharge (GHD, 2010 – Appendix 7.3).

Kerosene Vale was a previous underground mine and has been used as a stockpile area since the closure of operations. There are also clean and dirty water systems in place at this location. Whilst not within a Project Area for the proposed modifications, the continued rehabilitation is anticipated to decrease the area of dirty water catchment (GHD, 2010 – Appendix 7.3).

In June 2010 Angus Place Colliery responded to the DECCW regarding Condition U1 of the Angus Place Colliery Environment Protection License (EPL 467). Specifically, Angus Place Colliery was required to investigate and report on options for the reduction or removal of salt being discharged from LDP001. From this assessment Angus Place Colliery committed to the following:

- To extend the current aquatic monitoring suite to enhance understanding of the potential ecological impacts downstream of LDP001 and undertake a toxicity assessment of the downstream ecosystem to determine the biological effects of higher than background salinity levels.
- To cost and investigate the implementation of the preferred salinity management option. The preferred option consists of an overland transfer to the existing Springvale Delta Water Transfer Scheme.

Impacts and Consequences

Part of the proposal is to construct clean water diversions. During construction there is potential for an impact on water quality (GHD, 2010 – Appendix 7.3) and mitigation measures are set out below.

The upgrade works include the demolition and replacement of the existing spillways as well as raising of sections of the existing embankments. In addition to the pollution pond upgrade works, it is proposed to construct a dirty water diversion along the northern boundary of the ROM stockpile area. This dirty water diversion would include a trapezoidal dish drain and a series of impermeable barriers to contain sediment laden water within the ROM stockpile area. This diversion drain would then direct the dirty water to the primary pollution ponds. The impact of these works is an improvement to the dirty water management system at the pit top and the consequence of this is a reduced effect on receiving waters.

While there would be an increase in the production limit from 3.5 to 4 Mtpa, the current footprint of the ROM stockpile would be maintained through operational efficiencies in coal handling and management. This would allow an increase in production without encroachment into the proposed diversion drains (GHD, 2010 – Appendix 7.3). It is also proposed to re-align the existing clean water diversion to the west.

Mitigation

GHD identifies the following mitigation measures.

- The existing SWMP sets out measures currently incorporated within the water management system including the separation of clean and dirty water, sedimentation ponds, wetlands, oil water separators and regular monitoring. This would continue in accordance with the SWMP.
- During the construction of the modifications to the stockpile area, a range of standard mitigation measures would be implemented in accordance with 'Managing Urban Stormwater: Soils and Construction'.

In addition to GHD's recommended mitigation, Angus Place Colliery commits to the undertakings under condition U1 of the Environmental Protection Licence 467.

Residual Consequences

There are no consequences arising from the identified impacts because the impacts can be ameliorated by the mitigation measures set out above.

7.7.2 Air Quality

The Specialist Assessment

Heggies Pty Ltd (Heggies) has undertaken an Air Quality Assessment for the proposed modifications – see Appendix 7.11. The key findings are outlined below.

Existing Situation

Project specific data was used to determine a background deposited dust levels for the Study Area. For PM_{10}, Heggies obtained ambient background particulate monitoring data from DECCW for their monitoring site at Bathurst which is approximately 50km north west of Angus Place Colliery. Based on statistical comparison with the limited particulate (PM_{10} and Total Suspended Particulates [TSP]) monitoring data from Angus Place Colliery, the Bathurst data set was considered appropriate for use within the assessment. A background for TSP was also derived from the above data sets.

The atmospheric pollutants generated by activities occurring at Angus Place Colliery are fugitive emissions of particulates (such as PM_{10}, Total Suspended Particulate [TSP]), those generated through the combustion of fuel in vehicles (nitrogen oxides [NO_x], sulphur dioxide [SO_2], volatile organic compounds [VOCs], carbon monoxide [CO], PM_{10}) and fugitive emissions from the coal seam (Heggies, 2010a). Heggies consider that the main type of emissions from Angus Place Colliery is fugitive particulate emissions and therefore, the focus of the assessment is on fugitive emissions of dust and particulates.

Major sources of particulate (PM_{10} and dust) occur as a result of activities including stockpile management, stockpiles and open areas (wind erosion), conveying coal and loading trucks from the coal chute. Heggies assumed that these sources are not likely to change for the proposed modification.

Dust mitigation and management measures that are currently implemented at Angus Place Colliery include permanent road sealing, water sprays on conveyors, enclosures on main conveyors, belt cleaners at the main conveyors, enclosed coal chute at the stacking conveyor discharge point, watering of ROM coal handling areas and road sweeping. Angus Place Colliery's existing Air Quality Monitoring Program provides data that shows dust deposition rates in the vicinity of Angus Place Colliery are low, suggesting that the dust mitigation and management measures are being implemented in accordance with best practice (Heggies, 2010a).

Heggies understand that there have been no complaints regarding air quality at Angus Place Colliery.

The existing Project Approval of 2006 identifies air quality criteria that must not be exceeded by dust emissions generated at Angus Place Colliery. Also, it is a condition of Angus Place Colliery's EPL that Angus Place Colliery must be maintained in a condition that minimises or prevents dust emissions from the premises.

Three sensitive receptors have been identified for the assessment as shown on Figure 7.2.

There are a number of ventilation fans at Angus Place Colliery. These stimulate the movement of fresh air to the underground mining areas and remove emissions from the mining activities such as diesel combustion and coal seam gas extractive operations. These emissions were recently assessed in 2006, and the data reviewed within the Heggies submission.

Impacts and Consequences

The assessment has been undertaken in accordance with the guidance contained in 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW', DEC (now DECCW), 2005 (Heggies, 2010a).

The following project-specific air quality goals have been established for assessment of the proposed modifications.

- A 24-hour maximum PM_{10} concentration of 50 µg/m^3;
- An Annual average PM_{10} concentration of 30 µg/m^3;
- A total monthly average dust deposition rate (background plus increment) of 4 g/m^2/month.

Modelling of potential mining fugitive dust and PM_{10} emissions was undertaken by Heggies using the CALPUFF Dispersion Model software approved by the DECCW.

Heggies have assumed that dust generating activities with the proposed modification would be similar to those at present although the locations of mining activities and intensity of mining would be altered. It was considered that the fully operational mine would represent a worst case scenario, with regard to particulate emissions.

One scenario was modelled to represent potential emissions associated with the proposed modification. The findings indicate that the proposals 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_{10} and TSP concentrations are predicted to be below the project air quality goal at all surrounding dwellings.
- Incremental maximum 24-hour PM_{10} concentrations attributable to the modifications are predicted to be well below the project air quality goals at the majority of surrounding dwellings.
- Minimal impacts associated with the ventilation fans (odour and particles)

The results of the modelling indicate that the concentrations of particulate matter and dust deposition attributable to the proposed modifications would be within the current NSW DECCW air quality goals at all surrounding residences (Heggies, 2010a).

Mitigation

Heggies included the following air quality mitigation measures within the dispersion modelling that therefore should continue to be implemented:

- Permanent road sealing (asphalt seals);
- Dust suppressions;
- Enclosures on the main conveyors;
- Belt cleaners at the main conveyors;
- Enclosed coal chute at the stacking conveyor discharge point;
- Watering of ROM coal handling areas; and
- Road sweeping.

Residual Consequences

As the assessment has determined that air quality would be maintained within acceptable criteria there are no consequences as a result of the proposal.

7.7.3 Greenhouse Gases

The Specialist Assessment

Heggies Pty Ltd has undertaken a greenhouse gas assessment and this is included within their Air Quality Assessment – see Appendix 7.11. The key findings are summarised below.

This is a quantitative assessment to estimate the potential greenhouse gas emissions from the proposed modifications.

Existing Situation

The following direct emissions (referred to as Scope 1) were considered by Heggies:

- Emissions from the release of coal bed methane and carbon dioxide as a result of extraction activities.
- Emissions from the combustion of diesel – mobile and fixed plant and equipment
- Emissions from the combustion of LPG
- Consumption of sulphur hexafluoride for gas insulated switchgear and circuit breaker operations
- Consumption of oils and greases

The following indirect emissions (referred to as Scope 2) were considered by Heggies:

- Emissions associated with the consumption of generated and purchased electricity at the site.

The following indirect emissions (referred to as Scope 3) were considered by Heggies:

- Emissions from the extraction, production and transport of diesel consumed at the colliery.
- Emissions from the extraction, production and transport of fuel burned for the generation of electricity consumed at the colliery and the electricity lost in the delivery in the transmission and distribution network.
- Emissions from the combustion of coal from the colliery.

Heggies report that the current CO_2 emissions from Angus Place Colliery are as follows:

- scope 1 emissions – 25,980.50 tonnes per annum
- scope 2 emissions – 32,597 tonnes per annum
- scope 3 emissions - 523,992 tonnes per annum

Impacts and Consequences

Emissions of carbon dioxide (CO_2) and other non- CO_2 greenhouse gas emissions have been quantified by Heggies. They have been assessed in terms of direct (Scope 1) emission potential, indirect (Scope 2) emission potential and significant upstream/downstream (Scope 3) emission potential.

The changes in emissions from existing operations to the mine with the proposed modifications are identified by Heggies as follows:

- The direct emissions (Scope 1) (CO_2-e) are estimated to be approximately 26,323 tonnes per annum. This represents an increase of approximately 343 tonnes per annum compared to existing operations.
- Indirect emissions (Scope 2) are estimated to be 46,888 tonnes CO_2-e per annum, an increase of approximately 14,291 tonnes per annum compared to existing operations.

- Indirect emissions (Scope 3) are estimated to be 949,998 tonnes CO_2-e per annum, an increase of approximately 426,006 tonnes per annum compared to existing operations.
- Total emissions are estimated to be 1,023,210 tonnes CO_2-e per annum, an increase of approximately 440,640 tonnes per annum compared to existing operations.

Mitigation

Angus Place Colliery currently implements a number of measures to minimise greenhouse gas emissions. Relevant measures include maximising energy efficiency through the implementation of an Energy Savings Action Plan (ESAP) under the Energy Administration Amendment (Water and Energy Savings) Act 2005.

Heggies recommend the following additional measures:

- Utilise ventilation modelling to identify opportunities to reduce ventilation flow and therefore the energy used by the main fan as the production areas become closer to the mine pit bottom and ventilation circuit resistance is lowered.
- Identify and implement cost effective measures to improve energy efficiency.
- Regular maintenance of plant and equipment to minimise fuel consumption.
- Consideration of energy efficiency during the plant and equipment selection phase

Residual Consequences

Heggies (2010a) report that emissions of greenhouse gases in NSW were reported to be 163 million tonnes in 2007 which represents 27% of the Australian total greenhouse gas emissions of 597 million tonnes. Heggies provide a comparison of emissions attributable to the modified Project with NSW and Australia emission totals as set out in Table 7.5 below.

Table 7.5 Comparison of Modified Project GHG Emissions with State and National Totals 2007 (Heggies, 2010a)

Emission Scope	Estimated Emissions (tCO_2-e/annum)	Percentage of NSW 2007 GHG Emission Total	Percentage of Australian 2007 GHG Emission Total
1	26,324	0.0016	0.0044
Total (1,2 and 3)	1,023,210	0.63	0.17

7.7.4 Traffic and Transport

The Specialist Assessment

Stapleton Transportation and Planning Pty Ltd (STAP) prepared a Traffic Impact Assessment (TIA) – see Appendix 7.12. The TIA addresses potential changes in traffic levels on local public roads as well as any changes to coal truck movements using the private haul roads. The key findings are outlined below.

Existing Situation

Coal is transported from the Colliery to the Wallerawang and Mount Piper power stations via private haul roads. There is no transportation of coal via public roads. In addition, the pit top currently generates some heavy vehicle demand (deliveries of equipment, maintenance vehicles etc).

STAP has found most of the staff currently travel to Angus Place Colliery by private vehicle. The mine operates 24 hours per day, 7 days per week and employs 215 full time equivalent staff mainly across 3 shifts per 24 hour period.

Traffic surveys have been undertaken in the local area. Generally, the local network operates at a very good level of service based on low-moderate traffic demands even during peak periods, and excellent intersection infrastructure at key locations within the sub-regional network (STAP, 2010 – Appendix 7.12).

The traffic currently generated by Angus Place Colliery is relatively low, particularly during the commuter peak periods (STAP, 2010 – Appendix 7.12). This is a function of shifts commencing outside of commuter peak periods and what are essentially low colliery flows. All staff and heavy vehicle parking is provided on site.

Impacts and Consequences

There would be up to 75 temporary contractors and 10 additional full time equivalent staff during operation and therefore an increase in staff vehicle generation. Distributed across three shifts, and continuing to be generated primarily outside of commuter peak periods, these additional trips would have a negligible impact on the operation of public roads and intersections, with conditions virtually unchanged (STAP, 2010 – Appendix 7.12).

All parking for staff would continue to be provided on site. The increase in staff due to the proposed modifications would result in a maximum of 37 additional vehicles (STAP, 2010 – Appendix 7.12). This additional parking would be provided in the western car park. This car park currently provides approximately 25 spaces and would be formalised to provide a minimum of 40 spaces (this has approval under the 2006 Project Approval).

There would be a mix of 50 and 80 tonne trucks used to enable the haulage of coal that may be produced as a result of sustained production within a 12 month period, without increasing vehicle frequency and within the noise limitations applying to the haul roads (the Noise Impact Assessment by Heggies is presented in Appendix 7.13 and outlined at Section 7.8.1 below). The trucks would continue to travel the private haul roads and would not use the local road network.

It is not anticipated that the number of general heavy (service) vehicle trips via Wolgan Road would increase.

Mitigation

STAP identifies the following mitigation measures:

- The western car park to be formalised to provide a minimum of 40 spaces (as permitted under the Project Approval of 2006). Formalisation of the car park should be investigated such as delineating spaces and access aisles in accordance with AS2890.1:2004.
- Provide additional signage for contractors to the contractor car park.

Residual Consequences

There are no consequences arising from the identified impacts because the impacts can be ameliorated by the identified mitigation measures above.

7.7.5 Noise and Vibration

The Specialist Assessment

There are no significant surface infrastructure changes that are likely to result in increased noise emissions (Heggies, 2010b – see Appendix 7.13). The construction of the dewatering bore and associated infrastructure would be located approximately 6km to the east of Wolgan Road and in this distant location there would not be any construction or operational noise impacts on residences.

Heggies have prepared a Noise Impact Assessment (Appendix 7.13) which addresses noise emissions associated with the Colliery's pit top and Wallerawang haul road based on quarterly noise monitoring since 2007. This is supplemented with noise monitoring of the Mount Piper haul road obtained as part of the preparation of this EA. Noise impacts associated with Wallerawang and Mount Piper haul roads are discussed at Section 7.6 below.

Existing Situation

Five sensitive receptor locations were identified for the purposes of the noise assessment. These residences as shown on Figure 7.3 and include:

- Sharpe
- Mason
- Neubeck (Lidsdale)
- Blackmans Flat (east)
- Blackmans Flat

Sharpe is the nearest receptor to the pit top.

In accordance with the Angus Place Noise Monitoring Program (NMP), quarterly noise monitoring has been conducted since May 2008 by Heggies and between September 2007 and February 2008 by Atkins Acoustics. This has provided noise levels from attended noise measurements at the residences of Sharpe,

Mason and Neubeck. Due to the distances between the pit top and these sensitive receivers, the noise constituted by the pit top is either a very minor component of the monitored levels, or inaudible. The Wallerawang haul road accounts for most of the noise and therefore the results of the historical quarterly monitoring since May 2008, included in Tables 7.6 to 7.8, related to noise from the haul roads.

Table 7.6 Daytime Quarterly Noise Monitoring Results (Heggies, 2010b – see Appendix 7.13)

Location	Angus Place Colliery Contributed Noise Level $L_{Aeq\ (15\ minute)}$ dBA[1]							
	Noise Assessment Criteria	Dec 2009	Sept 2009	July 2009	Apr 2009	Jan 2009	Sept 2008	May 2008
R1 Sharpe	42	38	37	39	40	39	36	**43**
R2 Mason	41	40	39	39	39	40	39	41
R3 Neubeck	44	39	42	36	39	39	34	38

Table 7.7 Evening Quarterly Noise Monitoring Results (Heggies, 2010b – see Appendix 7.13)

Location	Angus Place Colliery Contributed Noise Level $L_{Aeq\ (15\ minute)}$ dBA[1]							
	Noise Assessment Criteria	Dec 2009	Sept 2009	July 2009	Apr 2009	Jan 2009	Sept 2008	May 2008
R1 Sharpe	38	33	37	**39**	**40**	**41**	**40**	38
R2 Mason	37	32	37	**39**	37	**41**	36	**39**
R3 Neubeck	40	35	39	36	39	37	36	39

Table 7.8 Night-time Quarterly Noise Monitoring Results (Heggies, 2010b – see Appendix 7.13)

Location	Angus Place Colliery Contributed Noise Level $L_{Aeq\ (15\ minute)}$ dBA[1]							
	Noise Assessment Criteria	Dec 2009	Sept 2009	July 2009	Apr 2009	Jan 2009	Sept 2008	May 2008
R1 Sharpe	36	30	<30	33	35	**37**	**38**	**38**
R2 Mason	35	<30	<30	<30	<30	33	35	**37**
R3 Neubeck	35	<30	<30	<30	<30	<35	<35	<35

The results indicate occasional minor exceedances of the noise impact assessment criteria. However, results are generally within the 2 dBA tolerance (as per Chapter 11 of the NSW INP). Heggies have found that there has been a general downward trend in noise levels and no exceedences have been reported since July 2009.

Heggies (2010b) report that since May 2008, a number of noise mitigation and management strategies have been investigated with the following measures being implemented:

- Coal bin management – the coal bin is no longer allowed to empty before being refilled to reduce noise from coal falling into empty bins.
- Truck loading – the coal process has been 'choked' and trucks crawl at a slower speed to prevent a high flow of coal from the bin impacting on the truck trailer, clam shell and bin gate.
- An Acoustic Specification for Procurement has been developed for haul roads to develop noise emission limits for the procurement of trucks for the haulage to Wallerawang and Mount Piper.

These have been taken into consideration for the purposes of the Noise Impact Assessment (see Appendix 7.13).

Impacts and Consequences from the Proposed Modification

The results of historical monitoring data (Tables 7.6 to 7.8) show that existing noise emission levels associated with the pit top have been in compliance with the relevant consent conditions since July 2009 (Heggies, 2010b).

Whilst the proposed modification does not result in any changes to the existing pit top infrastructure or to the handling of coal processed at the pit top, noise levels will continue to be monitored and there is a requirement under a condition of the Project Approval for continuous improvement in relation to noise mitigation.

Mitigation and Residual Consequences

On the basis that the existing operations are compliant with noise assessment criteria and the pit top handling arrangements do not require any modifications or new infrastructure and the proposed increase in production limit is for when a shut down period is not required, the proposed modification would not result in any additional noise impacts, nor consequences as a result of the proposed modification. Continued implementation of the monitoring program will ensure that noise levels from Angus Place Colliery do not

exceed project criteria and the requirement for continuous improvement (from the 2006 Project Approval) remains.

7.8 Continued Use of the Existing Private Haul Roads

The environmental issues specified in the DGRs are set out below together with the impact assessments undertaken in relation to the continued use of the existing private haul roads for the transportation of coal by truck to Wallerawang and Mount Piper Power Stations:

- Noise and Vibration
  - Noise Impact Assessment see Appendix 7.13
- Greenhouse gases
  - Greenhouse gas assessment by Heggies (Appendix 7.11) includes fuel use for vehicles transporting coal (see Section 7.7.2).

7.8.1 Noise and Vibration

The Specialist Assessment

There are no proposed modifications to the haul roads however the impact of transporting an additional 0.5 million tonnes of coal, within a 12 month period where no shut down period is required, has been assessed.

The key findings of Heggies Pty Ltd Noise Impact Assessment in relation to the Mount Piper haul road and Wallerawang haul road are outlined below.

In accordance with the Angus Place Noise Monitoring Program (NMP) Heggies has conducted quarterly noise monitoring at the Angus Place Colliery from May 2008 to present (refer to Table 7.6, 7.7 and 7.8 above). The results of historical monitoring data at the subject site show that existing noise emission levels from the Wallerawang haul road have been in compliance with the relevant consent conditions since July 2009 (Heggies, 2010b).

The Noise Impact Assessment has also monitored noise emissions from truck movements along the Mount Piper haul road.

Additional traffic on public roads due to the additional employees is negligible (STAP, 2010 – see Appendix 7.12) and therefore there would not be noise impacts associated with this increase.

Existing Situation

The residences of Sharpe, Mason and Neubeck (as shown on Figure 7.3) have been identified by Heggies as the nearest sensitive receivers to the Wallerawang haul road, while the Sharpe residence and two Blackmans Flat receivers are the nearest sensitive receivers to the Mount Piper haul road.

There are noise limits in place for the Wallerawang haul road (and colliery operation in general) under existing approvals. Quarterly monitoring data as set out in Tables 7.6 to 7.8 above show that existing noise emission levels have complied with the relevant consent conditions since July 2009 (Heggies, 2010b).

The results indicate occasional minor exceedances of the noise impact assessment criteria. However, results are generally within the 2 dBA tolerance (as per Chapter 11 of the NSW INP). There has been a general downward trend in noise levels and no exceedences have been reported since July 2009.

The Mount Piper Haul Road Development Consent states that *"the level of noise emanating from the transport of coal on the haul road shall not exceed an LAeq sound pressure level equivalent to the measured*

background, LA90T measured over a 15 minute period plus 5dBA", however, no defined noise limits are in place based on long term background noise monitoring. Therefore, ambient noise surveys have been undertaken to characterise and quantify the existing acoustical environment in the area surrounding the Mount Piper haul road and to determine Project Specific Noise Criteria (Heggies, 2010b – see Appendix 7.13).

Unattended and attended surveys were carried out at the following two residential locations:

- Sharpe Residence
- 1416 Castlereagh Highway, Blackmans Flat

These locations are considered to be representative of the nearest noise sensitive receptors to the Mount Piper haul road. The summary of results of existing ambient noise levels from the Noise Impact Assessment is shown in Table 7.9 below.

Table 7.9 Summary of Existing Ambient Noise Levels (Heggies, 2010b – see Appendix 7.13)

Location	Period	Background L_{A90} Noise Level Rating Background Level	Measured $L_{Aeq(Period)}$	Estimated Existing Industrial Contribution L_{Aeq}
Sharpe Residence	Day	36 dBA	53 dBA	<44 dBA
	Evening	36 dBA	49 dBA	<39 dBA
	Night	32 dBA	51 dBA	36 dBA
1416 Castlereagh Highway, Blackmans Flat	Day	41 dBA	55 dBA	<49 dBA
	Evening	39 dBA	51 dBA	<39 dBA
	Night	36 dBA	51 dBA	<34 dBA

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
Morning Shoulder 6.00 am to 7.00 am
On Sundays and Public Holidays, Daytime 8.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 8.00 am
The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level
L_{Aeq} - The equivalent continuous noise level is defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period

Heggies have found that the existing LAeq noise levels in the vicinity of the Mount Piper haul road are dominated by traffic and local residential activity.

Impacts from the Proposed Modifications

Noise modelling has been undertaken and two worst case scenarios for truck noise emissions along the haul roads have been assessed. These comprise the transportation of the whole 4Mtpa along either the Wallerawang haul road or Mount Piper haul road.

There would be a mix of 50 and 80 tonne trucks. The sound power levels of the 50 tonne trucks and the 80 tonne trucks are found to be similar (Heggies, 2010b – Appendix 7.13).

For the Wallerawang haul road the noise assessment (Heggies, 2010b – Appendix 7.13) reports that, in order to adhere to the project specific noise levels, the predicted maximum number of allowable truck movements is 10 per hour (each way and therefore 20 per hour) during the day and 8 per hour (each way and therefore 16 per hour) during the evening. No truck movements are permitted on the Wallerawang haul road during the night between 10.00pm and 7.00am. A total of 4Mtpa is able to be hauled within these truck movement limits.

For the Mount Piper haul road the noise assessment (Heggies, 2010b – Appendix 7.13) reports that, in order to adhere to the project specific noise levels, the predicted maximum number of allowable truck movements is 8 per hour (each way and therefore 16 per hour) during the day, 8 per hour (each way and therefore 16 per hour) during the evening and 5 per hour (each way and therefore 10 per hour) during the night. A total of 4Mtpa is able to be hauled within these truck movement limits.

The main vibration generating activities are the truck movements on the private haul roads. The nearest residential location is approximately 180m from the haul roads and vibration levels are predicted to be below levels of human perception and therefore a negligible effect (Heggies, 2010b – Appendix 7.13). The existing truck movements have been found to be compliant with existing noise limitations. The proposal may result in an additional 0.5Mtpa of coal produced within a 12 month period. This can be transported within the same noise limitations therefore the proposed modifications do not result in any noise impacts.

Measures to reduce noise levels are set out below.

Consequences

There are no consequences provided the truck movement limits are adhered to.

Recommended Mitigation

In order to achieve continued reduction to the level noise emissions, Heggies identify the following mitigation measures.

Where road surfaces have undergone deformation and deterioration they are likely to generate higher noise levels. Therefore it is recommended that regular inspection of the haul roads to identify and repair deformations and deterioration.

As road surface type can influence noise emissions by as much as 8dBA it is recommended that any road surface repairs and upgrades are undertaken using an open grade asphalt surface as this offers reduced tyre-road noise emissions.

Angus Place Colliery should continue to implement all reasonable and feasible best practice noise mitigation measures to ensure continuing compliance with the current Project Approval.

Residual Consequences

There are no consequences arising from the identified impacts because the impacts can be ameliorated by the identified mitigation measures above.

7.9 Cumulative Impacts

The following types of cumulative effects are addressed below:

- Impacts from the proposed modifications with the approved/existing mine
- Impacts from the modified mine together with other surrounding activities

7.9.1 Impacts from the Proposed Modifications with the Approved/Existing Mine

The cumulative impacts below have been compiled by RPS in association with the authors of the specialist assessments.

Surface Water

The proposed modifications include improvements to water management at the pit top and also further links to the Springvale Delta Transfer Scheme, GHD have confirmed that the combined impact of the additional works would provide an overall improvement to the treatment of surface water and therefore be a benefit for the receiving environment.

The impact on water quality is predicted to be negligible and therefore there would not be any combined effects.

There would be no change to potable water demands and therefore no combined impact.

The West Wolgan Creek passes over proposed longwall 910 and also existing longwall 920. There would be an increase in depth of subsidence over longwall 920 as a result of both the existing and proposed longwalls and part of West Wolgan Creek passes through an area that is at -1.1m as existing and would be -1.5 with both existing and proposed. GHD has confirmed that therefore, while there would be an increase in subsidence, the cumulative effect in relation to grade changes and ponding would be minor due to the profile and bed conditions of the creek.

There would be an overall improvement to surface water management at the mine.

Hydrogeology

Extraction of previous longwall panels at Angus Place Colliery has produced a fractured zone above the seam that has depressurised and drained the strata in the Illawarra Coal Measures, including any aquifers that may be present. Both of the proposed longwall panels are located adjacent to and between areas that have been previously extracted. Because of this, it is assumed that the area where these longwalls are located has been largely depressurised in the coal measure strata from the adjacent mining activities, and any aquifers present will have been drained. As a result, Aurecon considers that the extraction of these panels should have no additional impact on the coal measure aquifers (where they exist).

Groundwater monitoring over several years has shown that there have been no adverse impacts on the aquifers in the overlying Banks Wall Sandstone, from previous mining (Aurecon, 2010 – see Appendix 7.4). This is because the fractured zone above the mine does not extend into the Narrabeen Group strata, which are more than 100 metres above the seam. Since it is predicted that the proposed longwall extraction would not result in an increase in the height of fracturing above the mine, there would be no additional impacts from the extraction of longwalls 910 and 900W on the quality or quantity of the available groundwater resources in the aquifers in the Banks Wall Sandstone. Therefore, Aurecon has confirmed that there should be no cumulative effects on these aquifers above the Banks Wall Sandstone.

The three swamps that are located to the south of longwall 910 and over existing longwall 920 would be subject to an increased depth of subsidence from the extraction of longwall 910. However, Aurecon consider that the magnitude of the incremental subsidence is minimal when compared to the subsidence already experienced by these swamps due to the extraction of longwall 920, and would most likely be insufficient to adversely affect the groundwater source that supplies the swamps. As a result, Aurecon has advised that the incremental impacts on the swamps would be negligible and that since there have been no apparent impacts on the swamps from the extraction of longwall 920, and there are no predicted impacts from longwall 910, there would be no cumulative effect on the swamps.

Soils and Land

The assessment of the soils and land capability impacts within the Study Area (GSS, 2010a – see Appendix 7.5) shows minimal potential temporary disturbance with no long term impacts predicted. The environmental

controls, monitoring and repair measures proposed by GSS for impacts that may occur as a result of activities associated with the proposed modification would ensure that no long term impacts are experienced.

Biodiversity

As stated above for Hydrogeology, Aurecon has advised that the incremental impacts on the swamps would be negligible and that since there have been no apparent impacts on the swamps from the extraction of longwall 920, and there are no predicted impacts from longwall 910, there would be no cumulative effect on the swamps.

Cultural heritage

There are no important archaeological features within the subsidence areas for the proposed longwalls and therefore no cumulative effects with the existing area of subsidence.

Socio-economic

The combined impact of the socio-economics of the proposed modifications is considered positive. The modification works would result in the continued employment of workers to 2016 which provides ongoing economic multiplier benefits for the region.

Air

The pit top handling process is not proposed to be changed and the longwalls would be mined consecutively therefore there would not be cumulative effects.

GHG

The greenhouse gas assessment has identified the GHG emissions (CO2-e) for both the existing and the proposed modifications. There would be an increase in GHG emissions (CO2-e) as a result of the existing mining operations and the proposed modifications of 455,274 tonnes.

Traffic and Transport

STAP have confirmed that no cumulative impacts to the local transport network associated with the existing mine together with the proposed modifications are anticipated.

Noise

The noise levels from the traffic along the haul roads are predicted to be within the limits set in the existing Project Approval and longwalls would be mined consecutively. Therefore, there would not be a combined effect.

7.9.2 Impacts from the Modified Mine Together with Other Surrounding Activities

Cumulative impacts are already addressed by Angus Place Colliery within the existing Environmental Management Strategy. It is recognised that there are a number of industries with potential for impact in the area including Angus Place Colliery, the two power stations and underground and open cut coal mines. Whilst these individual operations might themselves comply with environmental standards and legislation, the combined or cumulative effect needs to be considered to gauge whether or not this might result in environmental limits and criteria being exceeded.

The cumulative impacts below have been compiled by RPS in association with the authors of the specialist assessments.

Surface Water

The site is located within a disturbed area, with surrounding land uses characterised by various existing and past mining operations, a power station and associated ash placement areas. These features would have an associated impact upon the quantity and quality of surface water flows in the local catchment.

Cumulative impacts on surface water, and particularly Coxs River, are associated with this proposal and other activities in the area. This proposal includes improvements to the existing water management system at Angus Place Colliery, which will result in an improvement to the quality of water leaving the site.

As existing mining and other industrial operations within the Coxs River catchment expand and update, water quality management and monitoring continues to improve. This is evident within the Coxs River catchment, where two current Part 3A proposals for activities at existing facilities include improvements to the water management system. These proposals and the potential for associated cumulative impacts are discussed further below.

No additional licensed discharge points are necessary as part of the proposed modifications, which are due for renewal in January 2011. While there is a potential for an increase in discharge from LDP001 and to the Delta Water Transfer Scheme as a result of extension of the life of mine the impact on water quality has been identified as negligible (GHD, 2010 – Appendix 7.3)

Hydrogeology

Aurecon has advised that there would be no conceivable impacts on the swamps or aquifers from the cumulative effects of the modified Angus Place Colliery and other existing activities/developments in the surrounding area.

Soils and Land

The Soils and Land Assessment (GSS, 2010a – Appendix 7.5) shows a minimal potential temporary disturbance and no long term impacts predicted. GSS consider that the environmental controls, monitoring and repair strategies proposed for the minor surface cracks which may occur would ensure no long term impacts are experienced.

Flora and Fauna

As stated above for Hydrogeology, Aurecon has advised that the incremental impacts on the swamps would be negligible and that since there have been no apparent impacts on the swamps from the extraction of longwall 920, and there are no predicted impacts from longwall 910, there would be no cumulative effect on the swamps.

Traffic and Transport

The traffic assessment (STAP, 2010 – Appendix 7.12) examines potential average annual increases in the sub-regional road network resulting from the proposed modification. It determines that such increases would continue to be appropriately accommodated by the existing traffic network. The local and sub-regional network provides excellent infrastructure (roads and intersections) for what are relatively minor sub-regional traffic flows. All available information suggests that the additional sub-regional flows modelled in the traffic assessment would represent the maximum additional generation over the operational life of the proposed modifications.

Noise

The cumulative effects of noise are described in the Noise Impact Assessment by Heggies (Appendix 7.13) and this is summarised below. Potential sources of noise in the area are identified as the Wallerawang and Mount Piper power stations, and the Kerosene Vale Ash Repository, the Pine Dale, Lamberts Gully and Springvale Coal Mines. Furthermore, it is understood that limited truck movements utilise the Wallerawang haul road for trucks transporting ash material from the Wallerawang power station to the Kerosene Vale Ash Repository. Of the noise receptors studied in the noise assessment only the receivers in Lidsdale (R3) and Blackmans Flat (R4 and R5) are impacted by other industries in the area.

Heggies have conducted significant noise monitoring at R3 within the township of Lidsdale as in accordance with the Angus Place Colliery Noise Monitoring Program since May 2008. From this monitoring, noise levels from other industries have been estimated as follows:

- Wallerawang power station – 42 dBA.
- Kerosene Vale Ash Repository – 35 dBA.
- Ash trucks – 36 dBA.

Based on these noise levels and the predicted noise levels from Angus Place Colliery, cumulative industrial noise levels in Lidsdale are predicted to be approximately 46 dBA during the daytime and 45 dBA during the evening. Therefore, the estimated cumulative LAeq (period) amenity levels are below the NSW INP's acceptable amenity criteria during the daytime and evening (no haul trucks would be operating on the Wallerawang haul road during the night) (Heggies, 2010b – Appendix 7.13).

During the operator-attended noise surveys in Blackmans Flat, no significant contribution was audible from either of the two local power stations. The Mount Piper power station is significantly distanced from the area and was inaudible during the operator-attended noise surveys. The Wallerawang power station and Lamberts Gully Coal Mine were also inaudible during the operator attended noise surveys. However, Pine Dale operations were audible from Blackmans Flat with the contribution calculated to be less than LAeq(period) 49 dBA. Therefore, the cumulative noise impacts of the site with existing industrial noise sources has been assessed in the determination of the amenity levels in Blackmans Flat (Heggies, 2010b – see Appendix 7.13).

The estimated cumulative LAeq(period) amenity levels from Angus Place Colliery operations and other industrial/extractive operations in the area are predicted to be below the INP's acceptable amenity criteria during the daytime, evening and night-time periods in Lidsdale and Blackmans Flat (Heggies, 2010b – see Appendix 7.13).

Air Quality and GHG

Heggies have advised that sources of atmospheric pollution surrounding Angus Place Colliery are mainly from mining activities from the mines in the vicinity. Angus Place Colliery is bordered by Springvale Colliery approximately 5.3km to the south and Ivanhoe Colliery approximately 6.3km to the northwest. Other coal mines that operate within close proximity include Pine Dale Coal Mine and Lambert's Gully approximately 3km and 4km northwest respectively from Angus Place Colliery. Heggies consider that the surrounding coal mining operations have the potential to cause cumulative impacts upon receptors surrounding Angus Place Colliery due to the small distance between Angus Place Colliery and these sources.

Particulate monitoring data (deposited dust, PM10 and TSP) collected adjacent to the Project site, together with PM10 data collected from the DECCW regional monitoring station at Bathurst have been used by Heggies to develop a background air quality profile surrounding the Project site.

A cumulative assessment was undertaken considering the background air quality profile and the modelling predictions associated with the proposed Angus Place modifications.

In summary:

- Dust deposition levels are predicted to be below the Project air quality criteria at all surrounding dwellings.
- Annual average PM10 and TSP concentrations are predicted to be below the Project air quality goal at all surrounding dwellings.
- 24-hour PM10 concentrations are predicted to be well below the Project air quality goals at the surrounding dwellings.

Cultural Heritage

There are no important archaeological features within the subsidence areas for the proposed longwalls and therefore no cumulative effects with the existing area of subsidence.

Socio-Economic

RPS consider that the security of employment resulting from this proposal combined with the surrounding mining operations would continue to support the strong social cohesion of the region, as demonstrated by the large proportion of home-ownership and home-purchasing and large number of family households, particularly households with children.

Potential Future Projects

There have been two recent Part 3A applications lodged for operations associated with the existing Mt Piper Power Station and the existing Pine Dale Coal Mine. MP 09_0186 is a combined Concept Plan and Project Application for new ash placement areas associated with the Mt Piper Power Station. It is currently on exhibition until 15 October 2010. MP 10_0041 is a Project Application for the Yarraboldy Extension to the Pine Dale coal mine. Exhibition of this project was finalised on 17 September. It should be acknowledged that these projects are proposals only and are yet to receive approval. This section therefore deals only with potential cumulative impacts, on the assumption that these proposals were approved and commenced operation during the same period as the Angus Place Colliery modifications.

Potential cumulative impacts associated with these proposals are mainly in relation to noise and surface water quality. As discussed above, water management systems at both facilities are proposed to be improved and would therefore result in a net benefit to the water quality of surface areas.

While there may be the potential for some increase in noise associated with the traffic and operations at these locations, this would be appropriately managed through implementation of noise emission criteria. Any increases in noise would still need to demonstrate compliance with the relevant noise assessment criteria.

On this basis, the appropriate management of site water and noise proposed at both sites, as well as at the Angus Place Colliery will mean that cumulative impacts will be negligible. Ongoing monitoring programs associated with all three of the sites would ensure that any issues are identified at their source and appropriate action undertaken to ensure no further impacts occur.

NORTH

910 (OPTION 1)

EXISTING LONGWALLS

KEROSENE VALE WORKINGS

900W

LEGEND

- Existing Track
- River/Creek
- Tributary
- Modelled Subsidence Area
- Preliminary Subsidence Area
- Extent of Proposed Longwall 900 (Option 1)
- Extent of Proposed Longwall 900W

RPS

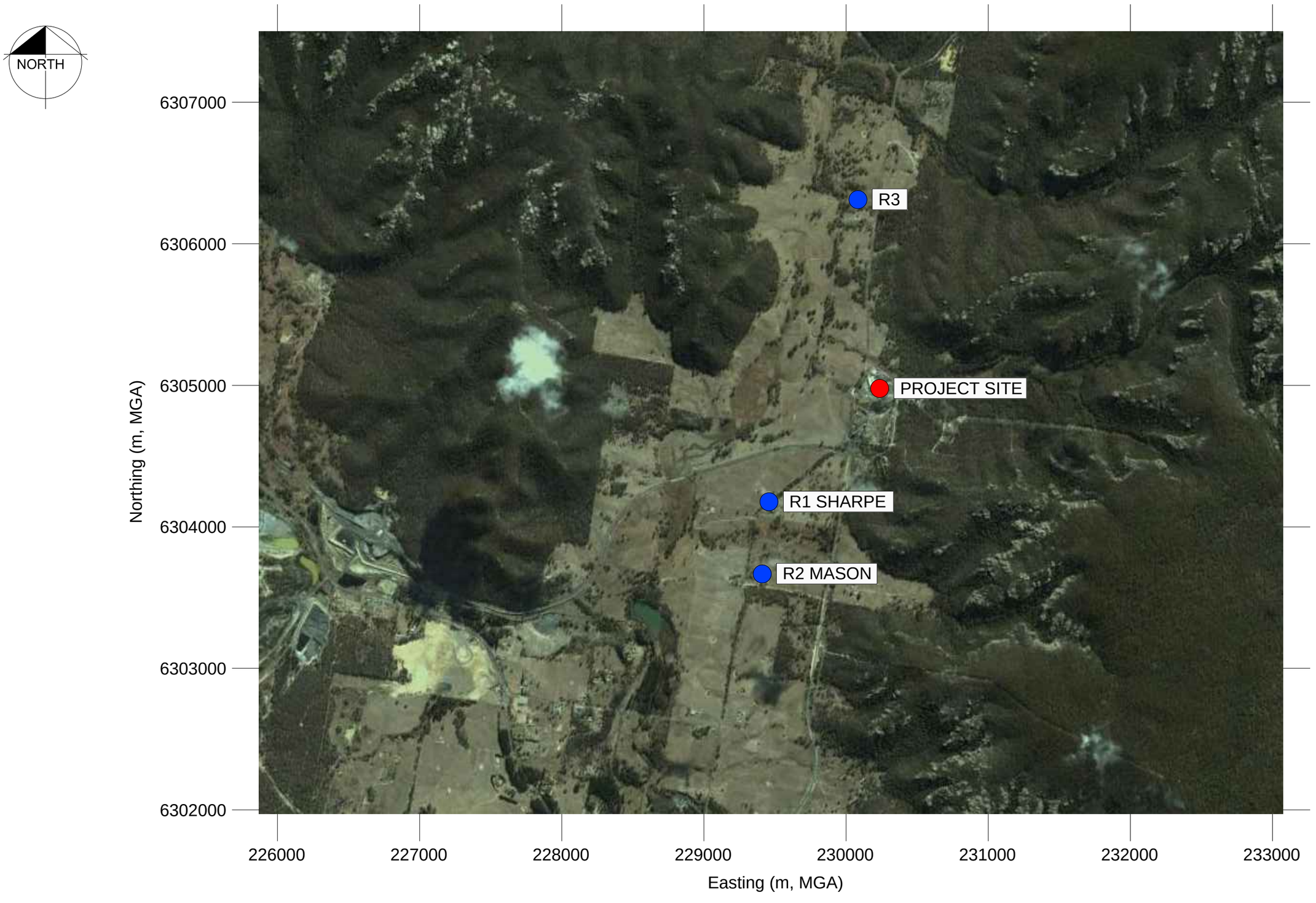
SCALE 1 : 20000 @ A3

0 250 500 750 1000

PRELIMINARY AND MODELLED SUBSIDENCE AREAS

FIGURE 7.1

DATE : OCTOBER 2010 DWG NAME : 104424-FIG7-1



AIR QUALITY SENSITIVE RECEPTORS

(SOURCE: HEGGIES AIR QUALITY ASSESSMENT 2010)

FIGURE 7.2

NEAREST SENSITIVE RECEIVERS

(SOURCE: HEGGIES NOISE IMPACT ASSESSEMENT 2010)

FIGURE 7.3

8 STATEMENT OF COMMITMENTS

8.1 Introduction

The mitigation measures identified within each of the specialist assessments have been summarised in Section 7 of the EA. These mitigation measures have been reviewed and analysed to identify whether they are:

1. already addressed under an existing management plan, procedure or protocol; and/or
2. already adequately covered in the Statement of Commitments identified in the 2006 EA.

8.2 Management Plans, Procedures and Protocols to be Revised

Table 8.1 below outlines the range of management plans, procedures and protocols currently utilised in daily operations at the Angus Place Colliery. As noted in the table, many of the mitigation measures identified for the proposed modification are adequately addressed in the existing plans and procedures. The Environmental Management Plan is proposed to be amended to include further provisions in relation to cultural heritage, however the remaining plans and documents do not need revising.

Table 8.1 Management Plans, Procedures and Protocols to be Revised

Title	Objective/Purpose	Review Required Following Approval
Public Safety Management Plan	This describes the processes developed to ensure Public Safety in any surface areas that may be affected by subsidence arising from the longwall mining in the SMP area at Angus Place Colliery. The Management Plan fulfils the requirements of Condition 16 of the Angus Place Subsidence Management Plan Approval dated 19th January 2007.	No specific measures to be added.
Infrastructure Management Plan	The Infrastructure Management Plan has been developed to manage the risks to infrastructure as a result of surface subsidence and mining operations.	Yes to include design measures recommended in the subsidence report (DGS, 2010) for the proposed pipeline and powerline.
Kangaroo Creek Management Plan	The purpose is to measure and manage potential subsidence impacts from longwall mining (within the SMP area) on Kangaroo Creek. Angus Place Colliery has as an approved Subsidence Management for longwalls 930 – 980. The Kangaroo Creek Management Plan fulfils the requirements of Condition 2a of the Angus Place Subsidence Management Plan Approval dated 19th January 2007. The document describes the environmental monitoring, reporting program and management to detail how the effects of subsidence on Kangaroo Creek are to be monitored and managed. This includes baseline data collection, investigation, assessment and regular reviews. The program aims to identify appropriate management measures to remediate/mitigate any subsidence impacts.	No specific measures to be added.
Land Management	The purpose is to ensure adequate management of any	No specific measures to be added.

Title	Objective/Purpose	Review Required Following Approval
Plan	impacts associated with surface cracking, erosion, soil slumping and land degradation caused by subsidence due to longwall mining and/or activities associated with subsidence monitoring or other management actions by Angus Place in the Subsidence Management Plan area. The Land Management Plan has been developed and implemented to comply with the requirements of Condition 20 within PA06_0021.	
Environmental Management Strategy	This describes the overall management strategy at Angus Place Colliery.	Yes - revise to include the maintenance of liaison with the Aboriginal Community as per the DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 during the proposed works, should any matters relating to Aboriginal heritage occur.
Environmental Monitoring Program	The Environmental Monitoring Program provides the details of monitoring work and reporting functions in response to the various management plans. The purpose of environmental monitoring is to gather data on the performance of the operation and determine the need for improvements or additional mitigation measures in order to achieve the assessment criteria for the operation.	No specific measures to be added
Subsidence Management Plan	Variations of the SMP were approved by the Department of Industry and Investment in October 2005, October 2006 and March 2008.	Yes – a new application would be made.
Subsidence Community Consultation Process (SCCP)	Angus Place Colliery has as an approved Subsidence Management for longwalls 930 – 980. The SCCP fulfils the requirements of Condition 2c (SMP approval dated 19/01/2007) of the Angus Place SMP Approval. The objectives of this SCCP include: ▪ Developing an effective process to communicate with relevant stakeholders regarding; the subsidence from Angus Place activities on the Newnes Plateau; ▪ Defining the responsibilities in respect of the communication paths and forums; ▪ Implementing a system to monitor and manage issues from relevant Stakeholders; and ▪ Providing the Angus Place complaints protocols.	Yes - revise to include the maintenance of liaison with the Aboriginal Community as per the DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 during the proposed works, should any matters relating to Aboriginal heritage occur.
Subsidence Monitoring and Reporting Program	The purpose is to provide a subsidence monitoring and reporting program to measure how the effects of subsidence are proposed to be monitored. The program includes monitoring both pre and post mining in Longwalls LW930 – LW980 (the SMP area). This Management Plan fulfils the requirements of Condition 11 and partially fulfils the requirements of Condition 17 (with respect to the development of a program to ensure on-going baseline data collection, investigation,	Yes – revise to include monitoring of the Rock Shelter with PAD site to identify any effects of cracking or movement and assess and quantify any impacts prior to commencement of works and during the course of the mining operations.

Title	Objective/Purpose	Review Required Following Approval
	assessment and regular reviews with the relevant stakeholders).	
Flora & Fauna Management Plan	The purpose of the Flora and Fauna Management Plan is to protect threatened species and communities, minimise impact on native flora and fauna, manage clearing on the site, control weeds, control access to environmentally sensitive areas and manage any potential conflicts between flora and fauna and Aboriginal heritage.	Yes – revise to include inspection during clearance work by a suitably qualified ecologist and follow protocols set out within the Flora and Fauna Assessment report by RPS (2010a) at Appendix 7.7.
Air Quality Management Plan	The Air Quality Monitoring Program sets out methods of monitoring dust generated from Angus Place Colliery.	No specific measures to be added.
Noise Monitoring Program	This sets out procedures for monitoring and assessing noise impacts from Angus Place Colliery to acceptable levels for residential neighbours and regulatory stakeholders. A key outcome is that the Noise Monitoring Program needs to demonstrate compliance with the noise level criteria set out in the existing Project Approval. Quarterly monitoring is undertaken at residential properties, colliery surface plant and the haul road and additional noise monitoring is undertaken in response to noise complaints.	No specific measures to be added.
Contractor Environmental Management Plan (CEMP)	The CEMP aims to ensure that all activities carried out on behalf of Angus Place comply with internal and external practices and guidelines for the impacts generated by the proposed activity.	Yes – for the construction of the proposed bore and associated infrastructure the outcomes of this EA to be taken into account including sediment control measures, monitoring of Rock Shelter and PAD and protocols for vegetation clearance set out in the Flora and Fauna Assessment report by RPS (2010a) at Appendix 7.7.
Bushfire Management Procedure and Management of Bushfire Assets Procedure.	These set out the procedures for reporting fire and for the inspection and maintenance of firebreaks and APZs at Angus Place Colliery and on Newnes Plateau.	Yes – add measures for the proposed powerline in accordance with the EA.
Mechanical Engineering Management System	Clause 13 (f) of the Coal Mines Health & Safety Regulations 2006 require a Mechanical Engineering Management Plan to be implemented. The objective of this Management System is to ensure as far as is reasonably practicable the safety of all persons present at the coal operation, this will be achieved as a minimum by complying with the requirements of OH&S legislation, including Coal Mines Health & Safety Act and Regulations. Aspects of the Mechanical Engineering Management Plan include:	No specific measures to be added. .

Title	Objective/Purpose	Review Required Following Approval
	▪ Life Cycle Management of Mechanical Plant (SEP). ▪ Noise management of plant ▪ Life Cycle Management of structures (buildings, bins, etc.) ▪ Management of Diesel Pollutants. ▪ Management of Hazardous substances. ▪ Inspections and maintenance.	
Wallerawang Haul Road Inspection Protocol	Directs haul road inspections to assess the surface conditions and identify areas requiring maintenance/additional work to repair surface deformations, which may increase noise levels when vehicles pass over them.	No specific measures to be added.
Energy Savings Action Plan	Energy Savings Action Plan (ESAP) under the Energy Administration Amendment (Water and Energy Savings) Act 2005.	No specific measures to be added. .
Erosion and Sediment Control Plan (ESCP)	In compliance with Schedule 3, Condition 10 of PA 06_0021, the ESCP has been prepared in accordance with the Department of Housing's Managing Urban Stormwater: Soils and Construction Manual, 2004 (the 'Blue Book'). The ESCP includes the following: ▪ Identification of potential sources of sediment; ▪ Description of management principles to be implemented; ▪ Description of the erosion sediment control structures in place; and ▪ Description of measures to be implemented to decommission structures over time.	Yes – localised sediment control measures for the construction of the proposed bore and associated infrastructure.

8.3 Proposed Measures for the Statement of Commitments

The matters listed in the Statement of Commitments for the 2006 Project Approval have been implemented as part of the current operations. Many of the mitigation measures identified in this EA for the proposed modifications are already adequately covered in the existing Statement of Commitments and therefore no further action is required.

Those mitigation measures identified in this EA for the proposed modification which are not able to be addressed within an existing management plan, procedure or protocol or already covered under a measure within the 2006 Statement of Commitments, are identified in Table 8.2 below. This table outlines additional commitments required to address these residual mitigation measures thereby forming the measures to be included in the Statement of Commitments for the proposed modifications.

Table 8.2 Proposed Measures for Statement of Commitments

Desired Outcome	Action
1. Rehabilitation	
To ensure that any land disturbed due to exploration or mining activities is rehabilitated to an appropriate standard.	▪ A Rehabilitation Strategy as set out in Appendix 7.6 of the EA will be developed and adopted within 6 months of obtaining approval
2. Soil and Land	
Establishment of localised sediment control measures for the areas of disturbance associated with the construction of the bore and associated infrastructure.	▪ The Contractor Environmental Management Plan will be updated with mitigation measures within 6 months of approval.
3. Flora and Fauna	
Vegetation clearance to minimise impacts on flora and fauna.	▪ Within 6 months of obtaining approval and prior to the commencement of any construction, measure to be communicated to construction contractor via the Contractor Environmental Management Plan and adopted.
4. Cultural Heritage	
Vegetation clearance and construction works to be undertaken to minimise impacts on aboriginal heritage.	▪ Within 6 months of obtaining approval, the Environmental Management Plan will be revised to require ongoing liaison with Aboriginal Community as per the DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 during the proposed works, should any matters relating to Aboriginal heritage occur.
5. Surface Water	
To improve understanding of water quality impacts from approved license discharge to Coxs River.	▪ Within 6 months of obtaining approval develop a Water Management Plan for the pit top area that takes into account mitigation measures identified in Appendix 7.3 Surface Water Assessment.
6. General	
To ensure the existing management plans, procedures and protocols are reviewed to include the measures identified in the EA (Table 8.1).	▪ Within 6 months of obtaining approval relevant management plans (Table 8.1) will be reviewed and updated as required.
To ensure the proper and orderly management of car parking during operations.	▪ Within 6 months of approval the formalisation of the western car park in accordance with AS2890.1:2004 will be investigated and constructed to provide a minimum of 40 car parking spaces. ▪ In consultation with Lithgow City Council, additional signage will be installed to direct contractors to the contractor car park within 6 months of obtaining approval.

9 JUSTIFICATION AND CONCLUSIONS

Angus Place Colliery has a long term commitment to ensuring that mining operations are carried out in accordance with the principles of ecologically sustainable development. This proposal had been developed taking these principles into account along with the environmental, economic and social considerations. The EA has identified the likely environmental impacts together with mitigation measures to ameliorate those effects.

Angus Place Colliery implements an existing Environmental Management Plan, encompassing a number of specific management plans and monitoring programs that would be continued for the proposed modified mine. This aims to ensure that activities undertaken at Angus Place Colliery are done so in a manner that minimises impact on the environment. The Environmental Management Plan is subject to continuous improvement and the relevant components would be updated to cover the proposed modifications (where not already covered) in accordance with the mitigation measures identified in this EA.

Environmental monitoring would play an important role in ensuring minimal impact from the proposal. Should an environmental issue arise, the appropriate environmental management plan provides guidance to facilitate the implementation of all relevant remedial actions.

The proposed modifications are justified for the following reasons:

- Potential environmental impacts have been identified;
- Mitigation measures have been identified to ameliorate adverse impacts;
- Monitoring would continue and trigger responses would be maintained;
- Angus Place Colliery has a good performance record;
- Local employment levels would be maintained to 2016 and economic benefits would continue for the region;
- The modification works are consistent with Section 73 of the *Mining Act 1992* and Section 75V of the *Environmental Planning & Assessment Act*.

This Environmental Assessment has been prepared in support of an application under section 75W of the Environmental Planning and Assessment Act 1979 to modify Project Approval 06_0021 issued in September 2006. Under the current approval, development activities are scheduled to be completed by October 2012, with longwall operations within the current extraction area planned to be completed by June 2014. To enable continued operations at Angus Place Colliery and sustained supply of coal to established markets, further reserves of coal need to be developed and extracted.

The existing approval covers the extraction of Longwalls 920 to 980 and to date, extraction of longwalls 920 to 950 have been completed consecutively. The extraction of 960 is approximately one third completed and 970 and 980 are yet to be mined.

It is proposed to extend operations through the consecutive development and extraction of two additional longwall panels 910 and 900W. Approval is sought for 2 options in relation to Longwall 910 with the essential difference being that Option 2 is almost half (120m) the width of Option 1 (200m). The reduced width provides room for the development of 4 mains headings to enable future access to a potential resource to the north east. As such there are lesser impacts associated with Option 2.

The current limit on production of 3.5mtpa is proposed to be increased to 4mtpa for additional flexibility. Essentially this is to provide for the scenario that longwall changeovers (typically an eight week period) may be able to be completed within a shorter timeframe which may contribute to a production rate greater than

3.5 million tonnes within a 12 month period. Irrespective of the production rate, the proposal would only result in the production of an additional 4.8 to 5.6 million tonnes (depending on whether Option 1 or 2 for Longwall 910 is pursued) of coal over a period of two years.

The majority of infrastructure related to the extraction of two additional longwalls exists at Angus Place Colliery including surface features located at the pit top, such as the stock pile, coal loading and handling plant and surface water handling, as well as the private haul roads used to transport coal to Delta Electricity's Wallerawang and Mount Piper power stations. To augment existing infrastructure approval is sought for a new dewatering bore above the eastern end of longwall 910 and associated power supply and water pipe. Improvements to the dirty water management systems at the pit top are proposed. The existing haul roads also form part of the modification application in that approval is sought for the ongoing haulage of the additional coal produced by the new longwalls. There are no physical changes proposed to the haul roads.

In addition to the matters prescribed in the Director General's Requirements, a risk based and consultative approach has been relied on in preparing this Environmental Assessment. The risk assessment identifies aspects of the proposed modification where further information or investigation was need to address any existing knowledge gaps. It also addresses any need to improve existing mitigation and management measures to ensure the residual risk for the proposal is acceptably low. Any unacceptable risks or knowledge/information gaps were used to inform the scope of the specialist investigations.

The specialist studies include:

- Subsidence;
- Surface water;
- Groundwater/Hydrogeology;
- Flora and Fauna;
- Air quality;
- Noise;
- Greenhouse gases;
- Soils and land capability;
- Social and Economic Impacts; and
- Cultural heritage.

There would be minimal impacts resulting from the clearance of approximately 4.2ha of vegetation on the Newnes Plateau and on two small hanging swamps on the southern side of Longwall 910. There would also be an increase in greenhouse gas emissions as well as potential cumulative effects and measures to reduce these emissions are identified. Noise levels are predicted to remain within the project assessment criteria and Angus Place Colliery will continue to monitor noise levels at nearby residential properties and are required to show continuous improvement under the existing Project Approval. There are potential cumulative effects associated with the Coxs River from a number of activities including Angus Place although improvements to the water management system are proposed by Angus Place and also by two other Part 3A proposals within the Coxs River Catchment. There are also potential cumulative dust emissions from a number of nearby activities. Other impacts are negligible or minimal and/or able to be ameliorated with recommended mitigation measures. There are positive consequences from aspects of the proposed works such as the improvements to surface water handling at the pit top and from continued mine life and the benefits of that to the local community. From an analysis of all of the mitigation measures recommended in the various specialist reports, the majority are currently addressed in the range of management plans and monitoring programs which are currently in place and will be revised to take into account the findings of this

EA. Those mitigation measures that are not already provided for are identified as commitments by Angus Place Colliery.

10 REFERENCES

Aurecon, October 2010, Assessment of Hydrogeological Impacts Angus Place Project Modification

Ditton Geotechnical Services (DGS), October 2010, Subsidence Prediction and Impact Assessment for the proposed Longwall Panels 910 and 900 West at Angus Place Colliery, Lidsdale

GHD, October 2010, Angus Place Colliery Surface Water Assessment

Gillespie Economics, October 2010, Angus Place Modification Economic Assessment

GSS Environmental, October 2010a, Angus Place Colliery 75W Modification Soils and Land Resource Assessment

GSS Environmental, October 2010b, Angus Place Colliery 75W Modification Rehabilitation Strategy

Heggies, October 2010a, Angus Place Colliery Section 75W Modification Air Quality Impact Assessment 2010

Heggies, October 2010b, Angus Place Colliery Expansion Project Section 75W – Project Approval Modification Noise Impact Assessment

International Environmental Consultants 2006 Angus Place Colliery Proposed Mining and Coal Transport Environmental Assessment, International Environment Consultants 2006

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RPS, October 2010a, Flora and Fauna Assessment Proposed Longwalls 910 and 900W Angus Place Colliery

RPS, October 2010b, Cultural Heritage Impact Assessment Angus Place Colliery 75W Modification

RPS, October 2010c, Social Impact Assessment Angus Place Colliery Proposed Modifications

Stapleton Transportation and Planning (STAP), October 2010, Angus Place Colliery Section 75W Modification Project Traffic Impact Assessment