Centennial Coal

STATEMENT OF ENVIRONMENTAL EFFECTS

Springvale Mine Extension Project

State Significant Development 5594

Modification 1

Volume 1: Main Report

July 2016

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Centennial Coal
Springvale

Springvale Mine

SSD 5594 – Modification 1

STATEMENT OF ENVIRONMENTAL EFFECTS

Prepared for:

Springvale Coal Pty Limited

By:

Centennial Coal Company Limited

Level 18, BT Tower
1 Market St
Sydney NSW 2000

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STATEMENT OF VALIDITY

Submission of *Statement of Environmental Effects*
Under Section 96(2) of the *Environmental Planning and Assessment Act 1979*

Development Application

Applicant Name	Springvale Coal Pty Limited
Applicant Address	Level 18, BT Tower, 1 Market St, Sydney NSW 2000
Development	Springvale Mine Extension Project
Development Description	Modification 1 to Springvale Mine's Consent SSD 5594 for activities described in **Section 1.3** and **Chapter 4.0** of this document.
Land to be Developed	Refer to Schedule of Land (**Appendix C**)
Environmental Impact Assessment	*Statement of Environmental Effects*

Document Preparation

Name	Nagindar Singh
Qualifications	BSc, MSc, PhD
Company	Centennial Coal Company Limited
Address	Level 18, BT Tower, 1 Market St, Sydney NSW 2000

Declaration

I certify I have prepared the *Statement of Environmental Effects*, and to the best of my knowledge:

- It contains all available information that is relevant to the environmental impact assessment of the development to which this statement relates.
- It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.

22 July 2016

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EXECUTIVE SUMMARY

Background

Springvale Mine is an established underground longwall coal mine located in the Western Coalfield of New South Wales (NSW), approximately 15 kilometres (km) northwest of Lithgow and 120 km west-northwest of Sydney. Springvale pit top is accessed via the Castlereagh Highway and is located 3 km east of the township of Wallerawang.

Springvale Mine is owned by Centennial Springvale Pty Limited (as to 50%) and Springvale SK Kores Pty Limited (as to 50%) as participants in the Springvale unincorporated joint venture. Springvale Coal Pty Limited (Springvale Coal) is the operator of Springvale Mine on behalf of the joint venture.

Underground coal commenced in 1995 following the granting of the development consent DA 11/92 on 27 July 1992 pursuant to Section 101 under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The consent DA 11/92 expired on 30 September 2015. Springvale Mine currently operates under State Significant Development consent SSD 5594. This consent was granted to the mine, for the Springvale Mine Extension Project, on 21 September 2015 by the Planning Assessment Commission of NSW under Section 89E of the EP&A Act. The consent SSD 5594 allows Springvale Mine to carry out mining operations until 31 December 2028. The Springvale Mine Extension Project is a controlled action (EPBC 2013/6881) under the *Environment Protection and Biodiversity Act 1999* (EPBC Act). The approval under the EPBC Act was granted on 13 October 2015 and has effect until 8 October 2035.

Springvale Mine's State consent and Federal approval allow extraction of coal from 20 longwalls (LW416 – LW432, LW501 – LW503), at the extraction rate of 4.5 million tonnes per annum (Mtpa), and the continued operation of the mine's surface infrastructure sites at the pit top and on Newnes Plateau. Springvale Mine is also approved to employ up to 310 full time personnel and carry out operations 24 hours per day, seven days per week.

Proposed Modification

Springvale Coal is proposing to modify SSD 5594 under Section 96(2) of the EP&A Act to permit:

- An increase in the workforce from the approved 310 full time equivalent (fte) personnel, including contractors, to 450 fte personnel
- An increase in run-of-mine (ROM) coal production from the approved 4.5 million tonnes per annum (Mtpa) to 5.5 Mtpa
- An increase in the existing ROM coal stockpile at the pit top from the approved 85,000 tonnes capacity to 200,000 tonnes capacity and an increase in the coal stockpile footprint by 0.3 ha northeast of the existing stockpile area.

There is no proposal to change the approved longwall mining technique or the approved mine plan to achieve the proposed increase in production. The proposed modification does not include any physical works or significant changes to the existing underground mining operations. Minimal changes to the surface infrastructure at the pit top will be required to extend the coal stockpile to the northeast of the existing footprint to achieve the proposed capacity of 200,000 tonnes. There is no proposal to change the life of the consent or the hours of operation.

The proposed increase in coal production will be achieved through:

i. The increased workforce

ii. The installation and operation of additional underground mining equipment

iii. Improved equipment utilisation and availability.

Environmental Impact Assessment

A *Statement of Environmental Effects* (SEE) has been prepared to support the modification, submitted under Section 96(2) of the EP&A Act. The SEE describes the proposed modification, and assesses the potential environmental, economic and social impacts due to the modification elements. Measures that will be required to mitigate potential environmental impacts, wherever relevant, are also described in the SEE.

The SEE has been prepared to meet the form of Part 1 Clause 2(4) of Schedule 1 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), and it contains information required under Clause 115 of the EP&A Regulation.

The table below presents an overview of the key environmental outcomes of the technical assessments undertaken for the SEE.

Summary of Environmental, Economic and Social Impacts

Issue	Overview of Key Findings
Traffic and Transport	• Additional trip generation to the pit top will result due to the proposed increase in staff, however, the traffic generation is considered minor and would have little impact on the operating capacity of the Castlereagh Highway, or on the Mine Access Road / Castlereagh Highway intersection's current level of service. • There will be no significant impact upon the capacity, efficiency and safety of the local, sub-regional and regional road network as a result of the proposed increase in Springvale Mine's workforce.
Air Quality	• Dust levels from the modification are predicted to meet relevant air quality criteria for Total Suspended Particulates (TSP), PM_{10}, $PM_{2.5}$ concentrations and dust deposition rate.
Greenhouse Gas Emissions	• Greenhouse gas emissions will increase slightly as a result of the modification. • The increase in direct (Scope 1) emissions from the modification are estimated to be approximately 4,479 t $CO_{2\text{-}e}$ per annum, which is relatively small and represents only approximately 0.0032% of NSW greenhouse gas (GHG) emissions and 0.0008% of Australia's total GHG emissions. • Given the increased coal production rate the Scope 1 emission predictions will cease at the end of the mining period, and will most likely not be sustained till the end of the consent life.
Groundwater Resources	• Revised mine inflow predictions undertaken for the modification indicate that the increase in mining rate does not lead to a significant difference in inflows to underground operations compared to that presented in the Springvale Mine Extension Project *Environmental Impact Statement* (SVMEP EIS). • Predictions of impacts to Newnes Plateau shrub swamps and hanging swamps overlying the mining area are consistent with that presented in the SVMEP EIS or are less. The impact on the shrub swamps therefore due to the modification is negligible. • Potential impacts to watercourses, surrounding land uses, groundwater users are consistent with those presented in the SVMEP EIS and approved in SSD 5594. The impacts on the watercourses, surrounding land uses, groundwater users due to the modification are negligible. • Updated estimates of requirements for water access licences (groundwater) indicate the

Issue	Overview of Key Findings
	water access licences held by Springvale Mine are sufficient.
Surface Water Resources	• Mine inflows dominate the site water balance and, given groundwater modelling shows that there is not a significant difference between the mine inflows due to the modification, there will be negligible change to the site water balance approved in SSD 5594. • Given the negligible change in the site water balance there will be no change to mine water discharge predicted to Sawyers Swamp Creek due to the proposed modification. There will therefore be negligible change to water flow, level and quality in Sawyers Swamp Creek, Coxs River. • There will be negligible impact on the relevant surface water users due to the modification.
Socio-Economic	• There will be a positive effect from the modification on socio-economics. • The modification will result in an increase in net benefit of approximately $32 million when compared with the net benefit of the Springvale Mine Extension Project as approved. • The modification will result in positive impact for direct and indirect employment and certainty of employment for existing employees at Springvale Mine.
Ecology	• No native vegetation clearing will occur. • No impacts will occur on threatened species or Endangered Ecological Communities, or fauna habitat.
Cultural Heritage	• No impacts will occur on any items of Aboriginal or historic cultural heritage significance.
Noise	• No impacts on the noise environment surrounding the Springvale Mine operations will occur.
Visual Amenity	• No impacts on the visual amenity of the area will occur.

Environmental Management System

Springvale Mine has a well established Environmental Management System (EMS) developed in accordance with the Centennial Coal's EMS Framework to manage its operations in a sustainable manner. The EMS ensures the effective management of environmental issues and compliance with all regulatory requirements. The EMS incorporates a large number of Environmental Management Plans (EMPs) designed to assist in meeting community expectations and regulatory conditions, including the conditions of the Environment Protection Licence for Springvale Mine.

Following approval of the modification, the existing EMPs will be reviewed and updated for the modification, as appropriate, and will take into consideration the environmental assessments undertaken as part of this SEE, the commitments made and all relevant revised consent conditions in SSD 5594.

Consultation

Springvale Coal maintains an open two-way communication with the local community, consent authority and other government agencies. A dedicated Stakeholder Engagement Plan was established for the modification. Consultation with the relevant stakeholders was undertaken during the preparation of the SEE. Consultation with the local community will be ongoing.

The broader community will be notified of the proposed modification through an advertisement placed in the local newspaper following lodgment of the modification application. The community will also be asked to take part in the modification assessment process through the public exhibition process, whereby the community will be invited to make formal submissions on the modification.

The Springvale Mine website will provide updates on the modification for all stakeholders while the internal stakeholders (Springvale Coal and other Centennial Coal employees) will be given information on the modification via information sessions and meetings.

Justification and Conclusion

Springvale Mine is a well-established underground coal mine with well-defined surface and mining environments. It has a long history in the area, with well-established community relationships. Springvale Mine is proposing to increase its production limit to 5.5 Mtpa and increase its workforce to up to 450 fte personnel.

Whilst the increase in production limit is initially to make up shortfall in revenue due to the mine not being operational for eight weeks in 2015, when the Springvale Mine Extension Project was being assessed, the proposed increase in production makes the mine more economically viable. The production increase will also improve the operational flexibility of Springvale Coal to respond to market opportunities that may present themselves. This flexibility has potentially positive implications for the State, as the ability to increase production in favourable markets would result in increased royalty returns in particular to NSW.

The Economic Impact Assessment shows the modification will have a positive effect on the quantum of economic benefits accruing to NSW. The modification will result in an increase in net benefit of approximately $32 million, when compared with the net benefit of the Springvale Mine Extension Project as approved.

The proposed modification will result in positive impact from the additional direct and indirect employment, and certainty of employment for existing employees. While the impacts of royalties and taxes are broadly distributed across the State, the direct and indirect effects of wages that will be earned by Springvale Mine workforce will benefit the local community more. The majority of the workforce lives in the Lithgow LGA, and the entire workforce lives in NSW.

The accelerated mining schedule resulting from the increased production rate of 5.5 Mtpa will result in earlier cessation of environmental impacts assessed and approved in SSD 5594, and the technical assessments undertaken for this SEE have concluded the environmental impacts from the proposed modification elements are not significant.

Benefits can be achieved with little to no risk of adverse environmental impact. Based on the predicted environmental effects of the modification elements and the ability to manage these effects to minimise harm to the environment, the Springvale Mine Extension Project as modified will present an overall minimal residual consequence.

In conclusion, the modification is a minor alteration of the approved Springvale Mine Extension Project and can be considered to be substantially the same development. The adverse environmental impacts of the proposed modification elements are predicted not to be significant. Any potential impact can be managed appropriately to minimise harm to the environment. The benefits of the modification can therefore be achieved with little or no risk of adverse impacts on the receiving environment. The modification meets the relevant objects of the EP&A Act and is consistent with the four principles of the ecologically sustainable development. It meets all government policies. On these bases, the modification will meet environmental performance and socio-economic benefit requirements to be considered for approval.

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1.0 INTRODUCTION

1.1 Overview

This *Statement of Environmental Effects* (SEE) relates to an application by Springvale Coal Pty Limited (Springvale Coal), operator of Springvale Mine, to modify the State Significant Development (SSD) 5594 consent, which granted approval for the Springvale Mine Extension Project. The consent was granted on 21 September 2015 by the Planning Assessment Commission of NSW, under delegation from the Minister of Planning. SSD 5594 was granted under Section 89E of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and allows Springvale Mine to carry out mining operations until 31 December 2028 (**Appendix A**).

The Springvale Mine Extension Project (the Project) is a controlled action (EPBC 2013/6881) under the *Environment Protection and Biodiversity Act 1999* (EPBC Act). The approval under the EPBC Act was granted on 13 October 2015 and has effect until 8 October 2035 (**Appendix A**).

Springvale Coal is seeking to modify the development consent SSD 5594 (the modification) to allow for increases in its coal production limit, workforce and the coal stockpile capacity at the pit top, described in further detail in **Section 1.3** and **Chapter 4.0**. This SEE has been prepared to support the application to modify development consent SSD 5594 pursuant to Section 96(2) of the EP&A Act.

In addition to describing the modification elements, the SEE contains a comprehensive and relevant assessment of the matters pertinent to the proposed modification to a level of detail commensurate with the scale of the modification, industry standards and the legislative framework under which it is permissible.

1.2 Background

Springvale Mine is an existing underground coal mine producing high quality thermal coal which is supplied to local domestic markets. The Springvale pit top is located to the west of the Blue Mountains (**Figure 1**) in the Western Coalfield of NSW, approximately 15 km northwest of Lithgow and 120 km west-northwest of Sydney, NSW. Springvale Coal is the operator of Springvale Mine.

Underground mining commenced at Springvale in 1995 following the granting of development consent DA 11/92 on 27 July 1992, pursuant to Section 101 under Part 4 of the EP&A Act. DA 11/92 expired on 30 September 2015. Springvale Mine was granted SSD 5594 on 21 September 2015 under the provisions of Part 4 Division 4.1 of the EP&A Act and the Federal approval EPBC 2013/6881 under the EPBC Act on 15 October 2015. SSD 5594 allows continuation of mining at Springvale Mine for a further 13 years from the date of SSD 5594 consent with an expiry date of 31 December 2028. The Project Application Area for SSD 5594 is shown in **Figure 2**.

The main components of Springvale Mine's existing operations are an underground longwall mine, accessed via the Springvale pit top, and supporting surface infrastructure within the pit top area and on Newnes Plateau within the Newnes State Forest.

Springvale Mine is approved to extract run of mine (ROM) coal up to 4.5 million tonnes per annum (Mtpa). Limited coal processing occurs at the pit top. Sized ROM coal is transferred to Springvale Coal Services Site (Western Coal Services Project, SSD 5579) via a dedicated overland conveyor system. This conveyor system connects the Springvale pit top to the Springvale Coal Services Site, Wallerawang Power Station (being decommissioned), Mount Piper Power Station (MPPS) and Lidsdale Siding Rail Loading Facility.

Springvale Mine is also approved to transport up to 50,000 tonnes per annum of ROM coal to local domestic market customers by road haulage from the pit top. The operational management of this truck haulage of ROM coal to local domestic markets is undertaken by Springvale Mine.

The operational management of ROM coal transport from the Springvale pit top to Springvale Coal Services Site on the overland conveyor system and the transfer of ROM coal to MPPS is authorised by the Western Coal Services Project's consent SSD 5579. Coal stockpiling and beneficiation (washing) of ROM coal occurs at the Springvale Coal Services Site. Beneficiated coal is subsequently transferred to the Lidsdale Siding Rail Loading Facility for export, the latter authorised by that facility's project approval (PA 08_0223).

Springvale is approved to employ a full time workforce of 310 employees, including contractors, under SSD 5594.

1.3 Proposed Modification

The modification to SSD 5594 has been prepared and is submitted under Section 96(2) of the EP&A Act to allow for:

- An increase in the workforce from the approved 310 full time equivalent (fte), including contractors, to 450 fte personnel
- An increase in ROM coal production from the approved 4.5 million tonnes per annum (Mtpa) to 5.5 Mtpa
- An increase in ROM coal stockpile capacity at the pit top from the approved 85,000 tonnes to 200,000 tonnes, and an increase in the coal stockpile footprint by 0.3 ha northeast of the existing area.

The SSD 5594 consent boundary for the Springvale Mine Extension Project remains unchanged (**Figure 2**). There are no major changes proposed to the surface infrastructure, other than an extension of the existing stockpile area to the northeast, into an area that is already heavily modified from previous surface activities. A diversion drain will be constructed around this stockpile extension area to divert surface run-off from the area to the existing dirty water system at the pit top.

No changes are proposed on the current surface operations and all activities on the surface (pit top and Newnes Plateau infrastructure areas) will continue to be undertaken as described in the Springvale Mine Extension Project EIS (Golder Associates, 2014). No change in rehabilitation activities is proposed. Progressive and life of mine rehabilitation will be undertaken as described in Golder Associates (2014).

There is no proposal to change the approved longwall mining technique or the approved mine plan to achieve the proposed increase in production. The proposed modification does not include any physical works or significant changes to the existing underground mining operations. Additional underground equipment (one longwall equipment and a continuous miner unit) will, however, will be introduced to support the proposed increase in production, described in more detail in **Section 1.6**.

Sized ROM coal will continue to be transferred to the Springvale Coal Services Site (Western Coal Services Project) via the overland conveyor system, except for the 50,000 tonnes per annum that is approved to be transported to local domestic market customers by road haulage.

There is no proposal to reduce the life of the consent in this modification from the approved 13 years from the date of consent, and the consent expiry date (31 December 2028) will remain unchanged.

Hours of operations are not proposed to change from the approved 24 hours per day and seven days per week.

1.4 The Applicant

Springvale Mine is owned by Centennial Springvale Pty Limited (as to 50%) and Springvale SK Kores Pty Limited (as to 50%) as participants in the Springvale unincorporated joint venture. Springvale Coal is the manager of the Springvale Mine on behalf of the joint venture.

Springvale Coal is the Applicant for the proposed modification. The relevant postal address of Springvale Coal is:

Springvale Coal Pty Limited
Level 18
BT Tower, 1 Market St
Sydney NSW 2000

1.5 Modification Approval Pathway

The Springvale Mine Extension Project was approved as a State Significant Development (SSD 5594) under Section 89E of the EP&A Act on 21 September 2015, and under Sections 130(1) and 133 of the EPBC Act (EPBC 2013/6881) on 15 October 2015.

SSD consents may be modified under Section 96 of the EP&A Act provided that the information stipulated in Clause 115 of the *Environmental and Planning Regulation 2000* (EP&A Regulation) is contained within the application, and that the development as modified will be substantially the same development as the development for which consent was originally granted.

The approval pathway was confirmed with the Department of Planning and Environment (DPE) in a letter from them dated 21 June 2016, attached as **Appendix B.**

When assessing an application under Section 96 for modification to consent, the consent authority is required to take into consideration the relevant matters outlined in Section 79C of the EP&A Act, which include the provisions of any relevant environmental planning instruments. The proposed modification meets the relevant provisions of a number of planning instruments discussed in **Chapter 5.0**, including:

- *State Environmental Planning Policy (State and Regional Development) 2011* (**Section 5.4.1**)
- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (**Section 5.4.2**)
- *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011* (**Section 5.4.3**)
- *Lithgow Local Environmental Plan 2014* (**Section 5.5**).

Consideration has been given to other State and Commonwealth legislation relevant to the proposed modification (**Chapter 5.0**). The proposed modification will require a variation to the Springvale Mine's Environment Protection Licence (EPL 3607) issued under the *Protection of the Environment Operations Act 1997* as a result of the increased coal transfer rate.

There will be minimal change to the existing site water management regime (**Section 4.2.8.2**, **Section 9.4, Section 9.5**) and there will be negligible change to the site water balance (**Section**

9.5.3.1), and therefore there will be no requirements for additional water access licences under the *Water Management Act 2000* (**Section 3.2.2**, **Section 5.3.3.3, Section 9.4**). However, surface water access licences will be required (**Section 9.4.5.2**).

The proposed modification will not impact on threatened species, endangered populations, ecological communities and other matters listed under the *Threatened Species Conservation Act 1995* or the *Environment Protection and Biodiversity Conservation Act 1999* (**Section 9.6**).

1.6 Modification Need

On 21 October 2015, Springvale Coal received consent SSD 5594 for the continued operations of Springvale Mine. The approved activities are described in **Chapter 3.0**. The current approved ROM coal extraction rate is 4.5 Mtpa.

In this modification Springvale Coal is proposing an increase in ROM coal production at Springvale Mine to up to 5.5 Mtpa. This production increase is consistent with Springvale Mine's current five-year business plan. Given the mine did not operate for eight weeks (21/08/15 – 16/10/15) while the Springvale Mine Extension Project was being assessed, Springvale Coal is now seeking to increase production output to make up shortfalls in revenue. This will result in increased output for the 2016 calendar year. To adequately ensure the future production limit has been assessed, Springvale Coal has elected to increase its production limit to 5.5 Mtpa. The effect of this is that the current approved timeframe for mining does not change. In the event that efficiencies are gained and markets are available to accommodate those efficiency gains, the life of the mine may be reduced.

The increase in production will be achieved through:

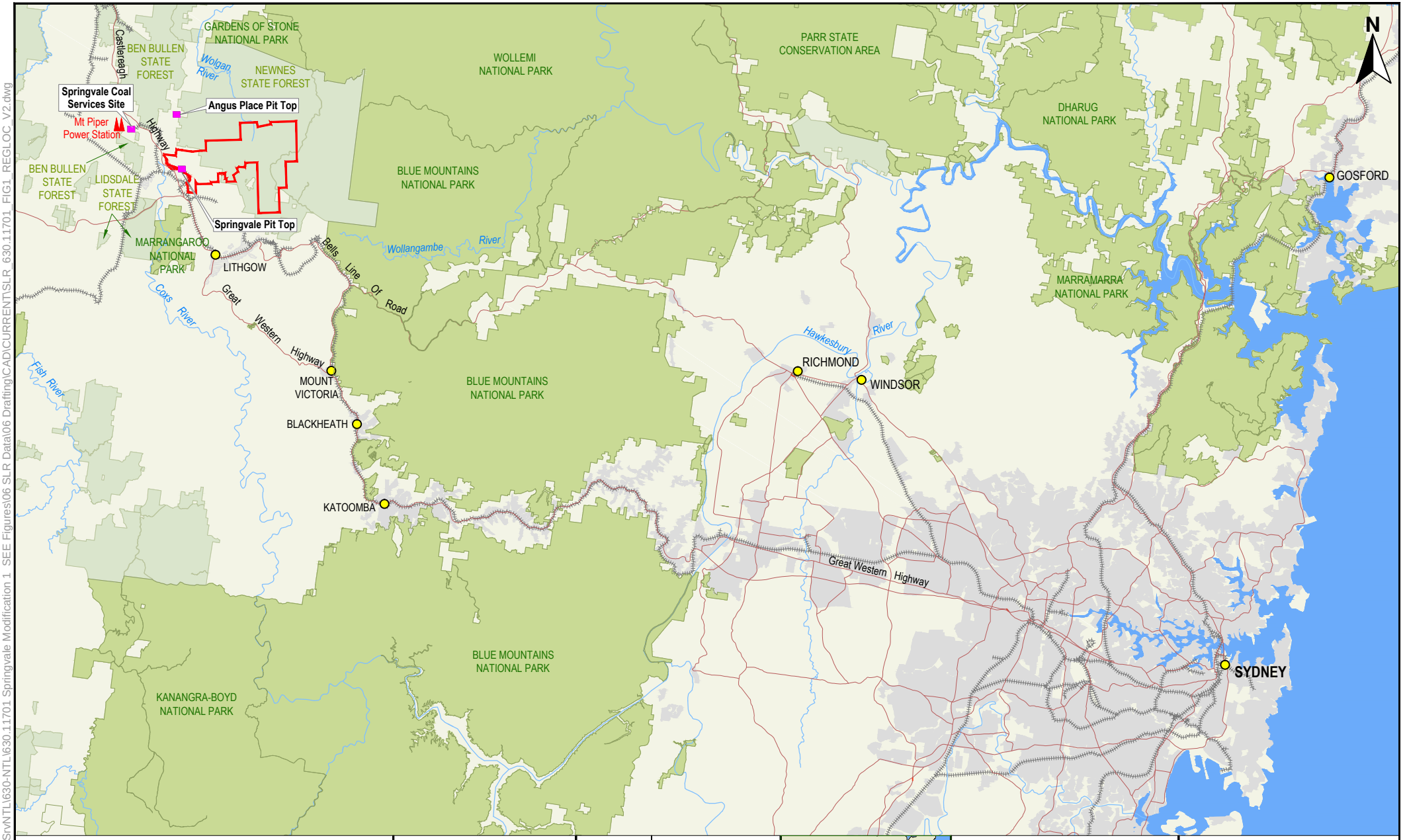
(i) The proposed increase in workforce

(ii) The installation and operation of additional underground mining equipment

(iii) Improved equipment utilisation and availability.

There is no proposal to change the approved longwall mining technique or the approved mine plan to achieve the proposed increase in production. The proposed modification does not include any physical works or significant changes to the existing underground mine operation. Additional equipment to be installed will comprise longwall equipment (increased from one to two longwalls) and continuous miners (increased from three to five). While there will be two longwalls underground some of the time, only one longwall equipment will operated at a time. Similarly, while five continuous miners will be located underground, only four will be operated at a time.

Installation of an additional longwall equipment underground means the changeover period between longwalls, approximately six weeks, will be eliminated. The next longwall to be extracted can be pre-installed with the additional longwall equipment prior to the completion of the current longwall being extracted. The elimination of production downtime will result in additional weeks available for ROM coal extraction.



LEGEND:

- Project Application Area
- Major Roads
- Watercourse
- Railway
- Built-up areas
- Town / City
- State Forest
- National Park

DATE	26.05.2016
SEAM	LITHGOW
REFERENCE	SLR_630.11701_FIG1_REGLOC_V2.dwg
SCALE	1 : 500000

Figure 1
Regional Location Map

0.0 10 20 KM

Centennial Coal
Springvale

Prepared by: SLR

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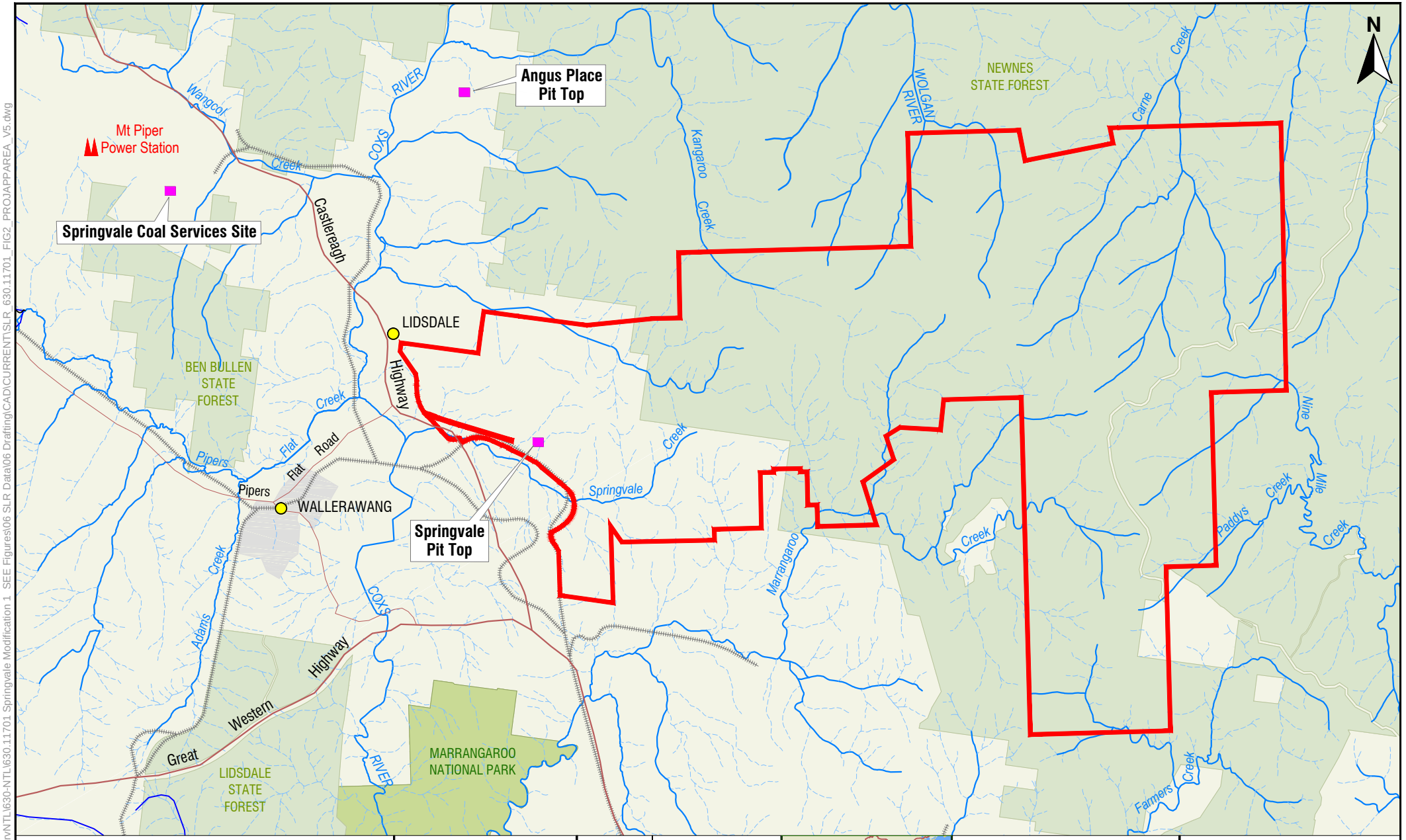

LEGEND:

- Project Application Area
- Major Roads
- Watercourse
- Railway
- Built-up areas
- Town / City
- State Forest
- National Park

DATE	13.07.2016
SEAM	LITHGOW
REFERENCE	SLR_630.11701_FIG2_ PROJAPPAREA_V2.dwg
SCALE	1:75000

Figure 2

Project Application Area

0.0 1.5 3.0 KM

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Springvale

Prepared by: SLR

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1.7 Environmental Assessment Considerations

No Secretary's Environmental Assessment Requirements were issued for the modification. Springvale Coal identified the potential impacts of the proposed modification elements in a letter to DPE dated 13 May 2016. The letter outlined the proposed modification elements, the technical assessments for the SEE and sought DPE's agreement on the approval pathway (**Section 1.5**) and the adequacy of the technical assessments proposed. A letter from DPE was received on 21 June 2016 (**Appendix B**) to confirm (i) the Department was satisfied the proposal represents a modification to the original project and that Section 96(2) of the EP&A Act is the appropriate approval pathway for the modification application, and (ii) the technical assessments proposed by Springvale Coal are appropriate to support the proposed modification application.

Assessments undertaken to assess the impacts of the proposed modification elements comprised:

(i) Air Quality and Greenhouse Gas Impact Assessment

(ii) Traffic Impact Assessment

(iii) Social Impact Assessment

(iv) Economic Impact Assessment

(v) Groundwater Assessment

(vi) Surface Water Assessment including Site Water and Salt Balance

(vii) Ecology Assessment

(viii) Aboriginal Cultural Heritage Assessment

1.8 Document Purpose

This SEE has been prepared on behalf of Springvale Coal to support an application for modification to Springvale Mine's consent under Section 96(2) of the EP&A Act.

The proposed modification elements are noted in **Section 1.3**, and discussed in detail in **Section 4.2**. The SEE has been prepared to meet the content of Part 1 Clause 2(4) of Schedule 1 of EP&A Act and contains information required under Clause 115 of the EP&A Regulation (**Section 5.3.1**).

The SEE describes the proposed modification, provides an assessment of its potential impacts and details measures that will be implemented to minimize the identified impacts. The information will be used by DPE and relevant government agencies to assess the merits of the proposed modification, and make recommendations to the determining authority on whether the proposed modification should be approved.

1.9 Document Structure

The SEE is provided in three volumes. Volume 1 comprises the main report while Volume 2 Parts 1 and 2 include all appendices to the SEE. The SEE document sets out the proposed modification in the context of the existing and approved environment, planning considerations, key environmental issues, potential impacts, mitigation measures and residual impacts. It is informed by the technical assessments in Volume 2 Part 1 (**Appendices E – H**) and Volume 2 Part 2 (**Appendices I – L)**.

Chapter 1.0 provides an overview of the proposed modification.

Chapter 2.0 provides a brief site description.

Chapter 3.0 provides brief discussions of the approved operations under SSD 5594.

Chapter 4.0 provides details of the modification elements for which approval is sought, and compares the current approved operations with the proposed operations as modified.

Chapter 5.0 describes the regulatory framework relevant to the modification.

Chapter 6.0 undertakes a socio-economic analyses of the proposed modification.

Chapter 7.0 describes the stakeholder consultation undertaken in respect of the modification.

Chapter 8.0 provides discussions on the broad brush, desktop-level risk assessment undertaken to broadly assess the potential environmental risks that may arise as a result of the proposed modification.

Chapter 9.0 assesses potential environmental impacts and outlines management and mitigation measures as necessary to minimise impacts from the modification.

Chapter 10.0 provides the Statement of Commitments.

Chapter 11.0 provides modification justification and conclusion.

2.0 SITE DESCRIPTION

2.1 Site Location

Springvale Mine is an existing underground longwall mining operation located in the Western Coalfield of New South Wales, approximately 15 km northwest of the city of Lithgow and 120 km west-northwest of Sydney. Springvale pit top is accessed via the Castlereagh Highway and is located 3 km east of the township of Wallerawang.

Springvale Mine is bordered by Angus Place Colliery to the north, the closed Lithgow State Mine to the south, grazing land to the west, Mount Piper Power Station to the northwest, and Newnes State Forest to the east (**Figure 2**).

2.2 The Project Application Area

The Springvale Mine Extension Project Application Area (**Figure 2**) comprises an area of 5,811 ha and is defined by the Mining Lease and Exploration Licence boundaries of Springvale Mine (**Figure 3**). A new Mining Lease ML1727 over southern portion of EL6974 was granted on 04 February 2016 under the *Mining Act 1992*, following the grant of SSD 5594.

The Project Application Area is located within the Lithgow Local Government Area and the Parishes of Cox, Clwydd, Cook, Marrangaroo and Lidsdale within the County of Cook.

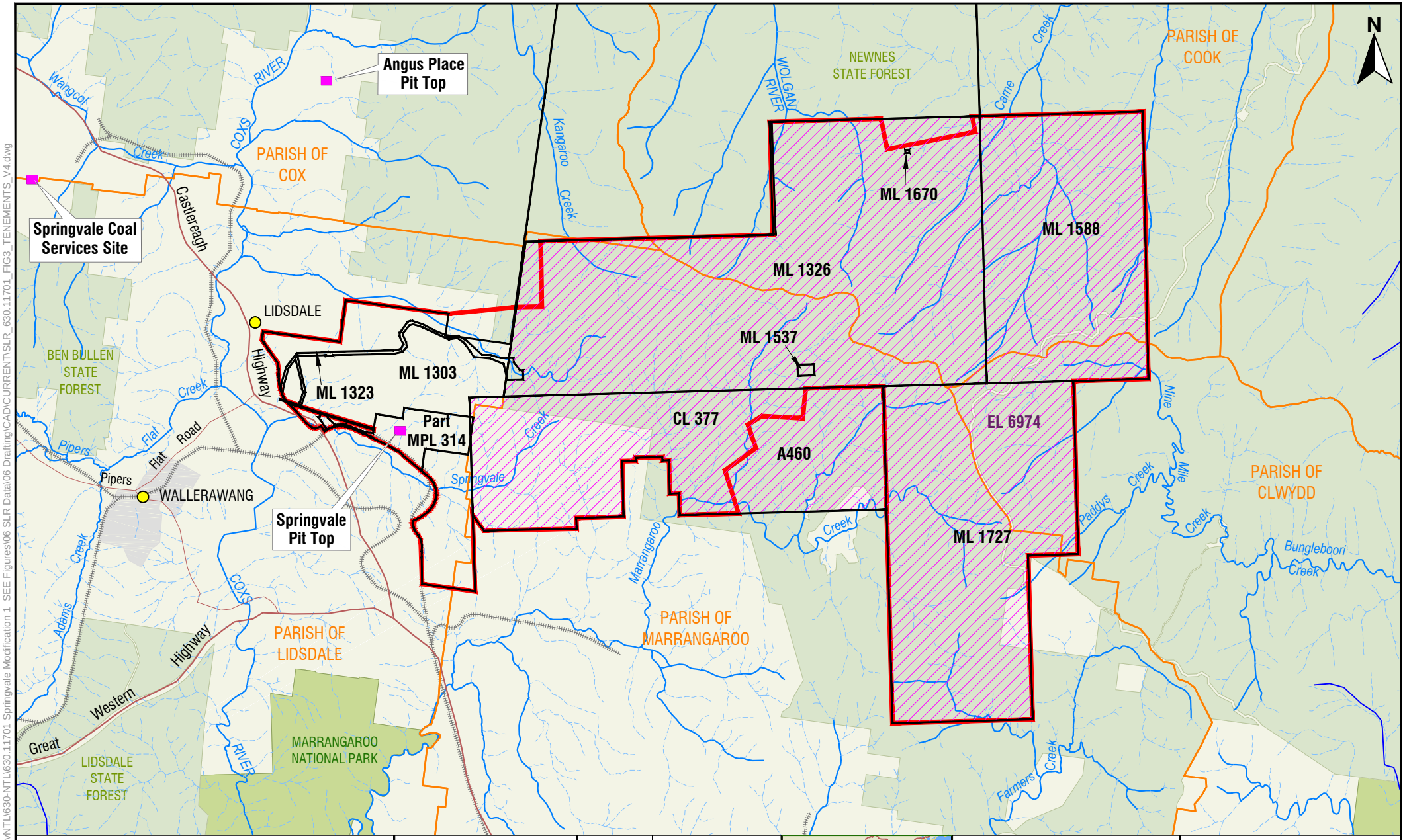
The characteristics of the Project Application Area and surrounds include rural land, Newnes State Forest, coal handling transport and infrastructure, power stations and natural areas. The area is characterised by environmental features such as pagodas, cliff lines, swamps, creeks, deep valleys, flora and fauna.

Marrangaroo Creek, the Wolgan River, Carne River, Lambs Creek, Paddys Creek and Kangaroo Creek overlie the Project Application Area. These swamps comprise both shrubs swamps that occur in valley floors and hanging swamps that occur on hillsides, and both are relatively common and widespread on the Newnes Plateau.

2.3 Land Zoning

The Project Application Area falls under the *Lithgow Local Environmental Plan 2014* (Lithgow LEP). The Lithgow LEP commenced on 19 December 2014 and is the principal planning instrument affecting land use in the Lithgow Local Government Area. Under the Lithgow LEP the Project Application Area encompasses the following zones, and are shown in **Figure 4**.

- RU1 Primary Production
- RU2 Rural Landscape
- RU3 Forestry
- R1 General Residential
- SP2 Infrastructure



LEGEND:

- Project Application Area
- Major Roads
- Watercourse
- Railway
- Built-up areas
- Town / City
- State Forest
- National Park
- Parish boundary
- Exploration Lease
- Mining Lease

DATE	13.07.2016
SEAM	LITHGOW
REFERENCE	SLR_630.11701_FIG3_TENEMENTS_V2.dwg
SCALE	1:75000

Figure 3
Existing Mining Tenements

0.0 1.5 3.0 KM

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Springvale

Prepared by: SLR

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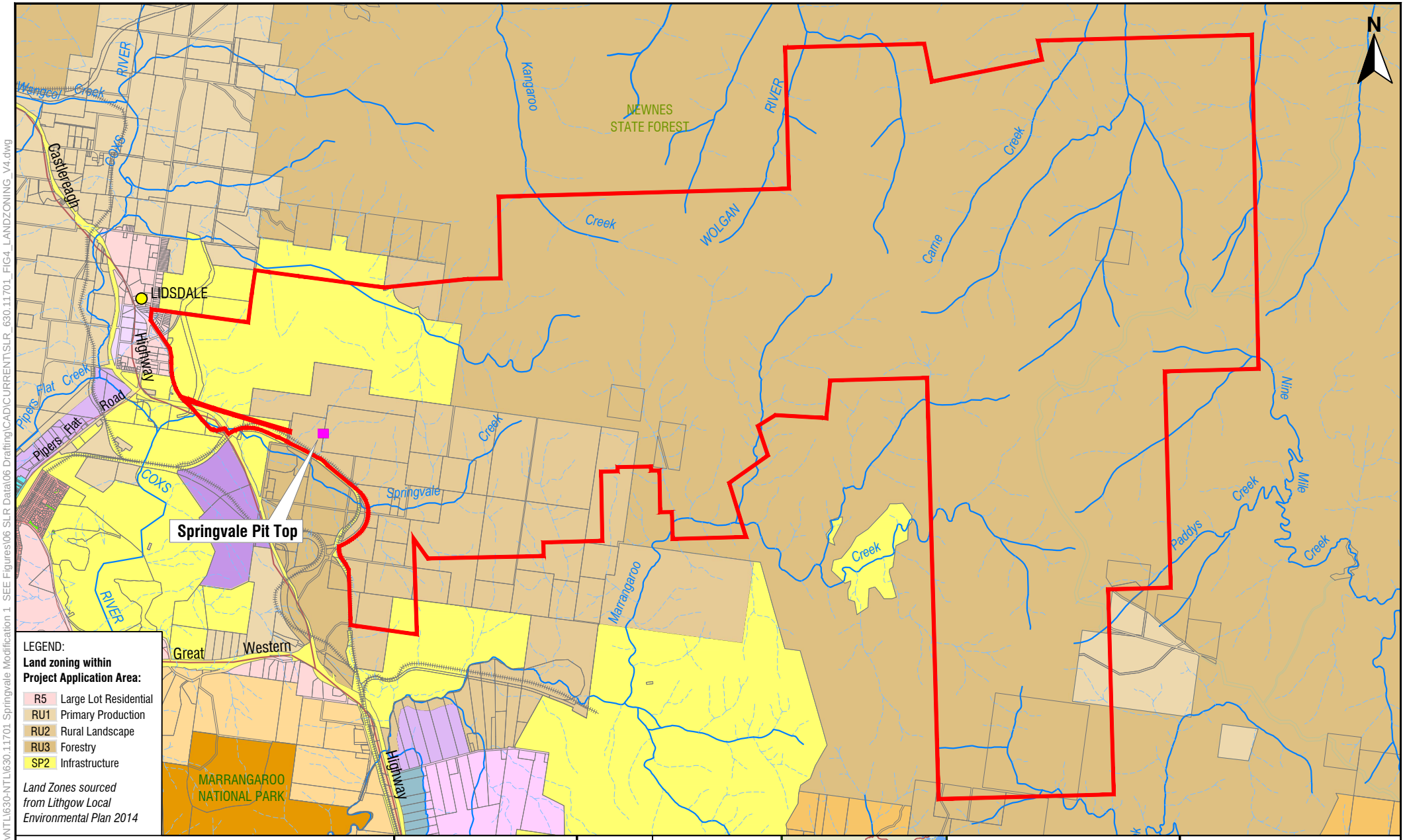

DATE	13.07.2016
SEAM	LITHGOW
REFERENCE	SLR_630.11701_FIG4_ LANDZONING_V2.dwg
SCALE	1:60000

Figure 4
Land Zoning

Centennial Coal
Springvale

Prepared by: SLR

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2.4 Land Ownership

Land ownership within and surrounding the Project Application Area consists of Crown Land, privately owned land including land owned by Energy Australia NSW Pty Ltd, and land owned and managed by the Forestry Corporation of NSW (**Figure 5**). Parcels of freehold land are located within the western boundaries of the Project Application Area and in the vicinity of Springvale pit top.

A schedule of land relevant to the Project Application Area is provided in **Appendix C**.

2.5 Land Uses

Land use in the vicinity of the Project Application Area consists of residential uses, agriculture, open cut and underground coal mining, coal handling infrastructure, transport infrastructure, commercial forestry and power generation (**Figure 5**). Mount Piper Power Station, owned and operated by Energy Australia NSW Pty Ltd (formerly Delta Electricity), is located to the northwest of the Springvale pit top, while the non-operational Wallerawang Power Station (being decommissioned) is located west of the pit top. Angus Place Colliery (on care and maintenance since March 2015) is located on the north from the Springvale pit top (**Figure 2**).

Centennial Coal's Lidsdale Siding Rail Loading Facility, located to the west from the Springvale pit top at Wallerawang, has been used as a coal storage and rail loading facility since 1974 to distribute coal by rail from Centennial Coal's western region mines to ports on the NSW coast.

Wallerawang is the closest retail and commercial centre, located approximately 3 kilometres west of the pit top. Lidsdale village is located to the west of the Project Application Area and provides a rural fire service, park amenities and a church.

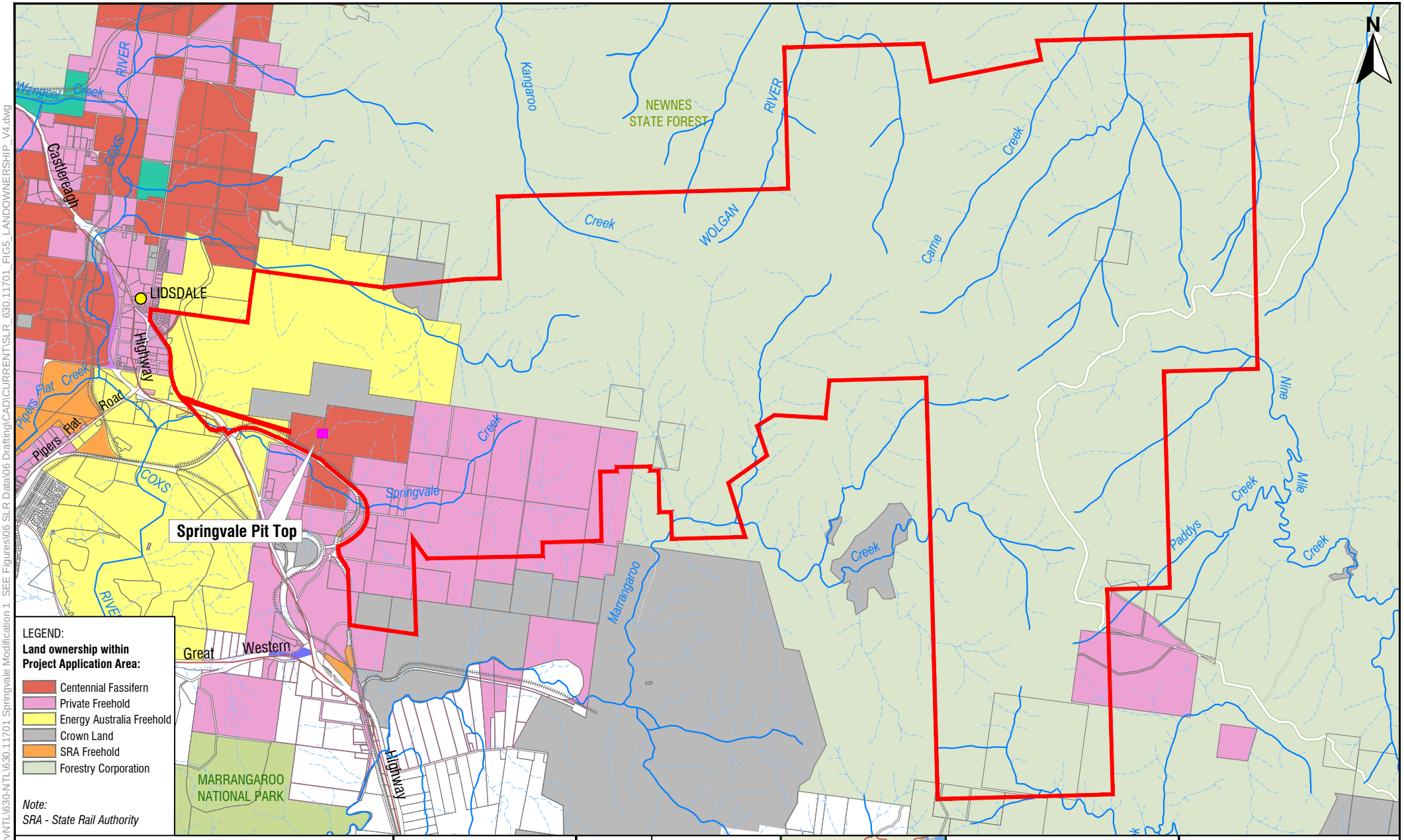
The nearest large urban centre is Lithgow with a population of 21,000. Lithgow is recognised as a tourist destination and meets the higher order retail, commercial and professional service needs of the area. Lithgow was established on the coal mining industry, however, steel manufacturing and other industrial enterprises have been carried out in the region. Agriculture accounts for 31% of land use of the area within the Lithgow Local Government Area.

The area around Springvale Mine has been subject to extensive mining operations in the past, with a number of active or completed mines in its vicinity, including Centennial Coal's existing operations.

Land use within the Project Application Area predominantly consists of historical and existing mining operations and commercial forestry in the Newnes State Forest. Newnes State Forest comprises approximately 25,000 ha of pine plantation and native hardwood forest that is selectively logged under the Forestry Corporation of NSW tenure and management. In addition to the timber industry, the Newnes State Forest supports a number of recreational land uses.

Public access is permitted in the Newnes State Forest with common recreation activities consisting of motorcycle riding, four wheel driving, bushwalking, camping, mountain bike riding, canyoning, photography, bird watching and other recreational and adventure activities.

A small portion of land along the western boundary of the Project Application Area is cleared and is used for agriculture. There is no intensive cropping in the area.



DATE	13.07.2016
SEAM	LITHGOW
REFERENCE	SLR_630.11701_FIG5_ LANDOWNERSHIP_V2.dwg
SCALE	1:60000

Figure 5
Land Ownership

Centennial Coal
Springvale

Prepared by: SLR

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2.6 Topography

Springvale is located in an area of significant topographical variation. Most of the land surface within the Project Application Area and its environs lies within the Newnes Plateau at elevations from 1100 m to 1200 m Australian Height Datum (AHD). Topography within the Newnes Plateau comprises narrow gorges with high undulating ridgelines and steep sided slopes of sandstone cliffs, which range between 10 m and 40 m in height. The cliffs rise above incised valleys, and hilly areas with relatively flat crests and some spurs with moderately sloped ephemeral drainage lines occur within the valleys.

To the north of the Springvale Mine is the Wolgan Valley, a steeply incised valley with sandstone cliffs. Elevation in the Wolgan Valley is 500 to 600 m AHD. To the southwest of Springvale Mine is the Coxs River, with an elevation of approximately 870 m AHD. The Coxs River resides within an open and relatively flat valley. The Springvale pit top is located on the footslopes of the Newnes Plateau. The elevation at the pit top is approximately 920 m AHD.

2.7 Soils

The major soil type/order present in the Project Application Area is Kandosols covering 4,036 ha (69.7%) of the Project Application Area. It represents the Soil Landscape Units of Warragamba, Medlow Bath, Newnes Plateau, Deanes Creek and the majority of Cullen Bullen. Other minor soil orders include Tenosols covering 1,064 ha (18.3%) and Rudosols covering 532 ha (9.2%). Other soil types, excluding disturbed terrain, covering the remainder of the Project Application Area are Organosol, Vertosol and Chromosol.

The major soil types within the surface infrastructure areas at Springvale Mine are Kandosols. Other minor soil types include Tenosols, Organosols and Rudosols.

2.8 Hydrology

The majority of the land surface above Springvale Mine's operations lies within the Newnes Plateau, which forms part of the divide between the Wolgan and Coxs River catchments. The catchment divide between these surface water catchments runs in a northwest – southeast direction above Springvale Mine's operations. Shrub swamps occur on the Newnes Plateau within the headwaters of narrow gorges. As presented in Golder Associates (2014), these swamps occur coincident with presence of low permeability aquitard plies of the uppermost geological unit (Burralow Formation) on the Newnes Plateau.

The Wolgan River, of which Carne Creek is a tributary, eventually feeds into the Colo River and then the Hawkesbury River. The Coxs River is one of the tributaries of Lake Burrogorang. Lake Burrogorang discharges into the Nepean River and then the Hawkesbury River. Lake Burrogorang is the main drinking water supply catchment for Sydney.

Carne Creek is located in the northwest of the Project Application Area and flows northwards into Wolgan River. The upper catchment of the Wolgan River is within the northern section of the Project Application Area and flows north via Wolgan Falls into the Wolgan Valley and eventually into the Colo River System, that flows into the Hawkesbury River.

The surface water catchments within the Project Application Area are the Coxs River in the west, Marrangaroo Creek in the centre, Wolgan River East and West in the northeast, Nine Mile and Bungleboori to the east and a small part of Farmers Creek catchment to the southeast.

Marrangaroo and Farmers Creek both join the Coxs River that flows generally south past Lithgow skirting the western flanks of the Blue Mountains before entering Lake Burragorang and eventually the Nepean River.

2.9 Geology

Springvale Mine is located in the southwest corner of the NSW Western Coalfields. The Illawarra Coal Measures are relatively thin in this area, with an average thickness of 110 m from the Katoomba to the Lithgow Seam. Above the coal measures, the Narrabeen Group is the only member of the Triassic sequence present in the area, having a maximum thickness of 340 m. Depth of cover to the Lithgow Seam generally ranges between 350 m and 420 m, hence, the upper Narrabeen Group comprises the surface strata above the existing and future workings at Springvale Mine.

The sedimentary strata (Illawarra Coal Measures and Narrabeen Group) lie above older Silurian and Devonian Proterozoic rocks of the Lachlan Fold Belt. The Lithgow Coal Seam at Angus Place Colliery and Springvale Mine is stratigraphically the lowest economic seam, with the depth to the older basement strata beneath this seam being shallow, up to 100 m, compared to other parts of the Sydney Basin, which can be many hundreds of metres. The Lithgow Seam ranges in thickness from less than one metre (where only the lower ply of the Lithgow Seam is present) to up to 9 m (where it coalesces with the overlying Lidsdale Seam) with some thin carbonaceous or tuffaceous claystone layers present in the upper half of the seam. The Lithgow Seam generally dips at 1 – 2 degrees to the east northeast. The Katoomba and other seams at Springvale Mine (and Angus Place Colliery) are too thin to be viably extracted.

Non coal-bearing Triassic strata directly overlie the Illawarra Coal Measures. These strata comprise the Narrabeen Group of rocks which have the following sequence of rock formations in descending order:

- Burralow Formation
- Banks Wall Sandstone
- Mount York Claystone
- Burra-Moko Head Sandstone
- Caley Formation.

These formations comprise interbedded siltstone, sandstone and conglomeratic sandstone, with occasional claystone bands, as observed in the characteristic cliffs that occur throughout the area.

Within the Narrabeen Group of rocks, the Burralow Formation and the Mount York Claystone are key stratigraphic horizons in terms of their hydrogeological significance.

2.10 Ecology

Of relevance to this modification are discussions on the existence of the Newnes Plateau shrub swamps and hanging swamps above the Springvale Mine mining area. Shrub swamps occupy the bases of valleys whereas hanging swamps develop higher up on the flanks of the valleys.

The shrub swamps are listed as an endangered ecological community (EEC) under the NSW *Threatened Species and Conservation Act* 1995 (NSW) and provide important habitat for a range of plants and animals. The shrub swamps and the hanging swamps are referred to collectively as the

Temperate Highland Peat Swamps on Sandstone (THPSS) in accordance with the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).

The shrub and hanging swamps have the potential to be impacted by mining related activities and discussed in more detail in **Section 9.4** and **Section 9.5**.

2.11 Climate

2.11.1 Temperature

The climate in the region surrounding Springvale Mine is typical of a cool temperate mountain climate, characterised by cold winters and warm summers. The highest temperatures occur throughout December, January and February, with the coolest temperatures occurring in July. Snow and/or sleet are common in winter months.

2.11.2 Rainfall

Rainfall throughout the year is relatively uniform, however, rainfall is higher during the months of October through to March. Summer months are generally the wettest months. It is noted that the intensity of the rainfall is locally affected by the orographic influence of the Great Dividing Range.

A number of Bureau of Meteorology (BoM) weather stations are located in the vicinity of Springvale Mine. BOM Station No. 063062 (Lithgow (Newnes Forest Centre)) represents the most complete historical rainfall dataset with respect to the Newnes Plateau (elevation above 1000 m AHD). Monitoring at this station ceased in 1999.

The distribution of the average monthly rainfalls through the year is shown in **Table 1**.

Table 1 – Distribution of Average Monthly Rainfall at the Newnes Plateau (mm/month)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
BOM Station No. 063132 (Lidsdale (Maddox Lane)) (1959 to present)													
Mean	85.1	78.7	64.2	42.4	51.1	48.8	51.6	65.5	53.7	68.4	73.4	72.9	766
Lowest	8.6	5.6	3.8	1.2	2.6	2.6	2.7	1.8	3.4	2.4	7.6	0.0	330
Highest	214	270	270	203	131	229	214	364	123	228	165	217	1260
BOM Station No. 063062 (Lithgow (Newnes Forest Centre)) (1938 to 1999)													
Mean	121	114	102	79.9	81.3	83.0	68.3	83.5	67.9	91.5	89.0	90.4	1070
Lowest	18.8	5.6	5.1	6.2	11.0	0.0	2.0	4.6	0.0	6.4	4.7	2.6	496
Highest	281	339	519	299	287	320	241	412	207	267	209	303	1890
Springvale (New Prison Farm) (2004 to present)													
Mean	89.8	140.0	88.0	70.0	42.4	82.2	46.1	55.2	52.0	68.5	111.5	101	986
Lowest	19.5	36.5	29.5	10.5	14.6	21.5	18.0	19.0	12.5	13.0	33.5	37.5	572
Highest	153	273	196	202	105	254	100	107	92.2	144	196	207	1290

2.11.3 Evapotranspiration

Daily Pan A evaporation has been recorded at the Bathurst Agricultural Station (BOM Station 63005) from 1966 to current. The average monthly evaporation rate is presented in **Table 2**. The annual average daily Pan A evaporation rate is 3.7 mm/day. The Bathurst Agricultural Station is the closest monitoring station to Springvale Mine and is 47 km to the west.

Pan A evaporation is usually used for estimating evaporation losses from open water surfaces of sediment ponds and dams. In forested areas, evaporation tends to be low compared to Pan A evaporation, but this is offset by increased transpiration. Analysis of flow gauging at Sunnyside Swamp on the Newnes Plateau suggest actual evaporation may be 35% of Pan A evaporation.

Table 2 – Distribution of Average Monthly Rainfall at the Newnes Plateau (mm/month)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	6.8	5.8	4.5	2.9	1.7	1.1	1.2	1.8	2.8	4.0	5.2	6.5	3.7

2.11.4 Wind

The annual wind behaviour predicted by CALMET for the Springvale pit top in the Air Quality and Greenhouse Gas Assessment (SLR (2016) indicates the site experiences predominantly light to moderate winds (between 1.5 m/s and 8 m/s), with the prevailing wind direction from western quadrant. The seasonal wind roses generated using CALMET in SLR (2016) for the year 2014 indicate the following.

- In spring, winds are light to moderate and experienced predominantly from west southwest quadrant with very few winds from the south southeast quadrant.
- In summer, light winds from northeast quadrant are predominant with very few winds from the southern quadrant.
- In autumn, winds are light to moderate and experienced almost evenly from all quadrants with the exception of the south southwest quadrant from which a low percentage of winds are experienced.
- In winter, winds are light to high and experienced predominantly from the western quadrant with very few winds from northeast quadrant.

2.11.5 Atmospheric Stability Classes

Atmospheric stability refers to the tendency of the atmosphere to resist or enhance vertical motion. The Pasquill-Turner assignment scheme identifies six Stability Classes, A to F, to categorize the degree of atmospheric stability as follows.

A: Extremely unstable conditions

B: Moderately unstable conditions

C: Slightly unstable conditions

D: Neutral conditions

E: Slightly stable conditions

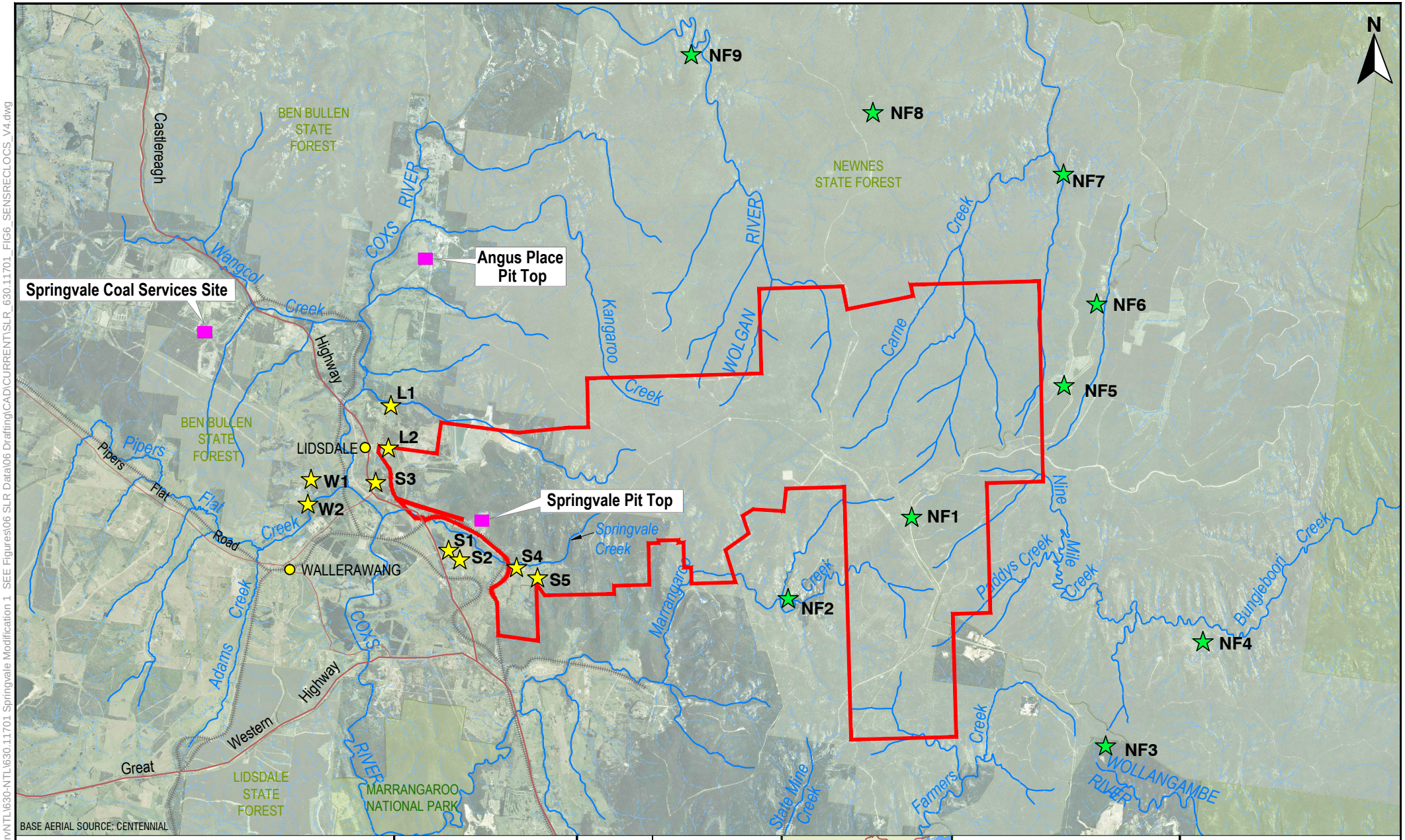
F: Moderately stable conditions

The frequency of each stability class predicted by CALMET (SLR (2016)), extracted at the Springvale pit top during the modelling period indicate a relatively even spread across stability classes C to F, with

a slightly higher frequency of conditions typical to stability class D. Stability class D is indicative of neutral atmospheric conditions, with moderate winds and even mixing properties.

2.12 Sensitive Receptors

A number of sensitive residential and recreational receptors exist in the vicinity of the Project and these are shown in **Figure 6**. The residential receptors are located to the south and southeast of Springvale pit top and the recreational receptors are located in the wider area of Newnes State Forest, such as areas used for camping.



LEGEND:

- Project Application Area
- Major Roads
- Watercourse
- Railway
- Town / City
- State Forest
- National Park
- Recreational Receptor
- Residential Receptor

DATE	13.07.2016
SEAM	LITHGOW
REFERENCE	SLR_630.11701_FIG6_SENSRECLOCS_V2.dwg
SCALE	1 : 100000

0.0 2.0 4.0 KM

Figure 6
Sensitive Receptor Locations

Centennial Coal
Springvale

Prepared by: SLR

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3.0 APPROVED OPERATIONS

3.1 Overview of Approved Operations

Springvale Mine was originally granted development consent DA 11/92 on 27 July 1992 by the then Minister for Planning, pursuant to Section 101 of the EP&A Act. The consent permitted the construction and operation of an underground coal mine to produce up to 3.4 Mtpa of ROM coal, along with the construction and operation of an overland conveyor system and a coal handling and preparation plant. Longwall mining at Springvale Mine commenced in 1995, extracting thermal coal from the Lithgow Seam. DA 11/92 was subsequently modified on four occasions in 1993, 1994, 2012 and 2013. Modifications 1 to 3 sought approvals for infrastructure required to facilitate mining operations, and a change in the schedule of lands and tenements associated with the development consent. Modification 4 allowed an increase of ROM coal production from 3.4 Mtpa to 4.5 Mtpa, an increase in workforce to up to 310 full time personnel, connection of the site's sewerage system to Lithgow City Council's main sewer system, and an extension of consent life to 30 September 2015.

Springvale Mine currently operates under State significant development consent SSD 5594, granted to the Springvale Mine Extension Project under Part 4 Division 4.1 of the EP&A Act. The supporting document for SSD 5594 is the Springvale Mine Extension Project *Environmental Impact Statement* (SVMEP EIS) (Golder Associates (2014)), which describes in detail the operations approved under the consent. SSD 5594 incorporates the operations approved under the DA 11/92 as modified. In summary, SSD 5594 allows:

- Extraction of up to 4.5 Mtpa of ROM coal from the Lithgow Seam underlying the Project Application Area
- Mining to continue for 13 years from the date of consent (until 31 December 2028) with rehabilitation to be undertaken after this period
- Operations 24 hours per day, seven days per week
- Employment to a full time workforce of up to 310 full time employees
- Development of underground access headings and roadways to the east to allow access to the proposed mining areas
- Secondary extraction by retreat longwall mining technique for the proposed longwalls LW416 to LW432 and LW501 to LW503
- Management and the handling of ROM coal through a crusher and screening plant at the Springvale pit top, and the subsequent loading of the coal onto the overland conveyor system (part of the Western Coal Services Project (SSD 5579) for despatch to SCSS
- The transport of up to 50,000 tonnes per annum of coal to local domestic customers by road haulage.
- Operation and maintenance of the existing ancillary surface infrastructure for ventilation, electricity, water, materials supply, and communications at the Springvale pit top and on Newnes Plateau
- Installation and operation of Bores 9 and 10 dewatering bore facilities on Newnes Plateau as extensions to the SDWTS
- Management of mine inflows using the SDWTS and subsequent discharge into Coxs River via LDP009
- Construction of a downcast ventilation borehole within the Bore 10 facility compound

- Establishment of a mine services borehole area on Newnes Plateau
- Exploration activities, predominantly borehole drilling to further refine the existing geological model
- Rehabilitation of disturbed areas at infrastructure sites progressively, when no longer required for operations
- Life-of-mine rehabilitation at the Springvale pit top and the Newnes Plateau infrastructure disturbance areas to create final landforms commensurate with the surrounding areas and the relevant zonings of the respective areas.

3.2 Existing Approvals

3.2.1 Development Consents and EPBC Act Approvals

Table 3 provides a summary of the development consents and EPBC Act approvals held by Springvale Mine.

Table 3 – Existing Development Consents and EPBC Act Approvals

Reference	Description	Issued by	Issue Date	Expiry Date

SSD 5594	State significant development consent permitting:
	• Annual coal extraction limit of 4.5 Mtpa from Lithgow Seam using retreat longwall mining for LW416 – LW423 and LW501 – LW503
	• Consent life of 13 years from date of consent (21/10/2015 – 31/12/2028)
	• Operations 24 hours per day, seven days per week
	• Employment of up to 310 fte personnel
	• Operation of Springvale pit top and Newnes Plateau infrastructure for:
	  ○ Coal handling, stockpiling and processing
	  ○ Water management
	  ○ Underground mine access
	  ○ Mine ventilation
	• Pit top facilities for administration buildings , workshops, electrical distribution network and telecommunications
	• Construction of new infrastructure on Newnes Plateau
	• ROM coal transport off site via overland conveyor system and road haulage
	• Pit top access via Mine Access Road off Castlereagh Highway in Wallerawang
	• Progressive rehabilitation and mine of life rehabilitation
	• Exploration activities.
		NSW Planning Assessment Commission	21/10/2015	31/12/2028

DA 326/02	Construction and operation of a coal conveyor from Castlereagh Highway to Wallerawang Power Station.	Lithgow City Council	20/09/2002	N/A

Reference	Description	Issued by	Issue Date	Expiry Date
DA 461/02	Construction and operation of Ventilation Shaft 3 Facility on the Newnes Plateau.	Lithgow City Council	23/01/2003	N/A
DA 461/02 Mod 1	Upgrade of Ventilation Shaft 3 Facility.	Lithgow City Council	30 May 2012	N/A
EPBC 2013/6881	Expansion of underground mining at Springvale Mine	DoE	13/09/2015 01/04/2016 (variation)	08/10/2035
EPBC 2011/5949	Mining of longwalls 415, 416 and 417 at Springvale Mine.	SEWPAC	14/03/2012	19/03/2032
EPBC 2012/6517	Remediation and restoration of East Wolgan Swamp	SEWPAC	21/09/2012	N/A
EPBC 2011/6017	Installation of piezometers for surface and groundwater monitoring on Newnes Plateau	SEWPAC	22/07/2011	N/A

3.2.2 Other Regulatory Requirements

Springvale Mine has a number of other regulatory requirements for operation. These consist of approvals, licences, permits and certificates as listed in **Table 4**.

Table 4 – Other Regulatory Approvals

Type	Approval Number	Regulatory Authority	Issue Date	Details
Mining Operations Plan (1 November 2015 – 31 October 2022)	OUT16/1425 MCV15/777-2	DTIRIS	25/02/2016	Springvale Mine's *Mining Operations Plan* (Springvale Coal (2015)) is a working reference for the activities of the mine in accordance with the DTIRIS guidelines for the period 01 November 2015 – 31 October 2022, inclusive. It is consistent with approved SMP commitments, EPL 3607 and the SSD 5594 consent. The objectives of the MOP are to meet statutory guidelines for reporting on Springvale Mine operations.
Environment Protection Licence	EPL 3607	NSW EPA	17 May 2000	Springvale Coal Pty. Ltd is the licensee of Springvale Mine EPL 3607 which authorises the mining of coal up to 3.5 Mtpa, and coal services works up to a scale of 5 Mtpa at the Springvale Coal Services site. Monitoring is undertaken in accordance with the licence and results reported on an annual basis to the EPA via the EPA Annual Return.
Occupation Permit (*Forestry Act 2012*)	Level 2- Exploration Level 3 - Infrastructure	Forestry Corporation NSW	26/11/2009 17/12/2012	Permit to occupy Newnes State Forest for activities associated with mineral exploration and construction of surface infrastructure.
Radiation Gauge	29346	NSW EPA	12/02/2004	Licence to sell/possess.

Type	Approval Number	Regulatory Authority	Issue Date	Details
Dangerous Goods Licence	35/027897	WorkCover NSW	-	Licence to store / handle dangerous goods on premises.
Groundwater Licences	10BL603519 / WAL36383 10BL602017/ WAL 36443 10BL601863 / WAL 36446 10BL605395	DPI Water	25/02/2010 & 05/08/2013 / 01/10/2014 04/09/2007 / 02/04/2014 04/09/2007 / 21/05/ 2014 17/06/2013	Springvale Mine has three extractive water licences. • Dewatering Bores 6 and 8 licensed at 5958 ML/year extraction limit (WAL 36383). • Pit top collection system licensed at 585 ML/year (WAL 36443). • Dewatering borehole at Ventilation Shaft 3 compound licensed at 3300 ML/year (WAL 36446).
Subsidence Management Plans and Variations LW 411 – LW418	04/1673 08/8497 11/3964 12/27914 13/37387 14/33055 13/2174 13/1178 13/21877 14/9977 14/15149 15/26505	DTIRIS	06/03/2006 to 30/09/2016	SMPs are prepared to consider the potential subsidence impacts of underground mining and identify measures to manage such impacts. Extraction plans will be prepared in the future.
High Risk Activity (*Work Health and Safety (Mines) Regulation 2014*)	Various	DTIRIS	Multiple	High Risk Activity – *Work Health and Safety (Mines) Regulation 2014* – Clause 33 Schedule 3 Notifications
Section 95 Certificate (*Threatened Species and Conservation Act 1995*)	1117191	OEH	02/08/2010	Undertake geotechnical and geophysical investigations within Newnes Plateau Shrub Swamp.
Section 95 Certificate (*Threatened Species and Conservation Act 1995*)	1111270	OEH	10/02/2010	Hand removal of weeds within Newnes Plateau Shrub Swamp.
Section 95 Certificate (*Threatened Species and Conservation Act 1995*)	1129457	OEH	07/09/2011	Installation of ten piezometers in swamp endangered ecological communities.

Type	Approval Number	Regulatory Authority	Issue Date	Details
Section 95 Certificate (*Threatened Species and Conservation Act 1995*)	C0000077	OEH	25/11/2013	Remediation works East Wolgan Swamp on Newnes Plateau to restore hydrological and ecological function of the Newnes Plateau endangered ecological community.

3.2.3 Mining Tenements

Springvale Mine operates under a variety of mining authorities (**Table 5**) consisting of mining leases, coal leases, authorisations and exploration licences. These tenements are shown in **Figure 3**.

Table 5 – Mining Tenements

Reference	Title	Grant Date	Expiry Date	Area (ha)		
				Surface	Underground	Total
CL377	Coal Lease 377	24/02/1992	09/04/2025	0	1105	1105
ML1303	Mining Lease 1303	15/12/1992	15/12/2034	0	713	713
ML1323	Mining Lease 1323	03/08/1993	03/08/2035	30.24	0	30.24
ML1326	Mining Lease 1326	20/09/1993	18 /08/2024	0	2157	2157
ML1537	Mining Lease 1537 (Vent Shaft 3)	16/06/2003	16/06/ 2024	4.125	0	4.125
ML1588	Mining Lease 1588	19/06/2006	19/06/2027	0	976	976
ML1670	Mining Lease 1670 (Bore 6 Infrastructure)	17/02/2012	17/022033	0.3	0	0.3
ML1727	Mining Lease 1727	04/02/2016	04/02/2037	0	1256	1256
Part MPL314	Mining Purposes Lease 314 (Springvale pit top)	03/08/1993	03/08/2035	96	0	96
MLA445	Mining Lease Application (Bore 8 Dewatering Facility)	Submitted 22/10/2012		18.97	0	18.97
MLA497	Mining Purposes	Submitted 28/05/2015		89.87	0	89.87
EL6974	Exploration Licence 6974	11/12/2007	13/12/2017	4381	0	4381
A460	Authorisation 460	07/07/1992	06/06/2020	1104	0	1104

3.3 Existing Operations

3.3.1 Hours of Operation and Workforce

Springvale Mine operates 24 hours a day, seven days a week. The mine is approved to employ a workforce of up to 310 full-time equivalent employees.

3.3.2 Site Access

Springvale pit top is accessed via Mine Access Road which joins the Castlereagh Highway near Wallerawang. From the Castlereagh Highway, access is readily available to the sub-regional and regional road network.

Access for light vehicles to the Newnes Plateau infrastructure sites is via State Mine Gully Road northeast of Lithgow and then along Glowworm Tunnel Road and Mayingu Marragu Trail. Access for heavy vehicles is restricted to a route via Chifley Road and Old Bells Line of Road at Clarence, and then along a route including Glowworm Tunnel Road or Mayinygu Marragu Trail. Light vehicles may use the heavy vehicle access route.

3.3.3 Coal Production Rate

Springvale Mine is approved to extract coal from the Lithgow Seam at the ROM extraction rate of 4.5 Mtpa.

3.3.4 Mining Method and Sequence

Springvale Mine is approved to extract the Lithgow coal seam using the longwall method of mining, comprising development (first workings) using continuous miner units and extraction (secondary workings) using longwall mining equipment. Springvale Mine utilises the retreat mining configuration whereby the longwall face equipment is established at the end of the panel that is remote from the main headings and coal is extracted within the panel as the longwall equipment moves towards the main headings.

Springvale Mine is approved to extract 20 longwalls under SSD 5594, comprising LW416 – LW423 (part of northern longwall block), LW424 – LW432 (southern longwall block) and LW501 – LW503 (southwest longwalls). On completion of the northern longwall block, the southern longwall block will be extracted. The southwest longwalls will be extracted last.

3.3.5 Coal Handling, Processing and Stockpiling

Coal is transported from the underground workings by the drift conveyor onto the temporary ROM coal stockpile area at the pit top (85,000 tonne capacity) via the Rill Tower. ROM coal is reclaimed from the coal stockpile area by two activators and two vibratory feeders. The feeders use vibration to feed the coal material onto the reclaim conveyor.

The coal from the reclaim conveyor is transferred to a fully clad crusher and screening plant. Processing within the crusher and screening plant occurs to form 50 mm sized product coal prior to transfer to the overland conveyor system for despatch off site.

All crushed coal is transported off site on an overland conveyor system extending from the pit top to Mount Piper Power Station via the Springvale Coal Services Site (Western Coal Services Project) on the Western Coal Services Project's consent (SSD 5579).

3.3.6 Coal Transport

ROM coal from the Springvale pit top is transported to either Mount Piper Power Station, or the Springvale Coal Services site via the overland conveyor system for stockpiling and further processing (beneficiation). Beneficiated and ROM coal from the Springvale Coal Services site is transferred to the Lidsdale Siding Rail Loading Facility, using the return belt of the overland conveyor system, for the export market.

As noted above, all ROM coal is transported from the Springvale pit top via the overland conveyor system, however, with the exception of a nominal 50,000 tonne of ROM coal, which Springvale Mine is permitted to transport to local domestic market customers by road haulage from the pit top. The 50,000 tonnes per annum includes transport of inert coal waste comprising ballast and coal reject from underground road maintenance to Springvale Coal Services Site.

The road haulage of ROM coal is implemented in exceptional circumstances only, such as a time when the overland conveyor system is undergoing maintenance or repair and is unavailable for extended periods.

3.3.7 Plant and Equipment

Springvale Mine utilises four continuous miners for development and one longwall shearer for coal extraction. Other underground equipment comprise: shuttle cars, an armoured face conveyor, auxiliary fans, roof bolting rigs, equipment handlers, equipment transporters and loaders, underground personnel transporters and associated pumping and electrical reticulation equipment.

A network of pipelines, valves and pumps are used to manage water and compressed air underground.

3.3.8 Mine Support Facilities and Surface Infrastructure

3.3.8.1 Mine Support Facilities

The mine support facilities and mining related infrastructure which support the underground operations at Springvale Mine (both pit top and Newnes Plateau infrastructure sites) consist of the following.

- Site access road and car park
- Underground mine access and associated infrastructure
- Coal handling, stockpiling and transport infrastructure
- Bath house facilities
- Incoming water supply (potable water) from Lithgow City Council
- Connection of sewerage system to Lithgow City Council sewer system at Duncan Street pump station in Lidsdale
- Workshop, services and administration infrastructure, telecommunications systems
- Ventilation facilities – ventilation shafts 1 and 2 (downcast), ventilation shaft 3 (upcast) on Newnes Plateau, additional upcast shaft in bore 10 compound (approved, not constructed)
- Electrical network: Substations 0 – 3 at the pit top, Substations 4, 5 and Borehole Substation on Newnes Plateau

- Underground water management – uses a series of pipelines and storage tanks to transfer mine water to the surface
- Surface water management systems including separation of dirty and clean water flow paths:
    - water storage dams
    - diversion drains
    - licensed discharge points
- Pollution control infrastructure comprising:
    - diversion bunds and drains, grit traps, oil/water separators and settling ponds
    - dust suppression of the stockpile area
    - wheelwash
    - diesel, solcenic and oil storage facilities.
- Mine services borehole (Ventilation Shaft 3 location) plus an additional approved mine services borehole within the Bore 10 compound (not constructed)
- Springvale Delta Water Transfer Scheme (SDWTS) comprising a network of trenched pipelines for the management of mine inflows.
- Dewatering bore sites connected to the SDWTS to draw water from the underground:
    - Bore 6 (Newnes Plateau)
    - Bore 8 (Newnes Plateau)
    - Bores 9 and 10 on Newnes Plateau (approved, not constructed)
    - Pit Top Collection System for drawing water from the Renown Workings for use as process water (underground use and surface operations) via the Fire Service Pipeline.
- Non-mine owned infrastructure comprising overhead powerlines (11 kV and 66 kV), telecommunications towers, and the external road network.

The Springvale pit top surface infrastructure is shown in **Figure 7**.

3.3.8.2 Surface Water Management and Pollution Control Infrastructure

The surface water management systems at the pit top rely on the separation of clean and dirty water and the effective management of water through collection, treatment and discharge. This is managed through a number of separate water systems including surface water dams and/or settling ponds, and clean water diversion channels, as described below.

- **Fire Dam** (8 ML capacity): Receives mine water from the Renown Colliery workings and existing Springvale Mine workings using the Fire Service Pipeline and the Pit Top Collection System for storage and use as process water, with excess water discharged through LDP001:
    - underground for continuous miners and longwall equipment and dust suppression
    - for surface facilities including the crusher and screening plant, vehicle washdown bay, maintenance and service workshop and for dust suppression.

DATE	14.06.2016
SEAM	LITHGOW
REFERENCE	SLR_630.11701_FIG7_SVPITTOPINFRA_V3.dwg
SCALE	1 : 4000

Figure 7

Springvale Pit Top Surface Infrastructure

0 75 150 M

Centennial Coal
Springvale

Prepared by: SLR

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- **Settling Ponds:** Three settling ponds, referred to as the Primary, Secondary and the Duck Ponds, exist at the pit top and perform the following functions.
    - The Primary Pond (7 ML) receives dirty water run-off from the crusher and screening plant and run-off from the contributing dirty water catchment. The Primary Pond overflows into the Secondary Pond. The Primary Pond is designed to handle a 1 in 100 year, 24 hour storm event. The pond volume is normally maintained at a low level to ensure maximum capacity is available to capture runoff in a storm event.
    - The Secondary Pond (7 ML) receives dirty water overflows from the ROM coal stockpile area, the oil/water separator and the run-off from the contributing dirty water catchment. Excess water from the Secondary Pond is pumped underground into Renown Colliery workings for purification via percolation through the workings for subsequent use as process water. The Secondary Pond is designed to handle a 1 in 100 year, 24 hour storm event.
    - Duck Pond (2 ML) receives dirty water run-off from the car park, administration and bathhouse areas. Duck Pond transfers to the Secondary Pond.
- **Oil/Water Separator:** Excess water from the Grit Trap, wastewater from the machinery wash-down bay, hardstand areas, oil storage areas, and workshop, and run-off from the contributing dirty water catchment is collected in a common wastewater collection drain, which gravity feeds to an oil/water separator unit. Water from the oil/water separator is transferred to the Secondary Pond. The oil/water separator is designed to accommodate a 1 in 5 year storm event, based on the first flush principle, without overflow. Oil and grease from the separator is disposed off–site by a licensed contractor.
- **Emergency Holding Dam**: (3.6 ML), located within the Ventilation Shaft 3 Facility compound on the Newnes Plateau for the storage of mine water for subsequent use by bushfire fighting helicopters as required.

Currently Springvale Mine's EPL 3607 has eight licensed discharge points (LDPs) listed. The LDPs (and their volumetric limits) consist of the following.

- LDP001 (volumetric limit 10 ML/day) – discharge of surface water, mine water make (Renown workings) and runoff from the Springvale pit top area into Springvale Creek through settling ponds.
- LDP002– previously for discharge of treated sewage effluent via a spray irrigation network to a designated utilisation area within the Springvale pit top area. LDP002 is in the process of being decommissioned.
- LDP004 (volumetric limit 15 ML/day) – emergency discharge point situated on the Newnes Plateau into an unnamed tributary of the Wolgan River. This is situated in the Hawkesbury/Nepean Catchment. In the event of a shutdown of SDWTS or essential maintenance, discharge is permitted through this LDP.
- LDP005 (volumetric limit 15 ML/day) – emergency discharge point situated on the Newnes Plateau into an unnamed tributary of the Wolgan River. This is situated in the Hawkesbury/Nepean Catchment. In the event of a shutdown of SDWTS or essential maintenance, discharge is permitted through this LDP.
- LDP006 (volumetric limit 10 ML/day) – discharge of runoff into Wangcol Creek through final filter lagoon located at the Springvale Coal Services site.

- LDP007 – discharge of runoff from the overland conveyor system, including coal fines, located at Brays Lane discharges into Coxs River.
- LDP009 (volumetric limit 30 ML/day) – discharge from the SDWTS bypass point east of Kerosene Vale Ash Dam for discharge into Coxs River.
- LDP010 – emergency/maintenance discharge from the SDWTS, upstream of settling ponds near LDP009 for discharge into Coxs River.

EPL 3607 (condition P1.3) will be subsequently updated to remove licensed discharge points LDP006 and LDP007, which will effectively be "transferred" to the new EPL of the Western Coal Services Project.

3.3.9 Waste Management

Production Waste

No production waste comprising reject materials from ROM coal beneficiation is generated at Springvale Mine. Volumes of coal waste comprising ballast and coal reject from underground road maintenance activities is disposed at the REAs within the Springvale Coal Services Site. The materials are transported from the Springvale pit top to the Springvale Coal Services Site using road haulage, and falls within the approved transport of up to 50,000 tonnes per annum of coal to local domestic customers by road haulage from the pit top.

Non-Production Waste

Waste management at Springvale Mine is managed in accordance with the MOP with all potentially hazardous material stored and/or bunded appropriately in accordance with relevant standards.

General waste is disposed of to landfill by licensed waste contractors. Recyclable materials, are recycled whenever possible at the site. Oil drums and filters are recycled with other waste metals, and are removed from site by a metal recycling company. Waste oil collected in the workshop is stored in an underground collection sump before being removed off site by a licensed contractor for recycling.

3.4 Environmental Management

Springvale Mine has an established Environmental Management System (EMS) that has been developed in accordance with Centennial Environmental Policy that sets out Centennial Coal's aims and values applicable to all employees and contractors. The Springvale EMS provides an environmental management framework for all activities and areas managed at Springvale Mine. This EMS ensures the effective management of environmental issues and compliance with all regulatory requirements. The EMS incorporates a large number of Environmental Management Plans (EMPs) designed to assist in meeting community expectations and regulatory conditions, including the conditions of the Environment Protection Licence for Springvale Mine.

The EMS applies to:

- Springvale Mine lease area – all surface and underground operations
- all personnel who have specific responsibilities and duties within the EMS and associated standards and procedures
- all mine employees, contractors and external parties.

The EMPs have been established in response to approval and licence requirements noted in **Section 3.2**, and documents described below.

- Statement of Commitments (SoC) made in the Springvale Mine Extension Project EIS (Golder (2014)) that accompanied the development application for SSD 5594, and the revised SoC included in the Response to Submissions
- EPL3607 (Springvale Mine)
- Mining Operations Plan (1 November 2015 – 31 October 2022)
- Environmental Management System Framework Document.

The current approved management plans comprise the following.

- Public Safety Management Plan
- Infrastructure Management Plan
- Land Management Plan
- Subsidence Management Plan
- Subsidence Monitoring and Reporting Program
- Subsidence Community Consultation Process
- *Persoonia hindii* Management and Research Program
- Newnes Plateau Shrub Swamp Management Plan
- Environmental Monitoring Program
- Air Quality Management Procedure
- Noise Management Plan
- Site Water Management Procedure
- Erosion and Sediment Control Plan
- Pollution Incident Response Management Plan
- Temperate Highland Peat Swamps on Sandstone Monitoring and Management Plan for LW415 to LW417
- Temperate Highland Peat Swamps on Sandstone Monitoring and Management Plan for LW418.

The following management plans are being prepared to meet SSD 5594 consent conditions. The above current management plans will be reviewed and a number of plans will become superseded:

- Environmental Management Strategy
- Water Management Plan
- Construction Environmental Management Plan
- Biodiversity Management Plan
- Regional Stygofauna Monitoring and Assessment Plan
- Heritage Management Plan (part of Western Region Cultural Heritage Management Plan)

- Noise Management Plan (part of Western Region Noise Management Plan)
- Air Quality and Greenhouse Gas Management Plan (part of Western Region Air Quality and Greenhouse Gas Management Plan)
- Upper Coxs River Action and Monitoring Plan
- Extraction Plans
- Exploration Activities and Minor Surface Infrastructure Management Plan
- Swamp Monitoring Program.

Monitoring results undertaken are reported on Centennial's website as required by EPL 3607 requirements, and on an annual basis in an Annual Review.

3.5 Rehabilitation and Final Landform

The rehabilitation activities undertaken at Springvale Mine is described in the MOP (1 November 2015 – 31 October 2022). Springvale Mine has a progressive approach to rehabilitation to reduce and mitigate potential environmental impacts. All reasonable and feasible measures are implemented to minimise the total area exposed for dust generation at any time. Facilities no longer required, for example, ventilation and dewatering facilities, are rehabilitated soon after decommissioning, to return disturbed land to the original landform. The former sewage treatment works is currently in the process of being decommissioned and will be rehabilitated.

Minor rehabilitation activities are carried out at the pit top regularly, for example, seeding of the area surrounding the carpark. Given that Springvale Mine is well established with no ongoing construction requiring the implementation of additional erosion and sediment controls, there is no requirement for the regular progressive rehabilitation at the pit top.

The life of mine rehabilitation will be undertaken in accordance with the *Decommissioning and Rehabilitation Strategy* (SLR (2014)) included in the Springvale Mine Extension project EIS (Golder (2014)). On cessation of all mining activities the disturbance areas will be fully rehabilitated to create stable and self-sustaining landform for the nominated end land uses of woodland (Newnes Plateau) and grassland (Springvale pit top). The creation of the proposed final landforms will ensure they are commensurate with the surrounding topography and the relevant zoning requirements of the time.

The MOP for the period 1 November 2015 – 31 October 2022 has been updated to include the requirements of the *Decommissioning and Rehabilitation Strategy* (SLR (2014)), and also fulfils the requirement for the preparation of a *Rehabilitation Management Plan* required by Schedule 4 Condition 32 of SSD 5594.

In accordance with the *Springvale Mine Extension Project Decommissioning and Rehabilitation Strategy* (SLR (2014)) and the *Strategic Framework for Mine Closure* (Minerals Council of Australia, 2004) Springvale Mine will commence the detailed mine closure planning process at least five years prior to the anticipated mine closure date (i.e. the planned cessation of mining). The detailed mine closure plan will be developed at least two years prior to the anticipated mine closure date. Based on the expiry date of SSD 5594 mining operations at Springvale will cease in 2028.

4.0 PROPOSED MODIFICATION

4.1 Overview

Springvale Coal is seeking to modify consent SSD 5594 under the provisions of Section 96(2) of the EP&A Act. The proposed modification elements are as follows:

- An increase in the workforce from the approved 310 full time equivalent (fte), including contractors, to 450 fte personnel (**Section 4.2.1**)
- An increase in run-of-mine (rom) coal production from the approved 4.5 million tonnes per annum (Mtpa) to 5.5 Mtpa (**Section 4.2.3**)
- An increase in rom coal stockpile at the pit top from the approved 85,000 tonnes capacity to 200,000 tonnes capacity, and an increase in the coal stockpile footprint by 0.33 ha to the northeast of the existing coal stockpile.(**Section 4.2.5**)

The SSD 5594 consent boundary for the Springvale Mine Extension Project remains unchanged (**Figure 2**). There are no major changes proposed to the surface infrastructure, other than an extension of the existing stockpile area to the northeast, into an area that is already heavily modified from previous surface activities. A diversion drain will be constructed around this stockpile extension area to divert surface run-off from the area to the existing dirty water system at the pit top.

No changes are proposed on the current surface operations and all activities on the surface (pit top and Newnes Plateau infrastructure areas) will continue to be undertaken as described in the SVMEP EIS (Golder Associates (2014)) and summarised in **Chapter 3.0**. No change in rehabilitation activities is proposed. Progressive and life of mine rehabilitation will be undertaken as described in SVMEP EIS and described briefly in **Section 3.5**.

There is no proposal to change the approved longwall mining technique or the approved mine plan to achieve the proposed increase in production. The proposed modification does not include any physical works or significant changes to the existing underground mining operations. Additional underground equipment (one longwall equipment and a continuous miner unit) will, however, will be introduced to support the proposed increase in production, described in detail in **Section 1.5**.

Sized ROM coal will continue to be transferred to the Springvale Coal Services Site (Western Coal Services Project) via the overland conveyor system, except for the 50,000 tonnes per annum that is approved to be transported to local domestic market customers by road haulage.

There is no proposal to reduce the life of the Project in this modification from the approved 13 years from the date of consent. The expiry date 31 December 2028) will not be altered in this modification. Hours of operations are not proposed to change from the approved 24 hours per day and seven days per week.

4.2 Proposed Modification

Table 6 summarises and compares the major components of the operations approved under SSD 5594, and the operations that are proposed to be modified. The individual modification elements are discussed below in the relevant sub-sections.

Table 6 – Key Features of the Proposed Modification and Comparison with Approved Operations

Key Feature	Approved Operation	Modification
Mine Life	• Mining operations to be undertaken until 31 December 2028. Rehabilitation activities to be undertaken after this expiry date.	• No change
Hours of Operation	• Mine operates 24 hours per day, 7 days per week.	• No change
Employment	• Approved 310 full time personnel.	• Increase workforce to 450 fte personnel
ROM Coal Production	• Annual extraction limit of 4.5 Mtpa of ROM coal.	• Increase ROM coal production limit to 5.5 Mtpa
Mining Method	• Retreat longwall mining	• No change
Mining Area	• SSD 5594 approved longwalls: LW416 to LW432 and LW501 to LW503.	• No change
Pit Top Infrastructure and Access	• Access via the Castlereagh Highway for employee, visitor and contractor parking areas. • Portal access to underground workings for personnel and materials. • Portal entrance providing for the coal conveyor drift to transport coal from underground workings. • Administration buildings with amenities, office and training areas. • Bathhouse. • Workshops, hardstand areas, vehicle and equipment wash down areas. • Diesel, solcenic hydraulic fluid and oil storage. • Mining supplies and conveyor equipment storage areas. • Dirty and clean water management systems in addition to provision of potable and waste water services. • ROM coal stockpile area. • Coal preparation (crushing and screening plant) and handling (conveyor systems and Rill Tower) facilities. • Overland conveyor system connecting pit top to Wallerawang and Mount Piper Power Stations, Springvale Coal Services site and Lidsdale Siding.	• No change

Key Feature	Approved Operation	Modification
	• Telecommunications facilities. • Electrical distribution network including substations 1 – 3 connecting to Substation 0 at Lidsdale. • Sewer connects to the Lithgow City Council's main sewer system via Duncan Street pump station in Lidsdale. • Ancillary infrastructure.	
Underground Mine Access	• Access to the underground mine through the main mine portal. • Access to the mine extraction areas via existing headings and roadways. • Extension of mains headings to the east. • Development of roadways to access proposed longwall extraction areas	• No change
ROM Coal Handling	• Drift conveyor for transfer of coal from underground to the ROM coal stockpile area via Rill Tower. • Reclaim conveyor for transfer of coal from the stockpile area to the crushing and screening plant. • Overland conveyor system for transport of coal off site. • Provisions of handling of 50,000 tonnes per annum of ROM coal to domestic markets by truck haulage.	• No change
ROM Coal Transport	• Sized ROM coal transported, using an overland conveyor system (part of the Western Coal Services Project (SSD5579) to Springvale Coal Services Site for stockpiling and further processing (beneficiation) or directly transported to Mount Piper Power Station. • Transport of up to 50,000 tonnes per annum of ROM coal to local domestic market customers by road haulage from the pit top.	• No change
Coal Processing and Handling	• ROM coal crushed and sized in the screening and crusher plant at the pit top to nominal 50 mm coal product prior to transfer to the overland conveyor system, or transported off site using road haulage, to offsite locations being Springvale Coal Services Site, other domestic markets and Mount Piper Power Station.	• No change
Mine Ventilation	• Air intake via the two surface portals at the pit top and two separate air intake shafts (Ventilation Shaft No.1 and Ventilation Shaft No.2) located off the pit top site. • One upcast shaft (Ventilation Shaft No.3) located in the Newnes State Forest.	• No change

Key Feature	Approved Operation	Modification
	• Downcast ventilation shaft within the Bore 10 dewatering facility (to be established).	
SDWTS and Bore Dewatering Facilities	• The SDWTS, comprising a network of predominantly trenched pipelines and power cables, used for the transfer of mine inflows from the dewatering facilities at the rate of up to 30 ML/day for discharge into Coxs River via LDP009 (EPL 3607). • Mine inflows currently managed by the Bore 6, Bore 8 dewatering facilities and the Ventilation Shaft 3 borehole. Water is directly fed into the SDWTS from these bore facilities.	• No change
Newnes Plateau Infrastructure and Access	• Ventilation Shaft 3 Facility with Substation 5 and existing mine services borehole area. • Substation 4 and Borehole Substation. • Operational Bores 6 and 8 dewatering facilities, being part of the SDWTS. • Approved Bores 9 and 10 dewatering facilities. • Mine Services Borehole Area • Bores 6 and 8 dewatering facilities • Access to infrastructure areas via either the Old Bells Line of Road from the town of Clarence (light and heavy vehicles) or via State Mine Gully Road (light vehicles only).	• No change
Water Management and Pollution Control	• Underground water management system for both clean and dirty water as follows: o Clean water from goaf areas runs under gravity to collection points for the dewatering bores, for transfer to the surface into the SDWTS using submersible pumps. o Dirty water from roadways (dust suppression, development and extraction) is collected into portable staging tanks and pumped into the existing workings for the sediment to settle out before being diverted to the clean water system (as above) for transfer to the SDWTS. • Surface water storages exists for both dirty water and clean water at the pit top and Newnes Plateau infrastructure areas, and include: o Fire Dam (8 ML) o The Primary Pond (7 ML) o The Secondary Pond (7 ML) o Duck Pond (2 ML)	• Construct dirty water diversion drain around the northern section of the coal stockpile extension area to divert water to the existing dirty water catchment at the pit top. • Minimal change to the existing dirty and clean water management at the pit top. • No change to other water management and pollution control infrastructure.

Key Feature	Approved Operation	Modification
	○ Oil/Water Separator ○ Emergency Holding Dam: (3.6 ML) . • Eight Licensed Discharge Points on Springvale Mine's EPL 3607, LDP001, LDP002, LDP004 – LDP007, LDP009, LDP010.	
Rehabilitation and Final Landform	• Progressive rehabilitation of infrastructure and exploration sites at the pit top and Newnes Plateau infrastructure areas, undertaken as required. • Life of mine rehabilitation of all disturbed areas associated with the pit top and Newnes Plateau infrastructure areas on completion of mining operations.	• No change
Exploration Activities	• Exploration activities within EL6974 and A460 boundaries.	• No change

4.2.1 Hours of Operation and Workforce

No change is proposed to the approved hours of operation. The modification however is proposing to increase the workforce from the approved 310 fte personnel to 450 fte personnel. The additional staff is required to facilitate the proposed increase in ROM coal production (**Section 4.2.3**).

4.2.2 Site Access

No change is proposed.

4.2.3 Coal Production Rate

This modification proposes to increase the maximum rate of ROM coal extraction from the approved 4.5 Mtpa to 5.5 Mtpa. This proposed increase in extraction rate, as described in **Section 1.5,** will be achieved through the increase in workforce, installation and operation of additional underground mining equipment, and improved equipment utilisation and availability.

The proposed increase in ROM coal production will only be realised in the event that efficiencies are gained and markets are available to accommodate those efficiency gains. It is feasible that mining at Springvale Mine could be completed by end of 2024, and as a result the life of the mine will be reduced. However, the modification is not seeking to modify the consent life. The increase production limit is to allow the mine to retain the flexibility of adjusting future mine schedules in response to market needs.

4.2.4 Mining Method and Sequence

There is no proposal to change the approved mine plan or the mine footprint. No physical works or significant changes to the existing mine operation are proposed to be changed.

4.2.5 Coal Handling, Processing and Stockpiling

There is no proposal to change the coal handling and processing practices currently undertaken at the pit top. However the modification is proposing to increase the approved stockpile capacity.

As noted in **Section 3.3.5** the approved ROM coal stockpile capacity at the pit top is 85,000 tonnes. With the proposed increase in the coal extraction rate, and to provide contingency for when the overland conveyor system is not operational, the coal stockpile capacity at the pit top is proposed to be increased to 200,000 tonnes. The existing stockpile area is approximately 1.45 ha for a modelled capacity of 125,000 tonnes. To accommodate up to 200,000 tonnes of ROM coal at the pit top, modelling shows that the existing footprint is required to be increased by approximately 0.3 ha to the northeast of the existing stockpile area, shown in **Figure 8**. The total disturbance footprint of the expanded stockpile will be 1.78 ha. The height of the coal stockpile will not exceed the existing coal stockpile height or the height of the existing Rill Tower, through which the coal stockpile is pushed to the surface from the underground.

The stockpile extension area is highly modified and devoid of any significant ecological attributes. Due diligence assessments for ecology and cultural heritage were undertaken over study areas that include the stockpile extension area, and are discussed in **Section 9.6** and **Section 9.7**, respectively.

The stockpile extension area currently falls within the clean water catchment at the pit top. The proposed extension of the coal stockpile area to the northeast will result in removal of approximately 0.3 ha from the existing clean water drain catchment and an increase in the dirty water catchment

draining to the Primary Pond. An appropriately sized diversion drain, designed to 100 year ARI, will be constructed around the enlarged stockpile area to divert all surface run-off from that area into the existing dirty water management system (**Section 4.2.8.2**). The design specifications of the diversion drain to be constructed has been provided in GHD (2016a), appended to this SEE as **Appendix D**.

4.2.6 Coal Transport

No change is proposed in the approved coal transport modes for transfer of coal to offsite locations.

4.2.7 Plant and Equipment

An additional longwall equipment and a continuous miner unit will be deployed underground to help achieve the increased production rate proposed in the modification. However, as noted in **Section 1.6**, while there will be two longwalls underground, only one longwall equipment will operated at a time. Similarly, while five continuous miners will be located underground, only four will be operated at a time.

No other change to the current plant and equipment feet underground is proposed.

4.2.8 Mine Support Facilities and Surface Infrastructure

4.2.8.1 Mine Support Facilities

A minor change to the surface water management, described in further detail in **Section 4.2.8.2**, is proposed.

No other changes to the existing mine support facilities and surface infrastructure are proposed. No change is proposed to the provision of potable water to Springvale Mine by Lithgow City Council for use in the administration buildings and bathhouse.

4.2.8.2 Surface Water Management and Pollution Control Infrastructure

A minor modification to the clean/dirty water management is proposed, in response to the increase in the coal stockpile extension area, which results in the removal of approximately 0.3 ha from the existing clean water drain catchment and an increase in the dirty water catchment draining to the Primary Pond by the same area. As noted in **Section 4.2.5** a dirty water diversion drain is proposed to be constructed around the expanded coal stockpile to divert the surface run-off from the extension area to the dirty water catchment of Primary Pond. The design specifications of the diversion drain are provided in GHD (2016a), included in **Appendix D**. According to GHD (2016a) the modification to the clean water diversion (through removal of 0.3 ha of clean water diversion upslope of the existing coal stockpile area) is not expected to impact on the capacity of the existing clean water diversion system. Similarly, GHD (2016a) concludes based on their analyses that the additional dirty water run-off generated by the proposed extension of the coal stockpile area will not have an appreciable impact on the performance of the existing dirty water drainage system.

No other changes to the water management and pollution control infrastructure are proposed.

4.2.9 Waste Management

No changes are proposed to Springvale Mine's current waste management. Both the production waste and non-production waste streams will continue to be undertaken as described in **Section 3.3.9**.

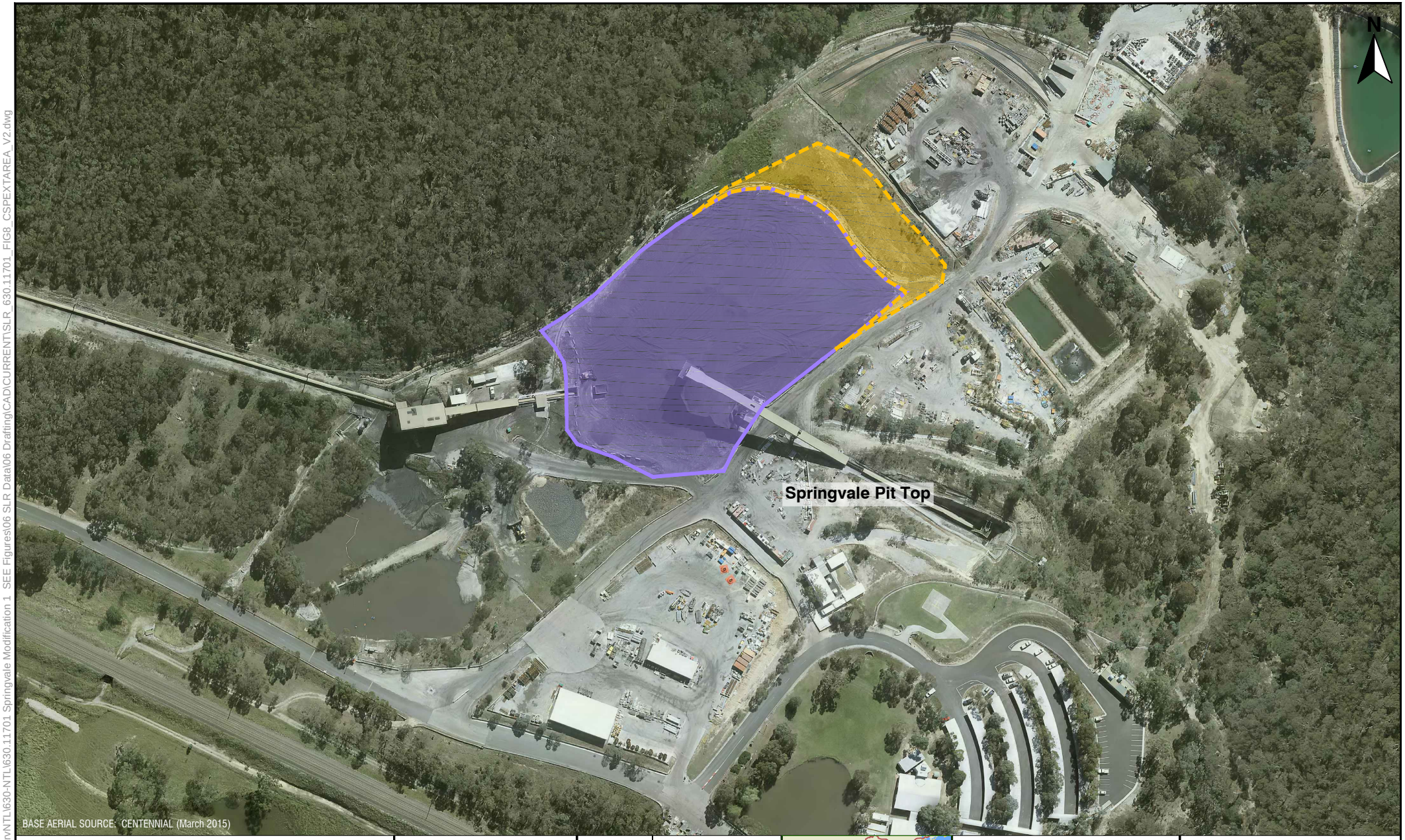
4.3 Environmental Management

Springvale Mine will continue to undertake monitoring and reporting in accordance with the existing EMS as described in **Section 3.4**. The management plans will continue to be reviewed regularly and updated as required. Monitoring results will continue to be reported in accordance with the EPL 3607 requirements, and on an annual basis in an Annual Review.

4.4 Rehabilitation and Final Landform

Progressive and life-of-mine rehabilitation within the Springvale Mine consent area will be undertaken as summarised in **Section 3.5,** and described in detail in the Springvale Mine's MOP (01 November 2015 – 31 October 2022).

As the proposed modification does not entail changes to the surface infrastructure and only minor surface disturbance (0.3 ha) for the establishment of the coal stockpile extension area there will be no significant adverse impact on mine rehabilitation as a result of the proposed rehabilitation.



LEGEND:

- Existing Coal Stockpile Area
- Coal Stockpile Extension Area

DATE	26.05.2016
SEAM	LITHGOW
REFERENCE	SLR_630.11701_FIG7_ CSPEXTAREA_V1.dwg
SCALE	1 : 2500

Figure 8

Coal Stockpile Extension Area

0 50 100 M

Centennial Coal
Springvale

Prepared by: SLR

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5.0 REGULATORY FRAMEWORK

5.1 Introduction

This chapter describes the applicable State and Commonwealth legislation under which the proposed modification has been assessed and will be determined. Full consideration of the environmental planning instruments has also been provided. The regulatory framework under which Springvale Mine Extension Project was approved is described in Chapter 5 of the SVMEP EIS (Golder Associates (2014)) and discussed below as relevant.

5.2 Approval Pathway and Permissibility

State Significant development consent SSD 5594 was granted to Springvale Mine for the Springvale Mine Extension Project under Part 4 Division 4.1 of the EP&A Act. The Project is classified as SSD pursuant to Section 89C of the EP&A Act and declared as such by the *State and Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP). Schedule 1 of the SRD SEPP identifies development for the purpose of coal mining as SSD. Development consent SSD 5594, was granted to the Springvale Mine Extension Project on 21 September 2015 by the Planning Assessment Commission of NSW, as delegate of the Minister of Planning. The SSD 5594 approval allows Springvale Coal to carry out mining operations from the Lithgow Seam at Springvale Mine until 31 December 2028 (**Appendix A**).

Springvale Mine is now proposing to modify its consent SSD 5594. SSD consents may be modified under Section 96 of the EP&A Act provided that the information stipulated in Clause 115 of the EP&A Regulation is contained within the modification application, and that the development as modified will be substantially the same development as the development for which consent was originally granted. This approval pathway is further discussed in **Section 5.3.1**. When assessing an application under Section 96 for modification to consent, the consent authority is required to take into consideration the relevant matters outlined in Section 79C of the EP&A Act, which include the provisions of any relevant environmental planning instruments. The environmental planning instruments relevant to the modification are discussed in **Section 5.4** and **Section 5.5**.

5.3 NSW State Legislation

5.3.1 Environmental Planning and Assessment Act 1979

Section 96 of the EP&A Act applies to modifications to Part 4 development consents generally, and includes provisions for modifications involving minor error, misdescription or miscalculation (Section 96(1) of EP&A Act)), and modifications involving minimal environmental impacts (Section 96(A) and other modifications (Section 96(2)).

Section 96(2) other modifications includes the following provisions:

> *A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:*
>
> *(a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and*

(b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 5) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and

(c) it has notified the application in accordance with:

(i) the regulations, if the regulations so require, or

(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and

(d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.

The proposed modification for SSD 5594 described in this SEE is being made under Section 96(2) other modifications. Negligible to minimal predicted environmental impacts and consequences, described in **Chapter 9.0** and **Chapter 11.0**, result from the proposed modification elements. The approval pathway is appropriate as the proposed modification elements will necessitate only minor changes to the currently approved activities, and the modified development would be substantially the same development for which the consent was originally granted (**Section 11.2**).

An application for modification of development consent under Section 96 of the EP&A Act must contain information stipulated in Clause 115 of the EP&A Regulation. **Table 7** provides the relevant information for the proposed modification and notes where the information has been addressed in the SEE.

Table 7 – Clause 115 Requirements for Section 96 Applications

Requirement	Where Addressed in SEE
(a) The name and address of the applicant.	**Section 1.4**
(b) A description of the development to be carried out under the consent.	**Chapter 3.0**
(c) The address, and formal particulars of title, of the land on which the development is to be carried out.	**Section 2.4** and **Appendix C**
(d) A description of the proposed modification to the development consent.	**Section 4.2, Table 6**
(e) A statement that indicates either: (i) that the modification is merely intended to correct a minor error, misdescription or miscalculation, or (ii) that the modification is intended to have some other effect, as specified in the statement.	N/A **Chapter 9.0, Section 11.3** The modification will have minimal environmental impacts.
(f) A description of the expected impacts of the modification.	**Chapter 9.0**
(g) An undertaking to the effect that the development (as to be modified) will remain substantially the same as the development that was originally approved.	**Section 11.2** The development as modified will remain substantially the same as the development

Requirement	Where Addressed in SEE
	(Springvale Mine Extension Project) that was originally approved in consent SSD 5594.
(h) If the applicant is not the owner of the land, a statement signed by the owner of the land to the effect that the owner consents to the making of the application (except where the application for the consent the subject of the modification was made, or could have been made, without the consent of the owner), (i) A statement as to whether the application is being made to the Court (under Section 96) or to the consent authority (under Section 96AA), and, if the consent authority so requires, must be in the form approved by that authority.	Landowner's consent is not required for SSD projects. Landowners will be notified of the application to modify consent SSD 5594 through an advertisement placed in the local newspaper following lodgement of modification application. The application is not being made to the Court (under Section 96) or to the consent authority (under Section 96AA).

Objects of the EP&A Act

The EP&A Act is the principal piece of legislation overseeing the assessment and determination of development proposals in NSW. It aims to encourage the proper management, development and conservation of resources, environmental protection and ecologically sustainable development.

The objects of the EP&A Act generally seek to promote management and conservation of natural and artificial resources, while also permitting appropriate development to occur. The principles of ecologically sustainable development and public participation are also objects of the EP&A Act. The consistency of the modification with the relevant objects is summarised in **Table 8**.

Table 8 – Objects of the EP&A Act

Object	Consistency of the Modification

(a) to encourage:
(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,
	Specialist consultants have been engaged to assess and report on the potential for the modification to impact upon the natural and artificial resources. Notably:
	• The impacts on the natural environment have been addressed within **Sections 9.4, Section 9.5**, and **Section 9.6**.
	• The social and economic implications have been addressed in **Chapter 6.0**.
	• The modification:
	  ○ affords an increase in employment opportunities to the local community
	  ○ will result in an increase in net benefit of approximately $32 million when compared with the Springvale Mine Extension Project as approved
	  ○ will result in negligible environmental impact and will not adversely impact on how people use the area.
	As demonstrated above and in the technical assessments undertaken in the SEE, the modification encourages the proper management and development of a natural resource for the purpose of promoting the social and economic welfare of the community and a better environment.

(ii) the promotion and co-ordination of the orderly and economic use and development of land,	The orderly and economic use of land is served by development which is permissible under the relevant planning regime and predominantly in accordance with the prevailing planning

Object	Consistency of the Modification
	controls. The modification comprises a permissible development which is consistent with the statutory and strategic planning controls. As detailed in SVMEP EIS, the proposal will result in positive economic impacts, with appropriate mitigation measures and management strategy being proposed to reduce adverse environmental impacts. The modification proposes a minor alteration to an approved coal mine which represents an orderly and economic use of a resource approved for extraction for supply to domestic power generation. The proposed modification will not impact on land uses within and surrounding Springvale Mine.
(iii) the protection, provision and co-ordination of communication and utility services,	The modification will not affect public communication networks or utilities.
(iv) the provision of land for public purposes,	Not applicable to the proposal.
(v) the provision and co-ordination of community services and facilities, and	Not applicable to the proposal.
(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and	Specialist consultants have been engaged to assess and report on the potential for the modification to impact upon the local environment. Notably, the impacts on flora and fauna have been addressed in a Due Diligence Ecology Assessment (RPS 2016a) discussed in **Section 9.6**. No additional native vegetation clearing will be undertaken in the modification to that already approved in SSD 5594 for the construction of infrastructure sites on Newnes Plateau. The coal stockpile extension area proposed at the pit top in the modification is heavily modified from previous operational activities and is devoid of any significant ecological attributes. This ecology due diligence assessment concluded the modification will not impact on any threatened species, populations and ecological communities, and their habitats.
(vii) ecologically sustainable development, and	The Springvale Mine Extension Project is consistent with the principles of ecological sustainable development (ESD), as outlined in Chapter 12 of Golder Associates (2014). The proposed modification is also consistent with the principles of ESD, discussed in detail in **Section 11.6**. The discussions included in **Section 11.6** address both this object of the EP&A Act and clause 7(1)f in Schedule 2 of the EP&A Regulation.
(viii) the provision and maintenance of affordable housing, and	Not applicable to the proposal.
(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and	As outlined in Section 5.1 of Golder Associates (2014) Springvale Mine Extension Project is an SSD and its assessment and approval was subject to the provisions of Part 4 of the EP&A Act. Extensive consultation with many different levels of government (Federal, State, local) was undertaken during the preparation of the SVMEP EIS. The assessment process and determination again included consultation with different levels of government, including local government. The modification will be assessed and approved under Section 96(2) of the EP&A Act and the assessment process will be undertaken by the DPE in consultation with other relevant government agencies. The preparation of the SEE in support of the proposed modification has involved engagement with NSW State and the local government, being Lithgow City Council.

Object	Consistency of the Modification
(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.	Extensive consultation with a wide range of stakeholder was undertaken during the preparation of the SVMEP EIS (Golder Associates (2014)). The consultation has been ongoing since the grant of SSD 5594. The community has been consulted during the preparation of the SEE through the Western Region Consultative Community Committee (CCC) held on 14 April 2016 (**Chapter 7.0**). Consultation will continue through the CCC and other Springvale Mine's community engagement tools. The community will have the opportunity to comment on the modification application during the public exhibition of the SEE.

Section 79C Evaluation

Section 79C of the EP&A Act applies to the determination of development applications for SSD. In determining an application for modification, the consent authority is required to consider the matters listed in Section 79C(1) of the EP&A Act as are of relevance to the development. Each of the relevant matters has been addressed in the SEE (**Section 5.4**, **Section 5.5**, **Chapter 9.0**) and will need to be considered by the consent authority during the assessment of the modification application.

Other Approvals

Pursuant to Section 89J of the EP&A Act, the following authorisations are not required for approved SSD proposals:

- The concurrence under Part 3 of the *Coastal Protection Act 1979* of the Minister administering that Part of the Act
- A permit under Section 201, 205 or 219 of the *Fisheries Management Act 1994*
- An approval under Part 4, or an excavation permit under Section 139, of the *Heritage Act 1977*
- An Aboriginal heritage impact permit under Section 90 of the *National Parks and Wildlife Act 1974*
- An authorisation referred to in Section 12 of the *Native Vegetation Act 2003* (or under any Act to be repealed by that Act) to clear native vegetation or State protected land
- A bush fire safety authority under Section 100B of the *Rural Fires Act 1997*
- A water use approval under Section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*
- An order under Division 8 of Part 6 of the *Heritage Act 1977* restricting harm to buildings, works or relics that are not protected by a heritage listing.

Pursuant to Clause 89K of the EP&A Act, an authorisation of the following kind cannot be refused if it is necessary for carrying out an approved SSD proposal, and must be granted "substantially consistent" with the SSD consent:

- An aquaculture permit under Section 144 of the *Fisheries Management Act 1994*
- An approval under Section 15 of the *Mine Subsidence Compensation Act 1961*
- A mining lease under the *Mining Act 1992*

- A production lease under the *Petroleum (Onshore) Act 1991*
- An environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in Section 43 of that Act);
- A consent under Section 138 of the *Roads Act 1993*
- A licence under the *Pipelines Act 1967*.

5.3.2 Other Key NSW State Legislation

The existing approvals relevant for Springvale Mine operations are described in **Section 3.2**. **Table 9** lists the key relevant pieces of NSW State legislation and indicates the implications, if any, for the modification.

Table 9 – Other Key NSW State Legislation

Relevant State Legislative Act	Project Implications (approvals, licences and/or authorities)
Protection of the Environment Operations Act 1997	The POEO Act is the principal environmental protection legislation in NSW and is administered by the EPA. Springvale Mine is a premises-based "scheduled activity" under Schedule 1 of the POEO Act and currently operates under the provisions of Environment Protection Licence EPL 3607, issued on 17 May 2000 and renewed annually on 1 January. The EPL allows for eight Licensed Discharge Points and five air quality monitoring points, for both Springvale Mine and Western Coal Services Project (SSD 5579). EPL 3607 (condition P1.3) will be subsequently updated to remove licensed discharge points LDP006 and LDP007, which will effectively be “transferred” to a new EPL for the Western Coal Services Project. Condition A1.1 of EPL 3607 currently authorises extraction and handling of up to 5 Mtpa of ROM coal. The proposed modification will require a subsequent variation to EPL 3607 to allow for the increased extraction and handling of ROM coal at Springvale. In addition, condition A2.1 will be updated to include all existing Springvale mining tenements as provided in **Table 5** and **Figure 3**.
Mining Act 1992	A new mining lease under the *Mining Act 1992* was applied (MLA451) for the longwalls LW424 – LW432, and was granted (ML1727) in February 2016 (**Table 5**) to facilitate mining operations approved in SSD 5594. No new mining lease is required as a result of the proposed modification. Springvale Mine has a currently approved Subsidence Management Plan (SMP) (**Table 3**) prepared and approved under the *Mining Act 1992,* and authorised the extraction of LW411 – LW418. No other SMPs will be prepared, as the extraction of the remainder of the approved longwalls (LW419 – LW432, LW501 – LW503), requires the preparation of an Extraction Plans in accordance with Schedule 3 Condition 10 of SSD 5594. . A Mining Operations Plan (MOP), for the period 1 November 2015 to 31 October 2022, has been prepared to outline proposed operations and rehabilitation approved under development consent SSD 5594. The MOP has been prepared in accordance with the Department of Industry – Division of Resources and Energy (DRE) publication titled *ESG3: Mining Operations Plan (MOP) Guidelines* (DRE 2013). The MOP was approved on 25 February 2016. The MOP has also been prepared to satisfy the requirements of a *Rehabilitation Management Plan*, required by Schedule 4, Condition 32 of SSD 5594.
Water Act 1912	The *Water Act 1912* (Water Act) governs access, trading and allocation of licences associated with surface water and groundwater sources where a Water Sharing Plan is not in place. As a Water Sharing Plan has been developed for the Project Application Area, the Water Act no longer applies. Springvale Mine was granted three groundwater licences for dewatering bores initially granted under the Water Act. Springvale Mine also holds groundwater

Relevant State Legislative Act	Project Implications (approvals, licences and/or authorities)
	monitoring licences approved under the Water Act for a series of shallow and deep groundwater monitoring piezometers. The dewatering bore licences have been converted to Water Access Licences (WALs) under the *Water Management Act 2000*, as provided in **Table 2**, and discussed below.
Water Management Act 2000	The *Water Management Act 2000* (WM Act) is intended to ensure that water resources are conserved and properly managed for sustainable use benefitting both present and future generations. Water sharing plans prepared in accordance with the WM Act include rules for protecting the environment and administrating water licensing and trading. Springvale Mine holds water access licences (groundwater) for its dewatering bores under the WM Act. The Springvale Mine Extension Project Application Area is within an area covered by two water sharing plans: • *Water Sharing Plan for the Greater Metropolitan Region Groundwater Source 2011* • *Water Sharing Plan for Greater Metropolitan Region Unregulated River Water Sources 2011.* In accordance with Clause 4 of the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Source 2011* the Project Area falls within the boundary of the Sydney Basin Coxs River Groundwater Source and the Sydney Basin Richmond Groundwater Source. Springvale Mine holds water access licences (WAL) for its dewatering bores (**Table 36**) comprising the pit top collection system (WAL36443), Vent Shaft 3 Borehole (WAL36446) and Bores 6 and 8 (WAL36383). In accordance with Clause 4 of the *Water Sharing Plan for Greater Metropolitan Region Unregulated River Water Sources 2011* the Project Area lies on the boundary of the Upper Nepean and Upstream Warragamba Water Source (Wywandy Management Zone) and the Hawkesbury and Lower Nepean Rivers Water Source (Colo River Management Zone). Currently Springvale Mine does not hold any surface water access licences. Mine inflows will not change due to the proposed coal extraction rate and the WALs (groundwater) held by Springvale Mine are sufficient to cover the requirements of the Project as modified (**Section 9.4.5.1**). However, additional water access licences (surface water) will be required in the Wywandy Management Zone of the Upper Nepean and Upstream Warragamba Water Source (**Section 9.4.5.2**). Springvale Mine will continue to hold all relevant licences, share component and allocation required to comply with the WM Act (and Water Act) at all times water is taken, whether during or after the life of the Springvale Mine Extension Project, as modified. By the operation of Section 89J of the EP&A Act, the Project as modified will not require water use approvals under Section 89 of the WM Act, water management approvals under Section 90 or a controlled activity approval under Section 91 of the WM Act.
Work Health and Safety (Mines and Petroleum Sites) Act 2013	*Work Health and Safety (Mines and Petroleum Sites) Act 2013* aims to securing and promoting the health and safety of persons at work at mines, petroleum sites or related places, and to protect workers at mines and petroleum sites and other persons against harm to their health and safety through the elimination or minimisation of risks arising from work. Springvale Coal currently holds all necessary approvals under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*.
Mine Subsidence Compensation Act 1961	The Project Application Area is not located within a Mine Subsidence District. The modification will not require approval by the Mine Subsidence Board given no significant surface improvements are proposed.
Dams Safety Act 1978	Springvale Mine does not propose any underground mining or surface disturbance on or in the vicinity of any dams prescribed under the *Dam Safety*

Relevant State Legislative Act	Project Implications (approvals, licences and/or authorities)
	Act 1978.
Crown Lands Act 1989	There is Crown land within the Project Application Area. No licence is required for the modification to use Crown Land under the provisions of the *Crown Lands Act 1989*.
Roads Act 1993	Section 138 of the *Roads Act 1993* requires consent be obtained prior to disturbing or undertaking work in, on or over a public road. No consent will be required for the modification given that no disturbance or works on public roads with the Project Application Area are proposed.
Threatened Species Conservation Act 1995	The *Threatened Species and Conservation Act* (TSC Act) provides protection for threatened plants and animals native to NSW (excluding fish and marine vegetation) and integrates the conservation of threatened species into development control processes under the EP&A Act. The coal stockpile extension area proposed to the northeast of the existing stockpile will not result in removal of native vegetation or threatened flora species (RPS (2016a)). The site lacks important fauna habitat features. The proposed modification therefore will not impact any protected entities under the TSC Act.
National Parks and Wildlife Act 1974	The *National Parks and Wildlife Act 1974* (NPW Act) contains provisions for the protection and management of national parks, historic sites, nature reserves and Aboriginal heritage. By operation of Section 89J of the EP&A Act, the Project does not require any additional approvals under the NPW Act. An Aboriginal Heritage Due Diligence Assessment is provided in **Section 9.7**. No items of Aboriginal heritage items have been identified within the coal stockpile extension area (**Section 9.7**). The proposed modification will not impact any heritage items protected under the NPW Act.
Aboriginal Land Rights Act 1983	The *Aboriginal Land Rights Act 1983* provides for the constitution of local, regional and State Aboriginal Land Councils and a mechanism for Land Councils to claim Crown land. There are no known granted claims over Crown land in the Project Application Area.
Heritage Act 1977	Historical archaeological relics, buildings, structures, archaeological deposits and features are protected under the *Heritage Act 1977*. There are no heritage items in the Project Application Area within the World Heritage List, NSW Heritage Register, Australian Heritage Database or the relevant Local Environmental Plans (RPS (2014a)). In any event, approval is not required under Part 4 of the *Heritage Act 1977* due to the operation of Section 89J of the EP&A Act. No items of historic heritage items (**Section 9.7**) have been identified within the coal stockpile extension area and the proposed modification will not impact any heritage items protected under the Heritage Act.
Contaminated Land Management Act 1997	The relevance of this legislation to modification is outlined in **Section 5.4.5**.
Forestry Act 2012	Springvale Coal currently holds Access permits (**Table 4**) to allow access to surface infrastructure sites in the Newnes State Forest. The occupation permits will not require to be updated following approval of the modification.

5.4 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are Environmental Planning Instruments (EPIs) prepared by the Minister to address issues significant to NSW. The SEPPs outlined in the below sub-sections contain provisions that are relevant to the proposed modification, and therefore are matters to be taken into consideration by the consent authority.

5.4.1 SEPP (State and Regional Development) 2011

State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) came into effect upon the repeal of Part 3A of the EP&A Act and identifies development to which the SSD assessment and determination process under Division 4.1 in Part 4 of the EP&A Act applies. The Springvale Mine Extension Project is classified as SSD pursuant to Section 89C of the EP&A Act and declared to be such by the *SEPP (State and Regional Development) 2011* (SRD SEPP). Schedule 1 of the SRD SEPP identifies development for the purpose of coal mining as SSD.

5.4.2 SEPP (Mining, Petroleum Production and Extractive Industries) 2007

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP) aims to provide for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of NSW. **Section 5.5** discusses the permissibility of the Project due to the application of sub-clauses 7(1)(a) and 5(3) of the Mining SEPP.

Part 3 of the Mining SEPP stipulates matters for consideration by the consent authority before determining an application for consent in respect of development for the purposes of mining. Specifically, Clauses 12 to 17 (inclusive) requires consideration to be given to the compatibility of projects with other surrounding land uses, including the existing and potential extraction of minerals, natural resource management and environmental management, resource recovery, transportation and rehabilitation.

The information presented in this SEE addresses relevant matters for consideration prescribed in the abovementioned clauses. The assessments undertaken have assessed the modification elements adequately, and in accordance with the government policies and guidelines. Emphasis has been placed on anticipation and prevention of potential environmental and social impacts, with various mitigation measures, management strategies, and monitoring activities proposed to minimise adverse impacts.

5.4.3 SEPP (Sydney Drinking Water Catchment) 2011

State Environmental Planning Policy (*Sydney Drinking Water Catchment*) *2011* applies to land within the Sydney drinking water catchment. The Project Application Area is partly located within the Sydney drinking water catchment.

The aims of SEPP (Sydney Drinking Water Catchment) 2011 are:

(a) to provide for healthy water catchments that will deliver high quality water while permitting development that is compatible with that goal

(b) to provide that a consent authority must not grant consent to a proposed development unless it is satisfied that the proposed development will have a neutral or beneficial effect on water quality, and

(c) to support the maintenance or achievement of the water quality objectives for the Sydney drinking water catchment.

Clause 9(1) of this SEPP provides that any development or activity proposed to be carried out on land within the Sydney drinking water catchment should incorporate the Water NSW's current recommended practices and standards. Clause 10(1) requires a development under Part 4 of the EP&A Act to demonstrate a neutral or beneficial effect on water quality. Springvale Mine's consent SSD 5594 Condition 12, Schedule 4 of SSD 5594 requires mine water discharges to be treated to

meet specified salinity limits. The specified salinity limits have been developed to meet beneficial effect at Springvale Mine's LDP009.

The proposed modification will not result in an increase in inflow to underground operations and there will be no expected change in water quality of mine water discharge (**Section 9.5.6.3**). There will be no change to already approved impact on water quality due to the modification.

5.4.4 SEPP (Infrastructure) 2007

SEPP *(Infrastructure) 2007* (Infrastructure SEPP) aims to facilitate the effective delivery of infrastructure across NSW by improving regulatory certainty and efficiency through a consistent planning regime and greater flexibility in the location of infrastructure and service facilities.

Clause 45 of the Infrastructure SEPP provides that for a development application in respect of development carried out:

- within or immediately adjacent to an easement for electricity purposes (whether or not the electricity infrastructure exists), or
- immediately adjacent to an electricity substation, or
- within 5 m of an exposed overhead electricity power line, and
- The consent authority must give written notice to the electricity supply authority for the area and invite comments about potential safety risks, and take into consideration any response to that notice received within 21 days after the notice is given.

Infrastructure SEPP was considered in the SVMEP EIS. The EIS assessed the Project's impact on the relevant electricity transmission lines in Newnes State Forest in a dedicated Subsidence Impact Assessment (MSEC (2013)). The EIS also describes the consultation that had been undertaken with respect to the potential impacts of subsidence on the electrical infrastructure over the approved mining area.

The mine design and the layout is not proposed to be changed in the proposed modification and as such the subsidence profiles described previously in MSEC (2013) and the SVMEP EIS (Golder Associates (2014)) will not change. There are no potential impacts on the existing electrical infrastructure overlying the mining area, described and assessed in the EIS and MSEC (2013), due to the modification. The subsidence performance measures stipulated in Condition 7 Schedule 3 of SSD 5594 will continue to apply following approval of the modification.

5.4.5 SEPP No. 55 – Remediation of Land

SEPP No. 55 – Remediation of Land (SEPP 55) provides for a state-wide planning approach to the remediation of contaminated land in order to reduce the risk to human health or any other aspect of the environment.

Clause 7(1) of SEPP 55 provides that a consent authority must not consent to the carrying out of any development on land unless:

- it has considered whether the land is contaminated
- if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and

- if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

Further, Clause 7(2) of SEPP 55 provides that before determining an application for consent to carry out development that would involve a "change of use" in respect of certain land specified in clause 7(4) of SEPP 55, the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines (being the 1998 publication *Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land*).

Centennial Coal undertook a contaminated site assessment across all its sites including Springvale Mine in accordance with the *Contaminated Land Management Act 1997* to determine whether any site triggered the Duty to Report criteria. A three phase approach was adopted as follows:

- Phase 1 desk top assessment completed in December 2010;
- Phase 2 intrusive sampling and analysis programme, completed in February 2012; and
- Phase 3 implementation of remediation plans.

In February 2012, Centennial Coal notified the then DECCW of the contamination status of Springvale Mine on the basis that there was visible evidence of limited soil contamination at the pit top but that some potential existed for contamination associated with an underground diesel storage tank, equipment washdown area and workshop. Based on the findings of the Phase 2 investigations Springvale Coal has implemented environmental management practices to address the identified issues. The updated Springvale Mine MOP (1 November 2015 – 31 October 2022) has committed to further studies on land contamination issues during the MOP term.

With the continued implementation of best management practices for hydrocarbons, as well as effective implementation of the approved environmental management plans and work health and safety management systems, the potential for contamination and associated issues remains low for Springvale Mine.

5.4.6 SEPP No. 44 – Koala Habitat Protection

SEPP No. 44 – Koala Habitat Protection provides for the protection of koala habitat by ensuring that areas subject to development proposals are considered for their value as habitat or potential habitat for koalas. The Greater Lithgow LGA is listed under Schedule 1 of SEPP No. 44 as an area to which the SEPP applies. The Springvale Mine Extension Project Application Area contains core koala habitat, however, no koala habitat will be impacted by the proposed modification.

5.4.7 SEPP No. 33 – Hazardous and Offensive Development

SEPP No. 33 - Hazardous and Offensive Development (SEPP 33) regulates, amongst other things, the determination of development applications to carry out what is defined in SEPP 33 as development for the purposes of a "potentially hazardous industry" or "potentially offensive industry". With the continued implementation of best management practices for hydrocarbons and explosives used at Springvale infrastructure sites as well as effective implementation of the approved EMS and occupation health and safety management systems, the proposed modification would not pose any significant risk, in relation to its locality, to human health, life or property or to the biophysical environment over and above the currently approved Springvale Mine Extension Project.

The proposed modification elements would not result in the emission of a polluting discharge in a manner which would have a significant adverse impact in its locality or on the existing or likely future development on other land.

On the above bases, the proposed modification is not considered to comprise a "potentially hazardous industry" or a "potentially offensive industry" within the meaning of these expressions in SEPP 33. Therefore a preliminary hazard analysis was not prepared as required by Clause 12 of SEPP 33 and nor does Clause 13 of SEPP 33 apply to the consent authority's determination of the modification.

5.5 Lithgow Local Environmental Plan 2014

Local Environmental Plans (LEPs) are instruments that guide planning decisions for Local Government Areas (LGAs) and allow Councils to manage the ways in which land is used through zoning and development consents. The *Lithgow Local Environmental Plan 2014* (Lithgow LEP 2014) was gazetted on 19 December 2014, after development application for SSD 5594 had been submitted on 20 November 2013.

The aim of the Lithgow LEP 2014 is to make local environmental planning provisions for land in Lithgow in accordance with the relevant standard environmental planning instrument under Section 33A of the EP&A Act. In particular, the aims of the Lithgow LEP 2014 include the encouragement of sustainable and planned development that complements the unique character and amenity of Lithgow, and to provide for a range of development opportunities that contribute to the social, economic and environmental resources of Lithgow through the implementation of the principles of ecologically sustainable development.

The land use zonings of the Project Application Area pursuant to the Lithgow LEP 2014, as illustrated on **Figure 4**, are:

- RU1 Primary Production
- RU2 Rural Landscape
- RU3 Forestry
- R1 General Residential
- SP2 Infrastructure.

The objectives of Zone RU1 Primary Production are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To minimise the environmental and visual impact of development on the rural landscape.
- To provide for recreational and tourist development and activities of an appropriate type and scale that do not detract from the economic resource, environmental or conservation value of the land.
- To maintain or improve the water quality of receiving water catchments.

The objectives of RU2 Rural Landscape are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To maintain the rural landscape character of the land.
- To provide for a range of compatible land uses, including extensive agriculture.
- To ensure that the type and intensity of development is appropriate in relation to the rural capability and suitability of the land, the preservation of the agricultural, mineral and extractive production of the land, the rural environment (including scenic resources) and the costs of providing services and amenities.
- To facilitate tourism and recreational uses that are compatible with the capability and suitability of the land.
- To maintain or improve the water quality of receiving water catchments.

The objectives of Zone RU3 Forestry are:

- To enable development for forestry purposes.
- To enable other development that is compatible with forestry land uses.

The objectives of Zone R1 General Residential are:

- To provide for the housing needs of the community.
- To provide for a variety of housing types and densities.
- To enable other land uses that provide facilities or services to meet the day to day needs of residents.
- To maintain or improve the water quality of receiving water catchments.

The objectives of Zone SP2 Infrastructure are:

- To provide for infrastructure and related uses.
- To prevent development that is not compatible with or that may detract from the provision of infrastructure.
- To maintain or improve the water quality of receiving water catchments.

Development for the purposes of “open cut mining” is permissible with development consent under the Lithgow LEP 2014 within Zone RU1 Primary Production and Zone RU3 Forestry. Mining is prohibited within Zone RU2 Rural Landscape, Zone R1 General Residential and Zone SP2 Infrastructure. Development consent SSD 5594 has been granted, and was granted pursuant to land zoning objectives and permissibility in accordance with the now *repealed Lithgow City Local Environmental Plan 1994* (Lithgow LEP 1994). The land zoning within the Project Application Area in accordance with Lithgow LEP 1994 (Golder (2014)) comprised Zone 1(a) Rural (General), Zone No 1(f) Rural (Forestry) and Zone No 2(v) Village. Development for the purposes of "mining" was permissible with development consent under the Lithgow LEP 1994 within Zone No 1(f) Rural (Forestry). Mining was not prohibited within Zone 1(a) Rural (General) and Zone No 2(v) Village under the Lithgow LEP 1994.

Sub-clause 7(1)(a) of the Mining SEPP (**Section 5.4.2**) states that development for the purpose of underground mining may be carried out on any land with development consent. In relation to any

inconsistency between the Mining SEPP and an LEP, Sub-clause 5(3) of Mining SEPP provides that the Mining SEPP prevails to the extent of the inconsistency. On this basis, any provision in the Lithgow LEP 2014 that would otherwise operate to prohibit the Springvale Mine Extension Project has no effect, and accordingly, the Springvale Mine Extension Project is permissible with development consent on the land in which the Project will be carried out that is within the Lithgow LGA.

5.6 Other Considerations

5.6.1 Lithgow Land Use Strategy 2010 – 2030

Lithgow City Council's *Lithgow Land Use Strategy 2010-2030* (LLUS) was adopted by Council on 31 October 2011 and endorsed by the NSW Department of Planning and Infrastructure on 24 May 2012.

The LLUS is a combined Land Use Issues Paper and Strategy. It explores the issues that currently face the Lithgow LGA and recommends a new planning approach to address these issues. The Strategy will be implemented through the planning system, primarily through the Lithgow LEP 2014 and Development Control Plan, as well as Council's other policy, regulatory and governance functions. This Strategy is significant to Council and the community because it will set directions and policy for the LGA's settlement and land use management for the next 20 years. The Strategy will be reviewed throughout this period every five years to ensure that its findings and recommendations remain relevant, are in keeping with sound planning principle and are continuing to meet the needs and expectations of the community.

5.6.2 Water Sharing Plans

Water Sharing Plans prepared in accordance with the *Water Management Act 2000* include rules for protecting the environment, extractions, managing licence holders' water accounts, and water trading within defined areas and specified water sources. The Water Sharing Plans provide the basis for equitable sharing of surface water and groundwater between water users, including the environment

Springvale Mine is regulated by the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Source 2011* established under Section 50 of the *Water Management Act 2000*. The Project Application Area straddles the boundary of the Sydney Basin Coxs River Groundwater Source and the Sydney Basin Richmond Groundwater Source.

The Project Application Area lies on the boundary of the Upper Nepean and Upstream Warragamba Water Source (Wywandy Management Zone) and the Hawkesbury and Lower Nepean Rivers Water Source (Colo River Management Zone) of *the Water Sharing Plan for Greater Metropolitan Region Unregulated River Water Sources 2011*.

There is no direct extraction of surface water from either Water Sharing Plan from Springvale Mine operations, however, reduction in baseflow contribution to surface watercourses from local groundwater systems require licensing, in accordance with the requirements of the NSW Aquifer Interference Policy.

5.6.3 Strategic Regional Land Use Policy

The NSW Government's *Strategic Regional Land Use Policy* (DP&I (2012)) was introduced in September 2012 and sets out a range of initiatives to better balance growth in the mining industry with the need to protect agricultural land and water resources. The Policy includes a package of measures including the following key elements:

- The preparation of Strategic Regional Land Use Plans (SRLUPs) for both the Upper Hunter and the New England North West regions of NSW which identify and map Strategic Agricultural Land (SAL) and Critical Industry Clusters (equine and viticulture land uses) within these areas
- The introduction of the NSW Aquifer Interference Policy (**Section 5.6.4**); and
- The requirement for Agricultural Impact Statements to accompany SSD applications for mining projects that have the potential to affect agricultural resources.

The proposed key policy response for resolving land use conflict between mining and coal seam gas proposals and agricultural land is a 'gateway process'. Under this process, a panel of independent experts would assess proposals involving mining or coal seam gas development on mapped SAL at an early stage before the lodgement of a development application. The outcome of the 'gateway process' would be that the proposal either meets the gateway criteria relating to agricultural and water impacts, or the proposal does not meet the criteria and therefore stringent requirements will be imposed that must be addressed at the development application stage. The 'gateway process' has commenced.

The existing SRLUPs do not apply to the Project Application Area. Notwithstanding, matters relating to soil landscapes, land use impacts, land capability and agricultural suitability had been addressed within the SVMEP EIS (Golder Associates (2104)). There is no land defined as Biophysical Strategic Agricultural Land within the Project Application Area.

5.6.4 NSW Aquifer Interference Policy

The *NSW Aquifer Interference Policy* (AIP) (DPI (2012)) is a key component of the NSW Government's *Strategic Regional Land Use Policy*. The AIP clarifies the water licensing and approval requirements for aquifer interference activities, including the taking of water from an aquifer in the course of carrying out mining, and defines the considerations for assessing potential impacts to key water-dependent assets.

The AIP indicates that where mining results in the loss of water from an overlying source that is covered by a Water Sharing Plan, a water access licence is required under the *Water Management Act 2000* to account for this take of water. According to the AIP, proponents of a mining project seeking development consent under Part 4 of the EP&A Act must provide estimates of all quantities of water likely to be taken from any water source during and following cessation of the activity and all predicted impacts associated with the activity. A groundwater impact assessment, which included hydrogeological modelling for the Springvale Mine Extension Project EIS, was undertaken and the results are discussed in detail in Appendix E of Golder Associates (2014). A Groundwater Assessment (Jacobs (2016a)) has been prepared for the modification (**Appendix I**), and assesses the impact of the revised groundwater mine inflows (Adhikary and Wilkins (2015)) against the relevant Commonwealth and NSW legislation (**Section. 9.4.4**), including the AIP.

The AIP requires that potential impacts on groundwater sources, including their users and Groundwater Dependent Ecosystems (GDE), be assessed against minimal impact considerations. If the predicted impacts are less than the Level 1 minimal impact considerations, then these impacts will be considered as acceptable. Appendix E and Section 10.2.4 of Golder Associates (2014) considered groundwater impacts and aquifer interference requirements and clarified that the Project is compliant with Level 1 Minimum Harm Criteria of the NSW Aquifer Interference Policy for Porous Rock Water Sources. Any impacts on potential GDEs, basic landholder rights and existing registered bores were also addressed in Appendix E of Golder Associates (2014).

Assessments to assess any potential impacts on GDEs, basic landholder rights and existing registered bores and whether the project as modified will be compliant with the Level 1 Minimum Harm Criteria

was undertaken for the modification in Jacobs (2016a). The Project as modified will remain compliant with Level 1 Minimum Harm Criteria (**Section 9.4.4.2**).

5.7 Commonwealth Approvals

5.7.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of the Environment (DoE), and provides a legal framework to protect and manage nationally important flora, fauna, ecological communities and heritage places defined as matters of 'national environmental significance' (NES). An action that "*has, will have or is likely to have a significant impact on a matter of National Environmental Significance*" may not be undertaken without prior approval from the Commonwealth Environment Minister, as provided under Part 9 of the EPBC Act. Approval under the EPBC Act is also required where actions are proposed on, or will affect, Commonwealth land and its environment.

Further to the submission of an EPBC Act referral (EPBC 2013/6881) to the Federal Minister of the Environment on 20 May 2013, the Springvale Mine Extension Project was determined to be a controlled action under the EPBC Act on 7 July 2013. EPBC 2013/6881 approval was granted on 15 October 2015 and has effect until 8 October 2035. EPBC 2013/6881 approved the following controlling provisions:

- Listed threatened species and communities
- Listed migratory species
- World heritage properties
- National heritage places
- A water resource, in relation to coal seam gas development and large coal mining development.

The matters of NES that have the potential to be impacted by the proposed modification are limited to threatened flora and fauna species and ecological communities, and water resources. The proposed stockpile extension area will not result in removal of any native vegetation or threatened vegetation communities and species listed under the EPBC Act.

Increasing production from 4.5 Mtpa to 5.5 Mtpa is intensification of mining with the potential to impact on water resources. Groundwater (Jacobs (2016a)) (**Appendix I**) and surface water (**Appendix J**) assessments (Jacobs (2016b)) were prepared to assess the impact of the proposed increase in production on water resources. These assessments (**Section 9.4.4.1, Section 9.5.6.1**) concluded that proposed modification would not, nor be likely to, have a significant impact on water resources, when assessed against the *Significant Impact Guidelines 1.3: Coal Seam Gas and Large Coal Mining Developments – Impacts on Water Resources* (DoE (2013)).

No other matters of NES will be impacted by the proposed modification. The Springvale Mine consent as modified will operate within the constraints of the EPBC 2013/6881 approval. Therefore, a referral to the DoE in relation to the modification is not required.

5.7.2 Native Title Act 1993

The *Native Title Act 1993* recognises that Aboriginal people may have rights and interests to certain land and waters which derive from their traditional laws and customs. Native title may be recognised

in places where Indigenous people continue to follow their traditional laws and customs and have maintained a link with their traditional country. Most of the lands within the Project Application Area are subject to an Ancillary Deed 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 this Deed.

The Deed is subject to a confidentiality clause and as such detailed commentary regarding the Deed is not provided in this document.

Any Native Title matters that are not dealt with within the existing Ancillary Deed are required to be resolved prior to the grant of a new mining lease required for the Project. No new mining leases will be required in relation to the proposed modification.

6.0 SOCIO-ECONOMIC ANALYSIS

6.1 Social Assessment

6.1.1 Introduction

The Social Impact Assessment (Centennial Coal, 2016) has been completed by James Marshall of Centennial Coal Company Limited and provided in **Appendix E**. The assessment titled *Springvale Mine Extension Project Modification 1: Social Impact Assessment* provides for a systematic approach to the identification, consideration and assessment of the social impacts of the proposed modification. The Social Impact Assessment (SIA) identifies and develops mitigation measures to address these potential impacts. The methodology is summarised as follows.

1) **Profiling**: Understanding the scale and scope of the modification, parameters of the SIA and identifying the stakeholders (determined by the areas of affectation). (**Section 6.1.2**)

2) **Scoping**: Identifying the potential impacts as a result of the modification. As identified in **Chapter 7.0** of the SEE, consultation has been undertaken with the Western Region Community Consultative Committee (CCC) on 14 April 2016. The Western Region CCC incorporates Springvale Mine, Angus Place Colliery, Lidsdale Siding and Western Coal Services. (**Section 6.1.3**)

3) **Assessment**: This section explores the likely impacts that will arise. The scope of the assessment is determined by the likely impacts of the proposed modification and as a guide may include, but not be limited to changes to: general population characteristics, employment opportunities, existing housing, utilisation of community infrastructure and services, and cultural and community identities. (**Section 6.1.4**)

4) **Management**: Identification and development of mitigation measures where feasible. These management measures are for not only potential adverse or detrimental social impacts, but also where those identified as positive can be enhanced and developed. This allows for an assessment as to whether the modification meets a net community benefit criteria. (**Section 6.1.5**)

5) **Monitoring**: Strategies to monitor identified impacts need to be developed to ensure that management strategies are adhered to and those cumulative impacts are identified, monitored and taken into account with further development. (**Section 6.1.5**)

6.1.2 Community Profile

6.1.2.1 Overview and Local Characteristics

The SIA has considered the strategic objectives of the Lithgow LGA. According to the most recent Australian Bureau of Statistics (ABS) Census 2011, the Lithgow LGA population on Census night was 20,161 which represent a 2.04% increase in population since 2006. The majority of the population live in Lithgow urban area (11,143 people), Wallerawang (1,855 people) and Portland (1,829 people). The remainder of the population (approximately 26%) live across the smaller villages, hamlets and rural localities across the LGA.

The Lithgow LGA's population has undergone slight fluctuations since 1996. There was a small decrease in population recorded between the 1996 and 2001 census period and a slight increase in population between the 2006 and 2011 census period. The median age Lithgow LGA is 42 years and is much higher in some rural areas. The out migration of young people noted below will exacerbate this trend.

The fluctuating population would be attributed to a number of factors which include:

- The changing employment characteristics of the area meaning that there is constant in/out migration, in particular families with young children
- A trend for younger people (18 – 24 years of age) to move out of the area to seek lifestyle, education and/or employment opportunities
- In-migration of mature age people seeking a rural lifestyle (tree change).

The characteristics of the Project Application Area and surrounds include the locality of Lidsdale, rural land and isolated rural residents, transport infrastructure and the Newnes State Forest. The town of Wallerawang is located to the southwest of the Springvale pit top, and is the closest retail and commercial centre, however, Lithgow remains the main centre meeting higher order retail, commercial and professional service needs.

6.1.2.2 Economic Profile

The Lithgow region has a long history with mining and power generation, and today the economic base of Lithgow is still recognised as being the energy and resources sector. These sectors are major employers and subsequently make a significant contribution to the overall economy including retail and accommodation via direct and indirect employment opportunities occurring.

The mining and energy sectors also present some challenges brought about by fluctuations in coal prices, production costs and market demand. However, the importance of the coal mining industry and its related employment is clearly vital to the broader economic wellbeing of the area. The largest sectors in the Lithgow economy by total output include:

- Mining
- Construction
- Electricity
- Public administration
- Manufacturing.

The main industries by employment in Lithgow are:

- Mining
- Health care
- Retail
- Public administration
- Accommodation.

The mining employment sector in the region offers a higher wage compared with other sectors.

6.1.3 Scoping of Potential Social Impacts

The scoping of potential social impacts was completed after a review of all the relevant technical assessments. The potential social impacts are summarised below.

- Adverse impacts to the social amenity of the area caused by:

  - Increased traffic flow due to increase workforce resulting in road safety risk, inadequate car parking and inadequate road capacity. (ARC (2016))
  - Adverse visual impact due to the increase in coal stockpile size.
  - Adverse ecological and cultural impacts due to the increase in stockpile size. (RPS (2016a) and RPS (2016b))
  - Adverse air quality impact from the increased size of the coal stockpile and increase in the number of underground equipment, being an additional continuous miner unit. (SLR (2016))
  - Increase in greenhouse gas emissions due to the increase in ROM coal extraction rate. (SLR (2016))
- Change in the economic impact brought about by increased employment and increased spending within the community. (AIGIS Group (2016)).

A bow-tie analysis was then utilised to understand the potential initiating events, degree of impact and the adequacy of controls. Details of the scoping exercise, initiative events and the reactive controls that have been or proposed to be implemented in the modification are provided in Tables 5 to 12 of Centennial Coal (2016).

6.1.4 Social Impact Assessment

The SIA has quantified the potential impacts of the modification against a number of potential effects. The methodology employed and the results from the quantification exercise are described in detail in Section 4.2 of the SIA. A summary of the SIA findings are provided below.

- Change in general population characteristics in the local area:
  - No impact identified.
- Modification will disadvantage or benefit individuals or groups:
  - Positive impact identified in the pay packet effect in the immediate local area.
  - Impact not immediately identified as a positive pay packet effect on a broader regional level.
- Changes to employment opportunities:
  - Positive impact identified for direct and indirect employment created by the modification.
  - Positive impact identified for longevity / certainty of employment for existing employees and indirect employment.
- Impacts on existing housing:
  - No impact identified.
- Additional utilization of community infrastructure and additional support services and service demand:
  - No impact identified for new services and facilities required.
  - Minor adverse impact identified for increase in employee traffic to and from the site.
  - Positive impact identified for ongoing use of existing services by existing workforce.
- Modification elements will cause conflict within the community:
  - No impacts identified for visual, environmental (noise, air quality), water quality changes.
  - Negligible impacts identified for transport noise caused by increased employee movements.

- Impact on community and cultural identities:
  - No impacts identified.

6.1.5 Management and Monitoring

Springvale Coal will continue to undertake monitoring of potential environmental impacts in accordance with the approved EMPs. Following approval of the modification, a review of the existing EMPs will be undertaken, and plans undated as appropriate, to take into consideration the environmental assessments undertaken as part of this SEE, the Statement of Commitments, and consent conditions. Reviews of the monitoring data will be undertaken on a regular basis to ensure that management strategies are adhered to and that the potential cumulative impacts are identified, monitored and managed where relevant.

6.1.6 Conclusion

The potential impacts of the proposed modification elements are identified and addressed in detail in the technical assessments undertaken and discussed within the SEE and the SIA. Relevant mitigation measures have been identified within the technical assessments and will be implemented as appropriate. Based on the review of technical assessments reports, the SIA has determined that any adverse impact associated with the modification will be negligible, will be temporary in nature and will not adversely impact on how people use the area. The proposed modification will result in positive impact for direct and indirect employment and certainty of employment for existing employees. Overall, the Springvale Mine Extension Project as modified will continue to provide a net benefit to the community with regard to social, economic and environmental impacts and benefits.

6.2 Economic Impact Assessment

6.2.1 Introduction

An Economic Impact Assessment (EIA) for the modification was completed by AIGIS Group and the report entitled *Springvale Mine Extension Project Section 96(2) Modification: Economic Impact Assessment* (AIGIS Group, 2016) is provided in **Appendix F**. The EIA has been prepared to comply to the greatest practicable extent with DPE's *Guidelines for the economic assessment of mining and coal seam gas proposals* (DPE, 2015).

Consistent with DPE (2015), the approach to the EIA has been to estimate the direct economic benefits and costs of the proposed modification, as they relate to the State, regional and local communities, employing:

- A Cost-Benefit Analysis (CBA) to assess the impacts of the modification at State (NSW) level
- A Local Effects Analysis to assess the localised impacts, particularly those relating to certain environmental, social and economic outcomes that are concentrated in the local and/or regional community.

The EIA seeks to address the above requirements by providing a 'triple bottom line' report focusing on the social, economic and environmental outcomes of the modification based on both quantitative and qualitative assessments of effects, which is largely based on the approved Springvale Mine Extension Project. The integrated assessment of the social, economic and environmental impacts of the modification takes into consideration the interdependencies between each of these assessment aspects, and the approach is consistent with consideration of the requirements of ecologically sustainable development (**Section 11.6**).

In order to estimate the net cost or benefit of the Project, all technical reports that address the key environmental issues associated with the modification ((SLR (2016), ARC (2016), RPS (2016a), RPS (2016b), Jacobs (2106a), Jacobs (2016b)) have been subject to qualitative and quantitative analysis as part of the EIA. This has resulted in the EIA providing monetised estimates of key aspects of the modification, based on specialist assessments of their magnitude, and relevant valuation methodologies. For a full description of the valuation methodologies and the sensitivity analyses utilised to quantify aspects of the modification, refer to the AIGIS Group (2016) in **Appendix F**.

6.2.2 Estimated Economic Benefit

The CBA data presented are present values (PV) and net present values (NPV), at an assumed discount rate of 7% consistent with relevant parts of *NSW Cost Benefit Analysis for mining and coal seam gas proposals* (NSW Treasury 2012) and NSW Treasury TPP07-6 *Economic Appraisal Principles and Procedures Simplified*. The CBA assumes the Springvale Mine Extension Project as approved as the base case, or 'business as usual' (BAU) scenario. For the purposes of business case modelling for the modification, mining is assumed as ceasing in 2024, rather than 2028 as originally assessed in the Springvale Mine Extension Project.

The key economic benefits that would accrue to the local and State communities, as distinct from the proponent corporation, on approval of the modification are as follows.

- An acceleration in payment of royalties and taxes accruing to NSW. On the basis of the time value of these economic flows, their notional value is likely to be increased by earlier delivery given that mining is assumed to cease in 2024, and not 2028 as assessed previously (AIGIS Group (2014), AIGIS Group (2015)).
- The availability of an additional 140 fte positions (direct and contract employees) at Springvale Mine, with similar flow-on effects to those noted above.

Table 10 shows the valuation of economic benefits.

Table 10 - Estimate of Economic Benefit

Economic Benefit	Estimation assumptions	SSD 5594 as Approved (Base Case) Estimate	SSD 5594 as Modified (Proposed Case) Estimate	Impact of Modification (+ / –)
Mine sustained and additional employment (proportional benefit to local/regional community	Operations employment[1]: 310 fte positions 2016-2028 as assessed in SSD 5594. Operations employment 450 fte positions 2016-2024 as per the proposed modification.	~ $105 million	~$113 million	**+ ~ $8 million**
NSW Government royalties	Assumed royalty rate: 7.2%[2]	~$159 million	~$165 million	**+ ~ $6 million**
State taxes (land tax); Local Government rates	Refer to Appendix 2 of **Appendix F** for detailed explanation of tax estimation assumptions.	~ $5.2 million	~ $4.7 million	**– ~ ($0.5 million)**
Total economic benefit	**-**	**~ $269.2 million**	**~ $282.7 million**	**+~ $13.5 million**

Note: 1. Includes contractors
2. Deep underground coal (+400 m) 6.2%; other underground coal 7.2%, open cut coal 8.2%.
3. These totals are rounded to $269 million and $285 million (differential $16 million) for the subsequent analyses.

6.2.3 Estimation of Economic Costs

The key methodological approach used for the estimation of economic costs has involved a comparison between the base case (Springvale Mine Extension Project as approved) and the proposed case (modification to the Springvale Mine Extension Project). Given the effects of the proposed modification will largely involve changes to the timing of costs and benefits induced by the increase in production rate, and subsequent possible reduction in mine life, the economic assessment of environmental effects were adjusted. The adjustments have been made to all technical assessments undertaken and approved for the SVMEP EIS. **Table 11** itemises the estimated assumptions and costs associated with the impacts of the approved Project and the proposed modification, and **Appendix F** provides further details on the calculation methodologies. The estimated costs are represented as present value (PV) at 7% discounted rate.

Table 11 – Estimate of Economic Cost

Economic Cost	Estimated Cost for Modification (Proposed Case)	Estimated Cost of SSD 5594 as Approved (Base Case)	Difference between Proposed Case and Approved Case
Noise	$1,052,799	$1,275,005	($222,206)
Subsidence, Soil and Land Use, Natural Heritage	$41,603,763	$47,709,488	($6,105,725)
Water resources	$41,603,763	$47,709,488	($6,105,725)

Economic Cost	Estimated Cost for Modification (Proposed Case)	Estimated Cost of SSD 5594 as Approved (Base Case)	Difference between Proposed Case and Approved Case
Air	$1,502,387	$1,141,866	$360,521
GHG emissions	$31,793,781	$37,774,740	($5,980,960)
Cultural heritage	$141,585	$159,298	($17,712)
Biodiversity	$1,893,059	$2,129,881	($236,822)
Visual amenity	$157,321	$190,525	($33,204)
Traffic and transport	-	-	-
Total Present Value	**~$120 million**	**~$138 million**	**-$18 million**

Table 11 shows the economic cost estimate for the modification is lower than the Springvale Mine Extension Project as approved by $18 million.

It is noted that the social impact has not been quantified and included in **Table 11**. Social impact may be described as the 'intrinsic value' of certain impacts or effects, as attributed by individual stakeholders. This aspect can be highly subjective, and consequently cannot be accurately quantified, as the estimation techniques applied, although based on valid methodologies, may not align with individual stakeholders' values.

It is also noted that DPE (2015) requires certain impacts to be considered in the context of NSW. The local effects analyses in DPE (2015) require the adoption of the relevant ABS Statistical Area Level 3 (SA3) as the locality in which the modification is located. The SA3 assessed in AIGIS Group (2016) was Lithgow-Mudgee while the local government area assessed was the Lithgow LGA. The quantified environmental impacts of the modification presented above will principally affect the regional and/or local communities, as distinct from broader, less contiguous community groups, such as those resident in other parts of NSW. However, it is noted that a number of the economic impacts assessed in the CBA are also differentially distributed across local/regional and broader communities. The impacts of royalties and taxes are broadly distributed across the State, whereas the direct and indirect effects of wages earned by workers in a specific region may be more concentrated in that region.

6.2.4 Comparison of Net Economic Benefit / Cost

Table 12 compares the measures of net economic benefit of the Springvale Mine Extension Project and the proposed modification for the State and regional communities, based on the benefit and cost assessments included in **Table 10** and **Table 11**, respectively.

Table 12 – Net Present Value and Benefit-Cost Ratio

Aspect	SSD 5594 as Approved (Base Case)	SSD 5594 as Modified (Proposed Case)	Difference between Proposed Case and Approved Case
Economic benefit (PV)	$269 million	$283 million	$16 million
Economic cost (PV)	$138 million	$120 million	($18 million)
Net Present Value (NPV)	$131 million	$163 million	$32 million
Benefit-Cost Ratio (BCR)	1.9	2.4	-

A comparison of the NPV presented in **Table 12** shows the proposed modification will result in an increase in net benefit of approximately $32 million when compared with the Project as approved, and will also result in a higher benefit-cost ratio (2.4) for the proposed modification than was estimated for the Springvale Mine Extension Project (1.9). The changes to economic outcomes at Springvale Mine that the proposed modification would stimulate relate to changes in production schedule assumptions and the timing of realisation of economic benefits. The analysis in the EIA suggests that the modification would have a positive effect on the quantum of economic benefits accruing to NSW.

Sensitivity analyses for alternate options at three discounted rates (4%, 7% and 10%) undertaken in the EIA confirm that the Springvale Mine Extension Project as modified remains positive under these discount rate assumptions, and as discussed above, the result is approximately $32 million more favourable in terms of State returns and employee benefit.

6.2.5 Employment Multipliers

The NSW Department of Trade, Investment, Regional Infrastructure and Services (Division of Resources and Energy) has previously identified output and employment multipliers for mining and related services. While acknowledging the limitations on multiplier analysis observed by, for example the ABS, the application of the relevant NSW Government Department's declared multipliers adds validity to the analysis. The relevant multipliers are displayed in **Table 13**.

Table 13 – Type 2A Multipliers – Mining and Services

Description	Multiplier Value
Output Multiplier – mining & services	2.136
Gross Value Added Multiplier – mining & services	4.099
Income Multiplier – mining & services	2.839
Employment Multiplier – mining & services	3.977

The relatively large Gross Value Added (GVA) multiplier value (4.099) demonstrates the importance of incomes generated by the Springvale Mine Extension Project, and the project as modified. It is noted the GVA comprises all components of income to workforce, plus the gross operating surplus of the corporate entity. Due to the foreign ownership of Springvale Coal, the latter will accrue beyond NSW; however, the former would be concentrated in the State and the immediate region.

6.2.6 Conclusion

Whilst the change in the mine schedule and the increased production rate proposed in the modification is to initially address losses in coal production in 2015 the modification will also improve the operational flexibility and responsiveness of Springvale Coal to take advantage of market opportunities that may present themselves. This flexibility has potentially positive implications for the State, as the ability to increase production in favourable markets would result in increased royalty returns in particular to NSW.

In overall terms, any marginal economic impact of the proposed modification is likely to be positive, as it will entail earlier realisation of economic benefits. The benefits are subsequently redistributed across local government areas, including Lithgow LGA. A key social effect due to a potentially shorter mine schedule as proposed in the modification is the potential change in the distribution and duration of employment-related benefit. The modification may result in this benefit being distributed across a greater number of employee households, however for a shorter period of time.

7.0 STAKEHOLDER ENGAGEMENT

7.1 Introduction

This chapter provides information on consultation undertaken with stakeholders with respect to the proposed modification in accordance with Springvale Mine's Stakeholder Engagement Strategy.

7.2 Springvale Stakeholder Engagement Strategy

Springvale Coal has an ongoing consultation strategy with all stakeholders, identified in *Springvale Mine Stakeholder Management Plan* (Springvale SEP). The Springvale SEP provides a framework to identify and appropriately consult with stakeholders that may be influenced by or have an interest in Springvale Mine's operations. The Springvale SEP identifies the following groups as the mine's stakeholders:

- Local community
- Indigenous stakeholders
- Non-government organisations
- Government (Local, State, Commonwealth)
- Springvale workforce and workforce at other Centennial Coal operations.

The Springvale SEP is underpinned by Centennial Coal's Environment and Community Management Standards which set out the minimum requirements for effective consultation and engagement with all stakeholders. The Springvale SEP, as is required by the Management Standard, was updated to address consultation and engagement activities for the proposed modification. Consultation for the proposed modification has been undertaken in accordance with the updated Springvale SEP.

Springvale Coal is committed to the timely, orderly, consistent and credible dissemination of appropriate information within the constraints of legal and regulatory requirements to all interested stakeholders. To date, no major complaints have been received on Springvale Mine from the community.

7.3 Consultation for the Modification

7.3.1 Consultation with Government

Department of Planning and Environment

A face to face meeting was held with officers of DPE on 27 April 2016 to discuss Centennial Coal's projects. This meeting also discussed Springvale Coal's proposal to modify Springvale Mine's consent.

A letter was sent to DPE on 13 May 2016 with a description of the modification elements, the proposed approval pathway for the modification and the technical assessments proposed to be undertaken for the preparation of the SEE supporting modification application. DPE provided a response to the letter on 21 June 2016 to confirm (i) the Department was satisfied the proposal represents a modification to the original project and that Section 96(2) of the EP&A Act is the appropriate approval pathway for the modification application, and (ii) the technical assessments proposed are appropriate to support the proposed modification application.

Lithgow City Council

Representatives from Lithgow City Council (LCC) were present at the Centennial Western Region Community Consultative Committee meeting held on 14 April 2016 when the proposed modification was discussed. Springvale Coal has committed to future ongoing consultation with LCC on the modification and other matters relating to Springvale Mine's operations.

Information on the proposed modification and technical assessment outcomes including socio-economic benefits of the modification have been provided via email to the Lithgow Economic Development Advisory Committee.

7.3.2 Consultation with Community

As noted above, Springvale Coal has ongoing consultation with the local community. Meetings are held on a regular basis with the Regular Western Region Community Consultative Committee (CCC). The CCC includes five community representatives and LCC representatives. At the CCC meeting of 14 April 2016 the Springvale modification was discussed and a brief description of the modification elements was provided to the members. No matters were raised by the community or the LCC representatives and hence no matters needed to be considered within this SEE.

The broader community will be notified of the proposed modification through an advertisement placed in the local newspaper (Lithgow Mercury) following lodgment of the modification application. The local community will also be asked to take part in the modification assessment process through the public exhibition process, whereby the community will be invited to make formal submissions on the modification.

7.4 Consultation Summary

A summary of the consultation undertaken for the proposed modification is provided in **Table 14**.

Table 14 – Summary of Stakeholder Consultation

Stakeholder	Date and Method of Consultation	Description of Outcomes
DPE	Face to face meeting held on 27/04/16. Letter sent on 13 May 2016. Response to letter received on 21 June 2016.	DPE confirmed Section 96(2) EP&A Act is the appropriate approval pathway for the modification application, and that the technical assessments proposed for the SEE are appropriate to support the proposed modification application.
LCC	Western Region CCC meeting.	LCC representatives present at the CCC meeting did not raise any issues on the proposed modification.
CCC	Meeting held on 14/04/16.	No specific issues relating to the modification were raised.

7.5 Future Consultation

Consultation with the community and other stakeholders will continue to ensure the community remains informed of the mine's progress and the outcomes of the modification application.

8.0 IDENTIFICATION OF KEY ENVIRONMENTAL ISSUES

8.1 Introduction

This chapter discusses the broad brush, desktop-level risk assessment that was undertaken to broadly assess the potential environmental risks that may arise as a result of the proposed modification. The primary purpose of the risk assessment was to identify, prioritise and inform the required environmental, social and economic impact studies required for the SEE.

8.2 Identification of Issues

Issues and aspects relating to the proposed modification elements with the potential to pose the greatest risk to the environment and community, and assessed in the risk assessment were as follows.

- Traffic impacts
- Air quality impacts
- Increases to greenhouse gas emissions
- Social impacts
- Economic impacts
- Water resources (groundwater and surface water)
- Ecology
- Aboriginal cultural heritage
- Noise
- Visual amenity

The risk assessment was used to determine the likelihood and consequence of this issue occurring. The ranking of environmental consequences is based upon the principles of the *Australian and New Zealand standard AS/NZS 4360:2004 – Risk Management.*

8.3 Risk Assessment Analyses

Table 15 provides the environmental risk analysis for the proposed modification. It includes:

- A summary of the potential key impacts/risks
- Consideration of the priority for the assessment
- A discussion regarding the findings of the risk analysis.

Table 15 – Broad Brush Risk Assessment Results

Issue or Aspect	Source of Risk	Potential Impact	Priority of Assessment	Discussion
Traffic and Transport	Additional traffic due to increase in workforce at Springvale Mine and impact on existing Mine Access Road and Castlereagh Highway. Increased traffic on the regional road network over and above the available capacity.	Impact upon the capacity or safety of the existing road network. Impact on existing levels of service of the Mine Access Road / Castlereagh Highway intersection, and Castlereagh Highway.	Moderate	A Traffic Impact Assessment to be undertaken to assess potential traffic impacts on the capacity, efficiency and safety of the road network.
Air Quality	Dust and TSP from increased coal stockpile capacity and footprint. Increased annual coal handling. Spontaneous combustion event on stockpile. Ventilation emissions from increased number of underground mining equipment.	Degradation of air quality in the vicinity of the nearest sensitive receptors.	Moderate	The coal stockpile footprint will increase by approximately 23% over the existing footprint. The stockpile capacity will increase from the approved 85,000 tonnes to 200,000 tonnes. One additional continuous miner will be operated underground and hence ventilation emissions will increase. An Air Quality Assessment to be undertaken to quantity impacts.
Greenhouse Gas emissions	Increased extraction rate to up to 5.5 Mtpa. Increased workforce.	Increase in Centennial Coal's contribution to total NSW and Australian GHG emissions	Moderate	A Greenhouse Gas Emissions Impact Assessment to be undertaken to quantify the GHG emissions arising from the proposed increases in production rate and workforce.
Groundwater and Surface Water Resources	Increased coal extraction rate.	Increased mine inflows underground. Increased mine water discharges at LDP009 to the Cox River catchment.	Moderate	Mine water make could exceed Water Access Licence limits. Mine water discharge at LDP009 could exceed EPL volumetric limits. Groundwater and surface water impact assessments to be undertaken to determine if increase in mine inflows and its subsequent discharge to the receiving environment due to increase in extraction rate is significantly higher than approved in SSD 5594.

Issue or Aspect	Source of Risk	Potential Impact	Priority of Assessment	Discussion
Economic	Environmental impact costs. Project benefits.	Net present value of the Springvale Mine Extension Project as approved reduced due to increased environmental impacts from modification elements. Benefits to local community and NSW State	Low	An Economic Impact Assessment to be undertaken to assess the environmental costs and project benefits, and compare the net present value of the Springvale Mine Extension Project as modified against the approved project.
Social Amenity	Increased workforce. Increased production rate. Increased footprint of coal stockpile area. Increased coal stockpile capacity.	Local benefits. Employment opportunities. Degradation of landscape. Impacts on local community (services, infrastructure, population, community identity, conflicts in community etc). Increase in environmental impacts.	Low	A Social Impact Assessment will be undertaken to assess the impact of the environmental, economic and social issues of the modification elements on the social fabric of the region.
Ecology	Coal stockpile extension area.	Impacts on native vegetation, threatened species and endangered ecological communities. Loss of fauna habitat.	Low	The coal stockpile extension area is highly modified from previous disturbance activities. Only a due diligence ecology assessment will be undertaken over the coal stockpile extension area.
Cultural Heritage	Coal stockpile extension area.	Impacts on Aboriginal artefacts or historic items. Loss of cultural heritage values.	Low	The coal stockpile extension area is highly modified from previous disturbance activities. Only a due diligence cultural heritage assessment will be undertaken over the coal stockpile extension area.
Noise	Increased traffic flows. Construction of diversion drain.	Increase in traffic noise. Diversion drain construction noise.	Low	Qualitative assessment of noise impacts to be undertaken.
Visual amenity	Coal stockpile extension area.	Loss or degradation of the visual amenity.	Low	Qualitative assessment of visual impacts on nearest to be undertaken.

8.4 Assessment of Environmental, Economic and Social Consequences

Due to the minor nature of the proposed modification no environmental issue has been assessed as providing a high or significant risk rating. **Table 16** provides a summary of the risk ratings for the issues assessed in the risk assessment.

Table 16 – Environmental, Economic and Social Risk Rating

High	Significant	Moderate	Low
None	None	Traffic and Transport	Economic
		Air Quality	Social Amenity
		Greenhouse Gas Emissions	Groundwater Resources
		Groundwater Resources	Ecology
		Surface Water Resources	Cultural Heritage
			Noise
			Visual amenity

Issues that have some potential to impact on the environment, have been denoted with moderate risk ratings in **Table 16**, and warrant further investigations through technical assessments. These issues comprise traffic and transport, air quality and greenhouse gas emissions, groundwater and surface water. The technical assessments undertaken for these issues are described in **Chapter 9.0**.

Issues that have been denoted with low risk ratings in **Table 13** were considered to pose minimal to negligible impacts on the environment. Despite this, technical assessments were also undertaken for these issues and discussed in **Chapter 6.0** (socio-economic assessments) and **Chapter 9.0**. Two additional low risk aspects, namely, noise and visual amenity have been assessed qualitatively (**Section 9.7**).

In summary, the following technical assessments have been undertaken in this SEE.

- Traffic and Transport (**Section 9.1**)
- Air Quality (**Section 9.2**)
- Greenhouse Gas Emissions (**Section 9.3**)
- Groundwater (**Section 9.4**)
- Surface Water (**Section 9.5**)
- Social Amenity (**Section 6.1**)
- Economic (**Section 6.2**)
- Ecology (**Section 9.6**)
- Cultural Heritage (**Section 9.7**)
- Noise (**Section 9.8**)
- Visual Amenity (**Section 9.8**)

9.0 ASSESSMENT AND MANAGEMENT OF KEY ENVIRONMENTAL ISSUES

9.1 Traffic and Transport

9.1.1 Introduction

A Traffic Impact Assessment (TIA) for the proposed modification has been undertaken by ARC Traffic and Transport (ARC, 2016) *Springvale Mine Extension Project Modification 1: Traffic Impact Assessment*, which is provided in full in **Appendix G**. The scope of this assessment was to review the existing traffic conditions for Springvale Mine, assess the likely changes to traffic and the potential impact upon the road network as a result of the modification, and to identify mitigation measures as required. Given that the proposed modification will not impact on any traffic movements to the Newnes Plateau infrastructure areas approved in the Springvale Mine Extension Project the TIA has not included any discussions on the Newnes Plateau traffic movements.

The TIA has referenced the following key AustRoads documents:

- *Guide to Road Design Part 4A* Unsignalised & Signalised Intersections (GRD4A)
- *Rural Road Design Guide* (RRDG)
- *Guide to Traffic Engineering Practice Part 5 Intersections at Grade* (GTEP5)

ARC (2016) includes information on consultation with the Roads and Maritime Services (RMS) in regard to accident data for this assessment.

As identified in **Section 3.3.5** and **Table 4** operational management of the transport of ROM coal from the Springvale pit top to Springvale Coal Services Site and Mount Piper Power Station occurs via an overland conveyor system. This transport component is not part of Springvale Mine's consent SSD 5594. The transfer of ROM coal to off site locations is undertaken under the Western Coal Services Project's consent (SSD 5579) and has not been assessed in the TIA. The modification is not proposing to change the contingency provisions for the road transport of 50,000 tonnes of ROM coal from Springvale pit top to the identified final local destinations via the public road network in the event the overland conveyor system becomes temporarily unavailable. The impact of the road transport of ROM coal was assessed in the SVMEP EIS and approved in SSD 5594.

9.1.2 Existing Environment

9.1.2.1 Road Network and Road Safety

All access to Springvale pit top is via Mine Access Road, which joins the Castlereagh Highway near Wallerawang. The Mine Access Road operates as a private access road and provides two wide traffic lanes and generates no traffic flows other than accessing the pit top. From the Castlereagh Highway, access is readily available to the sub-regional and regional road network.

The Castlereagh Highway (State Highway 18, State Route 86) is a regional highway connecting the Great Western Highway at Marrangaroo to Mudgee and Gulgong and then further through north-west NSW. The Castlereagh Highway provides two traffic lanes and well-designed at-grade and grade separated intersections appropriate to the through and turning traffic demands.

The intersection of the Castlereagh Highway and Mine Access Road currently provides Auxiliary Right (AUR) treatment in accordance with GRD4A for arrivals from the south, where a short section of the

Castlereagh Highway is widened to provide two lanes such that a through (northbound) vehicle can pass a vehicle turning right into Mine Access Road. The left turn from the Castlereagh Highway to Mine Access Road is provided as a channelised left (CHL) treatment with turn lane protected by a wide tapered splitter island, and then a give way intersection at Mine Access Road, which provides priority to vehicles arriving via the right turn from the Castlereagh Highway.

Existing traffic flows for Castlereagh Highway and Mine Access Road have been identified with a 24 hour intersection movement survey in November 2015 and the automatic traffic counters installed on the Castlereagh Highway and Mine Access Road for the period between 12 and 18 November 2015. The Castlereagh Highway has an average daily traffic (ADT) flow of 5,503 vehicle trips per day (vtpd). The average weekday traffic (AWT) flow is higher at 5,786 vtpd, while Friday 13 November 2015 reported the highest daily flow at 6,662 vtpd. The Mine Access Road has an ADT flow of 536 vtpd. The AWT flow is higher at 665 vtpd, while Wednesday 18 November 2015 reported the highest daily flow of 769 vtpd.

While the intersection survey data (refer Appendix A of ARC (2016)) indicate through flows are below 400 vehicles per hour (vph) on the day of the intersection survey itself, a closer review of the broader ADT data for the Castlereagh Highway indicated that on a number of days these through flows exceeded 400 vph during the weekday afternoon shift arrival period. As such Condition 21 Schedule 4 of SSD 5594 is being met and the existing AUR intersection between Castlereagh Highway and Mine Access Road is now required to be upgraded to a standard channelised right (CHR) treatment (AustRoads) in consultation with RMS.

Based upon traffic flows and in accordance with the SIDRA evaluation tool for intersection operations, the Castlereagh Highway and Mine Access Road intersection has a Level of Service (LoS) of 'A' or rating of good with very moderate delays and significant available capacity during each of the Springvale Mine shift arrival and departure periods. LoS is a basic performance indicator assigned to an intersection based on average delay. Relevant levels of service which follow the RMS level of service criteria are defined as:

- Level of Service 'A': delay of less than 15 seconds
- Level of Service 'B': delay of 15 to 28 seconds
- Level of Service 'C': delay of 29 to 42 seconds.

The upgraded intersection to CHR treatment will effectively provide the 'highest' order rural intersection design, however, the existing performance at the "A" LoS of the intersection would be generally unaffected by the upgrade i.e. average delays would be unchanged.

Data from RMS identify that no car accidents have occurred at the Castlereagh Highway and Mine Access Road intersection, which according to ARC (2016) is a function of the good design of the intersection, particularly with regard to sight distances.

With respect to the LoS of Castlereagh Highway adjacent to the Mine Access Road the traffic survey data undertaken for the modification (refer to Appendix A of ARC (2016)) show that this section of the highway generally operates at a LoS 'B', and has significant spare capacity within the RMS recommended operating performance standards.

Traffic generation at Springvale pit top comprises trips by mining and office staff, visitors, and minor service vehicle demands related to delivery of equipment and maintenance vehicles. The majority of the vehicle movements to and from Springvale pit top are by the existing 358 full time equivalent staff (including 21 contractors) comprising general administration and mining staff using private vehicles with the site operating 24 hours per day, 7 days per week. The vehicle movements occur mainly

across three shifts per day and these shifts and staff numbers vary between weekdays and weekend as shown in **Table 17.**

Table 17 – Existing Springvale Mine Staff and Shifts

Springvale Shifts and Staff Numbers	Weekday Shifts			Weekend Shifts	
	Day	Afternoon	Night	Day	Night
	6:00 am – 4:00 pm	2:00 pm – 12:00 pm	10:00 pm – 8:00 am	6:00 am – 6:00 pm	6:00 pm – 6:00 am
Mining	81	63	60	44	43
General staff	39	2	2	2	1
Contractor	9	5	7	0	0
Total	**129**	**70**	**69**	**46**	**44**

9.1.2.2 Pit Top Car Parking

The primary parking area at Springvale pit top provides 205 parking spaces, comprising 149 covered spaces and 56 uncovered spaces. The current peak demand is for up to approximately 180 parking spaces during the change-over period between the night shift and day shift (between approximately 6:00 am and 6:30 am), and up to approximately 199 spaces during the change-over period between the day shift and afternoon shift (between 2:00 pm and 4:00 pm). As such, the available car parking capacity is in excess of peak demand at all times.

9.1.3 Impact Assessment

9.1.3.1 Road Network and Road Safety

The Springvale pit top access, via the intersection of Castlereagh Highway and Mine Access Road will be unchanged by the modification and will more broadly use the same sub-regional network as described in **Section 9.1.2**. The modification will, however, result in a change to the existing traffic generation at Springvale pit top due to the increase in the employee number to 450 full time equivalent personnel. The numbers of employees within each shift proposed for the modification is shown in **Table 18**.

Table 18 – Proposed Springvale Mine Staff

Springvale Shifts and Staff Numbers	Weekday Shifts			Weekend Shifts	
	Day	Afternoon	Night	Day	Night
	6:00 am – 4:00 pm	2:00 pm – 12:00 pm	10:00 pm – 8:00 am	6:00 am – 6:00 pm	6:00 pm – 6:00 am
Mining	81	65	65	86	86
General staff	39	2	2	2	1
Contractor	9	5	7	0	0
Total	**129**	**72**	**74**	**88**	**87**

Given that each shift staff member generates an individual arrival trip prior to the shift starting, and an individual departure trip after the shift has ended (and these trips are not specifically concentrated in a

single arrival or departure hour) the traffic data suggest the potential for 100% of arrivals in the hour immediately preceding a shift start. If this worst case concentrated arrival and departure patterns are adopted the following additional trip generation estimates result due to the modification.

- An additional 2 vph in the hour prior to and hour following the weekday afternoon shift
- An additional 5 vph in the hour prior to and hour following the weekday night shift
- An additional 42 vph in the hour prior to and hour following the weekend day shift
- An additional 43 vph in the hour prior to and hour following the weekend night shift

With the above vehicle trip estimates from the modification and the projected 1.7% annual average growth forecast by RMS in 2010 on Castlereagh Highway in the vicinity of Springvale pit top, ARC (2016) has also assessed the impact on sub-regional traffic flow increases through to a forecast year 2025, discussed below.

With respect to the future intersection operations assessed for the 2025 forecast year peak period flows the TIA has concluded the Mine Access Road and Castlereagh Highway intersection will continue to operate at a good level of service during each of the Springvale Mine shift arrival and departure peak periods, with very moderate delays and significant available capacity. The modification will not alter the existing LoS 'A' at the intersection through to 2025.

The additional traffic generation due to the proposed modification noted above is considered minor, and would have little impact on the operating capacity of the Castlereagh Highway. With regard to the current LoS 'B' in the Castlereagh Highway noted above the additional traffic flows would not result in a change of level of service through all key peak periods through to the forecast year 2025. Significant growth capacity of Castlereagh Highway would still be available before a LoS 'C' traffic flows will be reached.

A cumulative assessment of the sub-regional mining projects that have the potential to generate additional trips to the Castlereagh Highway (Neubeck Project, Airly Mine Extension Project) through Wallerawang and past Springvale Mine has been undertaken in the TIA. The assessment indicates there is little potential for any significant traffic generation arising from individual projects other than minor short-term construction flows.

9.1.3.2 Pit Top Car Parking

The proposed increase in workforce in the modification will result in a future peak demand for up to 203 parking spaces during the change-over period between the weekend night shift and weekday day shift (between approximately 5:00 am and 6:30 am). The demand during the other weekday shift change-over periods will generally remain unchanged from the current peak demand. As such the pit top parking demands will continue to be provided within the pit top area for the proposed 450 fte workforce.

9.1.4 Consequence of Potential Impacts

Additional trip generation to the Springvale Mine pit top will result due to increase in staff proposed in the modification, however with no significant impact on Castlereagh Highway or the local road networks. For the forecast year 2025, the Springvale Mine traffic generation, annual average growth and other sub-regional traffic generating projects will occur. However, the traffic generation is considered minor and would have little impact on the operating capacity of the Castlereagh Highway, or on the Mine Access Road / Castlereagh Highway intersection's current level of service.

The Mine Access Road and Castlereagh Highway intersection will continue to operate at a good level of service, namely LoS 'A' during each of the Springvale Mine shift arrival and departure peak periods, and this level of service will not be altered through to 2025.

The current LoS 'B' in the Castlereagh Highway will not be altered due the additional traffic flows and this level of service will remain through all key peak periods through to the forecast year 2025. Significant growth capacity of Castlereagh Highway would still be available before a LoS 'C' traffic flows will be reached.

9.1.5 Management and Mitigation Measures

No specific mitigation measures have been proposed, given the impact additional traffic generation due to the modification is considered minor and the respective levels of service on Castlereagh Highway and at the Mine Access Road / Castlereagh Highway intersection will not be altered.

The continued Springvale traffic generation, annual average growth and other sub-regional traffic generating projects has over time generated total flows that meet AustRoads warrants for an upgrade of the existing Castlereagh Highway to Mine Access Road right turn treatment. As such Condition 21 Schedule 4 of SSD 5594 is being met and the existing AUR intersection between Castlereagh Highway and Mine Access Road will be upgraded to a standard channelised right (CHR) treatment (AustRoads) in consultation with RMS.

9.1.6 Conclusion

The traffic generated as a result of the proposed modification will have no significant impact upon the capacity, efficiency and safety of the local, sub-regional and regional road network over the life of the Springvale Mine Extension Project as modified.

The modification will not alter the characteristics of existing pit top traffic flows of the existing LoS 'B' within the sub-regional road network that consists of the Castlereagh Highway and Mine Access Road, nor will it alter the intersection performance between these two roads to access the Springvale pit top.

9.2 Air Quality

9.2.1 Introduction

An Air Quality Impact Assessment for the modification was undertaken by SLR Consulting Australia Pty Ltd "*Springvale Mine Modification to State Significant Development SSD 5594: Air Quality and Greenhouse Gas Impact Assessment"* (SLR, 2016), which is provided in full in **Appendix H.** The air quality assessment and has been prepared in accordance with the "*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*" (DEC, 2005), (Approved Methods).

The assessment involved the modelling of local meteorology and the dispersion of potential emissions from the Springvale pit top to predict the level of impact that may be experienced in the surrounding environment due to the proposed modification elements. Air quality goals for the modification as identified within the relevant policy, are presented in **Table 19**. The Approved Methods specify assessment criteria for Total Suspended Particulate (TSP) and PM_{10}, but not for $PM_{2.5}$. Potential impacts of the modification associated with $PM_{2.5}$ emissions have been assessed against criteria specified in the "National Environment Protection (Ambient Air Quality) Measure" (NEPM).

Table 19 – Modification Air Quality Goals

Pollutant	Averaging Time	Goal
TSP	Annual	90 µg/m^3
PM_{10}	24 Hours Annual	50 µg/m^3 (NSW EPA) 30 µg/m^3 (NSW EPA)
$PM_{2.5}$	24 Hours Annual	25 µg/m^3 (NEPM) 8 µg/m^3 (NEPM)
Dust Deposition	Annual	Maximum Incremental (Project only) increase of 2 g/m^2/month Maximum Total of 4 g/m^2/month (Project and other sources)

9.2.2 Existing Air Quality Environment

The air quality in the region surrounding Springvale is influenced by emissions generated by a range of sources, originating from both within and outside of the local area. Specifically, air quality will be influenced by traffic-generated pollution (e.g. motorised recreational vehicles travelling in the Newnes State Forest), emissions from power stations and associated ash dams in the area, other coal mining operations, pollution transported into the area from more distant sources, and pollution generated by the existing Springvale operations itself.

To appropriately assess the cumulative impact of the modification, the incremental impact from the proposed operation needs to be added to a dataset which includes the influences of all other sources of particulate in the region, and is representative of the air quality likely to be experienced at sensitive receptor locations without the impact of the proposed operation. As required by the Approved Methods, this background dataset is required to be contemporaneous with the meteorological data used within the assessment, and (for PM_{10}) include daily measurements. Given the limited availability of datasets from Springvale Mine and the general area which meet both of these criteria, data from Bathurst for the year 2014 have been selected for use within the assessment where appropriate.

9.2.3 Suspended Particulate Matter

Onsite ambient TSP and PM_{10} monitoring has been undertaken at Springvale Mine since December 2010, using two co-located high volume air samplers (HVAS) measuring TSP and PM_{10} concentrations on a 1-in-6-day cycle. The annual average TSP and PM_{10} concentrations during 2014 were measured at 15.3 µg/m^3 and 7.0 µg/m^3, respectively. The ratio of mean TSP to PM_{10} measurements in 2014 is of the order of 2.2 to 1. However, given the TSP to PM_{10} monitoring data were measured on a 1-in-6-day cycle (and not daily measurements) the Springvale data were not suitable for use in a contemporaneous cumulative impact analysis. Instead the continuous PM_{10} monitoring data (2014) from the OEH operated monitoring site at Bathurst has been used in SLR (2016). A comparison of the measured 24-hour average PM_{10} concentration data for the period 2010 – 2015 from Bathurst (all days) and Springvale HVAS (sampling days only) showed that the Bathurst data provide a conservative approximation of the background air quality experienced at the Springvale Mine and surrounding receptors.

No ambient background monitoring data for $PM_{2.5}$ are available in the local area or at the nearest OEH monitoring sites. Therefore a background $PM_{2.5}$ dataset cannot be used within this assessment and comparison of the incremental concentrations to the criteria has been performed.

9.2.3.1 Deposited Dust

Static dust monitoring commenced in January 2007 at two monitoring locations (DDG1 and DDG2) surrounding the Springvale pit top. All dust deposition results met the assessment criterion of 4 g/m^2/month with the exception of 2009. Monthly dust deposition results were shown to be elevated in September 2009 (between 10 g/m^2/month and 28 g/m^2/month) and October 2009 (between 7 g/m^2/month and 10 g/m^2/month) due to several dust storms experienced at the end of September 2009.

9.2.3.2 Adopted Background for Air Quality

No long term (≥1 year) continuous ambient monitoring data are available in the vicinity of the Springvale pit top to provide an assessment of potential cumulative pollutant concentrations at surrounding sensitive receptors. SLR (2016) have established that the use of continuous PM_{10} monitoring data (2014) from the OEH operated monitoring site at Bathurst provides a conservative estimate of regional background levels and includes the impact of industries surrounding the Springvale pit top.

The annual average background TSP concentration was estimated based on the annual average PM_{10} concentration at Bathurst and the TSP to PM_{10} ratio derived from Springvale HVAS data (**Section 9.2.3**). An annual average background dust deposition rate was calculated based on the average of 2014 data measured at five the dust deposition gauges surrounding Springvale. The adopted background data for this assessment are presented in **Table 20**.

Table 20 – Adopted Background Air Quality Data

Pollutant	Averaging Period	Background Concentration (µg/m^3)	Basis
PM_{10}	24-hours	Daily varying background	Monitoring data at Bathurst (2014)
	Annual	14.6	Monitoring data at Bathurst (2014)
TSP	Annual	32.1	TSP to PM_{10} ratio of 2.2
Dust Deposition	Annual	1.4 g/m^2/month	Average of dust deposition monitoring data in 2014

9.2.3.3 Sensitive Receptors

As shown in **Figure 6**, there are nine representative residential receptors, identified as S1 – S5, W1, W2, L1 and L2. In addition a further nine recreational receptors have been identified within Newnes Plateau (NF1 – NF9) for the purposes of assessing air quality impacts of the modification.

9.2.4 Impact Assessment

The proposed modification elements with the potential for air quality impacts comprise:

- Extension of the ROM coal stockpile footprint and an increase in the rate of ROM coal being received at the stockpile and the crusher and screening plant
- Increase in underground mining equipment (an additional continuous miner unit) and hence increased ventilation rate.

Mine activities with the potential to generate dust emissions include the following.

- Material handling (conveyor transfer points)
- Dozer operations on the coal stockpile
- Rom coal crushing
- Wheel-generated dust from vehicle movements
- Ventilation shaft emissions or fugitive emissions
- Wind erosion from coal stockpiles and other disturbed areas

The impacts of the above activities have been quantified in SLR (2016). The estimated emissions from modification components were incorporated into an existing atmospheric dispersion model for Springvale Mine to predict the future incremental and cumulative impacts on local air quality from the modification operations. The modelling predictive results for the ground level suspended particulate concentrations and deposition rates at the identified sensitive receivers (**Figure 6**) are summarised in **Table 21** to **Table 26**. Predicted contour plots for suspended particulate concentrations and deposition rates are included in SLR (2016).

9.2.4.1 Dust Deposition

Table 21 shows the the dust deposition rates predicted at the identified sensitive receptor locations due to the particulate emission rates estimated for the proposed modification. that the incremental and cumulative annual average dust deposition rates predicted at all nominated receptors and areas surrounding the Springvale pit top and Newnes Plateau are well below the criteria of 2 g/m^2/month (incremental increase in dust deposition) and 4 g/m^2/month (cumulative dust deposition). The incremental increase predicted as a result of the proposed modification operations are negligible and would not result in a measureable increase above background levels.

Table 21 – Predicted Annual Average Dust Deposition Rate

Receptor ID	Background (g/m²/month)	Annual Average Dust Deposition Rate (g/m²/month)	
		Increment	Cumulative
S1	1.4	0.2	1.6
S2	1.4	<0.1	<1.5
S3	1.4	<0.1	<1.5
S4	1.4	<0.1	<1.5
S5	1.4	<0.1	<1.5
W1	1.4	<0.1	<1.5
W2	1.4	<0.1	<1.5
L1	1.4	<0.1	<1.5
L2	1.4	<0.1	<1.5
NF1	1.4	<0.1	<1.5
NF2	1.4	<0.1	<1.5
NF3	1.4	<0.1	<1.5
NF4	1.4	<0.1	<1.5
NF5	1.4	<0.1	<1.5

Receptor ID	Background (g/m²/month)	Annual Average Dust Deposition Rate (g/m²/month)	
		Increment	Cumulative
NF6	1.4	<0.1	<1.5
NF7	1.4	<0.1	<1.5
NF8	1.4	<0.1	<1.5
NF9	1.4	<0.1	<1.5
NSW EPA Criteria		**2.0**	**4.0**

9.2.4.2 Suspended Particulates

Table 22 presents the annual average TSP concentration predicted by the dispersion modelling at each of the nominated receptors using the emission rates calculated

Table 22 – Predicted Annual Average TSP Concentration

Receptor ID	Background (µg/m³)	Annual Average TSP Concentration (µg/m³)	
		Increment	Cumulative
S1	32.1	5.6	37.7
S2	32.1	4.1	36.2
S3	32.1	1.0	33.1
S4	32.1	1.2	33.3
S5	32.1	0.6	32.7
W1	32.1	0.3	32.4
W2	32.1	0.3	32.4
L1	32.1	0.3	32.4
L2	32.1	0.8	32.9
NF1	32.1	<0.1	<32.2
NF2	32.1	<0.1	<32.2
NF3	32.1	<0.1	<32.2
NF4	32.1	<0.1	<32.2
NF5	32.1	<0.1	<32.2
NF6	32.1	<0.1	<32.2
NF7	32.1	<0.1	<32.2
NF8	32.1	<0.1	<32.2
NF9	32.1	<0.1	<32.2
NSW EPA Criterion		**-**	**90**

The cumulative annual average TSP concentration is predicted to be well below the criterion of 90 µg/m^3 at all nominated receptors and areas surrounding the Springvale pit top and recreational receptors on Newnes Plateau. The incremental increase predicted as a result of the modification operations are very low and are not predicted to give rise to a significant increase above existing background levels.

Table 23 presents the annual average PM_{10} concentration predicted by the dispersion modelling at each of the nominated receptors areas using the emission rates for the modification. The assumed background PM_{10} concentration has been discussed in detail in **Section 7.3.2.3**.

Table 23 – Predicted Annual Average PM_{10} Concentration

Receptor ID	Background (µg/m³)	Annual Average PM_{10} Concentration (µg/m³)	
		Increment	Cumulative
S1	14.6	2.1	16.7
S2	14.6	1.5	16.1
S3	14.6	0.4	15.0
S4	14.6	0.5	15.1
S5	14.6	0.3	14.9
W1	14.6	0.2	14.8
W2	14.6	0.1	14.7
L1	14.6	0.1	14.7
L2	14.6	0.4	15.0
NF1	14.6	<0.1	<14.7
NF2	14.6	<0.1	<14.7
NF3	14.6	<0.1	<14.7
NF4	14.6	<0.1	<14.7
NF5	14.6	<0.1	<14.7
NF6	14.6	<0.1	<14.7
NF7	14.6	<0.1	<14.7
NF8	14.6	<0.1	<14.7
NF9	14.6	<0.1	<14.7
NSW EPA Criterion		**-**	**30.0**

Annual average PM_{10} concentration is predicted to be well below the NSW EPA criterion of 30 µg/m3 at all nominated receptors and areas surrounding the Springvale pit top and recreational receptors on Newnes Plateau. The incremental increase predicted as a result of the modification operations are very low and are not predicted to give rise to a significant increase above existing levels.

To assess the cumulative maximum 24-hour average PM_{10} concentration at each of the identified sensitive receptors, the incremental impact predicted by the model for each hour of the year was added to the corresponding measured background concentration to provide cumulative 24-hour average PM_{10} concentrations.

Table 24 presents the maximum 24-hour average PM_{10} concentration predicted by the dispersion modelling at each of the nominated receptors and surrounding areas using the emission rates calculated for the modification. The results presented in **Table 24** show that the predicted cumulative 24-hour average PM_{10} concentration at each receptor is below the criterion of 50 µg/m³ and therefore the proposed modification operation is unlikely to cause any exceedences at any surrounding sensitive receptor locations.

Table 24 – Predicted Maximum 24 Hour Average PM_{10} Concentration

Receptor ID	Maximum 24-Hour Average PM_{10} Concentration (µg/m³)	
	Increment	Cumulative
S1	21.2	45.1
S2	21.1	39.9
S3	5.8	39.4
S4	5.3	39.4
S5	3.5	39.4
W1	2.0	39.4
W2	2.2	39.4
L1	1.8	39.6
L2	5.4	39.5
NF1	0.3	39.4
NF2	0.3	39.4
NF3	0.2	39.4
NF4	0.1	39.4
NF5	0.1	39.4
NF6	0.1	39.4
NF7	0.1	39.4
NF8	0.1	39.4
NF9	0.1	39.5
NSW EPA Criterion	**-**	**50**

Following the Approved Methods, a contemporaneous analysis of the maximum predicted 24-hour average PM_{10} concentration at the worst impacted receptor (S1) was performed and is presented in **Table 25.** This analysis showed that background concentrations are relatively low (<43% of the criterion) on days with highest predicted incremental contribution from the modification operations.

Table 25 – Summary of Contemporaneous Analysis at Receptor S1

Date	PM_{10} 24-Hour Average (µg/m³)			Date	PM_{10} 24-Hour Average (µg/m³)		
	Highest Background	Increment	Total		Background	Highest Increment	Total
25-03-2014	39.4	0.8	40.2	09-04-2014	7.9	21.2	29.1
26-03-2014	34.8	10.3	45.1	11-03-2014	10.5	19.8	30.3
01-10-2014	29.4	0.0	<29.5	07-02-2014	21.9	18.0	39.9
23-04-2014	28.1	0.0	<28.2	14-01-2014	14.5	15.9	30.4
06-01-2014	27.6	0.0	<27.7	13-02-2014	5.7	15.8	21.5

Table 26 presents the maximum 24-hour and annual average incremental $PM_{2.5}$ concentrations predicted by the dispersion modelling at each of the nominated receptor locations using the emission rates calculated for the modification. As noted in **Section 9.2.3**, no ambient background monitoring

data for $PM_{2.5}$ are available in the local area or at the nearest OEH monitoring sites. Modelling results have been assessed by comparison of the incremental concentrations against the criteria.

Table 26 shows that the incremental increase in 24-hour average and annual average $PM_{2.5}$ concentrations predicted as a result of the proposed modification operations are minor and are unlikely to cause any exceedences at any surrounding sensitive receptor locations.

Table 26 – Predicted 24-Hour and Annual Average $PM_{2.5}$ Concentrations

Receptor ID	Incremental $PM_{2.5}$ Concentration (µg/m³)	
	Maximum 24-Hour Average	Annual Average
S1	2.1	0.2
S2	2.1	0.2
S3	0.6	<0.1
S4	0.5	<0.1
S5	0.3	<0.1
W1	0.2	<0.1
W2	0.2	<0.1
L1	0.2	<0.1
L2	0.6	<0.1
NF1	<0.1	<0.1
NF2	<0.1	<0.1
NF3	<0.1	<0.1
NF4	<0.1	<0.1
NF5	<0.1	<0.1
NF6	<0.1	<0.1
NF7	<0.1	<0.1
NF8	<0.1	<0.1
NF9	<0.1	<0.1
NEPM Criteria	**25 (cumulative)**	**8 (cumulative)**

9.2.5 Cumulative Impact Assessment

Industrial facilities in the vicinity of Springvale Mine that have the potential to generate particulate matter emissions and may contribute to the cumulative impacts on the local airshed are:

- Wallerawang Power Station (being decommissioned and deconstructed) – fugitive emissions from the exposed areas
- Mount Piper Power Station and associated ash disposal areas
- Angus Place Colliery (under care and maintenance since March 2015)
- An approved (being constructed) new upcast ventilation shaft on Newnes Plateau for Angus Place Colliery
- Lidsdale Siding Rail Loading Facility

- Western Coal Services Project including Springvale Coal Services Site Operations, Mount Piper Haul Road, Wallerawang Haul Road and the overland conveyor system between Springvale pit top, Springvale Coal Services Site and Lidsdale Siding
- Clarence Colliery
- Surrounding forestry activities and recreational activities (e.g. vehicles within the Newnes State Forest).

Given that the continuous particulate monitoring data obtained from the Bathurst OEH site has been confirmed in SLR (2016), and noted in **Section 9.2.3.2**, to be clearly a conservative estimation of the actual particulate environment (as monitored) surrounding Springvale pit top, the identified existing activities and projects located in the area surrounding the mine (noted above) contribute to the cumulative background air quality levels, and hence have been considered as part of the modification assessment. The predicted results showed that the proposed modification activities are unlikely to cause any exceedences of the relevant ambient air quality criteria for TSP, PM_{10} and $PM_{2.5}$ concentrations or dust deposition rate at any identified surrounding sensitive receptors.

9.2.6 Consequence of Potential Impacts

The modification activities are predicted to comply with all relevant air quality criteria at representative receptors during operation with regard to potential cumulative impacts in the area surrounding the Springvale pit top.

9.2.7 Management and Mitigation

The estimated emissions for the modification have been calculated with existing management controls that will continue to be used throughout the life of Springvale mine.

Existing monitoring measures will continue for Springvale Mine, consisting of the two co-located high volume air samplers (measuring TSP and PM_{10} concentrations) and dust deposition gauges in the short term, as described in the Western Region – Air Quality and Greenhouse Gas Management Plan. Due to the predicted low air quality impacts of the modification, it is considered Springvale Mine's current monitoring is adequate for appropriately addressing the risk of air quality impacts upon identified residential and recreational receptors in the vicinity of Springvale Mine. In the long term air quality monitoring air quality monitoring will be undertaken in accordance with the monitoring schedule described in the Western Region – Air Quality and Greenhouse Gas Management Plan.

The potential air quality impacts will be mitigated through the continued implementation of existing management measures such as water spraying, minimisation of exposed areas and ceasing work during adverse weather conditions.

9.2.8 Conclusion

Dust levels (i.e. TSP, PM_{10}, $PM_{2.5}$ and dust deposition) arising from the Springvale Mine operations as modified are predicted to be within relevant air quality criteria.

9.3 Greenhouse Gas Emissions

9.3.1 Introduction

A Greenhouse Gas (GHG) Emissions Assessment for the modification was undertaken by SLR Consulting Australia Pty Ltd "*Springvale Mine Modification to State Significant Development SSD*

5594: Air Quality and Greenhouse Gas Impact Assessment" (SLR, 2016), which is provided in full in **Appendix H.**

The GHG Assessment has been performed with reference to the Australian Department of Climate Change and Energy Efficiency (DCCEE) document "*National Greenhouse Accounts Factors*" (August 2015), the NSW Department of Energy, Utilities and Sustainability (DEUS) document "*Guidelines for Energy Savings Action Plans*" (2005), the *National Greenhouse and Energy Reporting Act 2007* (NGER Act), the Centennial Coal Greenhouse Gas Assessment Guidance Notes (Centennial Coal, 2010) and Climate Change Response Policy (Centennial Coal, 2012).

The definitions used for Scope 1 and Scope 2 emissions are within the *National Greenhouse and Energy Reporting Regulations 2008*. Scope 3 emissions are not defined within the NGER Act, therefore these estimates have been undertaken in accordance with the National Greenhouse Accounts factors.

Quantification of Scope 1 and Scope 2 emissions and significant upstream/downstream Scope 3 GHG emissions has been undertaken in relation to both carbon dioxide (CO_2) and other greenhouse gases. For comparative purposes, non-CO_2 greenhouse gases are awarded a "CO_2-equivalence" (CO_2-e) based on their contribution to the enhancement of the greenhouse effect using a global warming potential index, also listed under *National Greenhouse and Energy Reporting Regulations 2008*.

Whilst the Greenhouse Gas Emissions Assessment in SLR (2016) is concerned with the proposed modification, data for all greenhouse gas generating activities at Springvale are presented. The data for the current operations (as approved in SSD 5594) and proposed operations with the modification elements included are both presented so that the impact of the modification elements can be determined.

The baseline against which the modification impacts were assessed is the currently approved ROM extraction and processing rate of 4.5 Mtpa. Springvale activity data for the National Pollutant Inventory (NPI) reporting period of July 2014 to June 2015 was used. Given that Springvale only extracted 3.8 Mt of ROM coal in this NPI reporting period then the baseline activity data were scaled by a factor of 1.18 (4.5/3.8) to enable a comparison of approved versus proposed activities occurring as part of the modification.

9.3.2 Existing Environment

The activity data for the period of July 2014 to June 2015 listed the following activities in the NPI report.

- Total ROM coal production (tonnes [t])
- Total electricity consumption (kilowatt-hours [kwh])
- Total diesel consumption (litres [L])
- Solid waste to landfill (t)
- Consumption of liquid petroleum gas (LPG)
- Consumption of oils and greases (consumed without combustion)

A summary of the potential Project GHG emission sources (Scopes 1 to 3) is provided in **Table 27.**

Table 27 – Summary of Potential GHG Emissions

Component	Direct Emissions	Indirect Emissions	
	Scope 1	**Scope 2**	**Scope 3**
Fugitive emissions	Emissions from the release of coal seam methane and carbon dioxide.	N/A	N/A
Diesel	Emissions from the combustion of diesel (both mobile and fixed plant and equipment).	N/A	Emissions from contractor diesel usage. Estimated emissions attributable to the extraction, production and transport of diesel consumed at Springvale Mine.
Liquid petroleum gas	Emissions from the combustion.	N/A	N/A
Oils and greases	Consumption (non-combustion) of oils and greases.	N/A	N/A
Electricity	N/A	Emissions associated with the consumption of generated and purchased electricity	Estimated emissions from the extraction, production and transport of fuel burned for the generation of electricity consumed and the electricity lost in delivery in the transmission and distribution network.
Solid Waste	N/A	N/A	Emissions associated with the disposal of solid waste to landfill.
Coal Combustion	N/A	N/A	Emissions associated with the combustion of coal at the mine.

Note: N/A means 'not applicable'

Table 28 provides a summary of Springvale's activity data relevant to GHG emissions for the current approved and proposed operations.

Table 28 – Summary of Emissions Data

Activity	Current Approved Operations	Proposed Operations
Annual ROM production (Mtpa)	4.5	5.5
Annual electricity consumption (kWh)	116,662,837	116,662,837
Annual diesel consumption – Springvale Coal (L)	1,908,947	2,406,272
Annual diesel consumption – Contractor (L)	697,452	852,441
Annual flowrate from mine ventilation shaft (airflow) (million m3)	4,792	5,426
Solid waste to landfill (tonnes)	669	971
Liquid Petroleum Gas (LPG) (kg)	35,281	35,281
Petroleum based oils used (L)	183,000	183,000
Petroleum based greases used (L)	3,000	3,000

9.3.3 Impact Assessment

Calculated Scope 1, Scope 2 and Scope 3 GHG emissions resulting from the emissions sources outlined within **Table 28** are presented in **Table 29**.

Table 29 – Scopes 1, 2 and 3 GHG Emissions

Source	Current Approved Operations (tonnes CO 2-e/annum)	Proposed Operations (tonnes CO2-e/annum)	Change (tonnes CO2-e/annum)
Scope 1			
Fugitive emissions	25,167	28,496	3,329
Diesel combustion	5,173	6,322	1,149
LPG combustion	81	81	0
Oil and grease consumption	99	99	0
Total (Scope 1)	**30,520**	**34,998**	**4,479**
Scope 2			
Electricity consumption	97,997	97,997	0
Total (Scope 2)	**97,997**	**97,997**	**0**
Scope 3			
Product coal combustion	10,962,945	13,399,155	2,436,210
Extraction, production and transport of diesel	265	324	59
Diesel use by contractors (combustion and production)	1,987	2,428	441
Oil and grease extraction, production and transport	26	26	0
Electricity consumption	15,166	15,166	0
LPG extraction, production & transport	6	6	0
Waste disposal	937	1,360	423
Employee travel	1,855	2,692	837
Total (Scope 3)	**10,893,187**	**13,421,157**	**2,437,970**

The impacts of the proposed modification are as follows.

- The proposed modification is estimated to result in an increase in direct (Scope 1) GHG emissions of 4,479 t CO_2-e per annum, which represents an increase of 15% on current approved operations.
- Indirect (Scope 2) GHG emissions are not expected to change as a result of the proposed modification.
- Indirect (Scope 3) GHG emissions are estimated to increase by 2,437,970 t CO_2-e per annum, an increase of approximately 22% on current approved operations. The increased emissions

are due to the indirect emissions associated with combustion of the additional 1 Mtpa product coal by end users.

9.3.4 Consequence of Potential Impacts

GHG emissions in NSW were reported to be 141.8 Mt in 2013, representing 28% of the Australian total GHG emissions of 549.4.8 Mt (http://ageis.climatechange.gov.au/). The modification's contribution to Australian emissions would be relatively small. Estimated annual Scope 1 emissions will represent approximately 0.0032% of NSW GHG emissions and 0.0008% of Australia's total GHG emissions.

It is widely accepted that increased GHG emissions exert a warming influence on climate. Atmospheric temperature increases can result in: changes in ocean levels (due to melting of glaciers and polar ice caps) and water temperatures; greater humidity; and changes in weather patterns which lead to effects such as more droughts in some areas and more flooding in others.

The modification will directly and indirectly generate GHG emissions, which will contribute to these associated global environmental effects. However, the increase in GHG emissions resulting from the modification will not substantially increase the total Australian emissions. In addition, due to the uncertainties and complexities of the climate system, quantification of the likely environmental effects associated with greenhouse gases being released in the atmosphere as a result of the modification cannot be made.

9.3.5 Mitigation, Management and Monitoring

No particular design measures can be incorporated into Springvale Mine's operations to avoid impacts associated with GHG emissions due to the modification.

Springvale Coal has implemented in its operational design, including mine planning, the following measures to minimise to the greatest extent practicable GHG emissions.

- Maximising energy efficiency as a key consideration in the development of the mine plan. For example, significant savings of greenhouse gas emissions (through increased energy efficiency) are achieved by mine planning decisions.
- The mine has developed and implemented an Energy and Greenhouse Management System and monitors and reports energy usage at the mine. Key Performance Indicators including energy demand and GHG emissions per tonne of ROM coal produced are tracked.
- Identification and implementation of cost effective measures to improve energy efficiency.
- Consideration of energy efficiency in plant and equipment selection/phase.
- Ongoing regular maintenance of plant and equipment to minimise fuel consumption is undertaken.

As part of Centennial Coal's Sustainability Strategy, the company has set its "Vision 2020", the platform to tangibly deliver the Company Vision and Values. Vision 2020 incorporates a target for GHG, being to reduce company greenhouse gas emissions by 25% by 2020. An action plan and roadmap is in place to deliver this goal.

9.3.6 Conclusion

The increase in direct (Scope 1) emissions from the modification are estimated to be approximately 4,479 t CO_2-e per annum, which represents an increase of 15% on current approved operations. The

increase is relatively small and represents approximately 0.0032% of NSW GHG emissions when compared to the latest available emissions data (2013) (Scope 1). The increase represents 0.0008% of Australia's total GHG emissions (Scope 1) for 2013.

9.4 Groundwater

9.4.1 Introduction

A Groundwater Assessment for the modification was prepared by Jacobs Australia Pty Limited, *Springvale Mine Groundwater Assessment – SSD 5594 Modification 1* (Jacobs, 2016a), which is provided in full in **Appendix I**. This report presents an assessment of the proposed modification on the hydrogeological environment at Springvale Mine. Given that the groundwater assessment for the SVMEP EIS was only recently undertaken (RPS (2014b)), Jacobs (2016) draws on information already presented in RPS (2014b). However, the mine inflow predictions presented in the updated hydrogeological modelling undertaken in 2015 by CSIRO (Adhikary and Wilkins (2015)) to account for the increased production rate of 5.5 Mtpa have been utilised in Jacobs (2016).

The numerical groundwater model at Springvale Mine was constructed in COSFLOW, which is a fully implicit solution to Darcy-Richards equation (variably saturated flow) and provides a continuous simulation of both unsaturated and saturated conditions. It is therefore capable of simulating the formation of multiple phreatic surfaces (water tables). This is an important attribute in the context of the hydrogeology of Springvale Mine.

Between 2004 and 2015, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) has undertaken a number of studies comprising numerical modelling simulations using COSFLOW to estimate surface subsidence and predict mine inflows from longwall mining (e.g. Guo, Adhikary and Gabeva (2007); Adhikary and Wilkins (2012); Adhikary and Wilkins (2013); Adhikary and Wilkins (2015)). These studies have culminated in a detailed COSFLOW numerical hydrogeological model that allows Springvale Mine to quantify the groundwater impacts, their magnitude and extent, including impacts on swamps and watercourses that overlie the Springvale mining area (**Figure 9**).

The most recent COSFLOW groundwater model (Adhikary and Wilkins (2015)) was updated by CSIRO in 2015 to account for the:

- Change in operational status at Angus Place Colliery, with the mine going on care and maintenance in March 2015
- Proposed change in coal mining rate at Springvale Mine, with an increase from the approved 4.5 Mtpa to up to 5.5 Mtpa.

9.4.2 Existing Environment

9.4.2.1 Geology and Groundwater System

As noted in **Section 2.9** the underlying strata of Newnes Plateau comprises mostly of sandstones of the Triassic Narrabeen Group with inter-bedded shale, claystone and siltstone, and the Permian Illawarra Coal Measures (**Figure 10**). The Narrabeen Group comprises the following sequence of rock formations:

- the Burralow Formation
- the Banks Wall Sandstone
- the Mount York Claystone

- the Burra-Moko Head Sandstone
- the Caley Sandstone.

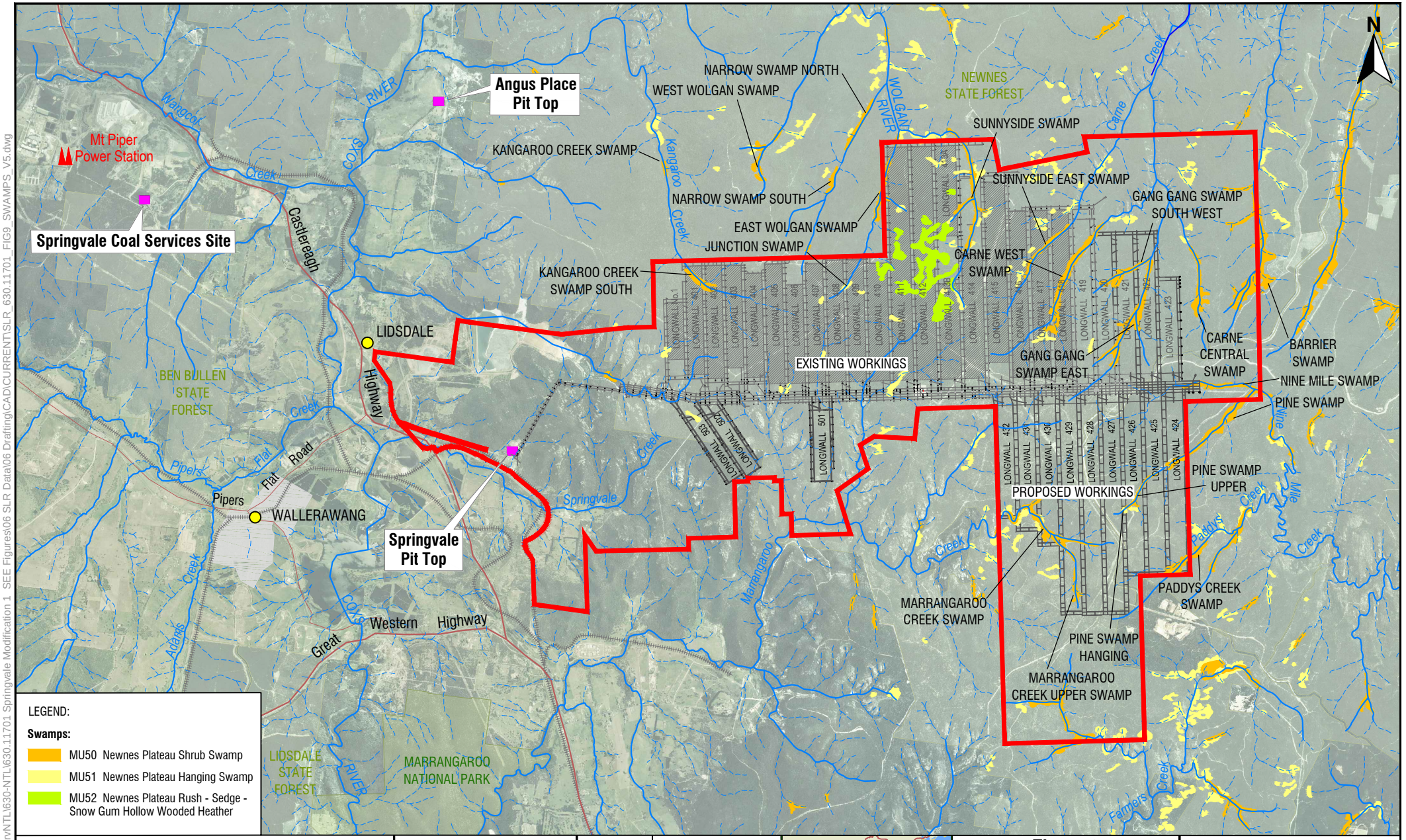
The detailed stratigraphy of the Project Application Area is described in Palaris (2013a and 2013b) and summarised by RPS (2014b). The key finding of Palaris (2013a, 2013b) of relevance to Springvale Mine potential groundwater impacts due to mining are the occurrence Burralow Formation and the Mount Clay Yorkstone within the Narrabeen Group over the mining area, and which respectively occur at the upper and lower boundary of the Banks Wall Sandstone. These two stratigraphic units are characterised by the presence of claystone/shale bands, and provide the hydraulic barriers between the perched and shallow groundwater systems and the shallow and deep groundwater systems, respectively (see below). Groundwater modelling indicates that the Mount York Claystone is the main aquitard in the region. The Burralow Formation and the Mount York Claystone are key to the hydrogeological regime of the area and Newnes Plateau Shrub Swamp formation.

Each of the three groundwater systems (perched, shallow and deep) defined by the stratigraphic units noted above, display independent hydraulic behaviours and are described below.

- **Perched groundwater system** – comprises discontinuous and surficial systems, which are generally hydraulically independent of the underlying regional groundwater system. They are located above the regional water table, on a series of low permeability bands, beds and lenses within the Burralow Formation. They are generally limited to topographically elevated areas and are completely reliant on rainfall to sustain them through direct recharge.
- **Shallow groundwater system** – is a regional system located in the Banks Wall Sandstone and generally extends to a depth of 90 m below the Burralow Formation (i.e. 90 m to 200 m below the ground surface). Most groundwater flow is horizontal and it is predominantly recharged by direct infiltration where the aquifer outcrops beneath a weathered section. The shallow groundwater system is underlain by 22 m thick Mount York Claystone.
- **Deep groundwater system** – located in the strata underlying the Mount York Claystone and includes the Illawarra Coal Measures which generally lie at a depth of 200 m to 500 m below the ground surface. Aquifer zones, which occur at depth are typically fractured rock aquifers or jointed coal seams. It is this system which produces the mine water inflows when groundwater in this system is drained into the goaf following coal extraction.

The key elements of the hydrogeological system, shown in **Figure 11** (after Figure 9B of RPS (2014b)), comprise:

- Stacked and segregated groundwater systems recharged by rainfall – locally in the case of shallow and perched systems and regionally in the case of the deeper systems
- Deep regional flow essentially isolated from the shallow and perched groundwater systems
- Perched water systems, supported on low permeability aquitard layers
- Shrub swamps fed partially by groundwater originating from the perched groundwater systems and partially from surface water run-off
- The mount york claystone acting as a significant regional aquitard isolating the shallow and perched groundwater systems from the deep groundwater system
- The deep interbedded and interbanded aquitard (mudstones) and aquifer (sandstone and coal) units present beneath the mount york claystone strongly influence the deep regional groundwater flow pattern at depth


Angus Place Pit Top
Springvale Coal Services Site
Mt Piper Power Station
Springvale Pit Top
LIDSDALE
WALLERAWANG
Pipers
NARROW SWAMP NORTH
WEST WOLGAN SWAMP
KANGAROO CREEK SWAMP
NARROW SWAMP SOUTH
EAST WOLGAN SWAMP
JUNCTION SWAMP
KANGAROO CREEK SWAMP SOUTH
SUNNYSIDE SWAMP
SUNNYSIDE EAST SWAMP
GANG GANG SWAMP SOUTH WEST
CARNE WEST SWAMP
GANG GANG SWAMP EAST
CARNE CENTRAL SWAMP
BARRIER SWAMP
NINE MILE SWAMP
PINE SWAMP
PINE SWAMP UPPER
EXISTING WORKINGS
PROPOSED WORKINGS
MARRANGAROO CREEK SWAMP
PADDYS CREEK SWAMP
PINE SWAMP HANGING
MARRANGAROO CREEK UPPER SWAMP
NEWNES STATE FOREST
BEN BULLEN STATE FOREST
LIDSDALE STATE FOREST
MARRANGAROO NATIONAL PARK
Western Highway
Great Western Highway
Castlereagh Highway
Wolgan River
Coxs River
Kangaroo Creek
Springvale Creek
Marrangaroo Creek
Pipers Flat Road
Wangcol Creek
Adams Creek
Carne Creek
Wine Mile Creek
Paddys Creek
Farmers Creek
N
LEGEND:
Swamps:
MU50 Newnes Plateau Shrub Swamp
MU51 Newnes Plateau Hanging Swamp
MU52 Newnes Plateau Rush - Sedge - Snow Gum Hollow Wooded Heather
LEGEND:
Project Application Area
Major Roads
Watercourse
Railway
Built-up areas
Town / City
State Forest
National Park
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DATE 13.07.2016
SEAM LITHGOW
REFERENCE SLR_630.11701_FIG2_PROJAPPAREA_V2.dwg
SCALE 1:75000
Springvale Project Site
Newcastle
Lithgow
Sydney
Figure 9
Springvale Mine Workings Relative to Swamps and Watercourses
0.0 1.5 3.0 KM
Centennial Coal
Springvale
Prepared by:
SLR
A4
H:\Projects-SLR\630-SrvNTL\630-NTL\630.11701 Springvale Modification 1 SEE Figures\06 SLR Data\06 Drafting\CAD\CURRENT\SLR_630.11701_FIG9_SWAMPS_V5.dwg

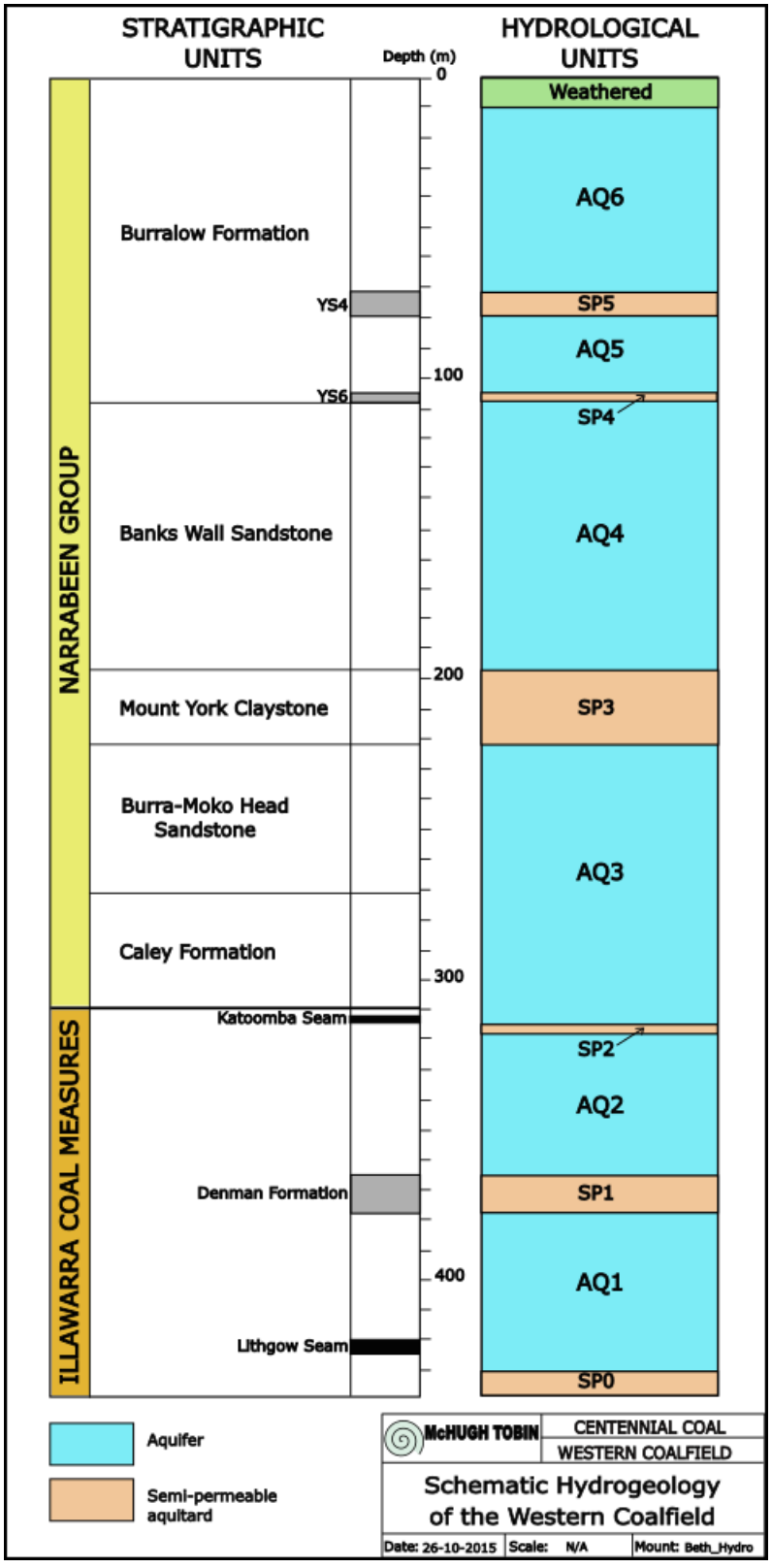

Figure 10 – Regional Stratigraphic Summary and Hydrological Units

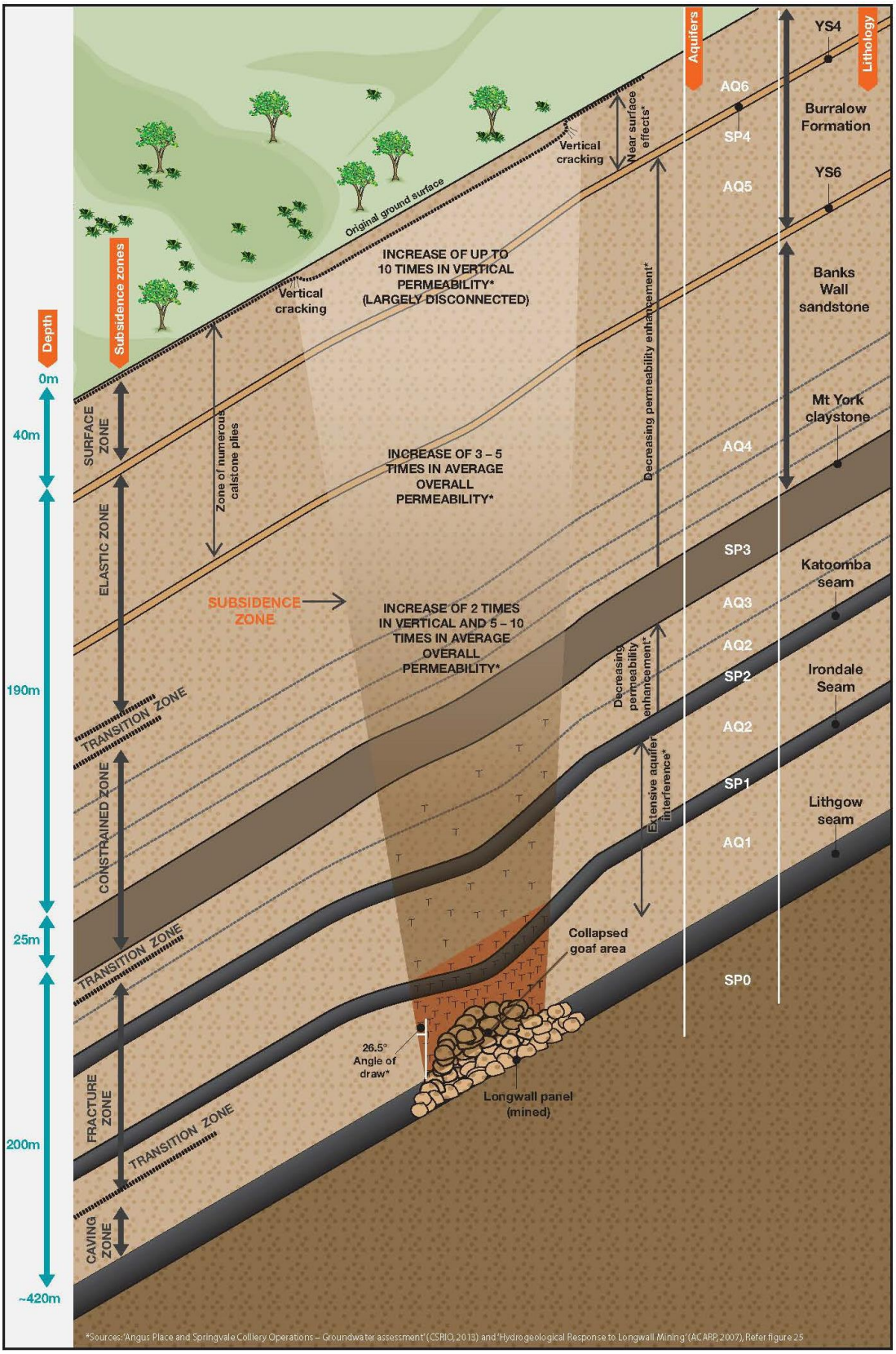

Figure 11 – Conceptual Hydrogeological Model

- Groundwater flow is dominated by both porous media flow (dominantly horizontal) and to a much lesser extent, fracture flow associated with the joint, fracture and fault conduits
- Variably enhanced groundwater flow through the lithological pile affected by subsidence induced permeability zones
- Extensive aquifer interference in the deep regional groundwater system aquifers due to subsidence induced goaf formation, collapse and fracturing affects. These observed aquifer impacts do not extend above the mount york claystone.
- Shallow formation sagging, induced by subsidence, gives rise to enhanced horizontal permeability in the shallow groundwater system (permeability enhancements decreasing closer to the ground surface)
- Disconnected vertical permeability enhancements are inferred in the shallow surface zones.

Within the sequences noted above, a number of key hydrostratigraphic units underlie the region. The aquifer units are identified as AQ1 – AQ6 and aquitard units are identified as SP0 – SP4, including YS4 and YS6 within the Burralow Formation. These units have been incorporated into the COSFLOW groundwater numerical model developed by CSIRO for Springvale Mine and Angus Colliery. The hydrogeological components incorporated in the groundwater model are included in Table 2.5 of SVMEP EIS (Golder Associates (2014)), and shown in **Figure 10**.

Existing mining operations comprise longwall mining of the Lithgow Seam at a depth of 300 m to 420 m beneath the Newnes Plateau. The conceptual hydrogeological and hydrological model of the Project Application Area developed as part of the SVMEP EIS (**Figure 11**) shows the influence of longwall mining on the overlying geology and the effect this can have on the hydraulic mechanisms that govern groundwater flow. Regional groundwater flow is to the northeast toward the Wolgan Valley, consistent with the regional dip of the target coal seams. In contrast, the perched aquifer system reflects the local topography, eventually discharging to rivers and creeks of the Wolgan River, Coxs River or Colo River. It has been established through the extensive groundwater monitoring program at Springvale Mine that water quality of the perched and shallow groundwater systems is very fresh.

9.4.2.2 Water Sharing Plans

The Springvale Mine Extension Project lies on the boundary of the Sydney Basin Coxs River Groundwater Source and the Sydney Basin Richmond Groundwater Source of the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Source 2011*. The Sydney Basin Coxs River Groundwater Source has been designated by DPI Water (DPI (2012)) to be a Less Productive Groundwater Source (Porous Rock) while the Sydney Basin Richmond Groundwater Source has been designated as a Highly Productive Groundwater Source (Porous Rock).

9.4.2.3 Groundwater Dependent Ecosystems

There are no high priority groundwater dependent ecosystems listed in the schedule of the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011* with respect to the Sydney Basin Richmond Groundwater Source. There are also no springs listed in the Water Sharing Plan for the Richmond Groundwater Source.

There is a potential karst environment listed in the schedule of the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources* 2011 with respect to the Sydney Basin Coxs River Groundwater Source, however, this is located a significant distance from Springvale Mine and is not considered further. There are no springs listed in the Water Sharing Plan with respect to the Coxs River Groundwater Source.

Whilst not identified as high priority groundwater dependent ecosystems in the Water Sharing Plan, the Newnes Plateau shrub swamps are listed as an ECC under the TSC Act and in accordance with the EPBC Act, the shrub swamps and hanging swamps are collectively referred to as the Temperate Highland Peat Swamps on Sandstone (THPSS).

Newnes Plateau shrub swamps and hanging swamps (**Section 2.10**) exist within the Project Application Area (**Figure 9**). Shrub swamps with the potential to be impacted by future longwall extraction are listed below.

- Carne West Swamp (LW419)
- Gang Gang Swamp South East and Gang Gang Swamp West (LW420, 421, 422)
- Pine Swamp (LW424)
- Paddys Creek (LW424)
- Pine Swamp Upper (LW425, 426 and 427)
- Marrangaroo Swamp and Marrangaroo Creek Upper Swamp (LW428, 429, 430, 431 and 432)

The hanging swamps located above future longwalls include:

- Hanging swamp on western slope above Gang Gang Swamp East (LW419)
- Hanging swamp on southwestern slope above Pine Swamp Upper Swamp (LW426)
- Hanging swamps above Marrangaroo Creek Swamp (LW430, 432, 432)
- Hanging swamp (unnamed) (LW503).

9.4.2.4 Groundwater Users

Majority of the works within a 10 km radius of Springvale Mine and Angus Place Colliery are monitoring piezometers, exploration boreholes or dewatering shafts.

There are 12 groundwater users in the Sydney Basin Coxs River Groundwater Source within 10 km of Springvale Mine, assessed as 10 km radial distance from the centre of LW414. The Water Access Licence (WAL) numbers are provided in Table 3.3 of Jacobs (2016a). Nine of these 12 WALs are for non-mining water supply works.

There are four groundwater users in the Sydney Basin Richmond Groundwater Source within 10 km of Springvale Mine (WALs provided in Table 3.4 in Jacobs (2016a)). Only one of these WALs apply to non-mining related water supply works.

9.4.2.5 Surface Water – Groundwater Interaction

The Upper Coxs River lies to the west of Springvale Mine and flows in a southerly direction toward Lake Wallace. Overflow from Lake Wallace flows south to Lake Lyell, which is a water supply reservoir for the Mount Piper Power Station.

Within the Wolgan River catchment, Carne Creek and several of its tributaries overlie LW419 to LW422. These surface watercourses flow in a northeasterly direction toward the Wolgan Valley, eventually discharging to the Colo River. Nine Mile Creek, Paddys Creek and Bungleboori Creek flow in an easterly direction and eventually discharge to the Colo River.

To the southwest of LW432, Marrangaroo Creek flows in a westerly and then southerly direction, and discharges to the Coxs River between Lake Wallace and Lake Lyell.

9.4.2.6 Groundwater Monitoring Network

Groundwater levels are monitored in the swamps, and in the shallow and deep groundwater systems. Further details are provided in RPS (2014b). Monitoring is undertaken using both standpipe piezometers and vibrating wire piezometers, and is taken in accordance with Springvale Mine's *Water Management Plan*. A summary of the monitoring undertaken comprise the following, however are currently under review, in consultation with the DPE, as part of the development of the Extraction Plan for LW419:

- Swamp / perched groundwater levels and quality (standpipe piezometers)
- Swamp surface water flows and quality (grab sample monitoring locations within swamps)
- Surface water flows and quality (rivers and creeks) (hydraulic structure-based monitoring locations)
- Shallow / ridge groundwater levels and quality (standpipe piezometers installed on topographic ridgelines)
- Shallow and deep groundwater levels (multi-level vibrating wire piezometers)
- Dewatering wells or collector system quality (grab samples at dewatering points)
- Underground inflows (calculated via metering of underground transfers and metering of discharge at licensed discharge points).

Groundwater level monitoring indicates there is a vertically downward hydraulic gradient from local aquifers within the Burralow Formation to the Illawarra Coal Measures, with significant difference in hydraulic head across aquitards units.

The key findings in the swamp groundwater level monitoring programme (perched groundwater system) is that similar water level trends are monitored in the swamps that have been undermined and the swamps that have not yet been undermined.

9.4.3 Groundwater Model Predictions

9.4.3.1 Modelled Change to Flow

Mine Inflows

Predicted inflow to underground workings at both Springvale Mine and Angus Place Colliery, including Angus Place East (APE) longwalls, is presented in **Figure 12**. It is noted that the simulation 'Basecase', as per RPS (2014b), represents continuation of mining concurrently at Springvale Mine and Angus Place Colliery, including the Angus Place Mine Extension Project (referred to as Angus Place East in Adhikary and Wilkins (2013, 2015)).

The 'SPR then APE' simulation, as presented in Adhikary and Wilkins (2013, 2015)) and **Figure 12** (after Figure G3 of Adhikary and Wilkins (2015)) represents sequential implementation of mining at Springvale Mine and Angus Place Colliery i.e. following completion of extraction at Springvale in 2023, extraction will commence in at Angus Place Colliery in 2024, subject to approval. Following completion of mining at Springvale, dewatering will cease, Springvale Mine will be allowed to flood, and

groundwater levels will commence recovering. For both the 'basecase' and 'SPR then APE' scenarios the mine inflow rate is provided in L/s.

For the 'SPR then APE' or sequential operational scenario case shown in **Figure 12**, the inflow to underground workings at both Angus Place and Springvale is relatively steady at 300 L/s (26 ML/day) through to completion of modelled mining at Springvale in 2023. Following completion of modelled mining at Springvale, inflow to underground workings is expected to decrease to approximately 200 L/s and then increase to approximately 400 L/s (approximately 36 ML/day) by 2030. After 2023 (when Springvale underground will be flooded) the mine inflows shown in **Figure 12** are attributable to the mine inflows to Angus Place workings only (refer to Figure 4.4 in Jacobs (2016a)).

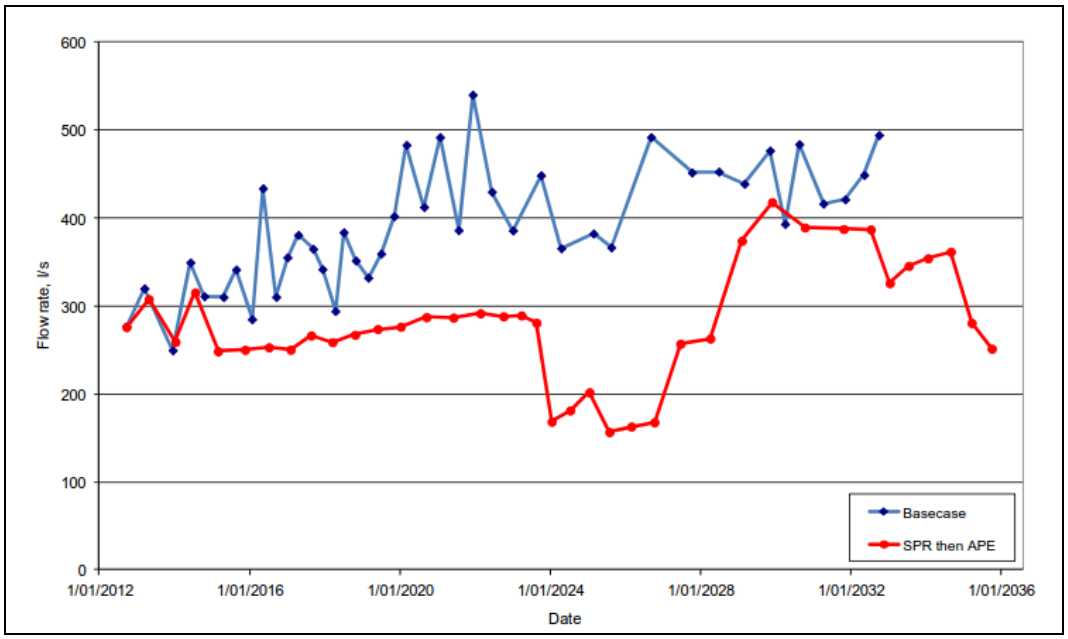

Figure 12 – Inflow to Underground Workings (Springvale Mine and Angus Place Colliery) in L/s

Modelled inflow to underground workings at Springvale Mine only is presented in **Figure 13** (after Figure G4 of Adhikary and Wilkins (2015)). Data for the 'basecase' (as presented in the SVMEP EIS for the extraction rate of 4.5 Mtpa) and mine predictions for the increased production rate of 5.5 Mtpa (SPR then APE') are both presented. (after Figure G4 of Adhikary and Wilkins (2015)). Data for the 'basecase' (as presented in the SVMEP EIS for the extraction rate of 4.5 Mtpa) and mine predictions for the increased production rate of 5.5 Mtpa (SPR then APE') are both presented. **Figure 13** shows the change in mining rate at Springvale Mine has negligible impact on modelled inflows to the underground. Modelled inflow rate to Springvale Mine workings rises from 140 L/s (~12 ML/day in 2014) to 220 L/s (19 ML/day in 2023). These mine inflows are consistent with the predictions included in the SVMEP EIS, which noted the mine inflows would increase from ~140 L/s in 2013 to a maximum of 210 L/s (19 ML/day), however the maximum would occur in 2022.

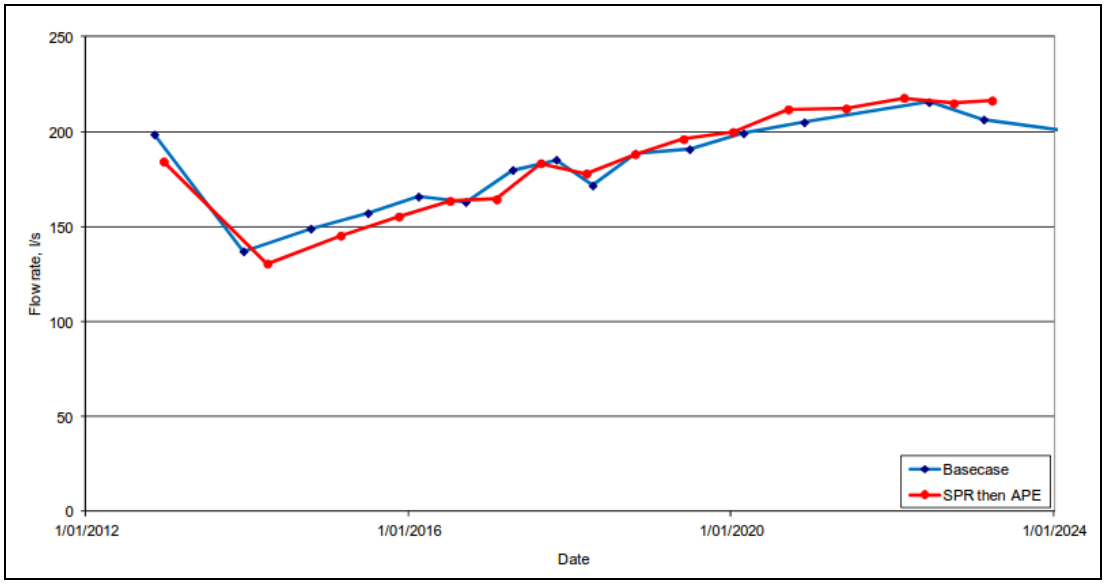

Figure 13 – Inflow to Underground Workings (Springvale Mine only) in L/s

Groundwater Contribution to Surface Watercourses and Swamps

Adhikary and Wilkins (2015) provide modelled groundwater contribution to simulated swamps and streams, as well modelled change to groundwater contribution (baseflow reduction). These are reproduced, respectively, in Table 4.2 and Table 4.3 in Jacobs (2016a), and conclusions drawn from the data presented in these tables are included below. A comparison with the discussions included in the SVMEP EIS, where relevant, is also included for the relevant watercourse or swamp.

Sunnyside East Swamp

Modelling indicates a decline in groundwater contribution from approximately 0.3 ML/day in 2012 to a minimum of 0.05 ML/day or 0.5 L/s in 2023, with recovery to 0.15 ML/d. Results presented are consistent with that presented in the SVMEP EIS.

Carne West Swamp

Carne West Swamp, as modelled, has a groundwater contribution of 0.02 ML/day or 0.25 L/s (pre-mining) and this is predicted to increase to 0.052 ML/day or 0.6 L/s in 2024. As noted in RPS (2014b) there is a predicted increase in baseflow to Carne West Swamp due to an assumed change in horizontal hydraulic conductivity applied via the RAMP function used in the COSFLOW hydrogeological model.

Carne Central Swamp

For Carne Central Swamp, there is a modelled decrease in groundwater contribution to surface water of 15% (0.18 ML/day or 2.1 L/s). As presented in Table 4.2 of Jacobs (2016a), modelled groundwater contribution in 2012 is 1.14 ML/day (13.2 L/s). The results presented indicate a reduction in modelled change to groundwater contribution for the “SPR then APE” simulation (Angus Place Colliery commencing operations after completion of mining at Springvale Mine) compared to the “Base Case” (both mines operating concurrently) simulation.

Gang Gang Swamp South East and Gang Gang Swamp West

For Gang Gang Swamp South West, there is a significant change to modelled groundwater contribution. From Table 4.2 of Jacobs (2016a), modelled groundwater contribution is a loss from surface water to groundwater at –0.06 ML/day (0.7 L/s), and this loss is predicted to increase to –0.225 ML/day (2.6 L/s) at maximum. Modelled change in loss from surface water to groundwater is equivalent to that presented in the SVMEP EIS.

For Gang Gang Swamp East, modelled groundwater contribution is a loss from surface water to groundwater, which is predicted to increase by 0.01 ML/day (0.1 L/s). Model results presented are consistent with that presented in the SVMEP EIS.

Nine Mile Swamp and Pine Swamp

For Nine Mile Swamp, there is an increase in groundwater contribution to surface water predicted. There is minimal change in Pine Swamp. It is noted that Pine Swamp in Adhikary and Wilkins (2013, 2015) refers to both Pine Swamp and Pine Swamp Upper.

Marrangaroo Creek Swamp

Marrangaroo Creek Swamp is incorporated into stream element Marrangaroo Creek in the COSFLOW hydrogeological model. The Marrangaroo Creek element extends to near to the downstream junction with Coxs River below Lake Lyell. From Table 4.2 in Jacobs (2016a), modelled groundwater contribution to surface water of this segment is 0.72 ML/day (8.3 L/s) in 2012 and this is predicted to decrease by 0.078 ML/day (0.9 L/s) and recover to 2012 levels in time.

Coxs River

Adhikary and Wilkins (2015) indicate that the Coxs River could be categorized as a leaking river and modelled change in groundwater level of less than 1 cm would lead to additional recharge to groundwater of 0.1 L/s/m width of river. The modelled additional loss from surface water to groundwater is considered insignificant, however, compared to the median flow in the Coxs River of 12.2 ML/d (as presented in Table 3.8 of RPS, 2014c).

9.4.3.2 Modelled Change in Level

Section 4.2.2.2 of Jacobs (2016a) provides summaries of, based on Adhikary and Wilkins (2015), modelled change in regional groundwater, groundwater level at ground surface (predicted to be generally of the order of tens of centimetres), and phreatic surfaces.

With respect to groundwater level changes to groundwater users in the vicinity of Springvale Mine, **Section 9.4.2.4** notes there are a number of non-mining related water supply works in the vicinity of Springvale Mine, however, these are of sufficient distance from the mine that there is no expected change to groundwater elevation at these WALs due to mining. It is also noted that the majority of the supply works are monitoring piezometers, exploration boreholes or large mine dewatering works.

Table 4.4 of Jacobs (2016a) presents the modelled groundwater level above ground surface at each swamp and stream included in the groundwater model (Adhikary and Wilkins (2015)). **Table 30** presents the maximum change in modelled groundwater level in swamps and streams in comparison to 2012 levels for the 'SPR then APE' current scenario as well as the 'basecase' scenario. The 'basecase' represents the scenario with both Angus Place and Springvale Mines operating concurrently. The 'basecase' maximum change in groundwater levels were included in SVMEP EIS and approved in SSD 5594.

The predicted changes in groundwater levels for the simulated shrub swamps and streams presented in **Table 30** (after Table G12 of Adhikary and Wilkins (2015)) for the 'SPR then APE' scenario are consistent with that presented in the SVMEP EIS. The most significant predicted change min the EIS was with respect to Gang Gang Swamp South West (referred to as Gang Gang Swamp South East in Adhikary and Wilkins (2013, 2015) and **Table 30**). The updated modelling indicates a minor decrease is predicted, from 0.364 m ('basecase') to 0.349 m ('SPR then APE').

Table 30 – Predicted Maximum Change in Groundwater Level in Simulated Swamps and Streams

Swamps and Streams Simulated in Adhikary and Wilkins (2015)	'Basecase' Model (m)	'SPR then APE' model (m)
CA2 (includes Carne Central Swamp)	0.103	0.068
Carne West Swamp	Small head increase	0.000
Carne Creek Total	0.027	0.023
Gang Gang Swamp South East	0.364	0.349
Gang Gang Swamp South	0.030	0.016
Kangaroo Swamp	0.095	0.093
Kangaroo Creek (KC1)	0.129	0.056
Kangaroo Creek (KC2)	0.035	0.034
Lamb Creek	0.047	0.028
Long Swamp	0.017	0.000
Marrangaroo Creek	0.020	0.013
Nine Mile Swamp	Small head increase	Small head increase
Paddys Creek	0.001	0.001
Pine Swamp	0.000	0.000
Tri-Star Swamp	0.081	0.075
Twin Gully Swamp	0.051	0.050
Sunnyside Swamp	0.013	0.006
Wolgan River Total	0.050	0.047

9.4.3.3 Expected Change in Quality

The COSFLOW numerical groundwater model at Springvale Mine considers groundwater flow only. Modelling indicates that depressurisation of the Lithgow Seam induces a change in storage within AQ3 (Burro-Moko Head and Caley Formation) and SP3 (Mount York Claystone), (refer **Figure 10**), which following cessation of mining, is replenished via recharge. Figure 4.9 of Jacobs (2016a) presents the modelled change in volume in time, including recovery.

Groundwater flow direction is vertically downwards from ground surface through to the Lithgow Seam. As identified in RPS (2014b) and noted above, the conceptual hydrogeological model (**Figure 11**) is that the deep groundwater system is hydraulically separated from the shallow groundwater system due to formation of the unsaturated zone beneath the Mount York Claystone (SP3). In contrast, the perched groundwater system reflects surface infiltration, with lateral transmission due to presence of sequence of low permeability aquitard plies YS4, YS6 (**Figure 10**) of the Burralow Formation.

There is no mine water discharge to the Newnes Plateau as part of the current Springvale Mine operations. Groundwater quality in the Banks Wall Sandstone is very fresh and is similar to water quality observed in peat / clay matrix of the shrub swamps. Groundwater quality of the Permian Illawarra Coal Measures is only fresh, with near neutral pH and electrical conductivity of approximately 1,200 µS/cm, though ranges up to 1,400 µS/cm. It is highlighted that salinity of groundwater in the Coal Measures is expected to be higher in a northeasterly direction, down-dip, reflecting increased water-rock interaction associated with increasing distance from point of recharge at outcrop.

Vertical hydraulic gradient is vertically downward, even through the unsaturated zone beneath the Mount York Claystone. There is therefore no expected impact to groundwater quality in the shallow and perched groundwater system as a result of mining. As noted in the SVMEP EIS, near surface cracking (**Figure 11**) may lead to minor additional water-rock interaction, however, the extensive record of observation at shrub swamps at Springvale Mine does not suggest this process is significant with respect to water quality.

9.4.4 Impact Assessment

This section presents and discusses the potential groundwater impacts as a result of the proposed modification. The impact assessment is presented with respect to relevant Commonwealth and NSW legislation, guidelines and policy.

9.4.4.1 Significant Impact Guidelines Assessment

Table 31 presents an assessment of the modification against the EPBC Act *Significant Impact Guidelines for Coal Seam Gas and Large Coal Mines* (DoE, 2013).

Table 31 – Impact Assessment against Significant Impact Guidelines (DoE, 2013)

Impact Guideline	Compliant	Comment
Hydrological Characteristics		
A significant impact on the hydrological characteristics of a water resource may occur where there are, as a result of the action: a) changes in the water quantity, including the timing of variations in water quantity	Yes	As presented in the SVMEP EIS, mine dewatering leads to depressurisation in the deep groundwater system and is initially replenished from storage, mostly from the bottom of the Mount York Claystone and in the very long term from recharge from the Coxs River. The modelled impact to the Coxs River is, however, imperceptible, as presented in the EIS. Impact to the perched groundwater system, upon which the THPSS reside, is shown by modelling presented in the EIS to depend on assumed RAMP function within the COSFLOW groundwater model. The RAMP function in the model is the assumed change in hydraulic properties with height above the coal seam. In accordance with the conceptual model there is no direct hydraulic connection between mine depressurisation and the perched groundwater system. As presented in **Section 9.4.3.1**, magnitude of modelled change to groundwater contribution to surface water flow in shrub swamps is relatively small, although the percentage change can be significant. The changes at specific swamps are presented in **Table 34**. It is noted that there is currently an investigation underway into a water level trigger that has occurred

Impact Guideline	Compliant	Comment
		at Carne West swamp.
b) changes in the integrity of hydrological or hydrogeological connections, including substantial structural damage (e.g. large scale subsidence)	Yes (Partial)	The conceptual model presented in the SVMEP EIS is the perched groundwater system, upon which the THPSS reside, reflects lateral transmission of infiltration rainfall due to presence of sequences of low permeability aquitard plies identified within the Burralow Formation. As noted above, there is currently an investigation underway into a water level trigger at Carne West Swamp.
c) changes in the area or extent of a water resource	N/A	Not applicable in a groundwater context. Refer to Surface Water Assessment (Jacobs, 2016b) for modification for details of surface water impact.
Water Quality		
A significant impact on a water resource may occur where, as a result of the action: a) there is a risk that the ability to achieve relevant local or regional water quality objectives would be materially compromised, and as a result the action: i. creates risks to human or animal health or to the condition of the natural environment as a result of the change in water quality	Yes	There is no expected change to groundwater quality presented in the EIS for the project and the modification will not lead to a change in that prediction. Groundwater sampling of standpipe piezometers installed into topographic ridgelines indicates water quality of the shallow groundwater system is very fresh. Groundwater quality of the shallow groundwater system is consistent with that obtained from the peat/clay matrix of the shrub swamps and therefore there is no expected change to groundwater quality in the shrub swamps as a result of subsidence-induced impacts. It is noted subsidence effects remain unchanged from the predictions provided in the SVMEP EIS and MSEC (2013) and are not influenced by the proposed increase in extraction rate included in the modification.
ii. substantially reduces the amount of water available for human consumptive uses or for other uses, including environmental uses, which are dependent on water of the appropriate quality	Yes	There is no expected change to groundwater quality within THPSS as a result of the Springvale Mine Extension Project and the modification will not lead to a change in that prediction.
iii. causes persistent organic chemicals, heavy metals, salt or other potentially harmful substances to accumulate in the environment	Yes	There is no expected change to groundwater quality within THPSS as a result of the Springvale Mine Extension Project and the modification will not lead to a change in that prediction. For the deep groundwater system, groundwater quality will decrease in a northeasterly direction, reflecting increasing recharge flowpath length. The consequence of the small increase in salinity with mine progression is presented in the Surface Water Assessment (Jacobs 2016b).
iv. seriously affects the habitat or lifecycle of a native species dependent on a water resource, or	N/A	Outside the scope of the Groundwater Assessment (Jacobs (2016a)).

Impact Guideline	Compliant	Comment
v. causes the establishment of an invasive species (or the spread of an existing invasive species) that is harmful to the ecosystem function of the water resource, or	Yes	N/A
b) there is a significant worsening of local water quality (where current local water quality is superior to local or regional water quality objectives), or	Yes	As indicated above, there is no expected change to groundwater quality within THPSS as a result of the Springvale Mine Extension Project, and the modification will not result in a change to that prediction.
c) high quality water is released into an ecosystem which is adapted to a lower quality of water.	Yes	N/A

9.4.4.2 Minimal Harm Criteria Assessment

Table 32 presents the Level 1 minimum harm criteria for less productive and highly productive porous rock in accordance with the *NSW Aquifer Interference Policy* (DPI (2012)).

Table 32 – Level 1 Minimal Impact Consideration (DPI, 2012)

Level 1 Minimal Impact Consideration	Compliant	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. **OR** A maximum of a 2 metre water table decline cumulatively at any water supply work.	Yes	There are no high priority GDEs or high priority culturally significant sites listed in the Schedule of the Water Sharing Plans, however, the Newnes Plateau shrub swamps and hanging swamps are listed under the EPBC Act and the shrub swamps are listed as EEC under the TSC Act. The most significant predicted change in the SVMEP EIS was with respect to Gang Gang Swamp South West (referred to as Gang Gang Swamp South East in Adhikary and Wilkins (2013, 2015)) where a decline of 35 cm is predicted. The updated modelling (**Table 30**) indicates a minor decrease in predicted impact compared to that presented in the EIS (RPS (2014b)). As noted above the results of updated modelling are consistent with impacts presented in the SVMEP EIS of SSD 5594. There are no non-mining related water supply works in the vicinity of Springvale Mine.
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	Yes	There are no non-mining related water supply works in the vicinity of Springvale Mine.
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	Yes	Mine depressurisation leads to capture of inflows to underground workings, with discharge to surface water via Springvale Mine's licensed discharge point, LDP009, located on Sawyers Swamp Creek. As noted in **Section 9.4.3.3**, subsidence effects in the near surface zone may lead to enhanced water-rock interaction, however, this has not been observed at Springvale Mine and therefore this process may not be significant with respect to water quality.

9.4.4.3 Impact to Surrounding Land Uses due to the Modification

Table 33 presents the expected impact to surrounding land uses.

Table 33 – Impacts to Surrounding Land Uses due to the Modification

Land Use	Location Compared to Springvale Mine	Predicted or Expected Change	Expected Impact due to Modification
Newnes State Forest	Longwalls underlie the Newnes State Forest.	(Predicted changes to EECs / GDEs are dealt with in **Table 34**) Negligible predicted drawdown on perched and shallow groundwater system outside of the Project Application Area. There are no non-mining related groundwater works in the vicinity.	Negligible change in impact.
Wollemi National Park	7.5 km north of LW419.	Negligible change to groundwater level, flow or groundwater quality of perched or shallow groundwater system outside of the Project Application Area.	Negligible change in impact.
Garden of Stone National Park	~17 km northwest of LW419.	Negligible change in groundwater level, flow or quality outside of the Project Application Area.	Negligible change in impact .
Birds Rock Flora Reserve	4.5 km northwest of LW419, within Newnes State Forest.	Negligible change in groundwater level, groundwater flow or quality outside of the Project Application Area.	Negligible change in impact.
Sawyers Swamp Creek Ash Dam (SSCAD)	1.5 km west of LW401.	Mine portal lies adjacent to SSCAD, however, these are established workings. LW502 and LW503 are located 1.6 km from SSCAD, however, drawdown modelled impact of previous workings at Angus Place are such that future mining expected to lead to negligible change to level and flow.	Negligible change in impact.

9.4.4.4 Impact to Groundwater Dependent Ecosystems

Table 34 presents the expected impacts to the groundwater dependent ecosystems that overlie the Springvale Mining area due to the modification, compared to the results that were obtained for the SVMEP EIS.

Table 34 – Impacts to Groundwater Dependent Ecosystems due to the Modification

Groundwater Dependent Ecosystem	Predicted or Expected Change to Level	Predicted or Expected Change to Flow	Predicted or Expected Change to Quality	Expected Impact due to Modification
Sunnyside East Swamp (included within CA5 in groundwater model)	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change in impact .
Carne West	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change in impact.

Groundwater Dependent Ecosystem	Predicted or Expected Change to Level	Predicted or Expected Change to Flow	Predicted or Expected Change to Quality	Expected Impact due to Modification
Gang Gang Swamp South West	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change in impact.
Gang Gang Swamp East	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change in impact.
Carne Central Swamp (included within CA2 in groundwater model)	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change in impact.
Nine Mile Swamp	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change in impact.
Pine Swamp and Upper Pine Swamp	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change in impact.
Marrangaroo Creek Swamp	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change in impact.

9.4.4.5 Impact to Surface Water – Groundwater Interaction

Table 35 presents the impact to surface watercourses in the vicinity of the Springvale Project Application Area due to the proposed modification, compared to the results that were obtained for the SVMEP EIS.

Table 35 – Impacts to Surface Water / Groundwater Interaction due to the Modification

Watercourse	Predicted or Expected Change to Level	Predicted or Expected Change to Flow	Predicted or Expected Change to Quality	Expected Impact due to Modification
Wolgan River	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change compared to EIS	Negligible change in impact.
Carne Creek	Negligible change compared to EIS	Negligible change compared to EIS	Negligible expected change to quality.	Negligible change in impact.
Coxs River	Negligible change compared to EIS	Negligible change compared to EIS	Negligible expected change to quality.	Negligible change in impact.

9.4.4.6 Impact to Groundwater Users

The Surface Water Assessment undertaken for the SVMEP EIS (RPS (2014c)) established in the there is a net excess of water at Springvale Mine and at adjacent operation at Angus Place Colliery. Accordingly, modification to Springvale consent does not impact on demand for water for mining operations.

As noted in **Section 9.4.2.4** there are 12 groundwater users (three WALs relate to dewatering bores at Springvale Mine and Angus Place Colliery) in the Sydney Basin Coxs River Groundwater Source and four (three WALs relate to dewatering bores at Springvale Mine, Angus Place and Clarence Collieries) in the Sydney Basin Richmond Groundwater Source within 10 km of Springvale Mine.

An assessment of the impact of the drawdowns predicted in Adhikary and Wilkins (2015) undertaken in Jacobs (2016b) (Section 5.5) on groundwater users has concluded that there will be negligible impacts to WALs that relate to non-mining water supply works within 10 km of Springvale Mine.

9.4.5 Water Licensing

9.4.5.1 Groundwater Licensing

Springvale Mine holds three WALs for the dewatering bores, provided in **Table 36**, for the pit top collection system (WAL36443), Vent Shaft 3 Borehole (WAL36446) and Bores 6 and 8 (WAL36383).

Table 36 – Water Access Licences (Groundwater) at Springvale Mine

Current Licence	Works Approval No.	Sydney Basin Coxs River	Sydney Basin Richmond
WAL36443	10WA118754	585 ML/year	-
WAL36446	10WA118752	3300 ML/year	-
WAL36383	10WA118719	-	5958 ML/year

Table 37 presents the estimated licence requirement with time. It is noted, the predicted inflow to underground workings is not segregated into relevant water sources in COSFLOW hydrogeological model. The requirement presented in **Table** 37 is therefore an estimate based on proportional spatial area.

Table 37 – Water Access Licence (Groundwater) Requirements

Water Year	Groundwater Extraction (ML/year)	Sydney Basin Coxs River Groundwater Source (ML/year)	(%)	Sydney Basin Richmond Groundwater Source (ML/year)	(%)	Comment
2016/2017	5,617	2,679	48%	2,938	52%	LW419, LW420
2017/2018	5,870	2,540	43%	3,330	57%	LW421, LW421
2018/2019	6,248	2,421	39%	3,827	61%	LW423, LW424
2019/2020	6,659	2,383	36%	4,276	64%	LW425, LW426
2020/2021	6,848	2,381	35%	4,467	65%	LW427, LW428
2021/2022	6,943	2,599	37%	4,344	63%	LW429
2022/2023	6,785	2,701	40%	4,084	60%	LW430, LW431
2023/2024	6,785	2,902	43%	3,882	57%	LW432, LW501, LW502, LW503
2024/2025	0			0		n/a
2025/2026	0			0		n/a

Water Year	Groundwater Extraction (ML/year)	Sydney Basin Coxs River Groundwater Source (ML/year)	(%)	Sydney Basin Richmond Groundwater Source (ML/year)	(%)	Comment
2026/2027	0			0		n/a
2027/2028	0			0		n/a
2028/2029	0			0		n/a
	Maximum Take	**2,902 ML/year**	**Maximum Take**	**4,467 ML/year**		

From **Table 37** peak water licensing requirement for Springvale Coal occurs in year 2023/2024 for the Sydney Basin Coxs River Groundwater Source at 2,902 ML/year and in year 2020/2021 for the Sydney Basin Richmond Groundwater Source at 4,467 ML/year. A comparison of groundwater requirements presented in **Table 37** with the WAL allocations noted in **Table 36** confirms Springvale Coal holds sufficient water access licences to cover the Project as modified requirements.

9.4.5.2 Surface Water Licensing

There is an indirect change to groundwater contribution to surface watercourses as a result of mining activity, and hence there is also a requirement for water access licences from surface water sources. In accordance with advice received from DPI Water to Springvale Coal (DPI Water (2015)), in limited circumstances, a zero share licence from the relevant groundwater source can be obtained and, upon application, will be considered by DPI Water with respect to licensing of estimated take from overlying intersected surface water source. Springvale Coal submitted these zero share water access licence (groundwater) applications to DPI Water on 07 October 2015. It is understood from DPI Water (2015), that upon granting of those licences, application for a dealing can be lodged to transfer entitlement from the relevant Springvale Coal existing water access licences (groundwater) to the new licences.

To calculate the time-series licensing requirements shrub swamps and streams included in the CSIRO model were assigned to relevant water sources, described in Jacobs (2016a) with reference to Figure 6.1 in that report. The approach adopted was the same as that used in Groundwater Assessment of the SVMEP EIS (RPS, 2014b) and in a subsequent communication with DPE (Jacobs (2015c)). Based on advice in DPI Water (2015) current water licences (surface water take assigned to groundwater source) held by Springvale Coal are presented in **Table 38**.

Table 38 – Water Access Licence (Surface Water) at Springvale Mine

Current Licence	Works Approval No.	Sydney Basin Coxs River Groundwater Source (assigned to modelled take from Upper Nepean and Upstream Warragamba Water Source (Wywandy Management Zone)	Sydney Basin Richmond Groundwater Source (assigned to modelled take from Hawkesbury and Lower Nepean Rivers Water Source (Colo River Management Zone)
TBA	TBA	0 ML/year and then updated	-
TBA	TBA	-	0 ML/year and then updated

Given the licence holding in:

- the Sydney Basin Coxs River Groundwater Source assigned to the estimated take from the Upper Nepean and Upstream Warrangamba Water Source (Wywandy Management Zone) is expected to be a 0 ML/year share
- the Sydney Basin Richmond Groundwater Source assigned to the estimated take from the Hawkesbury and Lower Nepean Rivers Water Source (Colo River Management Zone) is expected to be 0 ML/year

a subsequent transfer entitlement to surface water WAL will require to be effected from Springvale Coal's current water access licences (groundwater) presented in **Table 36**. Further discussions are provided below.

Table 6.4 of Jacobs (2016a) presents the time-series take from the relevant water sources (Wywandy Management Zone of the Upper Nepean and Upstream Warragamba Water Source and the Colo River Management Zone of the Hawkesbury and Lower Nepean Rivers Water Sources).

Based on current groundwater modelling (Adhikary and Wilkins (2015) and in accordance with Table 6.4 of Jacobs (2016a) additional licences in the Wywandy Management Zone (potentially addressed by a zero share component licence in the Sydney Basin Coxs River Groundwater Source and subsequent dealing with respect to transfer of entitlement from existing water access licence (groundwater)) will be required. However, since there is no predicted net take from the Colo River Management Zone no additional licence will be required from this management zone.

9.4.6 Consequence of Potential Impacts

Mine inflows predictions from the updated hydrogeological model for Springvale Mine and Angus Place Colliery (Adhikary and Wilkins, 2015) to allow for the increased extraction rate (5.5 Mtpa) at Springvale Mine yield a maximum inflow of 19 ML/day in 2023 due to mining at Springvale Mine, consistent with the mine inflow prediction included in the SVMEP EIS (Golder Associates (2015)). The predicted changes in groundwater levels for the simulated shrub swamps and streams presented in **Table 30** for the "SPR then APE" scenario are consistent with that presented in the SVMEP EIS.

Potential groundwater impacts assessed in Jacobs (2016a) indicate the Project as modified:

(i) Will be compliant with the *Significant Impact Guidelines* (DoE, 2013) assessment (**Section 9.4.4.1**)

(ii) will be compliant with Level 1 minimum harm criteria for less productive and highly productive porous rock in accordance with the *NSW Aquifer Interference Policy* (DPI (2012) (**Section 9.4.4.2**)

(iii) Will result in negligible impacts to surrounding land uses (**Section 9.4.4.3**)

(iv) Will result in negligible impacts to groundwater dependent ecosystems (Newnes Plateau shrub swamps) (**Section 9.4.4.4**)

(v) Will result in negligible impacts to watercourses assessed (Carne Creek, Coxs River, Wolgan River (**Section 9.4.4.5**)

(vi) Will result in negligible impacts on groundwater users (non-mining water supply works) within 10 km of Springvale Mine.

Based on conclusions on potential impacts provided above, the overall environmental consequence of the modification will be negligible.

9.4.7 Management

Water management at Springvale Mine is governed by the Water Management Plan (part of the Regional Groundwater Management Plan) as specified in Schedule 4, Condition 14, of SSD5594. In addition, there is a Water Management Plan component, including Biodiversity Management Plan and Swamp Monitoring Program with respect to each Extraction Plan, as specified in Schedule 3, Condition 10 of the current conditions of SSD 5594.

The Water Management Plan (both Whole of Operation and the Extraction Plan for LW419) presents the monitoring network, establishes trigger levels on expected impacts as well as presents the Trigger Action Response Plan (TARP). The Swamp Monitoring Program developed as part of the Extraction Plan for LW419 has proposed, based on relevant baseline data, triggers for individual parameters most likely to indicate mining related impacts on swamps and watercourses:

- Subsidence
- Flora
- Groundwater level and quality
- Surface water quality.

The Groundwater Assessment (Jacobs, 2016a) for the modification has not, based on their assessment of potential impacts, identified any necessity for changes to the current groundwater management or the groundwater monitoring network (**Section 9.4.2.6**) already in place at Springvale Mine, or proposed to be undertaken in the Swamp Monitoring Program.

9.4.8 Conclusion

Groundwater modelling (Adhikhary and Wilikins (2015)) indicates that the increase in mining rate does not lead to a significant difference in inflow to underground operations compared to that presented in the Groundwater Assessment (RPS, 2014b) of the SVMEP EIS (Golder Associates (2014)).

Accordingly, predictions of impacts to Newnes Plateau shrub swamps and hanging swamps on the Newnes Plateau are consistent with that presented in the Springvale Mine Extension Project EIS or are less. Similarly, potential impacts to watercourses, groundwater dependent ecosystems, surrounding land uses, groundwater users are consistent with those presented in the SVMEP EIS and approved in SSD 5594. Based on conclusions on potential impacts due to the modification, its has been concluded, the overall environmental consequence of the modification will be negligible.

Updated estimates of requirements for water access licences (groundwater) indicate the WALs held by Springvale Mine are sufficient. It is noted that licensing of groundwater-induced take from surface water sources for this site are being addressed through application for a zero share component water access licence (groundwater). Following successful application, a dealing to transfer entitlement from existing licences within relevant water sources to the new access licences would then be effected.

9.5 Surface Water

9.5.1 Introduction

A Surface Water Assessment for the modification was prepared by Jacobs Australia Pty Limited, *Surface Water Assessment – SSD 5594 Modification 1* (Jacobs, 2016b), which is provided in full in **Appendix J**. A site water and salt balance assessment prepared for the modification by GHD Pty Ltd

Springvale Mine Modification 1 Project: Site Water and Salt Balance Assessment is attached as Appendix A to Jacobs (2016b).

The purpose of the Surface Water Assessment report is to present an assessment of the modification on the surface water environment at Springvale Mine. Given that the Surface Water Assessment for the Springvale Mine Extension Project (RPS, 2014c) was only recently undertaken, Jacobs (2016b) draws heavily on information already presented in the SVMEP EIS and subsequent documentation presented during the assessment process for the Springvale Mine Extension Project.

9.5.2 Existing Environment

9.5.2.1 Surface Water System

The Project Application Area encompasses two adjacent catchments, the Coxs River Catchment and the Wolgan River Catchment. The catchment divide runs in a northwest to southeast direction through land surface on Newnes Plateau. The Wolgan River, of which Carne Creek is a tributary, eventually feeds into the Colo River and then the Hawkesbury River.

Surface water flow in the Coxs River is in a southerly direction, reflecting surface topographic gradient toward Lake Wallace and further downstream, Lake Lyell. Outflow from Lake Lyell eventually contributes to Lake Burragorang which is the primary drinking water reservoir for the City of Sydney.

The Coxs River Catchment and the Wolgan River Catchment are both under the jurisdiction of the Hawkesbury-Nepean Catchment Management Authority, although the Coxs River is listed within the boundary of the Sydney Drinking Water Catchment under the *State Environmental Planning Policy (Sydney Drinking Water Catchment 2011)*.

There is no direct extraction or discharge to surface watercourses on the Newnes Plateau by Springvale Mine or others. Rainfall/runoff on the Newnes Plateau discharges through the swamps, where present. All mine water make from Springvale Mine is currently discharged to the Coxs River via a licensed discharge point (LDP009) located in Sawyers Swamp Creek, adjacent the Sawyers Swamp Creek Ash Dam. Springvale Mine's pit top is located within the Coxs River Catchment.

The main watercourses within the Project Application Area are discussed below.

Hanging Swamps and Shrub Swamps

Newnes Plateau swamps exist within the headwater valleys on the Newnes Plateau and are controlled by the flat topography and impervious shale layers. Both shrub swamps and hanging swamps exist within the Project Application Area (**Figure 9**). Shrub swamps (which are the only named swamps in the Project Application Area) that will be undermined by the proposed longwalls are listed in **Section 9.4.2.3.**

Rivers and Creeks

Table 39 presents catchment characteristics in the Project Application Area. The watercourses are shown in **Figure 9**. There is minimal development in the Wolgan River catchment in the vicinity of the Project Application Area, and comprises more rugged terrain than the Coxs River. The majority of the Wolgan River catchment is designated as State Forest or National Park.

In the Coxs River catchment, there has been historical disturbance due to past mining activity, including mining within the watercourse directly (such as within Wangcol Creek), as well as

construction of several water supply reservoirs for power generation and waste disposal facilities (wet and dry ash deposition).

Table 39 – Catchment Characteristics in the Project Application Area

Main Catchment	Sub-Catchment and Strahler Order	Associated Watercourses	Sub-Catchment Area (ha)	% (approximate) of Catchment Area within Project Area
Coxs River	Coxs River (5th and 6th)	Wangcol Creek (3rd), Springvale (2nd) and Sawyers Swamp Creek (3rd)	13,026	30
	Marrangaroo Creek (4th)	Unnamed watercourses south of Project Area	5,495	30
	Pipers Flat Creek (5th)	Unnamed watercourses south of Project Area	5,948	0
Wolgan River	Wolgan River Western Branch	Wolgan River (4th and 5th)	8,526	9
	Wolgan River Eastern Branch	Carne Creek (5th and 6th)	8,597	30
Colo River	Nine Mile Creek / Bungleboori Creek	Nine Mile Creek (3rd)	4,840	1

9.5.2.2 Water Sharing Plan

The Project is situated within the Water Sharing Plan for the *Greater Metropolitan Region Unregulated River Water Sources 2011.* The Project Application Area is bisected by the Upper Nepean and Upstream Warragamba Water Source in the southwest (Wywandy Management Zone) and in the northeast Hawkesbury and Lower Nepean Rivers Water Source (Colo River Management Zone).

There is no direct extraction from surface water sources at Springvale Mine and the modification, similarly, does not include direct surface water extraction. Due to indirect change to groundwater contribution (baseflow contribution) to surface watercourses, as a result of mining activity, there is a requirement for water access licences from surface water sources, in accordance with the requirements of the NSW Aquifer Interference Policy (DPI (2012)). Details of these licensing requirements are summarised in **Section 9.5.7**.

9.5.2.3 Sensitive Environmental Receptors

Sensitive environmental include the groundwater dependent ecosystems, the shrub swamps and hanging swamps (**Section 2.10**), discussed in **Section 9.4.2.3**.

9.5.2.4 Surface Water Users

Table 3.5 in Jacobs (2016b) identifies surface water users in the Upper Nepean and Upstream Warragamba Water Source (Wywandy Management Zone) located downstream of the Project with the potential to be impacted. Table 3.6 in Jacobs (2016b) identifies surface water users in the Hawkesbury and Lower Nepean Water Source (Colo River Management Zone) downstream of the Project Project with the potential to be impacted.

9.5.2.5 Surface Water – Groundwater Interaction

The Newnes Plateau shrub and handing swamps are considered to be groundwater dependent although are not listed as high priority groundwater dependent ecosystems in the Schedule of the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011*. Some swamps are considered to be losing water features and others are considered to be gaining.

The Coxs River is considered to be a losing watercourse, however, the rate of loss is minor, given the streambed of the Coxs River comprises exposed Permian Coal Measures (previously mined in parts, such as within Wangcol Creek) and interburden.

9.5.2.6 Surface Water Monitoring

The surface monitoring network at Springvale Mine comprises:

- Flow and quality monitoring in rivers and creeks
- Flow and quality monitoring within shrub swamps (flow and quality).

Further detail of the monitoring network at Springvale is presented in RPS (2014b) and SVMEP EIS (Golder Associates, 2014). Future water monitoring will be undertaken in accordance with the Water Management Plan prepared to address Schedule 3, Condition 10 (Extraction Plan) and Schedule 4, Condition 14 (whole of operations) of SSD 5594. Swamp monitoring will be undertaken in accordance with the Swamp Monitoring Program prepared as part of the Extraction Plans.

9.5.3 Hydrological Analyses

9.5.3.1 Site Water Balance

Approach to Analyses

Site water balance modelling presented in the Surface Water Assessment (Jacobs 2016b) report was updated since the time of the SVMEP EIS, and incorporates the change in status at Angus Place Colliery (care and maintenance since March 2015), as well as the proposed increase to mining rate of 5.5 Mtpa proposed at Springvale Mine.

Objectives of the model were to:

- Quantify the water and salt budget on site with respect to existing operations (year 2016)
- Present an assessment of the impact of the modification to predicted conditions (year 2021).

Model Construction and Verification

The model was constructed in GoldSIM and incorporates all of the surface water sources and sinks within the Springvale Mine operation. The primary input to the site water balance is modelled inflow to underground operations. As presented in Appendix A of Jacobs (2016b), the model was verified against available monitoring data including daily metered pumping rates and discharges to Springvale Mine's LDP001 and LDP009 on EPL3607.

Model Results

Table 40 provides a summary of the average predicted water inputs and outputs of the Springvale Mine water management system for the existing (2016) and proposed (2021) conditions. The results presented for the proposed conditions are based on the predicted site conditions in 2021, the year when mine water make into the underground workings at Springvale Mine is predicted to peak, and the water management system at the site will be the most different compared to the existing conditions.

Table 40 – Summary of Average Predicted Water Inputs and Outputs

Inputs / Outputs	Existing conditions (2016) (ML/year)	Proposed conditions (2021) (ML/year)
Inputs		
Direct rainfall onto storages and catchment runoff	172.4	172.6
External potable water and bottled water supply	13.3	16.0
Groundwater inflows into underground workings	5,121.0	6,728.1
Total Inputs	**5,307**	**6,917**
Outputs		
Evaporation	13.0	13.1
Dust suppression	3.6	3.6
Discharge through LDP001	641.1	589.2
Discharge through LDP002	0.0	0.0
Discharge through LDP004/LDP005	0.0	0.0
Transfer to SDWTS	4,551.4	6,202.0
Removal of grit off-site	0.1	0.1
Inflow into Renown Workings	83.9	92.7
Sewage to Lithgow City Council system	13.3	16.0
Total Outputs	**5,306**	**6,917**
Change in Storage		
Surface water storages	0.3	0.0
Underground storages	0.0	0.0
Total Change in Storage	**0**	**0**
Balance		
Inputs – outputs – change in storage	1	0

As seen in **Table 40**, the largest source of water into the Springvale Mine water management system is the inflow of groundwater into the underground workings. Under existing conditions in 2016, the predicted groundwater make is 5,121 ML. The greatest change to the system is the predicted increase in groundwater make, which is estimated to increase by approximately 1,607 ML to a total of 6,728 ML in 2021.

Table 41 provides a summary of average predicted salt inputs and outputs of the Springvale Mine water management system for the existing (2016) and proposed (2021) conditions.

Table 41 – Summary of Average Predicted Salt Inputs and Outputs

Inputs / Outputs	Existing conditions (2016) (tonne/year)	Proposed conditions (2021) (tonne/year)
Inputs		
Direct rainfall onto storages and catchment runoff	29.8	30.2
Groundwater inflows into underground workings	3,894.2	5,116.3
Total Inputs	**3,924**	**5,147**
Outputs		
Dust suppression	2.7	2.7
Discharge through LDP001	401.3	362.1
Discharge through LDP002	0.0	0.0
Discharge through LDP004/LDP005	0.0	0.0
Transfer to SDWTS	3,459.6	4,714.6
Removal of grit off-site	0.1	0.1
Infiltration into Renown Workings	60.4	67.3
Total Outputs	**3,624**	**5,147**
Change in Storage		
Surface water storages	-0.1	-0.3
Underground storages	0.0	0.0
Total Change in Storage	**0**	**0**
Balance		
Inputs – outputs – change in storage	0	0

A comparison of data presented in **Table 40** and **Table 41** with the equivalent data presented in the Surface Water Assessment in the SVMEP EIS (RPS, 2014b) indicates negligible change to predicted discharge and water quality from the site due to the proposed modification. This is because the Groundwater Assessment (Jacobs 2016a), presented in **Section 9.4**, indicates that the increase in mining rate does not lead to a significant difference in inflow to underground operations compared to the predictions (Adhikhary and Wilkins, 2013) presented in the SVMEP EIS.

9.5.3.2 Regional Water Flow and Quality Modelling

Approach to Analyses

In 2014, as part of the response to submissions on the SVMEP EIS, a daily water and salt balance model was developed for the Coxs River and Wollondilly River catchments based on the Australian Water Balance Model (Boughton (2010)). The Regional Water Quality Impact Assessment Model (RWQIAM) prepared (RPS (2014d) encompasses all contributing catchments to Lake Burragorang (Warragamba Dam). These catchments lie within the Upper Nepean and Upstream Warragamba

Water Source of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (Water Management Act 2000).

The RWQIAM (RPS (2014d) was used to predict the impact to flow and quality (salinity) of mine water discharge (untreated) associated with the Angus Place and Springvale Mine Extension Projects within the Upper Coxs River on water quality and flow in the Coxs River and water quality and volume in Lake Burragorang.

The model was subsequently modified two times in 2015 (Jacobs (2015b); Jacobs (2015c)) to incorporate the change in status at Angus Place Colliery to Care and Maintenance and a number of mine water treatment options.

As presented in the Groundwater Assessment (Jacobs (2016a)), the increase in mining rate at Springvale Mine does not lead to a significant difference in inflow to underground operations to the predictions included in the SVMEP EIS and approved in SSD 5594. This results in negligible change to the site water balance (**Section 9.5.3.1**) due to the proposed modification. Accordingly, the model results presented in the RWQIAM (Jacobs, 2015b; Jacobs (2015c)) are applicable to use in support of the proposed modification, i.e. there are no significant changes to model predictions as a result of the modification.

Model Calibration

As presented in RPS (2014d) and Jacobs (2015a), the RWQIAM was calibrated to flow and water quality (salinity) at available monitoring locations with the Coxs River catchment, through to Lake Burragorang.

Model Results

From Jacobs (2015a), for the prediction simulation without treatment of mine water discharges at LDP009 provided the following result.

> *Predicted change to salinity in Lake Burragorang due to the Springvale Mine Extension Project was an increase from modelled median of 98 mg/L in the null case to a modelled median of 103 mg/L in the sequential implementation case* [Angus Place Colliery commencing extraction in 2024 following completion of mining at Springvale Mine in 2023] *under median rainfall conditions. This was equivalent to an increase of 5% and was considered to have a neutral impact to water quality since the predicted increase in salinity was small.*

Given that there is a negligible change to the site water balance for the proposed modification, there will also be negligible change to the RWQIAM presented during the assessment process of the Springvale Mine Extension Project (Jacobs (2015a); Jacobs (2015b)).

9.5.3.3 Rivers and Creeks

There is no direct extraction from surface watercourses associated with the Project (**Section 9.5.2.1**), and there is no proposed extraction associated with the modification.

Springvale Mine discharges mine water to Sawyers Swamp Creek and the Coxs River. The proposed modification to consent, however, does not result in an increase in inflow to underground operations and therefore there is no expected change to predicted impact to rivers and creeks.

9.5.3.4 Sensitive Environmental Receptors

The change to the hydrology of shrub swamps and hanging swamps due to the modification is presented in the Groundwater Assessment (Jacobs, 2016a) and discussed in **Section 9.4.3** and **Section 9.4.4**. Given that here is no expected change to subsidence due to the increased extraction, and the subsidence effects remain unchanged from that presented in the SVMEP EIS and MSEC (2103), there is no expected change to longitudinal gradient within these ecosystems that could lead to increased erosion potential.

9.5.3.5 Surface Water Users

The change to surface water flow, level and quality due to the modification to consent at relevant surface water users is presented in **Table 42**.

Table 42 – Predicted Change to Flow, Level and Quality for Surface Water Users

Surface Water User	Distance from Site	Predicted Change to Flow	Predicted Change to Level	Predicted Change to Quality
Coxs River (Upper Nepean and Upstream Warragamba Water Source (Wywandy Management Zone))				
WAL25607	3.5 km downstream of Springvale LDP009	No change due to the modification. Increase in flow due to the Project.	No change due to the modification. Increase in level (whilst remaining inbank) due to the Project.	No change in surface water quality due to the modification. Salinity of surface water quality of 1,200 µS/cm due to the Project.
WAL27428 (Lake Wallace)	7.4 km downstream of Springvale LDP009	No change due to the modification. Lake Wallace already operating at full level due to closure of Wallerawang Power Station in April 2014.	No change due to the modification.	No change due to the model. Salinity of surface water quality of approximately 1,200 µS/cm due to the Project.
Coxs River (Upper Nepean and Upstream Warragamba Water Source) (far field)				
WAL27428 (Lake Lyell)	22.6 km downstream of Springvale LDP009	No change due to the modification.	No change due to the modification.	No change due to the modification.
WAL27431 (Lake Burragorang)	~80 km downstream of Springvale LDP009	No change due to the modification.	No change due to the modification.	No change due to the modification. Increase from modelled median salinity of 98 mg/L to 103 mg/L under median rainfall conditions predicted for the Project.
Wolgan River (Hawkesbury and Lower Nepean Water Source (Colo River Management Zone))				
WAL25891	15.8 km downstream of LW418	No change due to the modification.	No change due to the modification.	No change due to the modification.
WAL26506	19.4 km downstream of LW418	No change due to the modification.	No change due to the modification.	No change due to the modification.

Data presented in **Table 42** show no expected change to surface water users due to the modification, and as identified above, the proposed modification will not change predicted impacts presented in the SVMEP EIS.

9.5.3.6 Surface Water – Groundwater Interactions

An assessment of the impact of mining-induced change to groundwater contribution to shrub swamps is presented in the Groundwater Assessment (Jacobs 2016a) and potential impacts due o the proposed modification is discussed in **Section 9.4.4**.

9.5.4 Geomorphology

Approach to Analysis

The potential for impact to geomorphology associated with the Project includes:

- change to longitudinal gradient through shrub swamps due to differential settlement
- potential for scour within Sawyers Swamp Creek associated with mine water discharge at LDP009.

Results of Analysis

Longitudinal Gradient through Shrub Swamps

There is no proposed change to predictions of subsidence presented in the EIS (RPS, 2014a). Subsidence effects remain the same as presented in the subsidence impact assessment presented in the SVMEP EIS (MSEC (2013)). Accordingly, it is concluded that the modification to consent will not result in a change to the potential for erosion within shrub swamps from that presented in the EIS.

Potential for Scour within Sawyers Swamp Creek

Section 6.3 of the Surface Water Assessment presented in the EIS (RPS, 2014c) presents an assessment of the potential for scour due to mine water discharge. RPS (2014c) found that the potential for scour was small since the average channel velocity during a typical large rainfall event was much higher than proposed channel velocities.

Given there is no proposed change to the rate of mine water discharge associated with the modification it is therefore concluded there is no change to the potential for scour within Sawyers Swamp Creek as a result of the modification.

9.5.5 Flood Modelling

Approach to Analysis

The potential for impact to flooding and drainage associated with the Project consists of mine water discharge to Sawyers Swamp Creek, which then flows into the Coxs River.

Results of Analysis

Section 6.3 of the Surface Water Assessment (RPS, 2014c) for the SVMEP EIS states that mine water discharge will not result in significant impact to flooding and drainage within Sawyers Swamp Creek or

the Coxs River, since predicted daily flow will remain in-bank, defined notionally to contain the 2 year Average Recurrence Interval flood event.

Given there is no proposed change to the rate of mine water discharge to Sawyers Swamp Creek associated with the modification, it is accordingly concluded there will be no change to flooding and drainage to this creek as a result of the modification.

Similarly, there is no expected change to geomorphology or flooding within the Coxs River due to the modification.

9.5.6 Impact Assessment

This section presents and discusses the potential impacts to streamflow and quality as a result of the proposed modification to the Project. The impact assessment is presented with respect to relevant Commonwealth and NSW legislation, guidelines and policy.

9.5.6.1 Significant Impact Guidelines Assessment

Table 43 presents an assessment of the modification against the EPBC Act *Significant Impact Guidelines for Coal Seam Gas and Large Coal Mines* (DoE (2013)).

Table 43 – Impact Assessment against Significant Impact Guidelines

Impact Guideline	Compliant	Comment
Hydrological Characteristics		
A significant impact on the hydrological characteristics of a water resource may occur where there are, as a result of the action: a) changes in the water quantity, including the timing of variations in water quantity	Yes	As established in the SVMEP EIS, the Coxs River has had a long history of industrial activity. The proposed modification does not change the predicted impact of the Project.
b) changes in the integrity of hydrological or hydrogeological connections, including substantial structural damage (e.g. large scale subsidence)	Yes	The predicted impact of the Project to the Newnes Plateau shrub swamps is presented in the SVMEP EIS. Further detail on potential impact to shrub swamps is presented in the Groundwater Assessment (Jacobs (2016a) and included in **Section 9.4.4.**
c) changes in the area or extent of a water resource	Yes	There is no change in the extent of any water resource as a result of the modification.
Water Quality		
A significant impact on a water resource may occur where, as a result of the action: a) there is a risk that the ability to achieve relevant local or regional water quality objectives would be materially compromised, and as a result the action: i. creates risks to human or animal health or to the condition of the natural environment as a result of the change in water quality	Yes	The Project results in mine water discharge to the Coxs River catchment, which eventually discharges into Lake Burragorang. As presented during the environmental impact assessment, the RWQIAM indicates a small increase in salinity in Lake Burragorang as a result of the Project.
ii. substantially reduces the amount of water available for human consumptive uses or for other uses, including environmental uses, which are	Yes	The Project comprises an increase in availability of water in the Coxs River catchment. The proposed modification does not change the predicted impact of the

Impact Guideline	Compliant	Comment
dependent on water of the appropriate quality		Project. The impact of the change to groundwater contribution to shrub swamps is presented in the Groundwater Assessment (Jacobs 2016a) and included in **Section 9.4.4**.
iii. causes persistent organic chemicals, heavy metals, salt or other potentially harmful substances to accumulate in the environment	Yes	Water quality criteria established in the SSD 5594, expressed in Springvale Coal's EPL 3607, have been tailored to reduce the potential impact of metals and salinity on the environment.
iv. seriously affects the habitat or lifecycle of a native species dependent on a water resource, or	Yes	As established in the SVMEP EIS, the Coxs River is an adapted ecosystem (perennial) from its long history as an industrialised catchment. The modification does not result in a change to the rate of mine water discharge from that presented in the SVMEP EIS.
v. causes the establishment of an invasive species (or the spread of an existing invasive species) that is harmful to the ecosystem function of the water resource, or	Yes	N/A
b) there is a significant worsening of local water quality (where current local water quality is superior to local or regional water quality objectives), or	Yes	As established in SSD 5594, there is a requirement to achieve a reduction in salinity of mine water discharge to the Coxs River to 500 µS/cm (90th percentile) by 30 June 2019 (Upper Coxs River Action and Monitoring Plan, Schedule 4 Condition 13 of SSD 5594). The target water quality (salinity) was derived through toxicity assessment by NSW OEH.
c) high quality water is released into an ecosystem which is adapted to a lower quality of water.	Yes	At this stage, the Upper Coxs River Action and Monitoring Plan has not been submitted. If there is mechanical treatment of mine water discharge to a higher water quality then it will be necessary to present that this will not lead to adverse impact.

9.5.6.2 Water Management Act 2000 Assessment

Water Management Plan for the Greater Metropolitan Unregulated River Water Sources 2011

As noted in **Section 9.5.2.2** the relevant water sharing plan for the Project Application Area is the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources* 2011 (NSW). There is no direct surface water extraction from this water sharing plan, however indirect take of water from the water sharing plan, due to mining-related reduction in groundwater contribution to surface watercourses does occur. This is discussed in detail in the Groundwater Assessment (Jacobs 2016a) for the modification, including an assessment of compliance with relevant rules from the water sharing plan, also included in **Section 9.4.3** and **Section 9.5.4.2**.

Impact to Surface Water Users

Table 44 presents an assessment of the impact of the predicted change to flow, level and quality due to the modification to the already approved impacts on relevant surface water users.

Table 44 – Impact Assessment of Changes to Flow, Level and Quality on Surface Water Users

Surface Water User	Distance from Site	Impact to Flow	Impact to Level	Impact to Quality
Coxs River (Upper Nepean and Upstream Warragamba Water Source (Wywandy Management Zone))				
WAL25607	3.5 km downstream of Springvale LDP009	Negligible	Negligible	Negligible
WAL27428 (Lake Wallace)	7.4 km downstream of Springvale LDP009	Negligible	Negligible	Negligible
Coxs River (Upper Nepean and Upstream Warragamba Water Source) (far field)				
WAL27428 (Lake Lyell)	22.6 km downstream of Springvale LDP009	Negligible	Negligible	Negligible
WAL27431 (Lake Burragorang)	~80 km downstream of Springvale LDP009	Negligible	Negligible	Negligible
Wolgan River (Hawkesbury and Lower Nepean Water Source (Colo River Management Zone))				
WAL25891	15.8 km downstream of LW418	Negligible	Negligible	Negligible
WAL26506	19.4 km downstream of LW418	Negligible	Negligible	Negligible

9.5.6.3 Environmental Planning and Assessment Act 1979 Assessment

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

Table 45 presents an assessment of the impact against the *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011*, in accordance with WaterNSW (2015). It is noted the assessment of the Project presented during the environmental impact assessment stage did not use the NorBE tool available in WaterNSW (2015), because it was not suitable.

Table 45 – Impact Assessment against Neutral or Beneficial Effect Test

Assessment Condition	Compliant	Impact Assessment
"A neutral or beneficial effect on water quality is satisfied if the development: (a) has no identifiable potential impact on water quality, or	N/A	N/A
(b) will contain any water quality impact on the development site and prevent it from reaching any watercourse, waterbody or	N/A	N/A

Assessment Condition	Compliant	Impact Assessment
drainage depression on the site, or		
(c) will transfer any water quality impact outside the site where it is treated and disposed of to standards approved by the consent authority."	Yes	As specified in under the Upper Coxs River Action and Monitoring Plan (Schedule 4, Condition 13), there is a requirement to meet a specified water quality (salinity) of 500 µS/cm (90th percentile by 30 June 2019. The modification to consent will not result in an increase in inflow to underground operations, and so there is no expected change in water quality of mine water discharge. Accordingly, there will be no change to already approved impact on water quality due to the modification.

9.5.6.4 NSW Water Quality and River Flow Objectives 2006 Assessment

Table 46 and **Table 47** present, respectively, water quality and river flow assessments of impact of the modification against the *NSW Water Quality Objectives* (OEH, 2006). The assessments included in **Table 46** and **Table 47** also satisfy the assessment requirements against the following Commonwealth guidelines:

- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* (ANZECC (2000))
- *Australian Drinking Water Guidelines 2011* (ADWD) (NHMRC (2016)).

Table 46 – Impact Assessment against NSW Water Quality Objectives

Water Quality Objective	Compliant	Impact Assessment
Aquatic Ecosystems "Maintaining or improving the ecological condition of water bodies and their riparian zones over the long term."	Yes	No change due to the modification. For the Project, as presented in the SVMEP EIS, predicted water quality (salinity) is within the range experienced historically in the Coxs River catchment. SSD 5594 conditions include the Upper Coxs River Action and Monitoring Plan, which prescribe a reduction in salinity to 500 µS/cm (90th percentile) by 30 June 2019. There is no proposed discharge to the Newnes Plateau associated with the modification. Also with respect to the Newnes Plateau, the modification will not lead to change in subsidence from that predicted in the EIS. Accordingly, there is no expected change to potential for erosion within these ecosystems because of differential settlement.
Visual Aesthetics "Aesthetic qualities of water"	Yes	No change due to the modification. There is a turbidity and suspended sediment quality limit to mine water discharge to Sawyers Swamp Creek at Springvale LDP009 on EPL3607.
Drinking Water – Groundwater "Refers to quality of drinking water drawn from the raw surface or groundwater sources before any treatment."	Yes	No change due to the modification. As indicated in the Groundwater Assessment (2016a) , there are no local users of groundwater with respect to water supply. For the Coxs River, mine water discharge meets the ADWG with the exception of salinity where 600 to 900 mg/L is considered of fair quality.
Industrial Water Supplies	Yes	No change due to the modification. As per the Water

Water Quality Objective	Compliant	Impact Assessment
"The high economic value of water taken from river and lakes for use by industry needs recognition in water quality planning and management. It has been identified as an important environmental value through community consultation."		Sharing Plan for the *Greater Metropolitan Unregulated River Water Sources 2011,* water must not be taken from the Coxs River under a major utility [power generation] access licence until all available mine water is used from its storages.

Table 47 – Impact Assessment against NSW River Flow Objectives

River Flow Objective	Compliant	Impact Assessment
Protect natural pools in dry times "Protect natural water levels in pools of creeks and rivers and wetlands during period of no flow"	Yes	No impact due to modification. There is no direct extraction of water from surface watercourses due to the Project or proposed as part of the modification.
Protect natural low flows "Protect natural low flows"	No	No change due to the modification with respect to the Newnes Plateau. As presented in the EIS, the Project does not discharge to the Newnes Plateau with respect to any THPSS, therefore meets this objective. With respect to the Coxs River there is continuous discharge to Sawyers Swamp Creek. This was approved as part of SSD 5594, and continuous discharge to Sawyers Swamp Creek will continue under the modified project.
Maintain wetland and floodplain inundation "Maintain or restore natural inundation patterns and distribution or floodwaters supporting natural wetland and floodplain ecosystems"	Yes	No change due to the modification, since there are no physical works such as hydraulic structures on the Newnes Plateau or within the Coxs River catchment.
Maintain natural flow variability "Maintain or mimic natural flow variability in all streams"	No	No change due to the modification, as continuous discharge of mine water to Sawyers Swamp Creek will continue, as currently approved. As presented in the SVMEP EIS, Sawyers Swamp Creek is a heavily modified catchment, due to its previous and current land use, including open cut mining and ash disposal facilities. The Coxs River is also extensively modified due to water supply reservoirs at Lake Wallace and Lake Lyell.
Maintain groundwater ecosystems "Maintain groundwater within natural levels and variability, critical to surface flows and ecosystems"	Yes	No expected change to groundwater level or quality due to the modification. As presented in the SVMEP EIS, there is no predicted change to groundwater level with respect to the Coxs River from mine dewatering. As presented in this assessment, mine water discharge to the Coxs River is not expected to have any change to groundwater. For the Newnes Plateau, the impact to THPSS due to mining-related change to groundwater contribution is presented in the Groundwater Assessment (2016a) and **Section 9.4.4**.

9.5.6.5 NSW Aquifer Interference Policy Assessment

Table 48 provides an assessment of the proposed modification against the Level 1 Minimal Impact Consideration of the NSW Aquifer Interference Policy (DPI (2012)) for the Less Productive Porous and Fractured Rock Aquifers.

Table 48 – Impact Assessment against NSW Aquifer Interference Policy (Level 1 Minimal Impact Considerations)

Level 1 Minimal Impact Consideration	Compliant	Impact Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan.	Yes	Negligible
OR A maximum of a 2 metre water table decline cumulatively at any water supply work.	Yes	Negligible
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	Yes	Negligible
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	Yes	Negligible

9.5.7 Water Licensing

There are no licensing requirements under the EPBC Act with respect to take from surface water sources.

There is no direct surface water extraction from the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011* and no surface licences are required under the *Water Management Act 2000*.

Surfaces water licences required for the indirect take of water from the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources* 2011 due to mining-related reduction in groundwater contribution to surface watercourses is discussed in **Section 9.5.4.2**.

9.5.8 Consequence of Potential Impacts

Groundwater modelling undertaken by Adhikary and Wilkins (2015) presented in the Groundwater Assessment (Jacobs 2016a) and discussed in **Section 9.4.3** and **Section 9.4.4** above indicates the increase in mining rate does not lead to a significant difference in inflow to underground operations compared to that presented in the SVMEP EIS (SSD 5594). Given that inflows to underground operations dominate the site water balance there is, accordingly, no change to mine water discharge predicted to Sawyers Swamp Creek via LDP009 due to the proposed modification. The environmental

consequence is that there will be negligible change to water flow, level and quality in Sawyers Swamp Creek and Coxs River due to the modification.

9.5.9 Management

Water management at Springvale Mine is governed by the Water Management Plan, as specified in Schedule 4, Condition 14, SSD 5594. The Water Management Plan presents the monitoring network, establishes trigger levels on expected impacts as well as presents the Trigger Action Response Plan (TARP).

There is also a tailored Water Management Plan required with respect to each Extraction Plan (Schedule 3, Condition 10).

Schedule 4, Condition 13 of SSD 5594 specify a requirement to prepare an Upper Coxs River Action and Monitoring Plan to achieve a target salinity in the Coxs River of 500 µS/cm (90^{th} percentile) by 30 June 2019. This management plan requires a monitoring program that focuses on:

- Water quality, macroinvertebrates and ecotoxicology monitoring across the Coxs River catchment to measure performance against a long term water quality target of 350 µS/cm and the impacts of toxicity and salinity changes on the aquatic ecology and ecosystem health of the Coxs River
- Water quality parameters to be monitored for all existing and proposed licensed discharge points
- A TARP detailing actions to be taken should any concentration limits be exceeded.

The Surface Water Assessment (Jacobs (2016b)) has concluded there are no presented changes to surface water management and monitoring already in place at Springvale Mine, and/or prescribed in SSD 5594. Water management and monitoring at Springvale Mine will continue to be undertaken as currently undertaken at the mine and in accordance with conditions of SSD 5594.

9.5.10 Conclusion

The Surface Water Assessment (Jacobs 2016b) has assessed the impacts of the revised groundwater predictions Adhikary and Wilkins (2015) to account for the increased extraction rate of 5.5 Mtpa proposed by Springvale Coal in this modification. The revised mine inflow predictions indicate the increase in mining rate does not lead to a significant difference in inflow to underground operations compared to that presented in the SVMEP EIS (SSD 5594). Negligible changes to the site water balance and the change to mine water discharge to Sawyers Swamp Creek via LDP009, due to the proposed modification, are predicted.

Surface water impact assessments undertaken with respect to relevant Commonwealth and NSW legislation, guidelines and policy conclude that overall there will be negligible change to water flow, level and quality in the watercourses within the Project Application Area and Coxs River due to the proposed modification. There will be negligible changes to flow, level and quality on the relevant surface water users. There will be negligible changes to flow, level and quality on the relevant surface water users.

9.6 Ecology

9.6.1 Introduction

A Due Diligence Ecology Assessment was undertaken for the coal stockpile extension area (**Figure 8**) by RPS East Australia Pty Limited (RPS (2016a)). The report is attached as **Appendix K**. The assessment has considered protected entities listed under the TSC Act and Matters of National Environmental Significance (MNES) as listed under the EPBC Act. Consideration has also been afforded to the requirements of the proposal in relation to the *Native Vegetation Act 2003*.

9.6.2 Methodology

A review of relevant information was undertaken to provide an understanding of ecological values occurring or potentially occurring within a 10 km radius of the Springvale pit top. The database searches undertaken were as follows.

- Protected Matters Search Tool (EPBC Act) (accessed December 2015)
- OEH Atlas of NSW Wildlife (TSC Act) (accessed December 2015).

The site was subsequently traversed on foot by a qualified RPS ecologist to determine ecological attributes of the area including targeted surveys for threatened flora species, ground-truthing of ecological communities and location of fauna habitat features including hollow-bearing trees and wombat burrows. A Trimble GPS unit with sub-metre accuracy was used to record any feature locations within the site.

9.6.3 Existing Environment

The coal stockpile extension site was determined to be highly modified and predominantly comprised of non-native vegetation comprising exotic grass and herb species, including common weeds such as *Phalaris aquatica* (Phalaris), *Conyza bonariensis* (Flax-leaf Fleabane), *Echium plantagineum* (Paterson's Curse) and *Holcus lanatus* (Yorkshire Fog). Some native grasses were also identified in the area, and included *Austrostipa verticillata* (Slender Bamboo Grass), *Rytidosperma carphoides* (Short Wallaby Grass) and *Panicum sp*. No canopy layer exists on the site. A sparse shrub layer of *Acacia dealbata* (Silver Wattle) and thickets of *Rubus fruticosis* (Blackberry) were identified within the site. As a result, the site was not considered to be commensurate with any native vegetation communities. In addition, no threatened flora species were identified.

The site was also devoid of any important habitat features such as hollow-bearing trees or wombat burrows.

9.6.4 Impact Assessment

The coal stockpile extension area was found to be highly modified and devoid of any significant ecological attributes. No native vegetation communities were present. Only non-native vegetation communities were present. As a result of the highly modified nature of the site and lack of important fauna habitat features on the site, no potential impacts to any protected entities under the TSC Act or the EPBC Act are expected. Therefore, an impact assessment under either legislation was not considered necessary.

9.6.5 Consequence of Potential Impacts

The Due Diligence Ecology Assessment concluded the modification will not impact on any threatened species, populations and ecological communities, and their habitats, listed under the TSC Act or the EPBC Act. No native vegetation clearing will occur. Non-native vegetation comprising exotic grass and herb species (**Section 9.6.3**) will only be cleared.

9.6.6 Mitigation and Management

The following management practices will be implemented to limit potential impacts of the proposed clearing works within the extension area upon surrounding ecological communities and associated flora and fauna species.

- Areas of non--native vegetation removal from within the coal stockpile extension area will be clearly demarcated to ensure clearing works are limited to areas within the site.
- Appropriate sedimentation and erosion barriers will be installed along the interface between the site and surrounds to prevent indirect impacts to adjacent areas.
- Washdown procedures will be employed for equipment used during clearing operations, if leaving the site, to prevent the spread of weed species into surrounding vegetation.

9.6.7 Conclusion

The due diligence ecological survey of the area proposed for coal stockpile expansion at the pit top determined that no native vegetation communities were present, and no threatened flora or fauna species were identified. Only non-native vegetation comprising exotic grass and herb species were recorded. No important habitat features were identified. As a result, there will be no native vegetation clearing or clearing of any threatened species, populations or endangered ecological species for the coal stockpile extension area. Only non-native vegetation will be cleared, and hence there will be no disturbance footprint associated with the proposed modification. An impact assessment under either the TSC Act or EPBC Act was not considered necessary.

9.7 Cultural Heritage

9.7.1 Introduction

An Aboriginal Heritage Due Diligence Assessment was undertaken for the coal stockpile extension area (**Figure 8**) by RPS East Australia Pty Limited (RPS (2016b)). The report is attached as **Appendix L**. The purpose of this investigation was to identify if there was risk of impact to Aboriginal objects within the coal stockpile extension area.

This due diligence assessment has been undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010) and the *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (Minerals Council, 2010).

9.7.2 Existing Environment

A search of the Aboriginal Heritage Information Management System (AHIMS), accessed on 18 January 2016, identified 12 previously recorded Aboriginal sites in the local region, of which one previously recorded site (AHIMS 45-1-0212–GS1; Springvale Colliery) was identified approximately 150 m to the south of the proposed coal extension area. According to aerial images of this recorded

site coupled with the original site description (which identified the site as being in poor condition) RPS (2016b) concluded that it was highly unlikely that AHIMS 45-1-0212–GS1; Springvale Colliery still exists.

The visual inspection of the coal stockpile extension area by the RPS archaeologists, surveyed as a single survey unit, concluded no artefacts were located in the survey unit. Additionally, the probability of Aboriginal sites located within the site was deemed highly improbable due to the highly disturbed nature and current land use practices in the area.

9.7.3 Impact Assessment

No impact on cultural heritage values will occur as a result of the modification given that the due diligence survey did not record any artefacts within the coal stockpile extension area and that RPS (2016b) concluded it is highly unlikely that intact deposits exist in the area.

The AHIMS 45-1-0212 – GS1; Springvale Colliery site is approximately 150 m south of the stockpile extension area. RPS (2016b) concluded that the distant location of the site to the extension area will ensure no impact (in the unlikely event that it still exists) due to the establishment of the expanded stockpile.

9.7.4 Consequence of Potential Impacts

No consequence on any Aboriginal site, including AHIMS 45-1-0212 – GS1; Springvale Colliery, is predicted due to the proposed establishment of the coal stockpile extension area.

9.7.5 Mitigation and Management

The following mitigation measures will be implemented during the establishment of the coal stockpile extension area.

- If unrecorded Aboriginal object/s are identified in the Project Area during works, then all works in the immediate area will cease and the area will be cordoned off. The area will be managed in accordance with the procedures outlined in Centennial Coal's Western Holdings *Aboriginal Cultural Heritage Management Plan 2014*.
- In the unlikely event that skeletal remains are identified, work will cease immediately in the vicinity of the remains and the area will be cordoned off. Procedures outlined in Centennial Coal's *Western Holdings Aboriginal Cultural Heritage Management Plan 2014* will be followed.
- If, during the course of development works, suspected historic cultural heritage material is uncovered, work will cease in that area immediately. The Heritage Branch, Office of Environment & Heritage (Enviroline 131 555) will be notified and works will only recommence when an approved management strategy has been developed.

9.7.6 Conclusion

The due diligence assessment did not identify any Aboriginal sites or artefacts within the stockpile extension area. The assessment concluded the establishment of the stockpile extension area will not impact on any Aboriginal site or artefact, including the nearest AHIMS 45-1-0212 – GS1; Springvale Colliery site, located approximately 150 m south of the stockpile extension area (in the unlikely event that is still exists).

9.8 Other Environmental Aspects

An assessment of other environmental aspects, namely noise and visual amenity, denoted as low risk in **Chapter 8.0,** relevant to the assessment of the proposed modification is provided in **Table 49**.

Table 49 – Other Environmental Aspects

Environmental Aspect	Assessment
Noise	Noise emissions at Springvale pit top are managed as described in the *Springvale Noise Management Plan* (part of Western Region Noise Management Plan), which was prepared in accordance with the requirements of Condition 4 Schedule 4 of SSD 5594. The potentially sensitive receptors (S1 – S3) identified in SSD 5594 are shown in **Figure 6**. Noise modelling undertaken for the Springvale Mine Extension Project (SLR (2014)) concluded that, with the noise controls committed to in Golder Associates (2014), it would be feasible to reduce noise emissions from Springvale pit top to be compliant with the relevant noise criteria at the receptors. The implementation of the noise controls identified in Golder Associates (2014) has now been completed. Attended noise monitoring at Springvale Mine is undertaken quarterly in accordance with the Noise Management Plan. The proposed modification will only involve additional operations underground (operation of an additional continuous miner) and will not change any aspect of the surface operations which have the potential to generate operational noise emissions at the potentially sensitive receptors. Noise from the construction of diversion drain (approximately 100 m in length) proposed around the coal stockpile area will generate minimal noise and will be temporary. As noted in **Chapter 3.0** and **Table 4** Springvale Mine's consent allows for the transport of 50,000 tonnes per annum of ROM coal from the pit top to the local domestic markets by road haulage. Offsite traffic noise due to this road haulage of coal was assessed in SLR (2014b) for the Springvale Mine Extension Project, and concluded the predictions comply with the NSW Road Noise Policy (EPA (2011)) day time and night time noise criteria. There is potential for some additional traffic generation by the proposed modification due to the increased workforce proposed. The greatest increases in traffic movements will occur during the weekend. The modification will result in traffic movements of 43 vehicles per hour in the hour prior to (5 pm to 6 pm) and the hour following (6 am – 7 am) the weekend night shift. An additional 42 vehicles per hour movement will also occur in the hour prior to (5 am to 6 am) and the hour following (6 pm – 7 pm) the weekend day shift. The traffic movements are essentially spread over two-hour periods and the predicted increase in traffic flows is considered minor (ARC (2016)). For these reasons it is unlikely that this relatively small increase in traffic flow will result in adverse noise impacts at the potentially sensitive receptors.
Visual Amenity	The proposed modification will not result in any new surface infrastructure. However, the establishment of the coal stockpile extension area will result in clearing of 0.3 ha of vegetation from the pit top. The area to be cleared is already heavily modified (**Section 9.6.3**) and is located adjacent to existing areas of disturbance, with the existing coal stockpile located to the southwest and the car park to the northeast. The stockpile extension area is not visible from publically accessible vantage points, including from Springvale Lane where the S1 and S2 receptors are located. It is located approximately 800 m from Castlereagh Highway and obscured by topography and vegetation. The increase in the stockpile capacity to up to 200,000 tonnes has a potential to have an adverse visual impact on the S1 and S2 receptors (**Figure 6**). However, the capacity increase will not result in higher coal stockpiles. The capacity increase will be accommodated within the existing footprint and additional increase in the stockpile footprint to the northeast (**Figure 8**)). Modelling has shown the stockpile will not exceed the existing coal stockpile heights or the Rill Tower height (**Figure 7**). The Rill Tower is used to push out the ROM coal from underground on to the surface. The existing vegetation cover between the pit top and the surrounding areas will continue to provide a visual buffer to the potentially impacted receptors and Castlereagh Highway. In conclusion, the modification will not result in an adverse impact on the visual amenity of the area surrounding the Springvale pit top.

10.0 STATEMENT OF COMMITMENTS

Table 50 provides a compilation of the mitigation controls to be implemented at Springvale Mine in order to effectively monitor, mitigate and / or manage the potential environmental impacts of the modification. Springvale Mine will continue to implement the controls already at place including those noted in the Statement of Commitments of the Springvale Mine Extension Project EIS (Golder Associates (2014)) and Response to Submissions (Springvale Coal, (2014)).

Table 50 – State of Commitments

Desired Outcome	Action
1. General	
Undertake all operations in a manner that will minimise the environmental impacts associated with the operation of Springvale Mine.	Operations will be undertaken in accordance with operations approved in the Springvale Mine Extension Project (SSD 5594) as modified.
2. Hours of Operation	
Undertake all operations within the approved operating hours.	Operations will be undertaken 24 hours a day and 7 days a week.
3. Air Quality and Greenhouse Gas Emissions	
Minimise air quality impacts to the greatest extent possible. Minimise to the greatest extent practicable greenhouse gas emissions from Springvale Mine operations.	The air quality and greenhouse gas emissions impacts will be managed in accordance with the Centennial Coal's *Western Region Regional Air Quality and Greenhouse Gas Management Plan*
5. Groundwater and Surface Water Resources	
All surface water groundwater and aquatic impacts are minimised to the greatest extent possible.	The surface and groundwater management and monitoring will be managed in accordance with the Water Management Plans, Swamp Monitoring Program and Upper Coxs River Action and Management Plan, prepared in accordance with SSD 5594 conditions.
6. Ecology	
Ensure no impact on any threatened species or endangered ecological communities.	The following management practices will be implemented to limit potential impacts of the proposed clearing of non-native vegetation within the stockpile extension area upon surrounding ecological communities and associated flora and fauna species. • Areas of vegetation removal will be clearly demarcated to ensure clearing works are limited to areas within the site. • Appropriate sedimentation and erosion barriers will be installed along the interface between the site and surrounds to prevent indirect impacts to adjacent areas. • Washdown procedures will be employed for all equipment used during clearing operations, if leaving the site, to prevent the spread of weed species into surrounding vegetation.

Desired Outcome	Action
7. Cultural Heritage	
Ensure that identified and unidentified Aboriginal sites or items of significance are appropriately managed.	The following management practices will be implemented prior to and during the establishment of the stockpile extension area. • If unrecorded Aboriginal object/s are identified in the Project Area during works, then all works in the immediate area will cease and the area will be cordoned off. The area will be managed in accordance with the procedures outlined in Centennial Coal's *Western Holdings Aboriginal Cultural Heritage Management Plan 2014*. • In the unlikely event that skeletal remains are identified, work will cease immediately in the vicinity of the remains and the area will be cordoned off. Procedures outlined in Centennial Coal's *Western Holdings Aboriginal Cultural Heritage Management Plan 2014* will be followed. • If, during the course of development works, suspected historic cultural heritage material is uncovered, work will cease in that area immediately. The Heritage Branch, Office of Environment & Heritage (Enviroline 131 555) will be notified and works will only recommence when an approved management strategy has been developed.

11.0 JUSTIFICATION AND CONCLUSION

11.1 Introduction

This chapter provides a justification for the proposed modification having regard to environmental, economic and social considerations. It summarises the potential environmental impacts, discusses the socio-economic benefits and considers the proposed modification against the principles of Ecologically Sustainable Development.

11.2 Substantially the Same Development

The proposed modification constitutes a minor change to an existing approved underground mine that has been operating successfully since 1995. Springvale Mine has well-defined surface mining environments. While the intensity of mining is proposed to be increased, with a proposal to increase ROM coal production from the approved 4.5 Mtpa to 5.5 Mtpa, the modification will not result in any change in the majority of the core elements of approved mining operations under SSD 5594, namely:

- mining method
- mine plan or the mining area
- total coal resource to be mined
- off site destinations of ROM coal and the method of delivery of coal to offsite locations
- underground and surface operations for the mining and handling of ROM coal
- operational hours
- life of mine.

Mining operations will occur within the SSD 5594 Project Application Area and existing mining leases (**Figure 3**). All mining leases required to facilitate operations approved under SSD 5594 have already been granted.

The modification proposes to increase Springvale Mine's workforce to 450 full time equivalent personnel to facilitate the increased coal production. A traffic impact assessment (ARC (2016)) of the proposed increase in workforce (**Section 9.1**) concluded the traffic generated as a result of the proposed modification will have no significant impact upon the capacity, efficiency and safety of the local, sub-regional and regional road network following the approval of the modification, and up to the forecast year of 2025.

The proposed increase in ROM coal production will result in direct and indirect greenhouse gas emissions (**Section 9.3.3**), however the modification's contribution to NSW and Australian emissions would be relatively small, and will not substantially increase the total Australian emissions. Estimated annual Scope 1 emissions will represent approximately 0.0032% of NSW GHG emissions and 0.0008% of Australia's total GHG emissions.

Groundwater modelling (Adhikary and Wilkins (2015)) indicates that the proposed increase in mining rate does not lead to a significant difference in inflow to underground operations compared to that presented in the SVMEP EIS (Golder Associates (2014)). Accordingly, predictions of impacts to groundwater dependent ecosystems (Newnes Plateau shrub swamps and hanging swamps) to watercourses, surrounding land uses, groundwater users (within 10 Km of Springvale Mine) are consistent with those presented in the SVMEP EIS. The potential impacts due to the proposed modification are negligible and the environmental consequences are negligible.

Given that inflows to underground operations dominate the site water balance and mine water inflows are not predicted to change significantly there is negligible change to the approved site water balance. Accordingly, no change to mine water discharge to Sawyers Swamp Creek and Coxs River due to the proposed modification is predicted. There will be negligible change to water flow, level and quality in Sawyers Swamp Creek, Coxs River and relevant surface water users due to the modification. As such the environmental consequences due to the modification are negligible.

The proposed increase in the ROM coal stockpile capacity from the approved 85,000 tonnes to 200,000 tonnes, additional coal handling and utilization of additional equipment underground will not result in exceedances of all relevant air quality criteria (**Section 9.2**). The associated increase in the stockpile footprint by approximately 0.3 ha to the northeast of the existing area will not significantly increase the pit top dirty water catchment or require any major changes to the existing water management at the pit top.

The coal stockpile extension area is heavily modified and devoid of any ecological values (**Section 9.6**). No native vegetation clearing or clearing of TSC Act and EPBC Act listed species or EECs will be required in the modification. No items of cultural heritage significance were recorded in the coal stockpile extension area and hence no impacts to items of cultural and historic significance will occur in this modification.

Overall, the adverse environmental impacts of the proposed modification elements (**Section 11.3**) are predicted not to be significant. The socio-economic impacts are predicted to be positive (**Section 11.4**). The Springvale Mine Extension Project as modified will continue to provide a net benefit to the community with regard to social, economic and environmental impacts and benefits.

For reasons discussed above, the Springvale Mine Extension Project (as to be modified) will remain substantially the same as the development that was originally approved as SSD 5594.

11.3 Environmental and Socio-Economic Impacts

As detailed in **Chapter 8.0**, the potential environmental impacts of the modification have been identified using a broad brush, desktop-level risk assessment to assess the potential environmental risks that may arise as a result of the proposed modification elements. The key environmental issues identified in that assessment were the subject of technical studies summarised in **Chapter 9.0** and provided in full in **Appendices F – M**.

Table 51 provides an overview of the key environmental and socio-economic assessment issues discussed in this SEE. The impacts range from minor to negligible and not predicted to be significant. Mitigation measures are proposed to be implemented as relevant for any potential adverse environmental impacts. The residual impacts of the modification are minimal, and meet the objectives of the EP&A Act (**Section 5.3.1.5**).

Table 51 – Summary of Environmental and Socio-Economic Impacts

Issue	Overview of Key Findings
Traffic and Transport	• Additional trip generation to the pit top will result due to the proposed increase in staff, however, the traffic generation is considered minor and would have little impact on the operating capacity of the Castlereagh Highway, or on the Mine Access Road / Castlereagh Highway intersection's current level of service. • There will be no significant impact upon the capacity, efficiency and safety of the local, sub-regional and regional road network as a result of the proposed increase in Springvale Mine's workforce.
Air Quality	• Dust levels from the modification are predicted to meet relevant air quality criteria for TSP, PM_{10}, $PM_{2.5}$ concentrations and dust deposition rate.
Greenhouse Gas Emissions	• Greenhouse gas emissions will increase slightly as a result of the modification. • The increase in direct (Scope 1) emissions from the modification are estimated to be approximately 4,479 t $CO_{2\text{-}e}$ per annum, which is relatively small and represents only approximately 0.0032% of NSW greenhouse gas (GHG) emissions and 0.0008% of Australia's total GHG emissions. • Given the increased coal production rate the Scope 1 emission predictions will cease at the end of the mining period, and will most likely not be sustained till the end of the consent life.
Groundwater Resources	• Revised mine inflow predictions undertaken for the modification indicate that the increase in mining rate does not lead to a significant difference in inflows to underground operations compared to that presented in the SVMEP EIS. • Predictions of impacts to Newnes Plateau shrub swamps and hanging swamps overlying the mining area are consistent with that presented in the SVMEP EIS or are less. The impact on the shrub swamps therefore due to the modification is negligible. • Potential impacts to watercourses, surrounding land uses, groundwater users are consistent with those presented in the SVMEP EIS and approved in SSD 5594. The impacts on the watercourses, surrounding land uses, groundwater users due to the modification are negligible. • Updated estimates of requirements for water access licences (groundwater) indicate the water access licences held by Springvale Mine are sufficient.
Surface Water Resources	• Mine inflows dominate the site water balance and, given groundwater modelling shows that there is not a significant difference between the mine inflows due to the modification, there will be negligible change to the site water balance approved in SSD 5594. • Given the negligible change in the site water balance there will be no change to mine water discharge predicted to Sawyers Swamp Creek due to the proposed modification. There will therefore be negligible change to water flow, level and quality in Sawyers Swamp Creek, Coxs River. • There will be negligible impact on the relevant surface water users due to the modification.
Socio-Economic	• There will be a positive effect from the modification on socio-economics. • The modification will result in an increase in net benefit of approximately $32 million when compared with the net benefit of the Springvale Mine Extension Project as approved. • The modification will result in positive impact for direct and indirect employment and certainty of employment for existing employees at Springvale Mine.
Ecology	• No native vegetation clearing will occur. • No impacts will occur on threatened species or Endangered Ecological Communities, or fauna habitat.
Cultural Heritage	• No impacts will occur on any items of Aboriginal or historic cultural heritage significance.
Noise	• No impacts on the noise environment surrounding the Springvale Mine operations will occur.
Visual Amenity	• No impacts on the visual amenity of the area will occur.

11.4 Benefits from the Proposed Modification

The socio-economic assessments identify a number of benefits as an outcome of the modification at a local, regional and State level. The economic impact assessment (**Section 6.2**) shows the modification will have a positive effect on the quantum of economic benefits accruing to NSW. The modification will result in an increase in net benefit of approximately $32 million when compared with the net benefit of the Springvale Mine Extension Project as approved. It will also result in a higher benefit cost ratio (2.4) for the proposed modification than that estimated for the Springvale Mine Extension Project as approved, at 1.9.

The modification's proposed increase in coal production limit will allow operational flexibility to Springvale Mine, and at the same time improve the mine's economic viability. A consequence of this operational flexibility is that the mine can respond to market opportunities that may present themselves. This flexibility has potentially positive implications for the State, as the ability to increase production in favourable markets would result in increased royalty returns in particular to NSW. In overall terms, any marginal impact is likely to be positive, as it will entail earlier realisation of economic benefits.

The accelerated mining schedule resulting from the increased production rate of 5.5 Mtpa will result in earlier cessation of environmental impacts assessed and approved in SSD 5594, and the technical assessments undertaken for this SEE have concluded the environmental impacts from the proposed modification elements are not significant.

The proposed modification will result in positive impact from the additional direct and indirect employment, and certainty of employment for existing employees. While the impacts of royalties and taxes are broadly distributed across the State, the direct and indirect effects of wages that will be earned by Springvale Mine workforce will benefit the local community more. The majority of the workforce lives in the Lithgow LGA and all workforce lives in NSW.

Other benefits from Springvale Mine operations comprise the following.

- The mine water inflows from coal extraction provide the critical base water supply for the Mount Piper Power Station in the catchment. This provides the opportunity to substitute water currently sourced from the Fish River system and Lake Lyell by Mount Piper Power Station, and therefore reduces the reliance and consequent impact on those water sources.
- Community participation and support, which helps strengthen the social fabric of the region.
- The indirect (through Western Coal Services Project) provision of ROM coal for domestic use and product coal for export (Lidsdale Siding Project).

Benefits can be achieved with little to no risk of adverse environmental impact. Based on the predicted environmental effects of the modification elements and the ability to manage these effects to minimise harm to the environment, the Springvale Mine Extension Project as modified will present an overall minimal residual consequence.

11.5 Alternative to Proposed Modification: Do Nothing Option

In the 'Do Nothing' option Springvale Mine will continue to operate as currently approved in the Springvale Mine Extension Project under the consent SSD 5594. The environmental impacts due to the proposed modification, noted in **Section 11.3,** will not eventuate and the benefits of the proposed modification noted in **Section 11.4** will not materialize.

11.6 Ecologically Sustainable Development

The principles of ecologically sustainable development (ESD) are outlined in Section 6(2) of the NSW *Protection of the Environment Administration Act 1991* and Clause 7(4) Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*. Section 5(a)(vii) of the EP&A Act adopts ESD as one of its objects.

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. In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options,

(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, such as:

(i) polluter pays – that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The consistency of the modification with each of the ESD principles noted above is discussed in sub-sections below.

11.6.1 The Precautionary Principle

As described in **Chapter 8.0** a broad brush desktop-level risk assessment was completed to identify, prioritise and inform the environmental, social and economic impact studies required to support the SEE. Only four aspects (traffic and transport, air quality, greenhouse gas emissions, groundwater and surface water resources) were denoted moderate risk rating and warranted further assessments. However, the other environmental issues considered in the risk assessment (ecology, cultural heritage) were denoted low risk rating since they were considered to pose minimal to negligible potential impacts to the environment. Despite this, and in accordance with the precautionary principle, due diligence assessments were completed for these low risk issues.

The technical assessments were completed by suitably qualified specialist consultants with many years experience in their respective areas of expertise, and who had been previously involved in the assessments undertaken for the Springvale Mine Extension Project EIS (Golder Associates (2014)). The technical assessments were undertaken in accordance with current government policies and guidelines and relied on robust monitoring data acquired within Springvale Mine's environmental monitoring framework. Where applicable, environmental safeguards have been developed in the technical assessments to avoid or minimise any impact on the environment. These mitigation measures will be adopted as relevant and are included in the Statement of Commitments (**Chapter 10.0**). Following approval of the modification all relevant management plans will be reviewed and updated to ensure any potential impacts identified will be managed appropriately. On this basis, the proposed modification is consistent with the precautionary principle.

11.6.2 Intergenerational Equity

The principle of 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. The potential impact of the proposed modification elements is not considered significant, and as a consequence has negligible potential to adversely affect the health, diversity or productivity of the environment.

Springvale Coal has an existing environmental monitoring framework with management strategies, mitigation measures and monitoring programmes designed to minimise adverse impact upon the local environment and nearby communities. Mitigation measures arising from the proposed modification will be incorporated into the monitoring framework as relevant to ensure potential impacts are managed appropriately.

For the reasons noted above the modification will not adversely impact the current or future generations.

11.6.3 Conservation of Biological Diversity and Ecological Integrity

The principle of conservation of biological diversity and ecological integrity holds that it should be a fundamental consideration for development proposals. The establishment of the coal stockpile extension area proposed at the pit top is heavily modified from previous operational activities and is devoid of any significant ecological attributes. An ecology due diligence assessment undertaken over the area concluded the modification will not require any native vegetation clearing and there will be no impact on any threatened species, populations and ecological communities, and their habitats. On this basis the modification is consistent with the principle of conservation of biological diversity and ecological integrity.

11.6.4 Improved Valuation, Pricing and Incentive Mechanisms

The principle of improved valuation, pricing and incentive mechanisms deems that environmental factors should be included in the valuation of assets and services, and that those who generate the pollution and waste should bear the cost of containment, avoidance or abatement. The cost associated with using or impacting upon an environmental resource, together with remediation costs is seen as a cost incurred to protect that resource.

While historically, environmental costs have been considered to be external to the development costs of a proposal, improved valuation and pricing methods attempt to internalise environmental costs and include them within a proposal's costing. The Economic Impact Assessment (**Appendix F**) undertaken for the modification has quantified the environmental impacts, and concludes the Springvale Mine

Extension Project as modified has a lower economic cost by approximately $18 million (**Section 6.2.3**) when compared to the Springvale Mine Extension Project as approved.

The continued operation of the Springvale Mine following approval of the modification will ensure the natural resources are valued both during mining and after mining has been completed.

11.7 Conclusion

Springvale Mine is a well-established underground coal mine with well-defined surface and mining environments. The Springvale Mine Extension Project was approved on 21 September 2015. The mine is seeking to modify its consent to increase its production limit to 5.5 Mtpa from the approved 4.5 Mtpa, increase its workforce to up to 450 full time equivalent personnel, and increase its coal stockpile capacity to 200,000 tonnes.

The increase in production is part of Springvale Mine's five year business plan. Given the mine did not operate for eight weeks (21/08/15 – 16/10/15) while the Springvale Mine Extension Project was being assessed, Springvale Coal is now seeking to increase production output to make up shortfalls in revenue. This will result in increased output for the 2016 calendar year. To ensure the future production limit has been assessed adequately, Springvale Coal has elected to increase its approved production limit to 5.5 Mtpa. The increase in production limit will not only improve the economic viability of Springvale Mine, it will also improve the operational flexibility of the mine to respond to market opportunities that may arise. This flexibility has potentially positive implications for the State, as the ability to increase production in favourable markets would result in increased royalty returns, in particular to NSW.

The modification will have a positive effect on the quantum of economic benefits accruing to NSW. The modification will result in an increase in net benefit of approximately $32 million when compared with the net benefit of the Springvale Mine Extension Project as approved. It will also result in a higher benefit cost ratio (2.4) for the proposed modification than that estimated for the Springvale Mine Extension Project as approved, at 1.9.

The increase in workforce required to facilitate the increase in production will result in positive impact due to the direct and indirect employment. The flow-on effects of the increased workforce will benefit the local community and the surrounding region. The modification may result in this benefit being distributed across a greater number of employee households, however for a shorter period of time.

The modification is a minor alteration of the approved Springvale Mine Extension Project and can be considered to be substantially the same development. The adverse environmental impacts of the proposed modification elements are predicted not to be significant. Any potential impact can be managed appropriately to minimise harm to the environment. The benefits of the modification can therefore be achieved with little or no risk of adverse impacts on the receiving environment. The modification meets the relevant objects of the EP&A Act and is consistent with the four principles of the ecologically sustainable development. It meets all government policies. On these bases, the modification will meet environmental performance and socio-economic benefit requirements to be considered for approval.

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13.0 ACRONYMS, UNITS AND ABBREVIATIONS

Acronyms, Units and Abbreviations	Definition
%	percent
%ile	Percentile
oC	Degrees Celsius
AADT	Annual average daily traffic
ABS	Australian Bureau of Statistics
AEMR	Annual Environmental Management Report
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ANZECC	Australian and New Zealand Environment Conservation Council
ARC	Anton Reisch Consulting Pty Ltd
AWS	Automatic weather station
BOM	Bureau of Meteorology
CBA	Cost-Benefit Analyses
CCC	Community Consultative Committee
CCL	Consolidated Coal Lease
CH_4	Methane
CHPP	Coal Handling and Preparation Plant
CL	Coal Lease
cm	centimetre
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CSIRO	Commonwealth Scientific and Industrial Research Organisation
dB	decibels
dB(A)	Decibels, A weighted (a filter has been applied to the measured result to mimic the human response to noise)
DoE	Federal Department of the Environment (formerly SEWPaC)
DEC	Department of Environment and Conservation (NSW)
DECC	Department of Environment and Climate Change (NSW)
DECCW	(Former) Department of Environment, Climate Change and Water (NSW) (now known as Office of Environment and Heritage (OEH))
DGRs	Director General's Requirements, now SEARs
DoP	(Former) Department of Planning
DPE	Department of Planning and Environment (NSW)

Acronyms, Units and Abbreviations	Definition
DRE	Division of Resources and Energy (within DTIRIS)
DTIRIS	Department of Trade & Investment, Regional Infrastructure and Services (NSW)
EEC	Endangered Ecological Community
EIA	Economic Impact Assessment
EIS	Environmental Impact Statement
EL	Exploration Licence
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPA	Environment Protection Authority
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act 1994* (NSW)
g	gram
g/m^2/month	grams per square metre per month
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
GJ	Gigajoule
GHD	GHD Pty Ltd
GHG	Greenhouse Gas
GPS	Geographic Positioning System
ha	hectare
hr	hour
HVAS	High Volume Air Sampler
IPCC	International Panel on Climate Change
kg	kilogram
kL	kilolitre
km	kilometre
km^2	square kilometre
LCC	Lithgow City Council
LDP	Licensed Discharge Point
LEP	Local Environmental Plan
LGA	Local Government Area
m	metre
M	million

Acronyms, Units and Abbreviations	Definition
m/s	Metres per second
m^2	Square metre
m^3	Cubic metre
min	minute
mg/L	Milligram per litre
ML	Megalitre or Mining Lease
MLA	Mining Lease Application
MNES	Matter of National Environmental Significance
mm	millimetre
mm/m	millimetre per metre
MOP	Mining Operations Plan
Mt	Million tonne
Mtpa	Million tonnes per annum
NES	National Environmental Significance
NEPM	National Environment Protection Measure
NGA	National Greenhouse Account
NGER Act	*National Greenhouse and Energy Reporting Act 2007*
NO_2	Nitrogen dioxide
N_2O	Nitrous oxide
NPI	National Pollution Inventory
NPV	Net Present Value
NP&W Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
Pa	Pascal – a unit of pressure
PM_{10}	Particulate matter less than 10 microns
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of 10 microns or less
POEO Act	*Protection of the Environment Operations Act 1997*
PRP	Pollution Reduction Programme
RBL	Rated Background Level
RMS	NSW Roads and Maritime Service (former RTA)
ROM	Run of Mine
RPS	RPS Australia East Pty Ltd
SAL	Strategic Agricultural Land
SDWTS	Springvale – Delta Water Transfer Scheme

Acronyms, Units and Abbreviations	Definition
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SEWPaC (now DoE)	The former Department of Sustainability, Environment, Water, Population and Communities (Commonwealth), now Department of the Environment
SF_6	Sulfur hexafluoride
SIA	Social Impact Assessment
SLR	SLR Consulting Australia Pty Ltd.
SVMEP	Springvale Mine Extension Project
SMP	Subsidence Management Plan
SoC	Statement of Commitments
sp.	species
subsp.	sub-species
TARP	Trigger Action Response Plan
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
TEOM	Tapered element oscillating microbalance
THPSS	Temperate highland peat swamps on sandstone
t	Tonne
TIA	Traffic Impact assessment
TSC Act	*Threatened Species Conservation Act 1995*
TSP	Total Suspended Particulates
WM Act	*Water Management Act 2000*
µg	Microgram
$\mu g/m^3$	Microgram per cubic metre
µm	Micrometre or micron