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Springvale Mine Extension Project

Decommissioning and Rehabilitation Strategy

Report Number CCC15-011

19 March 2014

Centennial Angus Place Pty Ltd

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ISSUE AND AMENDMENT CONTROL HISTORY

Issue	Date	Description	Author	QA/QC
1	26 March 2013	Decommissioning and Rehabilitation Strategy Draft 1	Andrew Regan & Malvin Manueli	Clayton Richards
2	22 May 2013	Decommissioning and Rehabilitation Strategy Draft 2	Jessica Elmes	Chris Jones
3	28 June 2013	Decommissioning and Rehabilitation Strategy Draft 3	Jessica Elmes	Chris Jones
4	27 August 2013	Decommissioning and Rehabilitation Strategy Draft 4	Jessica Elmes	Chris Jones
5	25 September 2013	Decommissioning and Rehabilitation Strategy Draft 5	Jessica Elmes	Chris Jones
6	4 November 2013	Decommissioning and Rehabilitation Strategy Final 1	Jessica Elmes	Chris Jones
7	31 January 2014	Decommissioning and Rehabilitation Strategy Final 2	Jessica Elmes	Chris Jones
8	19 March 2014	Decommissioning and Rehabilitation Strategy Final 3	Jessica Elmes	Chris Jones

EXECUTIVE SUMMARY

Springvale Coal Pty Limited (Springvale Coal) commissioned SLR Consulting Australia (SLR) to prepare a Decommissioning and Rehabilitation Strategy for the proposed Springvale Mine Extension Project (the Project). This Rehabilitation and Decommissioning Strategy has been developed as an accompanying stand-alone report to form part of the Environmental Impact Statement for the Project.

The Project proposes to extend Springvale Mine's (Springvale) underground mining operations, using longwall mining techniques to the east, the southeast and southwest of its existing operations. Springvale's current development consent will expire on 28 September 2014 and Springvale Coal is seeking approval to continue mining beyond this date.

In order to effectively address the complexity of various land uses at Springvale, the Project Application Area has been divided into three management or primary 'domains' defined as:

- **Domain 1** – Infrastructure Areas, comprising disturbance areas associated with the existing infrastructure at the Springvale pit top, and existing and proposed infrastructure areas on Newnes Plateau;
- **Domain 2** – Other Lands, comprising areas within the Project Application Area, not captured in Domains 1 and 3,
- **Domain 3** – Water Management Areas, comprising water storage and sediment ponds located at the pit top;

Decommissioning and rehabilitation activities for each domain are outlined in this Strategy, including the proposed removal of infrastructure such as services, equipment and buildings, and roads. The rehabilitation to be undertaken will result in two rehabilitated or secondary domains within the Project Application Area as follows:

- **Domain A** – Woodland, arising from the rehabilitation of disturbance areas associated with the Springvale pit top, and the existing and proposed infrastructure areas on Newnes Plateau; and
- **Domain B** – Water Management Areas, comprising the water storage and sediment ponds located at the pit top.

Rehabilitation will be undertaken both progressively and at the end of the mine life. Progressive rehabilitation will involve partial rehabilitation of the disturbed areas following construction of the proposed infrastructure on Newnes Plateau, namely, Bores 9 and 10 dewatering facilities, the services borehole facility, and exploration drill hole sites. It will also include rehabilitation of the existing Bore 8 dewatering facility at the end of 2016, when it will be decommissioned and rehabilitated, and Bore 9 will be commissioned. Similarly, Bore 9 will be decommissioned and rehabilitated when Bore 10 is commissioned. Life-of-mine rehabilitation will commence on cessation of all mining activities and will include the rehabilitation of all infrastructures areas at the pit top and on Newnes Plateau. At this time the disturbance areas will be fully rehabilitated to create stable and self-sustaining landform for the nominated end land uses noted above. Regular monitoring of the rehabilitated areas will occur during the initial vegetation establishment period and beyond, to demonstrate whether the objectives of this Strategy are being achieved and whether a sustainable, stable landform has been provided. In the event that monitoring confirms that rehabilitation is not successful or it limited maintenance works will be undertaken to address the issue.

An indicative closure timeline has also been developed for the Project. The key rehabilitation and decommissioning activities include closure planning, decommissioning and rehabilitation, maintenance and monitoring, relinquishment and post relinquishment activities.

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ABBREVIATIONS

AIS	Agricultural Impact Statement
ANZECC	Australian New Zealand Environment and Conservation Council
ANZMEC	Australian and New Zealand Minerals and Energy Council
BBRA	Broad Brush Risk Assessment
BSAL	Biophysical Strategic Agricultural Land
DGR	Director General's Requirement
DP&I	NSW Department of Planning and Infrastructure
DTIRIS	NSW Department of Trade and Investment, Regional Infrastructure and Services
EIS	Environmental Impact Statement
EL	Exploration Licence
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
FCNSW	Forestry Corporation of NSW
ICMM	International Council of Mining and Metals
LDP	Licensed Discharge Point
LGA	Local Government Area
LLUS	Lithgow Land Use Strategy
ML	Mining Lease
MOP	Mining Operations Plan
NEPM	National Environment Protection Measure
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
POEO Act	*Protection of the Environment Operations Act 1997*
ROM	Run of Mine
SDWTS	Springvale Delta Water Transfer Scheme
SLR	SLR Consulting Australia
TSC Act	*NSW Threatened Species Conservation Act 1995*

1.0 INTRODUCTION

1.1 Overview

SLR Consulting Australia (SLR) was commissioned by Springvale Coal Pty Ltd (Springvale Coal), operator of Springvale Mine (Springvale), to prepare a Decommissioning and Rehabilitation Strategy as part of the Environmental Impact Statement (EIS) for the Springvale Mine Extension Project (the Project) for submission to the Department of Planning and Infrastructure (DP&I). The EIS will support a development application by Springvale Coal for continuation of mining at Springvale when its current development consent (DA11/92) expires on 28 September 2014.

A plan detailing the general locality of Springvale is shown as Figure 1. Springvale is committed to return any land disturbed to a capacity which was present pre-mining. This Decommissioning and Rehabilitation Strategy provides an approach to rehabilitation of areas related to the Project to achieve this objective.

1.2 Background

Springvale 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 is operated by Springvale Coal Pty Limited (a wholly owned subsidiary of Centennial Coal Company Limited (Centennial Coal), for and on behalf of the Springvale joint venture participants.

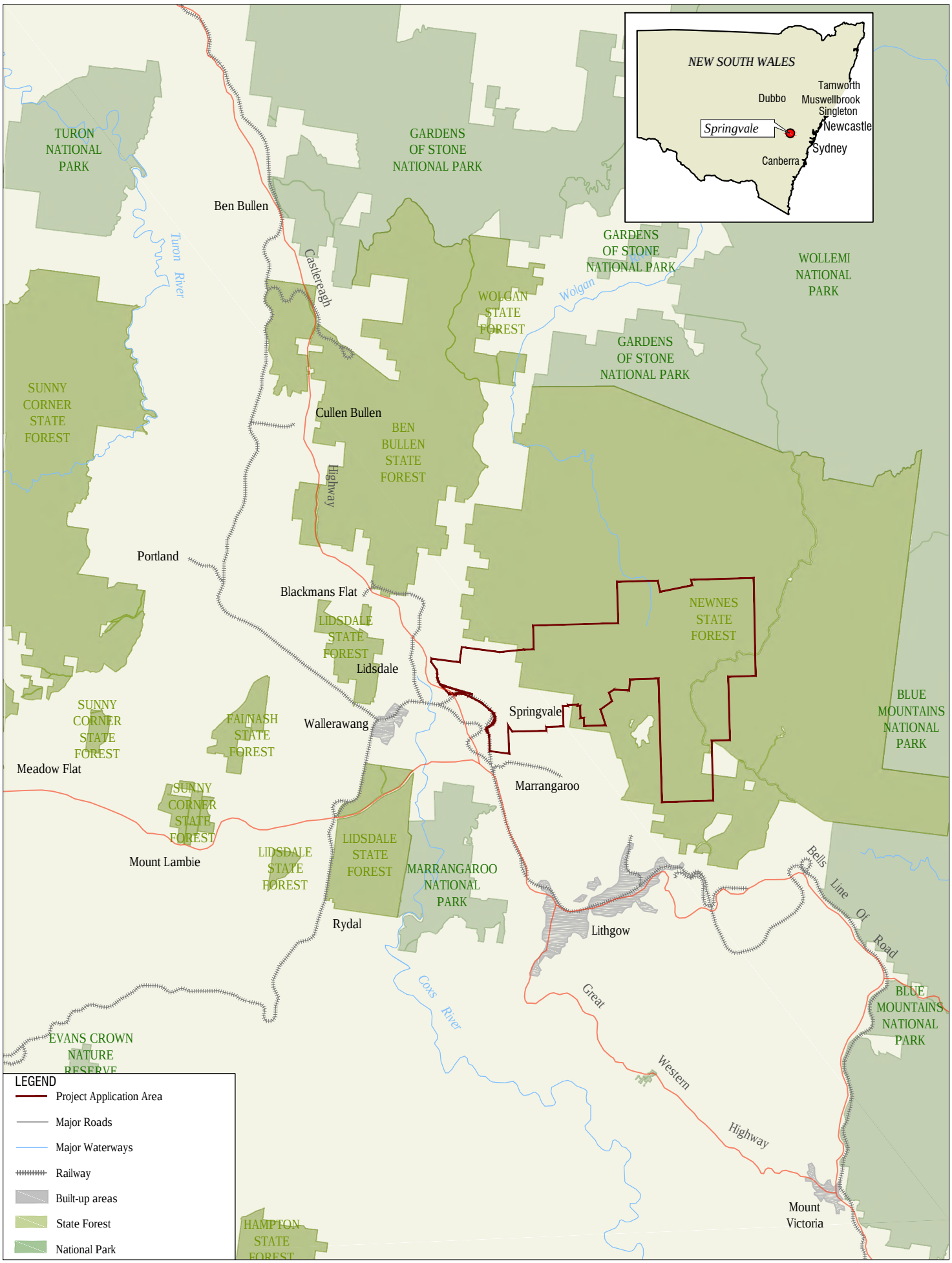
Springvale is an underground coal mine producing high quality thermal coal which is supplied to both domestic and international markets. The Springvale pit top is located approximately 15 kilometres north-west of the City of Lithgow (refer **Figure 1**) and is accessed off the Castlereagh Highway at Lidsdale. Springvale is located within the Lithgow Local Government Area (LGA). The underground longwall mine is situated directly below a sandstone plateau (Newnes Plateau) of undulating unpopulated bushland which is part of the Newnes State Forest.

Springvale is bordered by Angus Place Colliery (Centennial Angus Place Pty Ltd) to the north, the abandoned Lithgow State Mine to the south, and the Wolgan Valley and Newnes State Forest to the east. Collectively, existing land uses in the vicinity of the mine include residential land, pastoral farming, open cut and underground coal mining, power generation and commercial forestry.

1.3 Objectives of the Decommissioning and Rehabilitation Strategy

The purpose of this Decommissioning and Rehabilitation Strategy is to establish objectives for the decommissioning and rehabilitation of the existing disturbed land and disturbed land that will result from the Project. Specifically, the Decommissioning and Rehabilitation Strategy:

- Proposes rehabilitation strategies for existing disturbed areas and surface disturbance resulting from the Project;
- Proposes objectives for the rehabilitation of the existing disturbed areas and disturbance that will result from the Project;
- Develops a strategy to rehabilitate all disturbed land to original land capability or better;
- Proposes a strategy for the re-profiling of all disturbed areas to create a self-sustaining and stable final landform which will pose no long term environmental hazard;



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Springvale Pty Ltd

SPRINGVALE REHABILITATION STRATEGY

Regional Location

FIGURE 1

- Proposes to create a woodland final landform commensurate with the proposed RU2 Rural Landscape and RU3 Forestry land zonings in the Draft Lithgow Local Environmental Plan (2013);
- Establishes management controls that will preserve downstream water quality through creation of a final landform that is self-draining;
- Proposes an effective revegetation program for the rehabilitated areas;
- Proposes an effective monitoring program to assess performance of the rehabilitated areas; and
- Proposes preliminary success criteria for decommissioning and rehabilitation.

This report has generally been prepared in accordance with the requirements of the following relevant strategic land use planning and resource management plans and policies relating to mine rehabilitation and decommissioning. These include:

- *ESG3: Draft Mining Operations Plan (MOP) Guidelines* (DTIRIS, Resources and Energy, 2012);
- *The Strategic Framework for Mine Closure* (ANZMEC & MCA, 2000);
- *Leading Practice Sustainable Development Program for the Mining Industry - Mine Rehabilitation* (Department of Industry, Tourism and Resources, 2006);
- *Leading Practice Sustainable Development Program for the Mining Industry – Mine Closure and Completion* (Department of Industry, Tourism and Resources, 2006);
- The current Springvale *MOP* (Centennial Coal, 2009);
- The *Draft Lithgow City Council Local Environmental Plan 2013* (Lithgow City Council, 2013); and
- The *Lithgow Draft Land Use Strategy 2010-2030* (Lithgow City Council, 2011).

Further to the above, decommissioning and rehabilitation will be undertaken in accordance with the relevant Springvale approvals, leases, licences, the Director General's Requirements (DGRs) for the Project (refer **Tables 1** and **2**),

Relationship to the MOP

This Decommissioning and Rehabilitation Strategy has also been developed to integrate closely with the existing Springvale MOP. The MOP is a statutory plan approved by the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) and documents mining and rehabilitation activities for a period up to seven years. The MOP functions as a complementary rehabilitation and decommissioning plan by documenting both long term rehabilitation principles, and specific details of proposed rehabilitation activities and forecast rehabilitation progress for each year of the MOP term.

The current Springvale MOP covers the period from November 2009 to November 2016.

2.0 INFRASTRUCTURE, MINING AND REHABILITATION ACTIVITIES

2.1 Current Operations

The main components of Springvale's current operations are an underground longwall mine, supporting surface infrastructure within the Springvale pit top area, and supporting infrastructure on the Newnes Plateau.

Mined coal from the underground is transported to the surface and the stockpile area by a high capacity conveyor system. Coal is then crushed and sized using the existing Crushing and Screening Plant located at the pit top prior to despatch off site. Currently coal processing and distribution is managed at the Springvale Coal Services Site, located at Blackmans Flat. Run of mine (ROM) coal is transferred to this site, to two power stations (Wallerawang and Mount Piper Power Stations), and to Lidsdale Siding for overseas export using an overland conveyor system. The future coal handling and transport of ROM coal from the Springvale pit top to the final destinations will be managed under the development consent of the proposed Centennial Western Coal Services Project.

The existing Springvale surface facilities at the pit top area comprises the following components:

- Administration building and portable offices at the pit top site;
- Bathhouse facilities and services for the intended workforce;
- Sewage treatment and irrigation facilities;
- Coal Crushing and Screening Plant and coal stockpile;
- Various workshops, service buildings and material storage sheds;
- Visitor and employee parking areas;
- Personnel and materials drift for access to underground workings;
- Coal conveyor drift and coal conveyor drive to transport coal from the underground workings to the surface;
- Electrical distribution network comprising Substations 0 (located at Lidsdale) and Substations 1 to 3 located at the Springvale pit top;
- Communications network;
- Other ancillary services and activities;
- Diesel, solcenic hydraulic fluid and oil storage facilities;
- A dirty and clean water management control system, including two licensed discharge points (LDPs) (LDP001 and LDP002); and
- Mine dewatering infrastructure, referred to as the pit top collection system.

Existing underground infrastructure at Springvale includes:

- Longwall equipment comprising:
    - Double ended ranging drum shearer;
    - Shield supports;
    - Armoured Face Conveyor;
- Continuous Miners;
- Shuttle Cars;
- Ratio Feeders;

- Auxiliary fans;
- Mobile roof bolting rigs;
- Associated personnel and equipment transporters and loaders; and
- Associated pumping, electrical reticulation equipment.

In addition the Ventilation Shafts 1 and 2, used as downcast shafts, exist in the vicinity of the pit top.

The existing infrastructure on Newnes Plateau comprises:

- Dewatering Bore 6 Facility (to be decommissioned in 2013 and rehabilitated by end of 2013) and not considered further in this report;
- Dewatering Bore 8 Facility (to be commissioned in July 2013 and decommissioned by end of 2016);
- Ventilation Shaft 3 compound;
- Substation 5 (within the Ventilation Shaft 3 compound);
- Substation 4; and
- Infrastructure associated with Springvale Delta Water Transfer Scheme (SDWTS), comprising trenched power lines and pipelines.

The disturbance areas associated with the abovementioned infrastructure areas will require decommissioning and rehabilitation.

2.2 The Project

The Project is seeking development consent for the continuation of mining at Springvale beyond the expiry date (28 September 2014) of the current development consent DA11/92. Longwall mining is proposed to extend towards the east (LW416 – LW423), the southeast (LW424 – LW432) and the southeast (LW501 - LW503) of the existing workings (LW501 -LW503) shown in **Figure 2**.

More specifically, the Project will:

- Continue to extract up to 4.5 million tonnes per annum (Mtpa) of ROM coal from the Lithgow Seam underlying the Project Application Area;
- Develop underground access headings and roadways from the current mining area to the east to allow access to the proposed mining areas;
- Undertake secondary extraction by retreat longwall mining technique for the proposed longwalls LW416 to LW432 and LW501 to LW503;
- Continue to use the existing ancillary surface facilities at the Springvale pit top;
- Continue to manage 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 existing overland conveyor system for despatch to offsite locations;
- Continue to operate and maintain the existing ancillary surface infrastructure for ventilation, electricity, water, materials supply, and communications at the Springvale pit top and on Newnes Plateau;
- Install and operate two additional dewatering bore facilities (Bores 9 and 10) on Newnes Plateau and the associated power and pipeline infrastructure, and upgrade the existing and construct two new sections of access tracks to Bores 9 and 10 facilities;
- Construct a downcast ventilation borehole at the Bore 10 facility location;
- Establish a services borehole area;
- Upgrade the existing SDWTS comprising construction of new sections of the trenched pipelines to increase the water delivery capacity of SDWTS from the existing 30 ML/day to up to 50 ML/day;

- Manage mine inflows using a combination of direct water transfer to the Wallerawang Power Station, via the SDWTS, and discharge through Angus Place Colliery's LDP001 and Springvale Mine's LDP009;
- Continue to undertake existing and initiate new environmental monitoring programs;
- Continue to operate 24 hours per day seven days per week;
- Continue to provide employment to a full time workforce of up to 310 persons;
- Progressively rehabilitate disturbed areas at infrastructure sites no longer required for mining operations;
- Undertake 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;
- Transfer the operational management of coal processing and distribution infrastructure to the proposed Centennial Western Coal Services Project.

No changes are proposed to the existing pit top infrastructure, noted in **Section 2.1.** All existing infrastructure for the underground mining and coal handling operations for subsequent despatch off site will continue to be utilised in this Project. However, as noted in **Section 2.1** the ROM coal handling logistics for the despatch of coal from the pit top to the final destinations will be managed under the proposed Centennial Western Coal Services Project's development consent.

The following pieces of infrastructure will be established as part of the Project and all items will be located on Newnes Plateau.

2.2.1 Dewatering Provisions

Two dewatering bore sites, Bore 9 and Bore 10 (refer **Figure 2**) will be established for the continued management of mine inflows to satisfy safety and operational requirements. Four boreholes (each installed with submersible pumps) will be constructed at each bore site, and the associated power and switchroom facilities will also be established. Power to each bore site will be supplied from the existing substation 4 located on Newnes Plateau using trenched power cables running along the existing and/or upgraded access tracks (refer **Figure 2**).

Mine inflows will continue to be transferred into the existing SDWTS. Extensions of pipelines to Bores 9 and 10, trenched within the same infrastructure corridor as the underground power cable noted above, are proposed in the Project.

Duplication of the SDWTS (refer **Figure 2**) will be undertaken to accommodate the increased mine inflows predicted from the proposed longwalls within this Project and the Angus Place Mine Extension Project (Golder, 2013). This duplication will involve trenching of a second set of pipelines along the existing pipeline network at sections marked in Figure 2, to increase the water transfer capacity of the SDWTS from the current 30 ML/day to 50 ML/day.

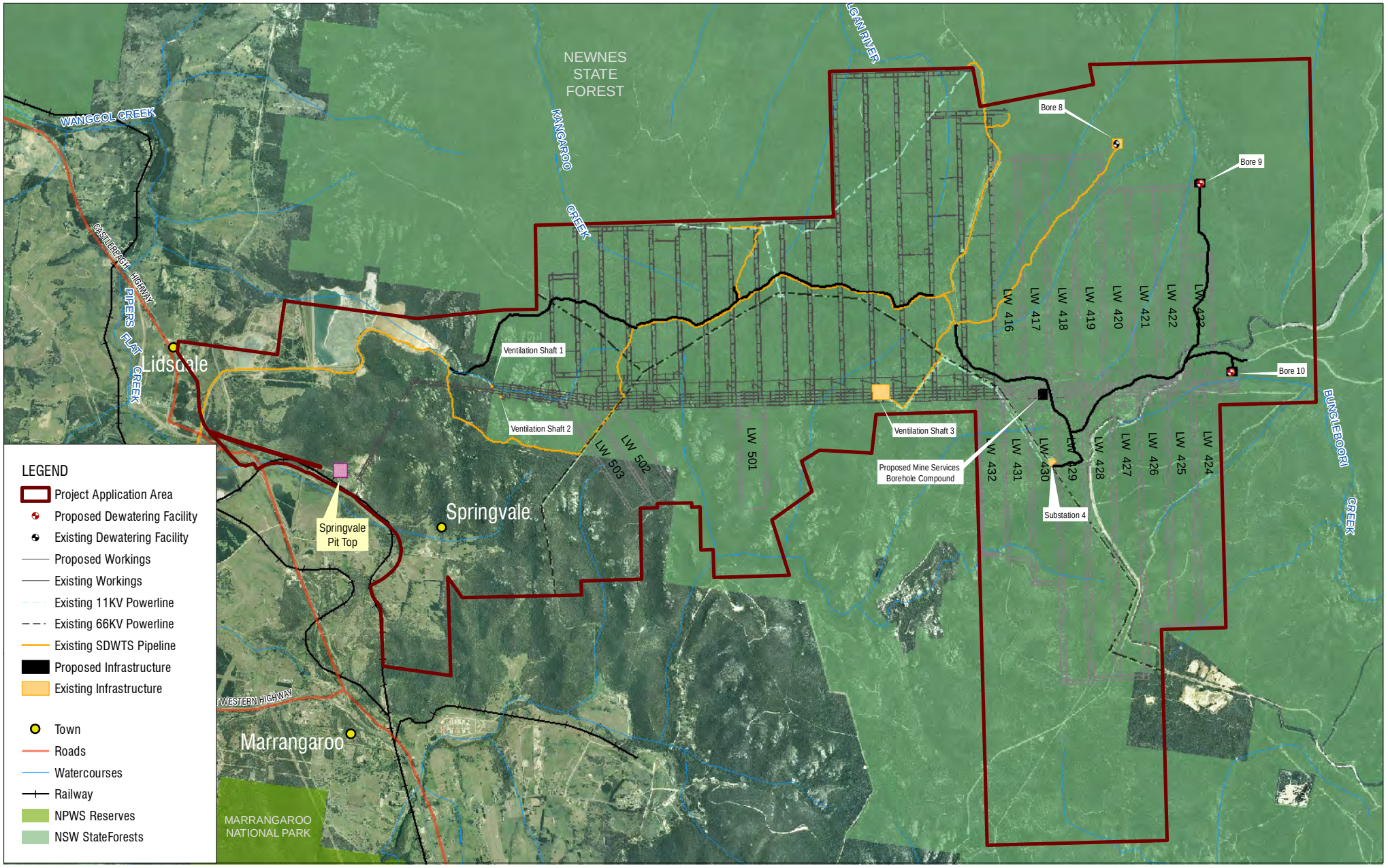
Further detail on the proposed extensions and duplication of the SDWTS is provided in the EIS, and accompanying Decommissioning and Rehabilitation Strategy for the Angus Place Mine Extension Project (Golder, 2013).

2.2.2 Underground Ventilation Services

An additional air intake shaft will be constructed within the Bore 9 dewatering facility site to deliver fresh air to the underground mine.

2.2.3 Mine Services Borehole Compound

A mine services borehole compound will be established on Newnes Plateau (refer **Figure 2**) for the supply of materials (e.g. ballast and concrete) underground. The mine services borehole compound will consist of four boreholes, appropriate water management structures, provisions for the supply of concrete material underground on an as-needed basis, and a shed or suitable housing to contain a telephone.



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SPRINGVALE REHABILITATION STRATEGY

Site Layout

FIGURE 2

3.0 LEGISLATION AND REGULATORY REQUIREMENTS

3.1 Legislation

3.1.1 Mining Act 1992

The *Mining Act 1992* regulates environmental protection, rehabilitation and closure conditions included in all mining leases. Springvale currently holds a number of Mining Leases (ML) and Exploration Licences (EL) issued under the *Mining Act 1992* over the Project Application Area. New mining leases may be required in certain areas of the Project Application Area. The *Mining Act 1992* has been considered during the preparation of this Strategy.

3.1.2 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal piece of legislation overseeing the assessment and determination of development proposals in New South Wales (NSW). Objectives of the EP&A Act are 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,*
>
> *(ii) the promotion and co-ordination of the orderly and economic use and development of land,*
>
> *(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*
>
> *(vii) ecological sustainable development.*

This Strategy has been prepared with consideration of the EP&A Act.

3.1.3 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes the State's environmental regulatory framework and includes licensing requirements for certain activities. The objectives of the POEO Act that relate to decommissioning and rehabilitation include to protect, restore, and enhance the environment, to reduce risks to human health and prevent degradation of the environment. This Act has been considered in the preparation of this Strategy.

3.2 Environmental Planning Instruments and Planning Policies

3.2.1 State Environmental Planning Policy (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. The SEPP provides that development for the purpose of mining may be carried out with development consent. It also defines mining developments that are prohibited, exempt from the need for consent or can be undertaken provided they comply with predetermined criteria/standards (complying development).

Development listed under the Mining SEPP as being exempt from the need for planning approval, which specifically relates to the decommissioning process, includes the demolition of a building or structure. Such demolition needs to be carried out in accordance with *Australian Standard AS2601-2001, Demolition of Structures*.

Furthermore, such development is only defined as exempt if the building or structure is not a heritage item, is not within a heritage conservation area and the demolition takes place on an approved mine site and is of minimal environmental impact.

3.2.2 Lithgow City Council Local Environmental Plan 1994

The Lithgow City Council Local Environment Plan (LEP) 1994 is the current environmental planning instrument governing land use and development decisions in the Lithgow City LGA. The LEP defines zones and the permissibility of development within each zone. The Project Application Area is located within the LEP, and the pit top is zoned 1(c) Rural (Small holdings), while the Newnes Plateau is zoned 1(f) Rural (Forestry). According to LEP 1994, development for the purpose of a 'mine' is permissible with consent in these zones. In addition, sub-clause 7(1)(a) of the Mining SEPP states that development for the purpose of underground mining (which includes mine related development) may be carried out on any land with development consent.

3.2.3 Lithgow City Council Draft Local Environmental Plan 2013

A draft Lithgow City Council *Local Environmental Plan* (LEP) *2013* (Draft LEP 2013) has been developed to implement a Standard Instrument LEP across the Lithgow LGA that will repeal and replace the two environmental planning instruments that currently apply to the Lithgow LGA: *Lithgow Local Environmental Plan 1994* and *Rylstone Local Environmental Plan 1996*. The Draft LEP 2013 seeks to implement Council's key strategic directions arising from the *Lithgow Land Use Strategy 2010-2030* (LLUS) adopted by Council on 31 October 2011 and formally endorsed by the Director General of DP&I on 24 May 2012.

The Draft LEP 2013 comprises a 'conversion' LEP where the land use zones within LEP 1994 are converted into similar zones that are set out in the Standard LEP Template prepared by the DP&I. In accordance with the Draft 2013 LEP, the Project Application Area comprises RU2 Rural Landscape zoning (Springvale pit top) and RU3 Forestry zoning (Newnes Plateau).

3.2.4 Lithgow Draft Land Use Strategy 2010-2030

Lithgow City Council has prepared the LLUS which has been exhibited and amended in accordance with Council's resolutions, and was formally endorsed by the Director General of DP&I 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 a new LEP (LEP 2013) and Development Control Plan as well as Council's other policy, regulatory and governance functions.

The LLUS is significant to Council and the community because it sets 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.

3.3 Other Policies and Guidelines

3.3.1 Strategic Framework for Mine Closure, Minerals Council of Australia

The Strategic Framework for Mine Closure has evolved as a cooperative development between the Australian and New Zealand Minerals and Energy Council (ANZMEC) and the Australian Minerals Industry (represented by the Minerals Council of Australia). It is designed to provide a broadly consistent framework for mine closure across various Australian jurisdictions.

The objective of the Strategic Framework for Mine Closure is to encourage the development of comprehensive closure plans that return all mine sites to viable, and whenever practicable, self-sustaining ecosystems, and to ensure these plans are adequately financed, implemented and monitored within all jurisdictions.

The Strategic Framework for Mine Closure is structured around a set of objectives and principles under six key areas:

- *Stakeholder Engagement*: to enable all stakeholders to have their interests considered during the mine closure process;
- *Planning*: to ensure the process of closure occurs in an orderly, cost effective and timely manner;
- *Financial Provisioning*: to ensure the cost of closure is adequately represented in company accounts and that the community is not left with a liability;
- *Implementation*: to ensure there is clear accountability, and adequate resources, for the implementation of the closure plan;
- *Standards*: to establish a set of indicators which will demonstrate the successful completion of the closure process; and
- *Relinquishment*: to reach a point where the company has met agreed completion criteria to the satisfaction of the responsible authority.

3.3.2 Leading Practice Sustainable Development Program for the Mining Industry, Australian Government, 2011

This Guide consolidates a series of handbooks relevant to all stages of a mine's life, being exploration, feasibility, design, construction, operation, closure and rehabilitation. The aim of the guideline is to identify key issues affecting sustainable development in the mining industry and provide information and case studies to enable a more sustainable basis for its operation. This Decommissioning and Rehabilitation Strategy has been developed in accordance with a number of guides generated through the Leading Practice Sustainable Development Program for Mines. These include:

- Mine Closure and Completion;
- Mine Rehabilitation;
- Biodiversity Management;
- Tailings Management;
- Water Management;
- Community Engagement and Development; and
- Hazardous Materials Management.

3.3.3 Guidance Paper - Financial Assurance for Mine Closure and Reclamation, International Council of Mining and Metals, 2006

This document has been prepared by the International Council of Mining and Metals (ICMM) and considers environmental financial assurance measures. It looks at issues and current policies in the use of financial assurances through the industry; analysing trends that were revealed through a survey of the industry, governments and financial institutions.

Environmental financial assurance for mine closure ensures that funds are available for decommissioning and reclamation of a site if an operator does not fulfil its obligations. It provides confidence to both governments and communities that satisfactory closure will be achieved. This document provides guidance on environmental financial assurance for both operators and regulators and covers the following areas:

- The case for financial assurance;
- Key issues associated with the application of financial assurance policies; and
- Recommendations for improving standards of practice relating to financial assurance.

3.3.4 NSW Department of Trade and Investment, Regional Infrastructure and Services Guidelines

DTIRIS also has in place a series of policy guidelines or environmental management guidelines that are either directly or indirectly relevant to mine closure issues. These include:

- *DTIRIS Guideline EDG01: Borehole Sealing Requirements on Land: Coal Exploration* (DTIRIS, 2012);
- *DPI-MR Guideline EDG02: Borehole Sealing Requirements on the Beds of Water Bodies: Coal Exploration Management of Exploration and Mining in NSW*, (Department of Mineral Resources, 1997);
- *DPI-MR Guideline EDG14: Reporting Requirements For Mine Closure And Lease Relinquishment*, (Department of Mineral Resources, 2006);
- *DPI-MR Guideline ESB20: Rehabilitation Security Deposit Requirements for Mining and Petroleum Titles* (DPI-MR, 2006);
- *DTIRIS Form ESB26: Rehabilitation Cost Calculation Tool V1.12* Excel Spreadsheet Tool used to calculate mine security deposits (DTIRIS, 2013);
- *DTIRIS Policy EDP11 Rehabilitation Security Deposits*, (DTIRIS, 2012); and
- *ESG1 Rehabilitation Cost Estimate Guidelines* (Industry and Investment NSW, 2010).

3.4 Centennial Coal Environment and Community Policy

The Centennial Coal Environment and Community Policy is a statement of Centennial Coal's commitment to manage environmental issues. When considering mine closure issues, the Policy contains specific reference to:

- Making appropriate decisions which comply with or exceed approvals, licences and agreements;
- Working constructively with local authorities, stakeholders and communities;
- Contributing to the conservation of biodiversity;
- Planning, designing and closing operations in a manner that enhances sustainable development; and
- Engaging and communicating openly with communities, with due regard and respect for local interests, cultures and customs.

3.5 Director General's Requirements

This Decommissioning and Rehabilitation Strategy has been prepared in accordance with the DGR's issued for the Project in November 2012. **Table 1** provides the DGR's relevant to rehabilitation and indicates where specific issues have been addressed in this document.

Table 1 – Summary of Director General's Requirements

Director General's Requirements	Addressed in Report
Rehabilitation – including the proposed rehabilitation strategy for the site, having regard to the key principles in *Strategic Framework for Mine Closure*, including:	
1. Rehabilitation objectives, methodology, monitoring programs, performance standards and proposed completion criteria;	**Sections 6.3, 8.0, and 9.0**
2. Nominated final land use, having regard to any relevant strategic land use planning or resource management plans or policies;	**Section 6**
3. A conceptual final landform design, including a detailed figure depicting relevant site features; and	**Section 6.2**
4. The potential for integrating this strategy with any other rehabilitation and/or offset strategies in the region.	**Section 3**

3.6 Regulatory Requirements for Rehabilitation

All regulatory requirements from DA11/92, ML1326, ML1537, ML1588, EL 2054 and Occupation Permit 2349 issued by the Forestry Corporation of NSW (FCNSW) related to rehabilitation at the site are listed in **Table 2**. The relevant section where each requirement has been addressed in this report has also been included in this table.

Table 2 – Regulatory Requirements for Rehabilitation

Section/ Condition	Area	Requirement	Addressed in Report
DA 11/92			
Schedule 2, Condition 19	Entire Site	**Site Rehabilitation** a) The Applicant shall prepare, within six months of this consent, a comprehensive plan for the staged rehabilitation of all lands disturbed by the development within the colliery holding and the coal washery and reject emplacement. The plan shall be submitted to the Council for its information and to the Department of Mineral Resources for its approval. The plan shall specify contour earthworks, tree screen plantings, grassed areas, means to control leachate from reject emplacements, soil erosion controls, final contours and proposals for maintenance of rehabilitation areas and management of waste disposal, including long term drainage both during and after the cessation of disposal operations, until such time as considered necessary by the Department of Mineral Resources.	**Completed**
		b) The Applicant shall consult and comply with the requirements of the Department of Conservation and Land Management in respect of the preparation and implementation of rehabilitation plans, revegetation programs, soil erosion controls and associated works.	
		c) The Applicant shall consult with NSW Agriculture and the Department of Conservation and Land Management concerning selection of appropriate vegetation species, seedling establishment techniques, soil testing and fertilizer selection and application.	

Section/ Condition	Area	Requirement	Addressed in Report
Schedule 2, Condition 19B (DA11/92 MOD 3)	Bore 8 Site	**Bore 8 – Rehabilitation** The Applicant shall prepare and implement a Rehabilitation Management Plan to rehabilitate areas of disturbance caused by construction of Bore 8 or the associated widening of access tracks to the satisfaction of Division of Resources and Energy. This Plan must: a) be prepared in consultation with the Department, Office of Environment and Heritage (OEH) and Forests NSW; b) be submitted to the Director-General Mineral Resources for approval, prior to 1 August 2013; c) describe how the performance of the rehabilitation would be monitored and assessed; d) describe measures for soil erosion and sediment control; e) provide for progressive rehabilitation of temporarily disturbed areas and final rehabilitation following decommissioning of the Bore 8 facilities; and f) include a timetable for the implementation of the components of the Plan.	**Submitted in April 2013**
Mining and Exploration Licences			
ML1326 Condition 15 (2)	ML Area	If the lease holder drills exploratory drill holes he must satisfy the Director General that: g) once any drill hole ceases to be used the land and its immediate vicinity is left in a clean, tidy and stable condition.	**Section 8.1.3.2**
ML1326 Condition 29	ML Area	The lease holder shall: j) complete work in relation to rehabilitation within the Warragamba Outer Catchment Area before termination of the authority to the satisfaction of the Authority.	**Section 8**
ML1537 Condition 21	ML Area	If so directed by the Minister the leaseholder shall rehabilitate to the satisfaction of the Minister any lands within the subject area which may have been disturbed by the lease holder.	**Section 8**
ML1537 Condition 22	ML Area	Upon completion of operations on the subject area or upon the expiry or sooner determination of this authority or any renewal thereof the lease holder shall remove from such surface such buildings, machinery, plant, equipment, constructions and works as may be directed by the Minister and such surface shall be rehabilitated and left in a clean, tidy and safe condition to the satisfaction of the Minister.	**Section 8.1**
ML1537 Condition 23	ML Area	If so directed by the Minister the leaseholder shall rehabilitate to the satisfaction of the Minister and within such time as may be allowed by the Minister any lands within the subject area which may have been disturbed by mining or prospecting operations whether such operations were or were not carried out by the lease holder.	**Section 8**
ML 1537 Condition 35 (j)	ML Area	The lease holder shall: j) complete work in relation to rehabilitation within the Warragamba Outer Catchment Area before termination of the authority to the satisfaction of the Authority.	**Section 8**
ML1537 Condition 36(h)	ML Area	During operations and progressively, the lease holder shall rehabilitate, consolidate and make trafficable all roads and firebreaks at present existing and which may be affected by the operations to the satisfaction of the Regional Manager or his deputy.	**Section 8.1**
EL 2054 Condition 16	EL Area	(g) as soon as possible after they are no longer required for prospecting operations temporary access tracks must be rehabilitated and revegetated to the satisfaction of the Department.	**Section 8.1**
EL 2054 Condition 16	EL Area	(h) Rehabilitation activities undertaken in regard to this condition must be included in reports prepared in accordance with Condition 28(a).	**Section 8.5**

Section/ Condition	Area	Requirement	Addressed in Report
EL 2054 Condition 23	EL Area	If the lease holder drills exploratory drill holes he must satisfy the Department that during and after the activity: vi) once any drill hole ceases to be used the land and its immediate vicinity is to be rehabilitated to its former condition.	**Section 8.1**
EL 2054 Condition 27	EL Area	(a) Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Department so that:- i) There is no adverse environmental effect outside the disturbed area and the land is properly drained and protected from soil erosion; ii) The state of the land is compatible with the surrounding land and land use requirements; iii) The landforms, soils, hydrology and flora require no greater maintenance than that in or on the surrounding land; iv) In cases where native vegetation has been removed or damaged, and where vegetation is required, species endemic to the area must be re-established. If the previous vegetation was not native, any re-established vegetation must be appropriate to the area or to the satisfaction of the landholder. Any re-established vegetation must be at an acceptable density and diversity; and v) The land does not pose a threat to public safety.	**Section 8**
		(b) Any topsoil that is temporarily removed from an area of prospecting operations must be stored, maintained and returned as soon as possible in a manner acceptable to the Department	**Section 8.3**
		(c) Any shafts, drill holes and excavations, that remain abandoned from previous mining or exploration, which are opened up or used by the licence holder must be filled in or otherwise rehabilitated to a standard Acceptable to the Department.	**Section 8.1**
		(d) All rehabilitation of disturbed areas should be completed before the expiry of the licence or immediately following the termination of the licence.	**Section 8**
ML1588 Condition 15 (2)		If the lease holder drills exploratory drill holes he must satisfy the Director General that: g) once any drill hole ceases to be used the land and its immediate vicinity is left in a clean, tidy and stable condition.	**Section 8.1**
Occupation Permit 2349			
3.14	Newnes State Forest	Without affecting the liability of the Applicant for damages or in relation to any other remedy to the reasonable satisfaction of FCNSW, the Applicant shall remedy to the satisfaction of FCNSW at its own expense any damage caused to the Area by the Applicant in breach of the provisions of this clause or otherwise including by the spillage of petroleum products or other pollutants or the deposition of polluting or obstructive materials within the area.	**Section 8.1.1.4**
4.10.4	Newnes State Forest	The Applicant must remedy any erosion or other Environmental damage or deterioration of the Area caused as a result of the Activity, its works or use of the Area and rehabilitate and revegetate all disturbed ground surfaces to the reasonable satisfaction of FCNSW and any Authority.	**Section 8.3**
4.11	Newnes State Forest	If the Applicant or Applicant's Employees and Agents Damage the Area or any part of it, or any part of FCNSW's Equipment, or any equipment, structures or other facilities of any party other than the Applicant, the Applicant must within a reasonable time make good the damage to the reasonable satisfaction of FCNSW or the relevant party whose equipment, structures or other facilities were so damaged.	**Section 8.2.1**

Section/ Condition	Area	Requirement	Addressed in Report
7.2.1	Newnes State Forest	The applicant must remove or fill as the case may be all excavations and other earth works so as not to compromise the rehabilitation potential of the Area in particular to with regard to standing timber or the surface of the ground including anything that may result in erosion of the soils in the Area, in carrying out such remediation works.	**Section 8.2**
18.1.3	Newnes State Forest	The Applicant and the Applicant's Employees and Agents must at all times ensure that any vegetation that has been cleared with the prior consent of FCNSW under this Occupation Permit is used for rehabilitation of the cleared site.	**Section 8.4**
18.4..5	Newnes State Forest	In the event that permission is granted by FCNSW to the Applicant to construct roads or access tracks within the Area, then in addition to any requirements set out elsewhere in this Occupation Permit, the Applicant must ensure any temporary access track or road shall be restored or revegetated in accordance with the provisions herein when no longer required.	**Section 8.1**

4.0 THE GENERAL ENVIRONMENT

4.1 Existing Land Use

The Springvale pit top supports existing mining operations situated directly below the unpopulated bushland which is part of the Newnes State Forest. Collectively, existing land uses in the vicinity of the mine include residential land, pastoral farming, open cut and underground coal mining, power generation and commercial forestry.

4.2 Geology and Soil Landscape

Springvale is situated in the south-western part of the Western Coalfields of the Sydney Basin. Strata in the Sydney Basin date from Early Permian to Late Triassic with Quaternary alluvium sediments deposited in erosional valleys. Two periods of coal deposition occurred during the Permian, with the more significant Late Permian episode resulting in widespread coal seam development across the entire Sydney Basin. The economically important Illawarra Coal Measures of the Southern and Western Coalfields were formed during this phase. Total thickness of the Illawarra Coal Measures increases towards the east, from approximately 120 m in the Lithgow area to a maximum thickness of 520 m in the northern part of the Southern Coalfield, (RPS, 2013a).

Non coal-bearing Triassic strata directly overlie the Illawarra Coal Measures. The basal unit is the Narrabeen Group, which consists of sandstone, shale and claystone. This is overlain by the Hawkesbury Sandstone, which is overlain by the Wianamatta Shale. Economic development of the Hawkesbury Sandstone and the Wianamatta Shale has not extensively taken place in the Western Coalfield.

The Lithgow area of the Western Coalfield occupies a unique geological position located on the edge of the Permian age coal bearing strata of the Sydney Basin. West of the coal bearing Permian strata, the sediments, meta-sediments and granitic bodies of the underlying Silurian and Devonian age rocks of the Lachlan Fold Belt dominate the surface geology. These older strata also extend beneath the coal bearing Sydney basin.

The Lithgow seam at Springvale is the lowermost economic seam and is only tens of metres to 100 metres above the older basement strata. In other parts of the Sydney basin it is typical for the Permian coal bearing strata to be separated from the basement strata by many hundreds of metres. The highest stratigraphic units present at Springvale are those of the Narrabeen Group.

4.3 Ecology

The Flora and Fauna Assessment (RPS, 2013b) undertaken for the Project identified 19 vegetation communities. Of these, three were listed as Endangered Ecology Communities namely Newnes Plateau Shrub Swamp, listed under the NSW Threatened Species Conservation Act (TSC Act), Montane Peatlands and Swamps, listed under the TSC Act, and Temperate Highland Peat Swamp on Sandstone, listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

A total of 13 threatened flora species listed under the TSC Act and/or EPBC Act were noted to have potential to occur within Project Application Area, and of these, four were recorded during the RPS survey. These species were *Persoonia hindii*, which is listed as Endangered under the TSC Act, *Veronica blakelyi* which is listed as Vulnerable under the TSC Act, and *Boronia deanei* which is listed as Vulnerable under both the NSW TSC Act and EBPC Act 1999, and *Eucalyptus aggregata* which is listed as Vulnerable under the TSC Act.

A total of 40 threatened fauna species listed under the TSC Act and/or EPBC Act were noted to have potential to occur within the Project Application Area, of these, 17 were recorded within the Project Application Area during the RPS survey.

Further detail on the ecology of the Project Application Area is provided in the RPS Flora and Fauna Assessment (2013b) included as Appendix O of the EIS.

4.4 Topography and Hydrology

The surface lands adjacent to and above Springvale underground workings are situated on the Newnes State Forest, which comprises narrow gorges with high ridgelines, steep sided slopes and sandstone cliffs above incised valleys, hilly areas with relatively flat crests and spurs and moderately sloped ephemeral drainage lines. Marrangaroo Creek, the Wolgan River, Carne Creek and their tributaries can be found in within the Project Application Area overlying the existing and proposed workings. Pastoral farming lands and private land exist above the western portion of the Project Application Area.

The Project Application Area lies on the border of the upper catchment of the Wolgan River (within the Hawkesbury–Nepean Catchment) and the catchment of the Coxs River. The Wolgan River flows in a north north–westerly direction and is a tributary of the Capertee River, which ultimately joins the Colo River, the Hawkesbury River and Broken Bay. The Coxs River on the other hand flows in a southerly direction and its catchment is part of the greater Warragamba Dam Catchment. The Warragamba Dam Catchment lies within the Sydney drinking water catchment.

4.5 Soil and Land Capability

A Soil and Land Capability Assessment was undertaken for the Project Application Area by SLR (2013a). The results of the desktop study using background information, field investigations and laboratory soil testing showed eleven soil types occur through the Project Application Area. The report identified that Class 4 (11 ha), Class 5 (64 ha), Class 6 (1 ha), and Class 8 (10 ha) land have the potential to be impacted by the new surface infrastructure, however SLR concluded that the LSC classes are expected to be returned to the pre-disturbance class.

A Biophysical Strategic Agricultural Land (BSAL) assessment undertaken for the Project Application Area (refer **Section 4.6**) to determine if any sensitive land resources occur determined that Soil Type 3 (Self-mulching, Black Vertosol) is the only potential BSAL present within the Project Application Area, however this soil type is not within the proposed disturbance areas.

A Soil and Land capability assessment undertaken for the Project (SLR, 2013a) determined the suitable soil resources available within the Project Application Area for later use in mine rehabilitation. The report found that soil resources are generally stable but will require standard erosion and sediment controls for any proposed disturbance areas associated with surface infrastructure or any potential surface cracking as a result of subsidence. The topsoil and subsoil resources allocated for infrastructure should be stripped and stockpiled separately nearby for the reinstatement of the soil profile upon rehabilitation.

4.6 Agricultural Suitability

An Agricultural Impact Statement (AIS) for the Project has been developed by SLR (2013b). The AIS assessed the impacts of the Project within the entire Project Application Area of 5,769 ha. Assessments of land disturbance due to the new proposed infrastructure and access road on Newnes Plateau (covering a total area of 48 ha) and any potential subsidence impacts within the proposed workings area (approximately1,934 ha) were also undertaken.

The assessment found that only 3% (175 ha) of the Project Application Area is cleared land which is currently used for agricultural production. The main agricultural land use is cattle, horse and goat grazing areas along the western edge. There are no agricultural enterprises located along the eastern edge of the Project Application Area in the vicinity of the proposed workings area. Importantly, SLR (2013b) concluded that post-mining potential agricultural economic activity within the Project Application Area is expected to be similar to pre-mining activity as there is no change predicted between the pre- and post-mining LSC classifications (refer **Section 4.5**).

BSAL was also assessed in SLR (2013b) to determine if any sensitive land resources occur within the Project Application Area. As no Strategic Regional Land Use Plan relevant to Project Application Area exists, the Project Application Area was assessed against the BSAL criteria contained in the *Upper Hunter Strategic Regional Land Use Plan* (DP&I, 2012). A second BSAL assessment was also completed against the assessment criteria in the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (OEH, 2013).

The BSAL assessment conducted according to the *Upper Hunter Strategic Regional Land Use Plan* (DP&I, 2012c) determined there was no BSAL within the Study Area. Alternately, the BSAL assessment conducted according to the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (OEH, 2013) determined there were 271 ha of BSAL within the Project Application Area (Self-Mulching Black Vertosol of the Cullen Bullen soil landscape unit), but no BSAL is present within the proposed workings area or land to be disturbed for the purposes of infrastructure establishment.

5.0 PLANNING FOR DECOMMISSIONING

A decommissioning and demolition strategy will form an integral part of the detailed closure planning for the Project. This will be developed for the site prior to closure and will include engaging structural engineers and appropriate technical experts with experience in demolition and the application of relevant Australian Standards and guidelines. A detailed investigation of all structures will be completed at this stage to determine the appropriate techniques, equipment required, and the sequence for decommissioning and removal required to execute the demolition activities safely.

Prior to commencement of demolition, an asset register will be distributed to all other Centennial sites to ascertain whether any of the key assets can be reused within the Centennial business.

5.1 Investigation of the Site

A site investigation will be completed during the decommissioning and demolition planning phase. This will include:

- The type, location and extent of underground services such as conduits, cables and pipe work owned and/or managed by Springvale Coal;
- The location and extent of underground structures to be retained and those to be removed;
- The location, type and extent of overhead services and structures such as power cables, conveyors, light poles and pipe work that are owned and/or managed by Springvale Coal;
- The location and condition of all tanks and vessels (with emphasis on remaining combustible materials and methods required for their removal);
- The presence of contaminated and hazardous materials and the classification and disposal of these materials;
- The general condition of adjacent structures; and
- Any infrastructure to remain following decommissioning (where appropriate).

5.2 Investigation of Structures

When planning for decommissioning and demolition an investigation of the structures will be completed to identify the following:

- The structures' current condition with regard to their state of disrepair or deterioration;
- The presence of heavy steel within structures that may require specialised demolition equipment and/or techniques; and
- Confined spaces and/or techniques required to be implemented in order to avoid entering such spaces.

5.3 Site Preparation

Prior to the commencement of any demolition activities the following tasks will be undertaken:

- All sumps will be dewatered;
- All items will be decommissioned, de-oiled, depressurised and isolated; and
- All hazardous materials will be removed and transported to appropriately licensed disposal facilities.

5.4 Site Infrastructure and Services

All buildings, including the main administration buildings, workshop areas, coal delivery systems (including conveyors and gantries), portals, decline tunnels and other surface infrastructure will be demolished unless there is a future landholder who is prepared to accept the on-going liability of a structure that they may wish to use. Opportunities for the sale and/or re-use of assets and recycling of scrap steel will be maximised where possible.

Concrete footings and pads will be broken up and removed. Options for the re-use of this material (for example, crushed and used for road and track stabilisation) will be investigated as the operation approaches closure. If re-use or recycling opportunities are not available or viable, all non-contaminated waste material will be disposed of in a suitable location on site (for example, in a shaft or portal) or taken off site to an approved waste management facility.

5.5 Contamination

Springvale Coal routinely undertakes investigations within their sites in relation to potential contamination. Phase 1 and 2 contamination studies have been undertaken at Springvale.

Prior to closure additional contamination studies will be undertaken at Springvale.

5.6 Hazardous Materials

Prior to the demolition of any structures, a hazardous material assessment will be undertaken to determine whether there are any hazardous materials present, including asbestos. Where hazardous materials are identified, they will be assessed and quantified to enable appropriate safety measures to be implemented during removal by a licensed contractor. All hazardous material removed from the buildings will be recorded and disposed of at an approved waste management facility.

6.0 ASSIGNING REHABILITATION AND CLOSURE DOMAINS, FINAL LAND USE OPTIONS ANALYSES

6.1 Assigning Rehabilitation and Closure Domains

This section describes the primary and secondary rehabilitation domains proposed for the Project. Primary domains can be defined as land management units within the mine site, usually with unique operational and functional purpose and therefore similar geophysical characteristics. Secondary domains are land management units characterised by a similar post mining land use objective. Accordingly, the Project's rehabilitation areas have been divided up into three primary domains and two secondary domains based on like rehabilitation outcome and closure criteria. These are shown in **Figures 3** and **4** and described in **Table 3**.

Table 3 – Primary and Secondary Domains

Domains	Description	Code
Primary Domains (refer **Figure 3**)		
Infrastructure	Includes existing and proposed infrastructure and facilities at the pit top and Newnes Plateau including workshops, administration buildings, powerlines (overhead and trenched), pipelines (trenched), substations, car parks, access roads, haul roads, sewage treatment plant and associated irrigation area, hardstand/laydown areas, coal stockpile areas, underground infrastructure including mine access, ventilation shafts (Downcast Ventilation Shafts 1 and 2, Upcast Ventilation Shaft 3), and dewatering bore facilities (Bores 8, 9 and 10) and associated water management structures. The dewatering bores and other infrastructure no longer required will be progressively rehabilitated. Equipment components within this domain that are not sold at mine closure or relocated to other Centennial Coal sites will be decommissioned and/or demolished. The disturbed areas will be rehabilitated, with the exception of the tracks to the infrastructure facilities on Newnes Plateau. These tracks will not be rehabilitated but will be retained for use as fire tails or access tracks by recreational users of Newnes State Forest and FCNSW.	1
Other Lands	This domain will include all areas of the Project Application Area not captured in Domains 1 and 3, and does not include disturbed areas arising from clearing of vegetation for infrastructure establishment. Domain 2 will include the proposed mining areas (proposed workings area) where limited rehabilitation works may be required given the subsidence impacts predicted for the Project (MSEC, 2013) are minimal or manageable for the majority of natural and man-made features. Furthermore, rehabilitation of any subsidence impacts will be triggered by the criteria outlined in the existing Subsidence Management Plan (SMP) and future Extraction Plan for the proposed longwalls, as relevant.	2
Water Management Area	Includes the network of dams and associated water management infrastructure at Springvale pit top. These structures will not be decommissioned at the end of mine life but will be maintained for future use.	3
Secondary Domains (refer **Figure 4**)		
Rehabilitation – Woodland	Rehabilitation Domain A – Woodland will comprise the Springvale Pit Top, and components of infrastructure areas from the Newnes Plateau that will be rehabilitated by the Project, but will exclude access tracks and overhead 11 kV and 66 kV powerlines. Areas will be rehabilitated with woodland species commensurate with adjacent remnant vegetation. Includes all rehabilitation to be undertaken on the Newnes Plateau and covers areas adjacent to the existing undisturbed native vegetation. This domain will continue to provide wildlife corridors.	A
Rehabilitation – Water Management Area	Rehabilitation Domain B – Water Management Area comprises the footprint of water management structures retained in the final landform at the Springvale pit top.	B

6.2 Domain Rehabilitation Objectives

General rehabilitation objectives for the Project are outlined in **Section 1.3**. Rehabilitation domains require specific management objectives to realise the desired final land use outcome due to the distinct geophysical features associated with the current land function. Rehabilitation objectives for each domain, and the relevant regulatory and approval requirements, are listed in **Table 4**.

Table 4 – Domain Rehabilitation Objectives

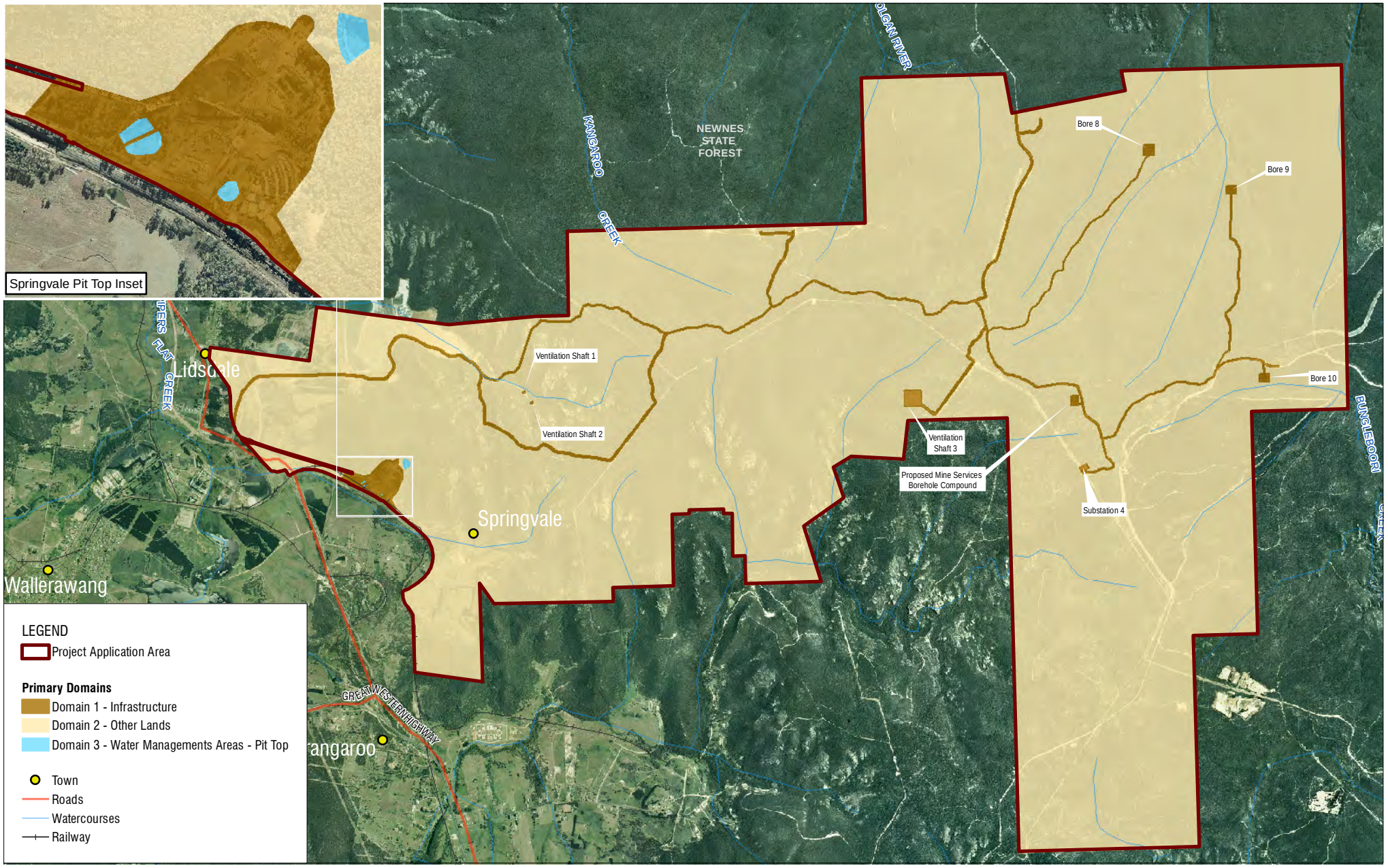
Domain	Rehabilitation Objective
Primary Domains (refer **Figure 3**)	
Domain 1 – Infrastructure	The principal objectives of Domain 1 are: • to form a stable landform which will pose no long-term environmental hazard; and • to create final landforms for the nominated end land use of open forest for the Pit Top and the disturbed areas on Newnes Plateau.
Domain 2 – Other Lands	The principal objective of Domain 2 is to rehabilitate surface impacts arising from activities other than direct clearing of vegetation, including subsidence effects, for the stabilisation of the impacted areas.
Domain 3 – Water Management Area	The principal objective of this Domain 3 is to allow the on-going capture of surface water run-off to provide water resources for any fauna habiting the pit top and the separation of clean and dirty water.
Secondary Domains (refer **Figure 4**)	
Domain A Rehabilitation – Woodland	The principal objectives of this domain are to form a stable and a self-sustaining landform which will pose no long-term environmental hazard, and to establish native forest ecosystem similar to the immediate surrounds, to ultimately provide opportunities to develop wildlife corridors.
Domain B Rehabilitation – Water Management Area	The principal objectives of this domain are to provide water resources to the fauna habiting the rehabilitated areas at the pit top, to allow separation of clean and dirty water within the rehabilitated areas prior to vegetation establishment within the disturbed areas, and to meet water requirements during the landform establishment, growth medium development, ecosystem establishment and development stages of the rehabilitation program.

6.3 Final Land Use Options Analyses and Justification

6.3.1 Rehabilitation Domain A – Woodland

Rehabilitation Domain A – Woodland comprises the Springvale Pit Top and the rehabilitated infrastructure areas (refer Table 3 and Figure 4) on Newnes Plateau. The Springvale pit top is currently zoned 1(c) Rural (small holdings) pursuant to the LEP 1994. The zoning of this land is set to change to RU2 Rural Landscape, under the provisions of the Draft LEP 2013 (see Section 3.2). The objectives of the RU2 zoning 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; and
- To maintain or improve the water quality of receiving water catchments in accordance with the NSW water quality objectives.



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Projection:	GDA 1994 MGA Zone 56

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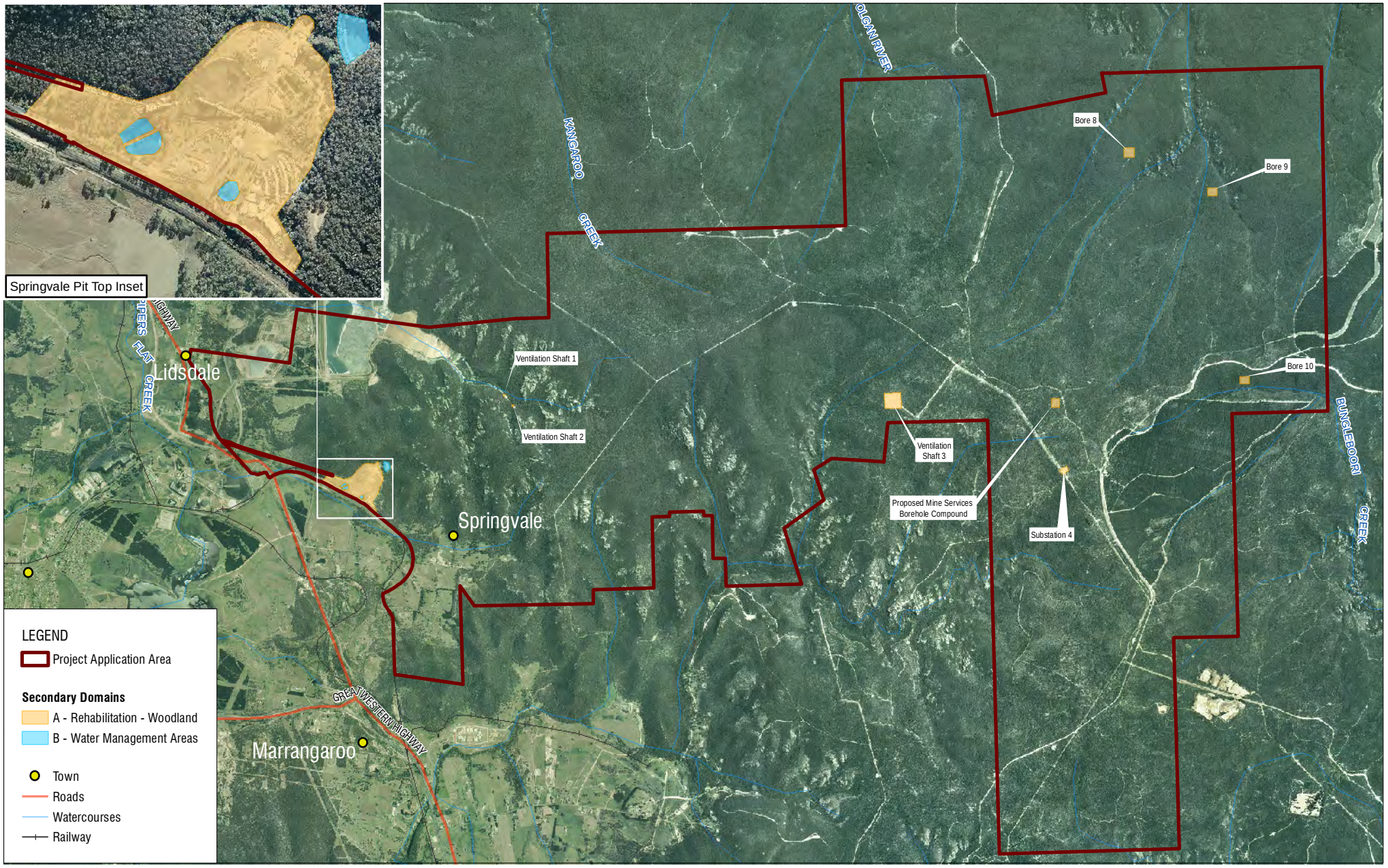
SPRINGVALE REHABILITATION STRATEGY

Springvale Rehabilitation Domains

FIGURE 3



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SPRINGVALE REHABILITATION STRATEGY

Conceptual Final Landform

FIGURE 4

Under both the 1(c) and the RU2 zonings, environmental protection works are permitted with consent. Under the 2013 Draft Lithgow LEP, environmental protection works are defined as means works associated with the rehabilitation of land towards its natural state or any work to protect land from environmental degradation, and includes bush regeneration works, wetland protection works, erosion protection works, dune restoration works and the like, but does not include coastal protection works.

As noted in **Section 3.2**, the Newnes Plateau is currently zoned 1(f) Rural (Forestry) pursuant to the LEP 1994. Development for any purpose authorised by the Forestry Corporation under the *Forestry Act 2012* is a permissible land use within zone 1(f) without consent.

However, the zoning of this land is set to change to RU3 Forestry, under the provisions of the Draft LEP 2013 (refer **Section 3.2**). Uses authorised under the *Forestry Act 2012* are also a land use permitted without consent within zone RU3. The objectives of the RU3 zoning are:

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

The objectives of both the RU2 and the RU3 zonings have been taken into consideration when determining the final land use option for Rehabilitation Domain A – Woodland.

The *Lithgow Draft Land Use Strategy 2010-2030* states that two of the major environmental protection and natural resource issues affecting the Lithgow Local Government Area, are the "*loss or reduction of environmentally sensitive land, water and biodiversity resources"*, and "*the encroachment of development on the scenic quality of landscapes" (Lithgow City Council, 2011)*. Returning the pit top and Newnes Plateau disturbance areas to woodland would support biodiversity within the region and increase the scenic landscape of the area, therefore aligning with the outcomes of the *Lithgow Draft Land Use Strategy 2010-2030*.

The final land use for this domain will become 'environmental protection works' at the pit top, and forestry on the Newnes Plateau. This final land use is consistent with the surrounding land use of forestry in the Newnes State Forest. These final land uses align with the current *Lithgow LEP 1994*, the *Draft Lithgow LEP 2013* and the *Lithgow Draft Land Use Strategy 2010-2030*. No additional strategic land use planning, or resource management plans or policies apply to the Project Application Area.

6.3.2 Rehabilitation Domain B – Water Management Area

The Rehabilitation Domain B – Water Management Area comprises the water management structures within Springvale pit top to be used for the supply of water to meet rehabilitation requirements in the short term, and to provide water resources for any fauna habiting the pit top. As stated in **Section 3.2**, the Springvale pit top is currently zoned 1(c) Rural (small holdings) pursuant to the LEP 1994.

The zoning of this land is set to change to RU2 Rural Landscape, under the provisions of the Draft LEP 2013 (see **Section 3.2**). The objectives of the RU2 zoning are listed in **Section 6.3.1** above.

These objectives have been taken into consideration when determining the final land use option for Rehabilitation Domain B – Water Management.

6.4 Centennial Strategic Agricultural Land Assessment

Centennial Coal recently completed a strategic agricultural land assessment for their on-tenement land holdings, which included the preparation of an internal report titled *Strategic Agricultural Land Assessment: On-Tenement Lands* (GSS Environmental, 2013). The assessment was targeted at assessing the options, opportunities and constraints to facilitate strategically managing Centennial Coal's on-tenement land bank. Only a section of the land within the Project Application Area was considered as part of this assessment, namely around the Springvale Pit Top. The assessment included lands other than those proposed to be disturbed by this Project, however the summary outcomes of this work are relevant in terms of establishing the future land use of the area and have been considered during the preparation of this report.

A review of the BSAL criteria was carried out to determine the potential for BSAL to be present within the Project Application Area. This BSAL assessment was undertaken at a desktop level for the Springvale pit top only, prior to the BSAL assessments undertaken for the Agricultural Impact Statement described in **Section 4.6**. The BSAL assessments were undertaken against both the *Upper Hunter Strategic Regional Land Use Plan* (DP&I, 2012) criteria, and the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (OEH, 2013) BSAL criteria.

The *Strategic Agricultural Land Assessment: On-Tenement Lands* report concluded that the 73 lots which make up Angus Place and Springvale Collieries only meet one of the *Upper Hunter Strategic Regional Land Use Plan* (DP&I, 2012) BSAL criteria, that being water availability, with an annual rainfall greater than 350 mm. The report found that, as the Inherent Fertility is Low and the Land Capability is Class IV and higher, it is unlikely any of the lots at Angus Place and Springvale Mines will meet the *Upper Hunter Strategic Regional Land Use Plan* criteria for BSAL.

Furthermore, although the slope analysis showed there are 529 hectares which meet the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (OEH, 2013) BSAL criteria, none of the lots meet the minimum criteria for soil type. These lots were therefore not classified as BSAL land.

6.5 Stakeholder Engagement

Centennial Coal has a strong commitment to stakeholder engagement, in particular the company's website states that:

"Centennial recognises both our local neighbours and the broader community as important stakeholders in our business and we aim to maintain effective working relationships with these stakeholders."

Springvale currently conducts community consultation widely and in accordance with the Springvale Stakeholder Engagement Plan. Community consultation is undertaken through a number of forums, including:

- The combined Springvale and Angus Place Community Consultative Committee;
- Meetings with individual landowners and stakeholders;
- Letters and community newsletters;
- Publications in local newspapers;
- Community information sessions and open days; and
- The Centennial Coal website.

Consultation with the appropriate landholders and additional stakeholder impacted by the specific activities will be undertaken prior to any proposed constructions works and progressive rehabilitation, where practicable. Decommissioning and rehabilitation works at the cessation of operations will require additional consultation and this will be included in the detailed closure planning process. The consultation process may include:

- Identification of all stakeholders and preparation of a specific stakeholder engagement strategy;
- Discussion regarding the opportunities for the re-use of infrastructure constructed for the Project (including water management structures, roads and tracks); and
- Identification of any other issues, key risks and information needs regarding decommissioning and rehabilitation of the Project.

Centennial Coal places the utmost importance on maintaining effective communication with the local communities and other stakeholders in which it operates. Detailed closure planning will be integrated into the stakeholder engagement process as the Project approaches five years out from permanent closure.

This report has been updated based on the adequacy comments received from the DP&I on the 28 December 2013 and the DTIRIS on 12 December 2013 relating to rehabilitation and land management.

6.6 Integration with Surrounding Rehabilitation

The size of the areas of disturbance associated with the Project does not allow for linkages with other rehabilitation and/ or offset strategies in the region. Consequently, the final land uses have been chosen to be consistent with surrounding environment, namely the Newnes State Forest.

Notwithstanding, the Angus Place and Springvale rehabilitation strategies have been prepared simultaneously to ensure they are consistent and the two final landforms for the Projects are integrated. Both of these Projects will be rehabilitated to woodland commensurate with the vegetation communities present across the Newnes State Forest.

7.0 RISK MANAGEMENT

7.1 Springvale Environmental Risk Assessment

A Broad Brush Risk Assessment (BBRA) was undertaken during development of the Briefing Paper for the Project. Centennial Coal's Risk Management Standard Risk Matrix was used to calculate the consequence and likelihood of an event to evaluate the subsequent risk level (risk rank). Risks are ranked as Low, Moderate, Significant, High or Extreme. This system operates in accordance with AS/NZS ISO 31000/2009. The primary objectives of the environmental risk analysis include:

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

No risks were identified as extreme or high. The significant and moderate risks identified in the Project BBRA relating to decommissioning and rehabilitation related to:

- Subsidence resulting in depressurisation of groundwater aquifers;
- Subsidence resulting in impacts to threatened flora, Endangered Ecological Communities (EEC) and fauna habitat;
- Exceedances of Environment Protection Licence (EPL) and/or Australian New Zealand Environment and Conservation Council (ANZECC) water quality criteria;
- Infrastructure construction/upgrades resulting in impacts to Bushfire, EECs, fauna habitat, flora, or rehabilitation requirements; and
- Impact to FCNSW access tracks within the Project Application Area due to increased usage.

The existing Springvale Environmental Management Plans (EMPs) already address the risks and controls identified in the abovementioned Risk Assessment. To ensure the continued implementation and improvement of the Springvale Environmental Management System (EMS), the identification and assessment of site based hazards and risks (aspects and impacts) are undertaken periodically.

7.2 Springvale Environmental Risk Management

Springvale has implemented an EMS, supported by a comprehensive set of EMPs to manage environmental risks at Springvale, including the management of rehabilitation areas. These plans have been developed and implemented by Springvale in accordance with the current Development Consent and regulatory requirements. EMPs are supported by an environmental monitoring program which includes monitoring meteorological conditions, air quality, noise, surface water and groundwater.

These plans are regularly updated with the relevant management plans made publically available on the Centennial Coal website. All relevant Springvale EMPs will be reviewed and updated to include the Springvale Mine Extension Project following approval. Springvale will notify DTIRIS when management plans have been updated, and approved management plans will be available on the Centennial Coal website.

8.0 DECOMMISSIONING AND REHABILITATION IMPLEMENTATION

Rehabilitation of the Project will comprise:

Progressive Rehabilitation – Part rehabilitation of the disturbed areas following construction of the proposed infrastructure on Newnes Plateau, namely, Bores 9 and 10, the services borehole facility, will be undertaken on completion of the respective construction phase. These areas to be progressively rehabilitated comprise areas that were only required for infrastructure construction stage and will not be required for operational phase. Staged rehabilitation of the dewatering bores will be undertaken. The Project will fully rehabilitate the existing dewatering bore facility, Bore 8, when it is no longer effective at managing mine inflows. This is likely to occur at the end of 2016 when extraction of LW419 will be completed. Similarly, Bore 9 will be fully rehabilitated on completion of the extraction of LW423. Bore 10 will be rehabilitated on cessation of mining at Springvale and would be undertaken as part of the life-of-mine rehabilitation discussed below. Similarly, when any other infrastructure area is no longer required for operations it will be rehabilitated after decommissioning within a reasonable timeframe and as agreed with FCNSW.

Progressive rehabilitation will also be undertaken within exploration drill hole sites should any exploration drilling activities be undertaken within the Project Application Area during the life of mine.

Life-of-Mine Rehabilitation – 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 use of woodland. Achievement of the agreed post mining land use will be achieved through a series of conceptual rehabilitation stages described in **Table 5**.

Table 5 – Life of Mine Rehabilitation Phases

Phase		Description
1	Decommissioning	The process of removing hardstand areas, plant, equipment, buildings and other structures and all contaminated and hazardous materials.
2	Landform Establishment	The process of shaping unformed rock of other sub-stratum material into a desired land surface profile including final landform drainage features. This phase includes substrate material characterisation, hazardous material encapsulation and earthworks to achieve safe and stable slopes with the desired gradients and landscape characteristics.
3	Growth Medium Development	The process of establishing and enhancing the physical structure, chemical properties and biological properties of a soil stratum suitable for plant growth. This includes placing and spreading soil and applying ameliorants.
4	Ecosystem Establishment	The process of seeding, planting and transplanting plant species. Incorporates management actions such as weed and feral pest control to achieve species establishment and growth to juvenile communities, and habitat augmentation.
5	Ecosystem Development	The process of applying management techniques to encourage an ecosystem to grow and develop towards a desired and sustainable post mining land use outcome. Incorporates features including species reproduction, nutrient recycling and community structure.
6	Rehabilitation Complete/Relinquishment	Completion criteria for rehabilitation are met and the land is determined to be suitable to be relinquished from the mine lease.

8.1 Decommissioning Phase

8.1.1 Domain 1 – Infrastructure

The key infrastructure to be decommissioned and rehabilitated in Domain 1 includes the following.

Springvale Pit Top

- Administration buildings and portable offices;
- Bathhouse facilities and services for the workforce;
- Sewage treatment and irrigation facilities;
- Coal Crushing and Screening Plant and coal stockpile;
- Various workshops, service buildings and material storage sheds;
- Visitor and employee parking areas;
- Personnel and materials drift for access to underground workings;
- Coal conveyor drift and coal conveyor drive to transport coal from the underground workings to the surface;
- Electrical distribution network comprising Substations 0 (located at Lidsdale) and Substations 1 to 3 located at the Springvale pit top;
- Communications network;
- Other ancillary services and activities;
- Diesel, solcenic hydraulic fluid and oil storage facilities;
- A dirty and clean water management control system, including two LDPs (LDP001 and LDP002); and
- Mine dewatering infrastructure, referred to the pit top collection system.

The underground infrastructure listed in **Section 2.1** will either be reclaimed and relocated for use elsewhere, or left behind underground after being made safe.

The Ventilation Shaft 1 and 2 facilities will also be decommissioned and sealed.

Newnes Plateau

- Dewatering Bore 8 (to be commissioned in July 2013 and decommissioned by end of 2016) and Bores 9 and 10 dewatering facilities comprising removal of:
    - Equipment comprising four submersible pumps, transformers and associated controllers;
    - Concrete pads;
    - Buildings;
    - Water management structures;
    - Security fencing; and
    - Boreholes (four dewatering boreholes and one ventilation downcast borehole).
- Ventilation Shaft 3 components comprising removal of:
    - Equipment (two ventilation fans, associated pumps, housings, electrical services, etc.);
    - Concrete pads;
    - Substation 5 and associated switchrooms;
    - Water management structures including the Emergency Holding Dam;

  - Security fencing and gates;
  - Vent shaft; and
  - Service borehole.
- Substation 4;
- Services borehole area, comprising:
  - Boreholes;
  - Sheds; and
  - Security fencing.
- Monitoring infrastructure (piezometers, weirs and transducers, seismometers, survey markers); and
- Infrastructure associated with SDWTS, comprising trenched power lines and pipelines.

8.1.1.1 Site Services

All services, including power, water, data and telephone, that are not required for demolition activities will be safely isolated, disconnected and terminated. Generally all underground services will be made safe and left buried in-situ. Overhead powerline connections to the infrastructure sites will be isolated and removed, and the materials, including poles and wire, recovered for potential re-sale or recycling where practicable. The overhead 66 kV and 11 kV powerlines on Newnes Plateau will not be removed but will be made safe and left for future use by FCNSW and any other potential users on Newnes Plateau.

Where also practicable, pipelines and cables, including those associated with the SDWTS, will be capped and will remain in-situ. This is due to the risk of disturbing the re-established vegetation by excavation and removal. The location of pipelines that are to remain in-situ will be recorded in an abandoned services register and signs will be erected where appropriate.

Pipelines located in critical locations, for example infrastructure crossings of environmentally sensitive areas and/or riparian zones, will be filled with inert a material (such as concrete) to avoid additional disturbance of the environment.

8.1.1.2 Equipment and Buildings

All demountable/transportable buildings will be removed from the surface facility sites, including the pit top. All remaining permanent buildings, including the administration buildings and workshops will then be demolished, with the component materials being recycled or re-sold.

Any materials not recycled or re-sold will be disposed of in a suitable location either on site or off site at a licenced waste management facility. Opportunities for the sale and/or re-use of assets and recycling of scrap steel will be maximised where possible. Material assessed as not hazardous or contaminated by a suitably qualified person will be crushed and disposed of within the main Springvale portal entry or placed as fill into the shafts.

Concrete footings and pads will be broken up and removed. Options for the re-use of this material (for example, crushed and used for road and track stabilisation) will be investigated as the mine approaches closure. If re-use or recycling opportunities are not available or viable, all non-contaminated waste material will be disposed of in a suitable location on-site (for example, filling the drift) or off site at an approved waste management facility.

All sumps will be de-watered and de-silted prior to the commencement of demolition. In addition, all items of equipment will be de-oiled, degassed, depressurised and isolated, and all hazardous materials associated with the Springvale operations will be removed from the Project Application Area. Prior to disposal, all wastes will be assessed and classified in accordance with the relevant regulatory requirements.

8.1.1.3 Bitumen Roads, Tracks, Car Parks and Hard Stand Areas

Roadways and/or tracks may be required to remain to provide on-going access for rehabilitation monitoring and maintenance activities. Access tracks upgraded or established as part of the Project on Newnes Plateau will remain for use as access tracks by recreational users and by FCNSW.

Access roads, tracks, car parks and hard stand areas at the pit top that are not required will be scalped to remove stabilised and compacted material. The inert waste will be disposed of in a suitable location on site or off site at an approved waste management facility. Material assessed as not hazardous or contaminated by a suitably qualified person can be crushed and disposed of within the Springvale portal entry or placed as fill into the shafts.

Should cracking due to subsidence impacts occur in roads or general disturbed areas, the surface will be graded and the cracks filled with sand, or other suitable material, prior to the surface being re-graded and compacted. If the area is no longer utilised, it will be deep ripped, top-soiled and appropriately re-vegetated.

8.1.1.4 Fuel and Chemical Storage Areas

Prior to closure any remaining fuel and/or chemicals will be recycled or disposed of at an appropriately licenced facility. All items of equipment will be de-oiled, degassed, depressurised and isolated, and all hazardous materials removed from the site. All infrastructure associated with fuel and chemical storage areas will be demolished and disposed of off site at a licenced waste management facility. Opportunities for the sale and/or re-use of assets and recycling of scrap steel will be maximised where possible.

Concrete footings and pads will be broken up and removed. Options for the re-use of this material (for example, crushed and used for road and track stabilisation) will be investigated as the operation approaches closure. If re-use or recycling opportunities are not available or viable, all non-contaminated waste material will be disposed of in a suitable location on site or off site at an approved waste management facility. Material assessed as not hazardous or contaminated by a suitably qualified person can be crushed and disposed of within the Springvale portal entry or placed as fill into the shafts.

Springvale Coal will remediate (to the satisfaction of FCNSW) any damage caused to the part of the Project Application Area that lies within the Newnes State Forest including by the spillage of petroleum products or other pollutants within the area.

8.1.1.5 Mine Ventilation Shafts and Service Bore Holes

Decommissioning and rehabilitation of ventilation fans shall be undertaken with general safely precautions and, where necessary, relevant approvals will be obtained from DTIRIS (or its equivalent at the time of decommissioning). The appropriate guidelines and standards will be followed to ensure that the works meet the relevant standards of the day.

Sealing of shafts associated with ventilation fans is required to ensure that surface runoff does not enter the mine and potentially contaminate groundwater. In addition, sealing of the shaft will improve safety and prevent fugitive gas emissions from the mine. For this task the key decommissioning activities will include:

- Removal of equipment (fans, pumps, housing, electrical services, etc.);
- Backfilling the shaft ensuring appropriate compaction to minimise subsidence, this may require the construction of a bulk head within the mine workings where it is accessible;
- Sealing of shaft openings using an appropriately designed and engineered plug reinforcement that complies with relevant construction standards;
- Construction of the engineered plug will be undertaken by component personnel under the supervision of a suitably qualified engineer; and
- Construction of appropriate drainage infrastructure on the surface to prevent erosion and ensure runoff does not enter the mine or cause potential groundwater contamination.

The boreholes will be sealed using an appropriately designed and engineered plug reinforcement that complies with relevant construction standards and DTIRIS guidelines, and following discussions with DTIRIS and the FCNSW. The sealing activity will be undertaken under the supervision of a suitably qualified engineer.

8.1.1.6 Mine Access Portals and Coal Delivery Systems

All services associated with the mine access portals and coal delivery systems will be disconnected and made safe. The conveyor and services from underground to the surface will be dismantled, removed from site and recycled at an appropriate facility. The decommissioning and demolition of the overland conveyor system used for the transfer of ROM coal to the Springvale Coal Services site will be undertaken as part of the proposed Centennial Western Coal Services Project, and will also include the rehabilitation of the associated disturbed areas.

The length of services to be dismantled as part of this Project will be based on the relevant DTIRIS (or its equivalent at the time of decommissioning) guidelines at the time of decommissioning. Opportunities for the sale and/or re-use of assets and recycling of materials will be maximised to the extent practicable.

The mine access portals will be backfilled against an engineered concrete bulk head. The distance of backfilling will be determined at the time if closure and will be based on relevant DTIRIS (or its equivalent at the time of decommissioning) guidelines and best practice at that time. Construction of the engineered bulkhead will be undertaken by competent personnel under the supervision of a suitably qualified engineer. Inert material such as concrete from around the site will be backfilled against the bulk head equal to the natural surface. Sealing of the portals will be undertaken in accordance with relevant regulatory guidelines and approved by the DTIRIS (or its equivalent at the time of decommissioning). The location of portals will be recorded on an abandoned services register, which will be retained on site records.

8.1.1.7 Trenched Pipelines and Power Cables

The trenched pipelines (SDWTS) and power cables supplying power to the dewatering bores will not be removed but will be isolated and made safe in accordance with the relevant guidelines.

8.1.1.8 Subsidence Survey Markers

Subsidence survey markers will be decommissioned and removed.

8.1.1.9 Groundwater Monitoring Boreholes and Surface Water Monitoring

Groundwater monitoring wells (shallow and deep piezometers) will be decommissioned in accordance with relevant DTIRIS (or its equivalent at the time of decommissioning) requirements. The aim of well decommissioning is to prevent the leakage of gas and water.

Devices associated with the monitoring of surface water baseflows (for example transducers and telemetry data management equipment) will be decommissioned and removed from within the Project Application Area, for use at other Centennial Coal mines as appropriate.

All borehole sealing will be undertaken in accordance with *EDG01: Borehole Sealing Requirements on Land: Coal Exploration* (DTIRIS, 2012). All boreholes will be filled in from the total depth to the surface with approved cement mixtures. Records will be kept to demonstrate the method used to seal each bore hole, volumes and types of materials used and information on the drillhole such as depth, diameter and casing string(s) left in the hole. All records relating to the sealing of boreholes will be provided to the DTIRIS together with a declaration confirming that the work was carried out according to the guidelines.

All boreholes will be sealed by filling with a cement mixture, then plugging and grouting as necessary. In order to produce an effective seal all casing strings that are not cemented into place according to the guideline will be removed prior to or during the sealing of the hole. Where non-grouted casing cannot be removed, methods will be undertaken as outlined in EDG01.

Following decommissioning, all boreholes will be surveyed in accordance with EDG01 to determine their horizontal and vertical positions and a permanent steel identification plate or reference mark will be placed at the location of each borehole for relocation purposes. Survey details will be provided to the DTIRIS.

8.1.1.10 Associated Infrastructure

Where practicable, all other associated infrastructure will be removed. Re-use and/or recycling opportunities will be investigated, or alternately all non-contaminated waste material will be disposed of in a suitable approved location.

8.1.2 Domain 2 – Other Lands

There will be no decommissioning of this Domain.

8.1.3 Domain 3 – Water Management Area

The network of dams and associated water management infrastructure at Springvale pit top will not be decommissioned at the end of mine life but will be maintained for future use. The water storages will provide a valuable water resource to surrounding fauna or an asset to the final land use.

Generally all underground water management infrastructure will be made safe and left buried in-situ. The location of water management infrastructure that is to remain in-situ will be recorded in an abandoned services register and signs will be erected where appropriate.

8.2 Landform Establishment Phase

8.2.1 Domain 1 – Infrastructure Area

The primary objective of landform establishment within infrastructure areas will be the stabilisation of batters, road verges, drains, banks, and cleared areas. Disturbed areas within this domain will be re-profiled to establish geotechnically stable and self-draining areas. In the case of disturbance areas associated with infrastructure sites on Newnes Plateau full rehabilitation will be undertaken in accordance with the Occupation Permit, and to FCNSW's standard and satisfaction. Any damage caused by Springvale to the parts of the Project Application Area within the Newnes State Forest, as well as any damage caused to any FCNSW equipment, structures or other facilities will be remediated to the satisfaction of FCNSW.

All areas will be trimmed, shaped, and the proposed rehabilitation works will ensure that the final landforms at the sites are stable and non–polluting, and mimic the near-original landform for an end land use of open forest.

Prior to the re-establishment of vegetation cover, temporary control measures will be utilised for erosion and sediment control. These measures may include the use of sediment fences for non-channelised flow over disturbed areas, sand bags, rip rap, or any combination of those materials.

8.2.2 Domain 2 – Other Lands

Should subsidence impacts occur to surface features, remediation and rehabilitation will be undertaken in accordance with the Trigger Action Response Plans, the existing SMP, and future approved Extraction Plans that will be developed for the Project. Subsidence remediation and rehabilitation will be on-going throughout the life of the mine. Any cracking in the surface soils associated with mining activities is expected to be typically within the range of less than 5 mm to 25 mm (MSEC, 2013). Surface cracks are expected to be generally isolated and minor in nature due to the reasonable depths of cover above the proposed longwalls, the relatively low magnitudes of predicted strain, and the clayey soils which can more readily absorb ground strains.

The majority of surface cracking is predicted to be naturally filled with soil during subsequent flow events, especially during times of heavy rainfall (MSEC, 2013).

If any surface cracks are found not to fill naturally, some remedial measures may be required at the completion of mining. Where necessary, any significant surface cracks in the drainage line beds will be remediated by infilling with soil or other suitable materials, or by locally re-grading and re-compacting the surface. These works will be undertaken as per best practice for landform design in Mine Rehabilitation (Department of Industry, Tourism and Resources, 2006).

MSEC (2013) stated that the predicted changes in grade along the Wolgan river are small when compared to the existing natural grades and, therefore, it is unlikely that there would be any significant changes in the levels of ponding, flooding or scouring of the river banks, or any significant changes in the stream alignment. Similarly, the predicted post mining grades along the minor drainage lines within the subsidence area are similar to the natural grades and, therefore, it is not expected that there would be any significant adverse changes in ponding or scouring resulting from the proposed mining. MSEC (2013) also stated that there could be some very minor localised areas which could experience small increases in the levels of ponding, where the natural gradients are low immediately upstream of the longwall chain pillars.

The predicted post mining grades within the swamps in the subsidence area are similar to the natural grades and, therefore MSEC has stated that it is not expected that there would be any adverse changes in ponding or scouring within the swamps.

Any disturbance associated with access tracks to the groundwater (piezometer) and surface water monitoring sites will be reshaped as required and re-vegetated to be consistent with the surrounding vegetation.

8.2.3 Domain 3 – Water Management Area

As for Domain 1, control measures will be utilised for erosion and sediment control within Domain 3, including the use of sediment fences, sand bags, rip rap, or any combination of those materials. Erosion control structures will be installed at intervals commensurate with the slope of the landform.

Water storages will be rehabilitated to a stable non-polluting condition. It is anticipated that the only features to remain will be sediment ponds associated with the water management system for the site. These will be necessary until a stable landform is created following removal of all other infrastructure.

Once revegetation works for the site are advanced, the remaining sediment ponds will provide a valuable water resource to surrounding fauna or an asset to the final land use.

8.3 Growth Media Development Phase

Springvale recognises the importance of appropriate soil identification, stripping, and management practices for successful rehabilitation and the achievement of the nominated end land use. Soil resources from the already disturbed areas at the pit top and the Newnes Plateau areas will be utilised to rehabilitate areas of direct surface disturbance. Preference will be given to any stockpiled soil resources available at the infrastructure sites. The growth media development stage of the proposed rehabilitation relates mainly to rehabilitation Domain A – Woodland. Limited growth media development activities will apply to Domain B – Water Management Area.

A description of appropriate topsoil resources within the Project Application Area and their management is included in the Soil and Land Capability Assessment (SLR, 2013a).

8.3.1 Topsoil Stripping and Handling

Where topsoil stripping and transportation is required, the topsoil handling techniques, as detailed in the Soil and Land Capability Assessment (SLR, 2013a) and the current Springvale MOP will be adopted to prevent excessive soil deterioration.

8.3.2 Topsoil Management

Where possible, topsoil will be re-spread directly onto cleared/reshaped landforms. Where topsoil resources allow, topsoil will be spread to a nominal minimum depth range of 100 – 300 mm on all areas to be rehabilitated.

Thorough seedbed preparation will be undertaken to optimise establishment and growth of vegetation. All topsoiled areas will be lightly contour-ripped (after topsoil spreading) to create a 'key' between the topsoil and the subsoil. Ripping will be undertaken on the contour and the tynes lifted for approximately 2 m every 200 m to reduce the potential for channelised erosion on slopes greater than 10°. Ripping will be undertaken when soil is moist and immediately prior to sowing for best results. The respread topsoil surface will be scarified prior to or during seeding to reduce runoff and increase infiltration.

For areas requiring long duration topsoil stockpiling opportunities will be investigated for the application of additional ameliorants (e.g. bio-solids) to assist with the regeneration of the desirable microorganism activity in the soil stockpiles.

The spoil generated from construction will be reused to fill the shafts during decommissioning and rehabilitation. The spoil will be stored and treated as a subsoil stockpile with regard to stockpile design and with appropriate erosion and sediment controls in place. The cuttings will be tested to ensure they are within the required limits of the National Environment Protection Measure (NEPM) *Assessment of Site Contamination (1999) - Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater*, and if required will be either treated prior to use for rehabilitation or disposed of at a licensed facility.

8.3.3 Erosion and Sediment Control

Standard erosion and sediment controls (e.g. sediment fences, clean and dirty water diversion structures) will be implemented during rehabilitation to manage surface runoff water from all disturbed areas within Domain A – Woodland. These controls will be in place until the success of the re-vegetation activities has been established and stable surfaces result within the domains. Within the Domain B – Water Management Area the existing erosion and sediment controls will be maintained on a regular basis until completion of rehabilitation.

Prior to the re-establishment of vegetation cover, temporary control measures will be utilised for erosion and sediment control. These measures may include the use of sediment fences for non-channelised flow over disturbed areas, sand bags, rip rap, or any combination of those materials.

Consideration will be given to erosion and sediment control procedures for activities undertaken during the construction phase. These procedures may include restricted access during wet weather or to areas under rehabilitation, reporting of erosion and sediment hazards or incidents and regular checking and maintenance of structures.

8.3.4 Weed Management

The presence of weed species within topsoil spread on the rehabilitated areas has the potential to have a major impact on re-vegetation and regeneration outcomes. The presence of weed species within the surrounding land also has the potential to significantly impact on the biodiversity value of the rehabilitated areas. Weed management will be a critical component of rehabilitation activities.

Weeds will be managed across the site through a series of control measures, including:

- Herbicide spraying or scalping weeds from topsoil stockpiles prior to re-spreading topsoil;
- Regular inspections of the rehabilitated areas to identify potential weed infestations; and
- Identifying and spraying existing weed populations.

The spread of declared noxious weeds will be prevented by using the measures above. Weed control, if required, will be undertaken in a manner that will minimise soil disturbance. Herbicides will be used in accordance with regulatory requirements. Records will be maintained of weed infestations and control programs will be implemented according to best management practice for the weed species concerned.

8.4 Ecosystem Establishment Phase

Revegetation of the shaped areas, within Domain 1 – Infrastructure and Domain 2 – Other Lands, will be undertaken to create rehabilitated domains for final land use of Woodland. Given Domain 3 – Water Management Area will be retained following maintenance works, the proposed rehabilitation of the relevant areas within the Project Application Area will result in two rehabilitated domains as follows (refer **Figure 4**).

- Domain A – Woodland; and
- Domain B – Water Management Area.

Domain A – Woodland

Appropriate revegetation steps and selection criteria for the species mix will be undertaken to ensure a high success revegetation rate, and will comprise, but not be limited to, the following

- Appropriate species selection for the rehabilitation domain;
- Optimal sowing rates and species proportions;
- Seed pre-treatment; and
- Soil amelioration and fertiliser application.

In Domain A, endemic species mixes will be utilised. The species selection will focus on those species that will successfully establish on the available growth medium, bind the soil and will result in a variety of structure and food/habitat resources. The woodland seed mix will include a mix of understorey, mid-storey and over-storey species. Whilst every attempt will be made to use species that existed prior to disturbance, additional species may be required to ensure suitable initial groundcover for site stabilisation and minimal soil erosion. This may include the use of short-lived annual exotic non-invasive grass species.

Fertiliser will be applied with seed mixes to increase the likelihood of initial revegetation success. All revegetation activities will be undertaken immediately after the landform establishment stage.

Domain B – Water Management Area

No revegetation activities will be undertaken for this domain.

8.5 Ecosystem Development Phase

8.5.1 Rehabilitation Monitoring

A commitment to effective rehabilitation involves an on-going monitoring (and concurrent maintenance as required) program, developed for the Project in consultation with FCNSW. Areas of completed rehabilitation will be regularly inspected and assessed against the short-term and long-term rehabilitation objectives.

A dedicated monitoring system will be established in order to assess effectiveness of implementation of the rehabilitation measures as well as to identify the need for corrective action as soon as required. The monitoring program will be developed for each closure domain, incorporating the most appropriate indicators and methods that:

- Provide a measure of completion criteria to be assessed in accordance with the defined rehabilitation objectives;
- Are reproducible;

- Utilise scientific recognised techniques; and
- Are cost-effective.

Rehabilitation monitoring will include regular inspections for the following key aspects:

- Evidence of any erosion or sedimentation;
- Success of initial establishment of grass cover and tree and shrub seeding / plantings;
- Natural regeneration of native species;
- Weed infestation (primarily noxious weeds, but also where rehabilitation areas are dominated by other weeds);
- Integrity of graded banks, diversion drains, waterways and sediment control structures; and
- General stability of the rehabilitation areas.

A feral animal control strategy will be implemented to contain the spread of weeds and other detrimental impacts on rehabilitation areas by feral animals. Goats, foxes, cats, rabbits, pigs and dogs will be controlled in accordance with Livestock Health and Pest Authority procedures.

8.5.2 Rehabilitation Maintenance

Where rehabilitation monitoring undertaken as described in Section 8.5.1 confirms that the rehabilitation is not successful or is limited, maintenance works will be undertaken. This may include the following:

- Re-seeding and, where necessary, re-topsoiling and/or the application of specialised treatments such as composted mulch or bio-solids to areas with poor vegetation establishment;
- Installation of tree guards around planted seedlings or construction of temporary fencing suitable for excluding native and feral fauna species should grazing by animals be excessive;
- Replacement of drainage controls if they are found to be inadequate for their intended purpose, or compromised by vegetation or wildlife;
- De-silting or repair of sediment control structures; and
- Where monitoring indicates the presence of excessive weeds or the potential for noxious weed infestation, necessary precautions to prevent the development of weeds within the rehabilitated areas will be undertaken.

Monitoring results, any required maintenance activities and any refinements of rehabilitation techniques will be reported as part of Springvale's reporting requirements, for example, in the Annual Reviews.

9.0 CONCEPTUAL REHABILITATION SUCCESS CRITERIA

Conceptual rehabilitation success criteria have been developed to provide long-term performance goals for rehabilitation activities. The rehabilitation success criteria presented in this section are considered conceptual, and will be developed further following consultation on the final land use with the relevant stakeholders during the detailed mine closure planning stage. The mine closure planning for the Project will commence no later than five years from permanent closure. This will include the development of specific, measurable, achievable, realistic, and outcome based, criteria. The criteria will be based on the results of research and on-going monitoring of the progressive rehabilitation areas.

Conceptual rehabilitation success criteria are provided in **Table 6**. Each criterion is designed as a performance objective or standard against which rehabilitation success can be demonstrated. Meeting the success criteria (as indicated by monitoring results) demonstrates that the rehabilitated landscape is in a sustainable condition, ready to be relinquished, and handed back to the appropriate stakeholders.

The success criteria comprise indicators for vegetation, fauna, soil, stability, land use and safety on a landform-type basis that reflects the nominated end land use of open forest / native bushland and water management area.

Table 6 – Conceptual Rehabilitation Success Criteria

Rehabilitation Element	Secondary Domain	Indicator	Rehabilitation Success Criteria
Phase 1 – Decommissioning			
Infrastructure	Domains 1 and 2	Land use (open forest/native woodland)	• All infrastructure within the Springvale pit top has been removed, and disposed appropriately, for example, to appropriate waste management facilities. • All buildings and equipment, water storage, and other infrastructure on the Newnes Plateau have been removed unless agreed with stakeholders, including the landowner Forest NSW, for their retention. • All boreholes (except those retained for monitoring purposes) have been shut down, bore casings near the surface are removed and holes plugged or capped in accordance with the regulatory standards. • All landforms are stable and free draining. • The domain accomplishes and remains as healthy open forest, and the management inputs are no greater than other open forest land.
	Domain 3	Water Management Area	• Presence of sediment and erosion controls for the minimisation of discharge of dirty water off site. • Presence of water management structures (e.g. contour banks and diversion drains) to direct water into the retained dams or other into stable areas. • Water quality of the receiving waters (e.g. Springvale Creek) is not affected by surface water runoff from the site, Discharge water meets the contaminant limits (EC, pH, TSS and oil and grease) of the EPL conditions.
	All Domains	No contamination	• All sites have been assessed by suitably qualified personnel as not containing contaminants exceeding the relevant criteria for the proposed final land use.

Rehabilitation Element	Secondary Domain	Indicator	Rehabilitation Success Criteria
Safety	Domains 1 and 2	Physical	• Excavations have been rendered safe. • All holes/pits and other openings are securely capped, filled or otherwise made safe. • Access to members of the public and livestock is restricted as appropriate to site conditions. • No rubbish remains at the surface, or at risk of being exposed through erosion.
Phase 2 – Landform Establishment			
Landform Stability	Domains 1 and 2	Surface water drainage	• The landform is stable and contour banks and diversion drains are installed to direct water into stable areas or sediment control basins.
	All domains	Erosion control	• Erosion control structures are installed at intervals commensurate with the slope of the landform.
	Domain 3	Stable landform	• Water storages to be rehabilitated to a stable non-polluting condition.
Phase 3 – Growth Media Development			
Top soil	Domain 1 and 2	Physical and chemical parameters	• Previously stockpiled topsoil have been used in the rehabilitation activities. • Suitable and alternative topsoil substitute (for example bio-solids, organics, etc.) have been used at the site to make up any short-fall in the topsoil required for complete rehabilitation.
Phase 4 – Ecosystem Establishment			
Vegetation	Domain 1	Species composition	• A mixture of native trees, shrubs and grasses representative of regionally occurring woodland is present within Domain A. • Established species survive and/or regenerate after disturbance. • Weeds do not dominate native species after disturbance or after rain. • Pests do not occur in substantial numbers or visibly affect the development of planted species. • Minimum of 70% vegetative cover is present (or 50% if rocks, logs or other features of cover are present).
Phase 5 – Ecosystem Development			
Vegetation	Domain1	Sustainability	• Species are capable of setting viable seed, flowering or otherwise reproducing. Evidence of second generation of tree/shrub species. • Evidence of active use of habitat provided during rehabilitation such as nest boxes, and logs and signs of natural generation of shelter sources including leaf litter.
Fauna	All domains	Vertebrate Species	• Presence of representatives of a broad range of functional indicator groups involved in different ecological processes.
	All domains	Invertebrate species	• Presence of representatives of a broad range of functional indicator groups involved in different ecological processes.
	All domains	Habitat structure	• Typical food and water sources required by the majority of vertebrate and invertebrate inhabitants of that ecosystem type are present.

Rehabilitation Element	Secondary Domain	Indicator	Rehabilitation Success Criteria
Land Use	All domains	Land use	• The rehabilitated sites can be managed for the designated land uses without any greater management inputs than other land in the area being used for a similar purpose.

10.0 INDICATIVE CLOSURE TIMELINE

An indicative closure timeline is shown in **Table 7**, including the key rehabilitation and closure activities throughout the life of the Project. In particular the key activities include:

- Closure planning;
- Decommissioning and rehabilitation;
- Maintenance and monitoring;
- Relinquishment; and
- Post relinquishment activities.

Table 7 - Indicative Closure Timeline

Years From Closure	Closure Planning					Decommissioning and Rehabilitation				Monitoring and Maintenance				Relinquishment	
	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10
Closure Planning															
Stakeholder consultation regarding closure															
Agreed final detailed closure strategy															
Develop an infrastructure demolition plan															
Closure Activities															
Demolition of infrastructure															
Sealing of underground access areas															
Landform establishment															
Growth media establishment															
Ecosystem establishment															
Ecosystem development															
Post Closure Activities															
Maintenance of Rehabilitated Areas															
Monitoring and Inspections															

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