# Western Coal Services Project

## Modification report for modification to SSD-5579

**Prepared for Springvale Coal Pty Limited**
**December 2021**

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# Western Coal Services Project

Modification report for modification to SSD-5579

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**Client**

Springvale Coal Pty Limited

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3 December 2021

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3 December 2021

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# Executive Summary

Springvale Coal Pty Limited (Springvale Coal) operates Western Coal Services (WCS), a coal handling, processing, transportation and management operation. WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission, as delegate for the NSW Minister of Planning and Infrastructure.

Springvale Coal Services Site (SCSS) is a coal processing and storage facility that forms part of WCS. Clean and dirty water is managed on-site at SCSS as part of existing operations. The SCSS catchment drains towards licenced discharge point (LDP) 001. The majority of water discharged from LDP001 is untreated groundwater from historical mine workings. Runoff is discharged through LDP001 into Wangcol Creek, as licensed by Environment Protection Licence (EPL) 21229. Wangcol Creek flows south-east to the Coxs River.

The discharge of untreated groundwater into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. NSW Environment Protection Authority (EPA) issued Springvale Coal with a Pollution Reduction Program on 18 December 2020 to evaluate options for the long-term management of groundwater being discharged from LDP001.

As part of ongoing engagement with government agencies, other businesses and the community, Springvale Coal has identified opportunities to transfer water to and from other operations in the region, including Mount Piper Power Station, Angus Place Colliery and the proposed McPhillamys Gold Mine. The transfer of water to and from these operations will create a beneficial reuse for water generated at SCSS and reduce the need to discharge water from LDP001 to Wangcol Creek.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), to change the existing water management system at SCSS to facilitate the transfer of water between WCS and other operations, and to improve the quality of water discharged to Wangcol Creek.

The NSW Department of Planning, Industry and Environment (DPIE) and key stakeholders have been consulted regarding the proposed modification to assist in identifying all of the relevant issues to be assessed. This modification report and supporting technical reports assess the potential impacts of the proposed modification.

The proposed modification has been designed to avoid and minimise adverse biophysical, social and economic impacts. Appropriate management measures have been identified to mitigate any residual impacts from the proposed modification. These management measures will help to ensure construction activities will have minimal additional environmental impacts when compared with SCSS's existing operations.

The proposed modification is considered to be consistent with the relevant objects of the EP&A Act, including the principles of ecologically sustainable development, and will not change the nature of the development originally approved.

The primary objective of the proposed modification is to address the requirements of the EPL 21229 Pollution Reduction Program by reducing the volume, frequency and pollutant load of LDP001 discharges to Wangcol Creek. Water and salt balance modelling illustrates that this can be achieved.

Environmental management will continue in accordance with SSD-5579 and EPL 21229, approved plans and other elements of the consent. Where required, additional safeguards have been proposed and these will be included in a construction environmental management plan (CEMP) and implemented during construction.

# Table of Contents


Executive Summary ES.1

1 Introduction 1

1.1 Western Coal Services 1

1.2 Springvale Coal Services Site 1

1.3 Modification overview 4

1.4 Proponent 4

1.5 Related operations 5

1.5.1 McPhillamys Gold Project 5

1.5.2 Springvale Water Treatment Project 5

1.5.3 Angus Place Colliery 5

1.5.4 Springvale Mine 6

1.6 Terminology 6

2 Site description 7

2.1 Project application area 7

2.2 Land use and ownership 7

2.3 Land zones 7

2.4 Environmental setting 10

2.4.1 Geology, topography and soils 10

2.4.2 Water resources and hydrology 10

2.4.3 Climate 10

3 Existing operations 11

3.1 Existing approvals and licences 11

3.1.1 Development consent 11

3.1.2 Environment protection licence 13

3.2 Coal handling, storage and transport 13

3.3 Coal processing 14

3.4 Reject emplacement 14

3.5 Water management 14

3.5.1 Water sources and demands 14

3.5.2 Water transfers and pipelines 14

3.5.3 Water management system 15
3.6 Rehabilitation and final landform 18
3.7 Environmental management 18
4 Proposed modification 19
4.1 Modification summary 19
4.2 Surface water management 21
4.3 Water transfers 24
4.3.1 SCSS Water Transfer System 24
4.3.2 Receipt of water from Angus Place Colliery 24
4.4 Construction requirements 24
4.4.1 Construction envelope and project application area 24
4.4.2 Construction activities 25
4.5 Amendments to rehabilitation management 25
4.6 Conditions of consent 26
5 Statutory context 27
5.1 Introduction 27
5.2 Commonwealth legislation 27
5.3 NSW State legislation 27
5.3.1 NSW Environmental Planning and Assessment Act 1979 27
5.3.2 NSW Environmental Planning and Assessment Regulation 2000 29
5.3.3 Other relevant NSW State legislation and planning instruments 30
5.3.4 State Environmental Planning Policies 31
5.4 Local environmental plans 32
6 Stakeholder engagement 34
6.1 NSW Department of Planning, Industry and Environment 34
6.2 Western Region Community Consultative Committee 36
6.3 Forestry Corporation of NSW 36
6.4 Transport for NSW 36
6.5 Heritage NSW 38
6.6 Biodiversity, Conservation and Science Directorate 38
6.7 Environment Protection Authority 38
6.8 NSW Department of Planning, Industry and Environment – Water 38
6.9 Lithgow City Council 38

6.10 Aboriginal stakeholders 39
6.11 Wallerawang Lidsdale Progress Association 39
6.12 Lithgow Environment Group 39
7 Assessment of impacts 40
7.1 Water resources 40
7.1.1 Overview 40
7.1.2 Existing environment 40
7.1.3 Impact assessment 41
7.1.4 Management and mitigation 42
7.1.5 Conclusion 43
7.2 Construction noise 43
7.2.1 Overview 43
7.2.2 Existing environment 43
7.2.3 Assessment criteria 44
7.2.4 Impact assessment 44
7.2.5 Management and mitigation 46
7.2.6 Conclusion 47
7.3 Construction air quality 47
7.3.1 Overview 47
7.3.2 Existing environment 47
7.3.3 Impact assessment 47
7.3.4 Management and mitigation 48
7.3.5 Conclusion 49
7.4 Aboriginal cultural heritage 49
7.4.1 Overview 49
7.4.2 Existing environment 50
7.4.3 Assessment method 50
7.4.4 Impact assessment 52
7.4.5 Management and mitigation 52
7.4.6 Conclusion 53
7.5 Biodiversity 53
7.5.1 Overview 53
7.5.2 Existing environment 53

7.5.3 Impact assessment 57
7.5.4 Management and mitigation 59
7.5.5 Conclusion 60
7.6 Traffic 61
7.6.1 Overview 61
7.6.2 Existing environment 61
7.6.3 Impact assessment 62
7.6.4 Management and mitigation 63
7.6.5 Conclusion 63
7.7 Rehabilitation and final landform 64
7.7.1 Overview 64
7.7.2 Rehabilitation planning and management 64
7.7.3 Rehabilitation offset areas 68
7.7.4 Final landform and land use 70
7.7.5 Conclusion 70
7.8 Other environmental aspects 70
8 Justification of the modified project 73
8.1 Justification 73
8.2 Alternatives 74
8.3 Ecological sustainable development 74
8.3.1 Precautionary principle 75
8.3.2 Inter-generational equity 75
8.3.3 Conservation of biological diversity and maintenance of ecological integrity 75
8.3.4 Improved valuation and pricing of environmental resources 76
8.4 Conclusion 76
References 77
Abbreviations 78

## Appendices

Appendix A Water resources impact assessment A.1
Appendix B Construction noise impact assessment B.1
Appendix C Construction air quality assessment C.1
Appendix D Aboriginal cultural heritage assessment D.1

Appendix E Biodiversity development assessment report E.1
Appendix F Traffic impact assessment F.1
Appendix G Revised schedule of land G.1
Appendix H Stakeholder correspondence H.1

## Tables

Table 3.1 Summary of modifications 13
Table 4.1 Comparison of existing operation and proposed modification 19
Table 4.2 Construction envelope and disturbance areas 25
Table 4.3 Additions to the schedule of land 25
Table 5.1 Compliance with Section 4.55(2) requirements 28
Table 5.2 EP&A Regulation Clause 115 information requirements 29
Table 5.3 Other relevant NSW State legislation 30
Table 6.1 Feedback from DPIE and how it has been addressed 34
Table 6.2 Feedback from TfNSW and how it has been addressed 36
Table 7.1 Noise assessment locations 44
Table 7.2 Construction noise predictions – standard construction hours 45
Table 7.4 AHIMS sites by site type 50
Table 7.5 Vegetation zones mapped within the construction envelope 54
Table 7.6 Offset liability by proposed modification element – ecosystem credits 58
Table 7.7 Offset liability by proposed modification element – species credits 59
Table 7.8 Construction traffic schedule 62
Table 7.9 Domain table – Proposed primary domains 64
Table 7.10 Domain table – Proposed secondary domains 65
Table 7.11 Potential impacts of the proposed modification 70
Table G.1 Revised schedule of land G.2

## Figures

Figure 1.1 Regional context 2
Figure 1.2 Local context 3
Figure 2.1 Land ownership 8
Figure 2.2 Land zones 9

| | | |
|---|---|---|
| Figure 3.1 | Springvale Coal Services Site surface facilities area | 12 |
| Figure 3.2 | Existing water management system at Springvale Coal Services Site | 16 |
| Figure 4.1 | Proposed modification elements | 22 |
| Figure 4.2 | Proposed water management system at Springvale Coal Services Site | 23 |
| Figure 7.1 | Aboriginal cultural heritage field survey results and AHIMS sites | 51 |
| Figure 7.2 | Vegetation zones and threatened species | 55 |
| Figure 7.3 | Primary domains within the proposed project application area | 66 |
| Figure 7.4 | Secondary domains within the proposed project application area | 67 |
| Figure 7.5 | Proposed amendments to additional rehabilitation initiatives at SCSS | 69 |

# 1 Introduction

Springvale Coal Pty Limited (Springvale Coal) operates Western Coal Services (WCS), a coal handling, processing, transportation and management operation approximately 15 kilometres (km) north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1.1). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission, as delegate for the NSW Minister of Planning and Infrastructure.

Springvale Coal is seeking approval to change the existing water management system at Springvale Coal Services Site (SCSS) to facilitate the transfer of water between WCS and other operations, and to improve the quality of water discharged to Wangcol Creek.

This modification report has been prepared to support the application to modify SSD-5579.

## 1.1 Western Coal Services

WCS includes the operation of infrastructure for the receipt, handling and processing of coal and reject materials from Springvale Mine (SSD-5594), Angus Place Colliery (SSD 06_0021) and other Centennial Coal Company Limited (Centennial) operations; and the transportation of this coal to Mount Piper Power Station (MPPS) (DA80/10060) and Lidsdale Siding (Development Consent 08_0223). WCS also receives and emplaces residual waste from the Springvale Water Treatment Project (SWTP) (SSD-7592). This waste stream is generated by the removal of suspended solid materials from raw mine water treated by SWTP and can be up to 2% solids.

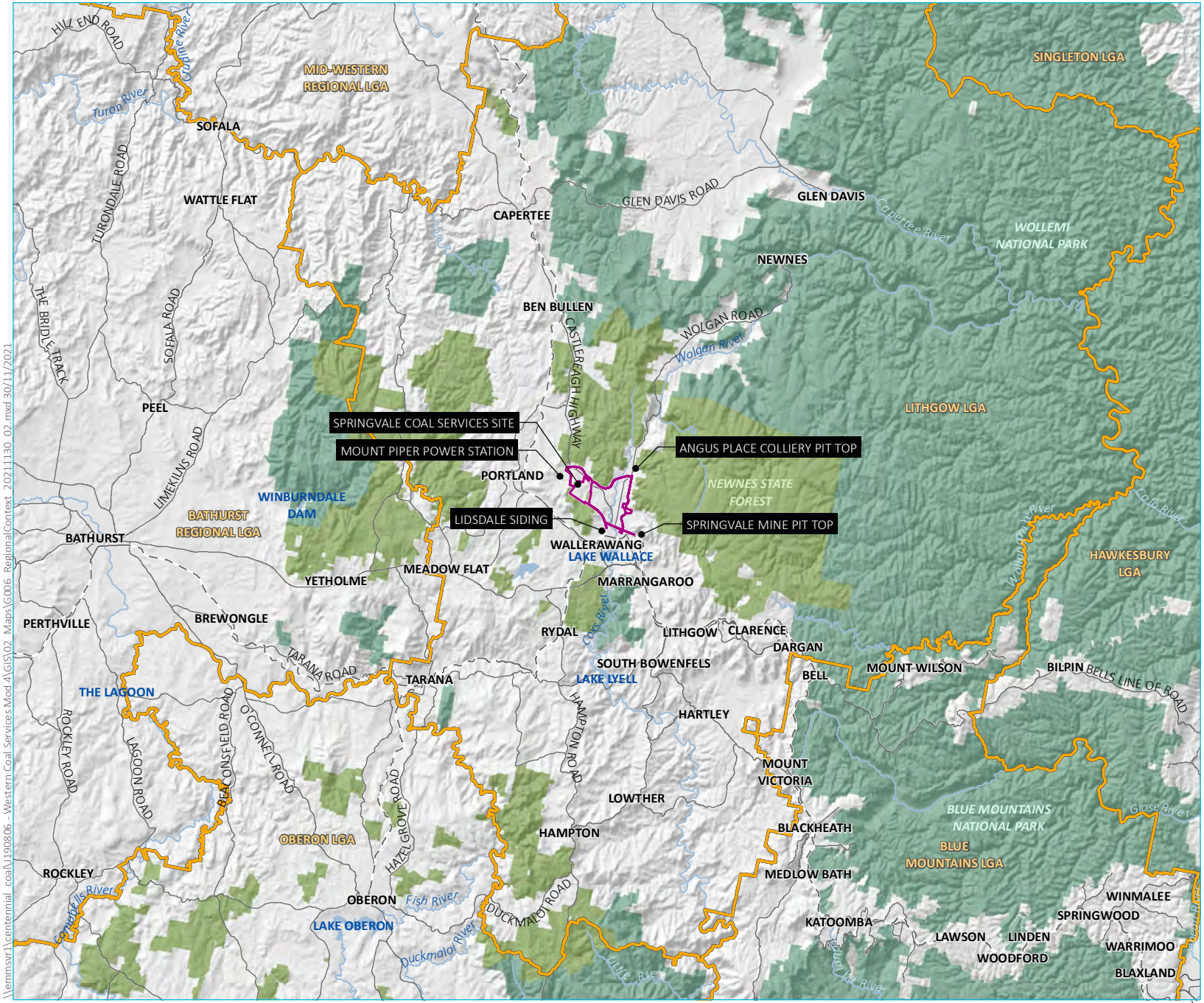
## 1.2 Springvale Coal Services Site

SCSS is a coal processing and storage facility that forms part of WCS. It is used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual waste material from the SWTP. It connects to a network of conveyors which are able to transfer coal between Springvale Mine, Wallerawang Power Station (now closed), MPPS and Lidsdale Siding. The site is approved to receive and process up to 9.5 million tonnes per annum (Mtpa) of coal from Angus Place Colliery, Springvale Mine and other Centennial operations.

SCSS and its operations are described in Chapter 3 and the layout of SCSS is shown on Figure 3.1.

Clean and dirty water is managed on-site at SCSS as part of existing operations. Sources of water include potable water supply, rainfall, runoff and groundwater inflow to the open cut areas and Cooks Dam. Primary water demands are for dust suppression, coal washing and staff amenities. A schematic of the existing water management system at SCSS is provided in Figure 3.2.

The SCSS catchment drains towards licenced discharge point (LDP) 001 on the northern-eastern side of the site. The majority of water discharged from LDP001 is untreated groundwater from historical mine workings. Runoff is discharged through LDP001 into Wangcol Creek (Figure 1.2), as licensed by Environment Protection Licence (EPL) 21229. Wangcol Creek flows south-east to the Coxs River.



KEY

- Project application area (SSD-5579)
- Rail line
- Major road
- River
- Named waterbody
- NPWS reserve
- State forest
- Local government area

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2021); Centennial Coal (2021); DFSI (2017); GA (2011); ASGC (2006)

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Regional context

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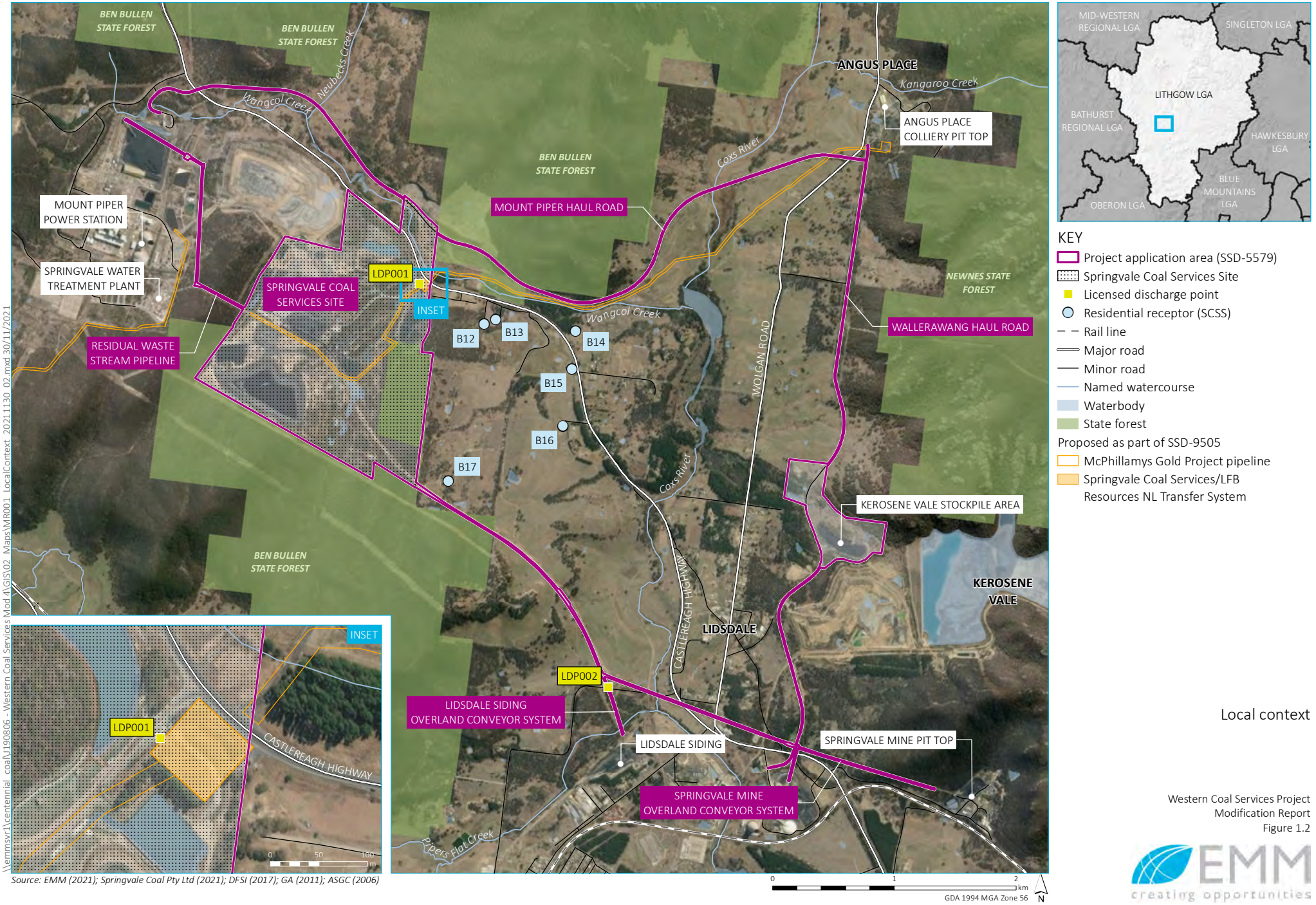


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Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)

Local context

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Figure 1.2

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## 1.3 Modification overview

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), to allow:

- construction and operation of the SCSS Water Transfer System, consisting of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001;
- transfer of water from the SCSS Water Transfer System:
  - to the SCSS/Regis Transfer System for use at the McPhillamys Gold Mine;
  - to MPPS for treatment and reuse within the MPPS cooling water system;
- receipt of raw water from the Angus Place Water Transfer System for use in the coal preparation plant at SCSS;
- changes to the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and to improve the quality of water discharged to Wangcol Creek;
- an increase in the capacity of the Washery Dam at SCSS; and
- administrative changes to Condition 45 of Schedule 3 of SSD-5579 to align with amendments to the NSW *Mining Act 1992* and NSW Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021 (Mining Amendment Regulation).

The upgrade of the water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will require a minor increase to the project application area.

It is not proposed to modify the approved handling, processing or transport operations, the limits on these activities, or the project life.

The proposed modification is described in detail in Chapter 4.

## 1.4 Proponent

Springvale Coal (ABN 39 052 096 769) is a wholly owned subsidiary of Centennial. Centennial is a wholly owned subsidiary of Banpu Public Company Limited (Banpu).

Springvale Coal is the proponent for the modification. The relevant address is:

Springvale Coal Pty Limited
Level 18, 1 Market Street
Sydney NSW 2000

## 1.5 Related operations

Water will be transferred to and from sites and projects outside of the WCS project application area. An overview of each is provided below.

### 1.5.1 McPhillamys Gold Project

LFB Resources NL, a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis), is seeking development consent for the construction and operation of the McPhillamys Gold Project (SSD-9505), a greenfield open cut gold mine about 27 km south-east of Orange and associated water supply pipeline between the mine and WCS. Water will be supplied via the pipeline from the following sources:

- untreated mine water that is currently discharged from SCSS through LDP001 to Wangcol Creek;
- process and blowdown water from MPPS; and
- untreated mine water from Angus Place Colliery.

As part of the application for the McPhillamys Gold Project (SSD-9505), Regis is seeking approval to construct and operate a pumping station and storage tank at SCSS that will be used to transfer water from SCSS to the water pipeline (Figure 1.2).

### 1.5.2 Springvale Water Treatment Project

The SWTP (SSD-7592, approved in June 2017) includes the transfer and treatment of water from underground mine dewatering at Springvale Mine and Angus Place Colliery to MPPS for beneficial reuse. The project was initiated to improve environmental outcomes for the Coxs River catchment by eliminating mine water discharges from Springvale Mine's LDP009.

The utilisation of Pond D at MPPS and brine concentrators for the treatment of water for beneficial reuse was incorporated into SWTP through MOD 6 to SSD-7592. Water transferred from SCSS to MPPS will be temporarily stored within Pond D at MPPS prior to treatment within MPPS's brine concentrators. Permeate from the water treatment process will be transferred to MPPS's cooling water system with brine used to condition ash prior to emplacement within MPPS's ash emplacement areas.

A separate modification application will be prepared by Springvale Coal to modify SSD-7592 to:

- allow the transfer of water between the SWTP and SCSS; and
- allow the temporary storage of water within Pond D, treatment of water within MPPS's brine concentrators, transfer of permeate to MPPS's cooling water system and management of brine.

### 1.5.3 Angus Place Colliery

Centennial Angus Place Pty Ltd (Centennial Angus Place) operates Angus Place Colliery, an underground coal mine with approval to produce up to 4 Mtpa of ROM coal for domestic markets. Angus Place Colliery's current project approval (MP 06_0021) was granted in September 2006 under the now repealed Part 3A of the EP&A Act.

Angus Place Colliery was placed on care and maintenance in 2015. There is currently no coal extraction, coal processing or coal transport from the mine. Current activities undertaken at Angus Place Colliery include ensuring that the mine remains stable and safe; maintaining surface and underground infrastructure and plant; groundwater management and monitoring; and surface water management and monitoring to ensure that the quality of water leaving the site meets the conditions of EPL 467.

WCS is approved to receive up to 4 Mtpa of ROM coal from Angus Place Colliery via the Mount Piper and Wallerawang haul roads. Angus Place Colliery's pit top is approximately 4 km north-east of SCSS (Figure 1.2).

Centennial Angus Place is currently preparing an environmental impact statement (EIS) to address the Secretary's Environmental Assessment Requirements (SEARs) for the Angus Place West project (SSD-26254212). The Angus Place West project includes the recommencement of underground mining activities at Angus Place and also seeks approval for the transfer of water from the Angus Place Water Transfer System to SCSS.

### 1.5.4 Springvale Mine

Springvale Coal operates Springvale Mine, an underground coal mine with approval to produce up to 4.5 Mtpa of ROM coal for domestic and export markets. Springvale Mine currently operates under SSD-5594, which was granted for the Springvale Mine Extension Project in September 2015 by the NSW Planning Assessment Commission. SSD-5594 allows Springvale Coal to carry out mining operations until 31 December 2028.

The main components of Springvale Mine's existing operations are an underground longwall mine and supporting surface infrastructure within the pit top area and on Newnes Plateau. WCS is approved to receive up to 5.5 Mtpa of ROM coal from Springvale Mine. Springvale Mine's pit top is approximately 6 km south-east of SCSS (Figure 1.2).

No modifications to SSD-5594 are required to facilitate the proposed modification.

## 1.6 Terminology

The following terms are used in this modification report:

- approved project application area – the approved development area defined by SSD-5579, which aligns with the Schedule of Land in Appendix 1 of SSD-5579;
- construction envelope – the area within which disturbance works associated with the proposed modification will be confined (Figure 4.1); and
- proposed project application area – the modified project application area, which includes the land within the existing project application area and the construction envelope (Figure 4.1).

# 2 Site description

## 2.1 Project application area

WCS is in the Lithgow LGA, approximately 18 km north of Lithgow. The approved project application area encompasses 339.5 hectares (ha) and includes (Figure 1.2) and contains:

- SCSS;
- Kerosene Vale Stockpile Area;
- an overland conveyor system (linking Springvale Mine to MPPS, Wallerawang Power Station, Lidsdale Siding and SCSS);
- Mount Piper Haul Road (linking Angus Place Colliery to MPPS);
- Wallerawang Haul Road (linking Angus Place Colliery to Wallerawang Power Station);
- Link Haul Road (a proposed link road between SCSS and the Mount Piper Haul Road); and
- a residual waste stream pipeline that transfers residual waste material from SWTP to SCSS.

It is proposed to increase the project application area by 10 ha (or 2.95%) to 349.5 ha to facilitate the construction of the pipeline between MPPS and SCSS (see Section 4.4.1).

## 2.2 Land use and ownership

Land uses within and surrounding SCSS include industrial, mining, power generation, residential, agricultural and forestry uses. MPPS is immediately west of SCSS, and Blackmans Flat is east of SCSS. Pine Dale Coal Mine (currently in care and maintenance) is north of SCSS and sections of Ben Bullen State Forest are within the project application area to the south and north-east of SCSS (Figure 1.2).

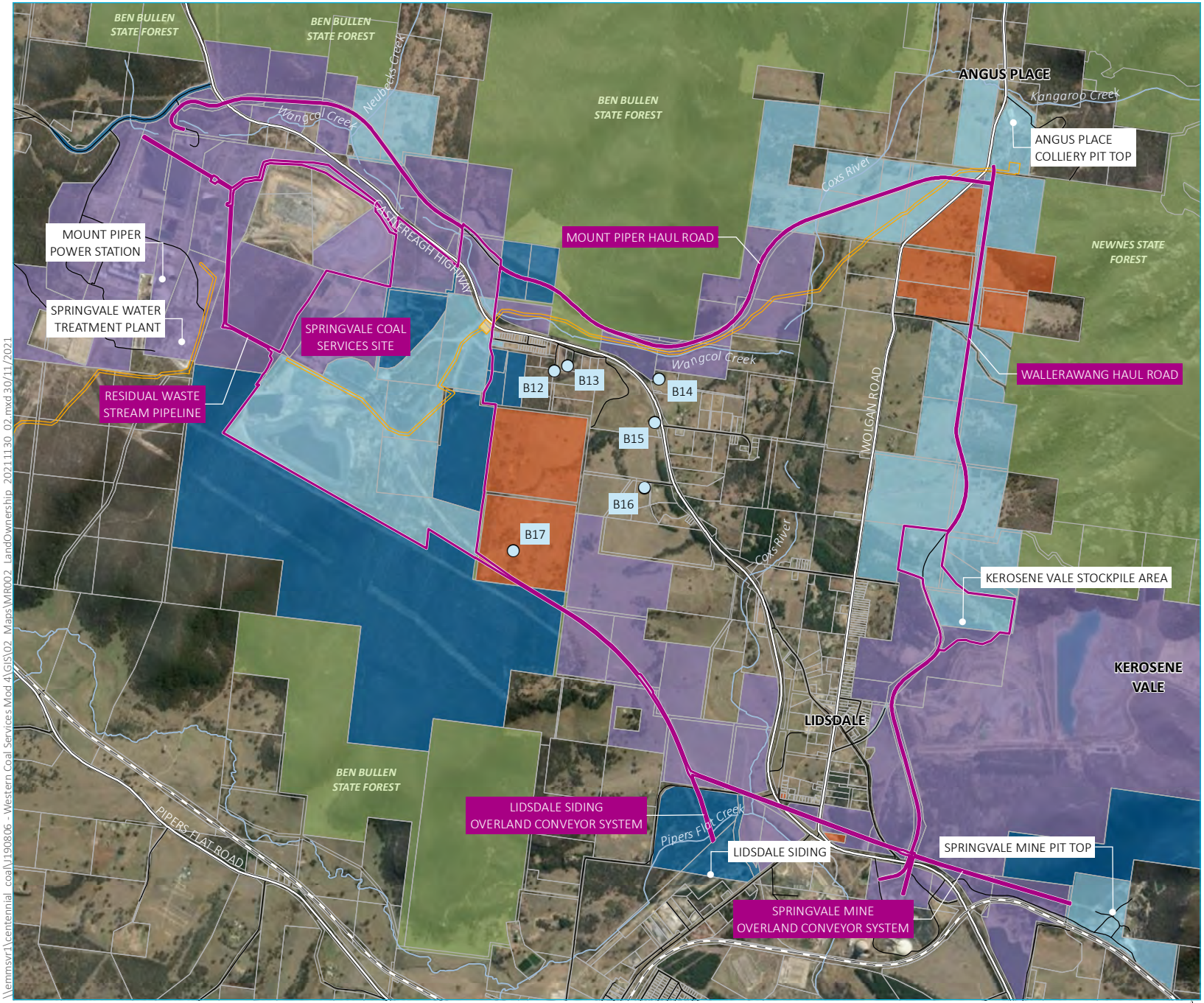
Land at SCSS is owned by (Figure 2.1):

- Centennial;
- EnergyAustralia;
- Lithgow City Council; and
- NSW Government (including Crown land).

The proposed schedule of land for WCS is provided in Appendix G.

## 2.3 Land zones

SCSS is zoned a mix of RU1 Primary Production, RU3 Forestry and SP2 Infrastructure under the Lithgow Local Environmental Plan 2014 (Lithgow LEP) (Figure 2.2).

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Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011)

Land ownership

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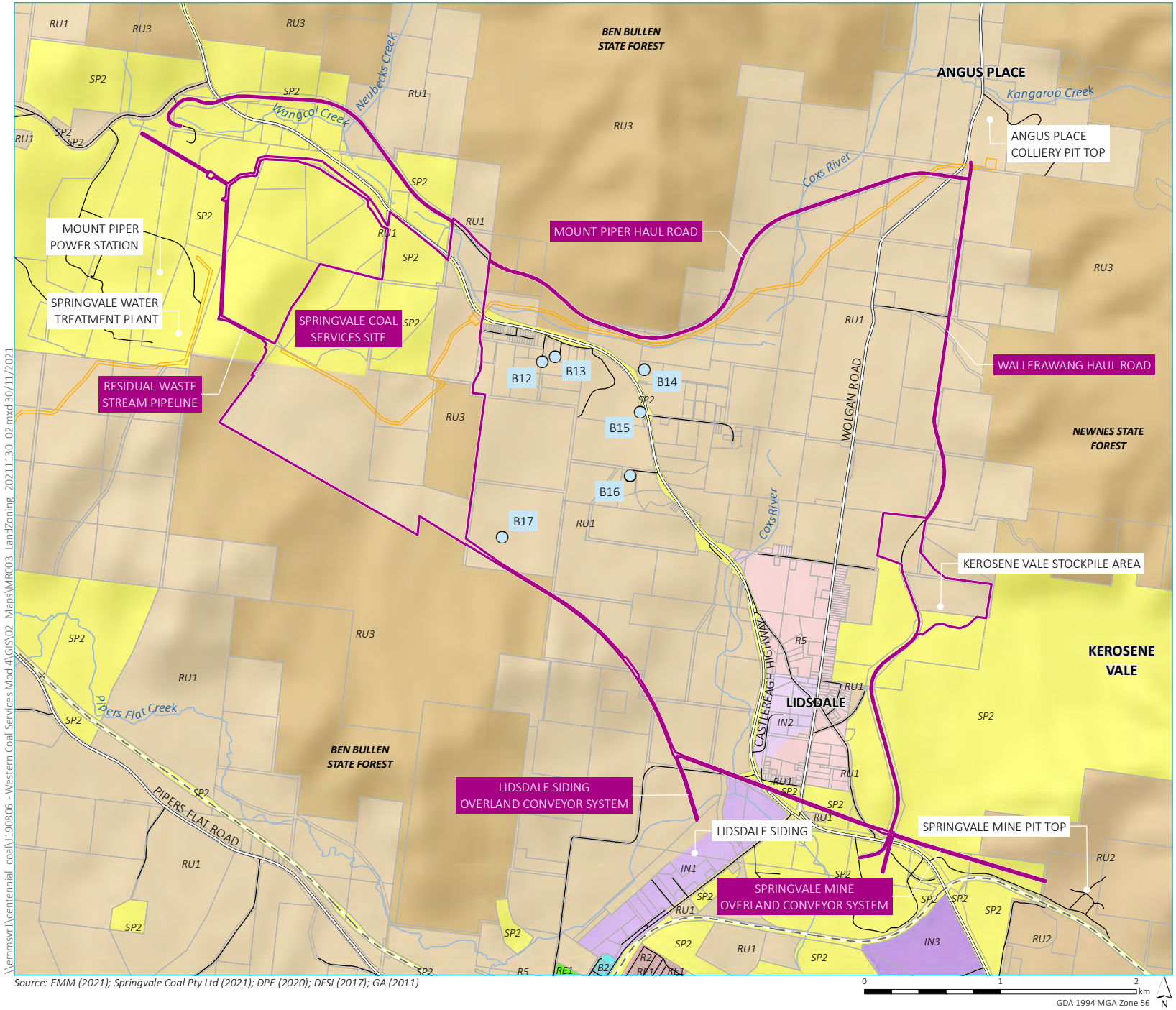


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Source: EMM (2021); Springvale Coal Pty Ltd (2021); DPE (2020); DFSI (2017); GA (2011)

Land zones

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Figure 2.2

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## 2.4 Environmental setting

### 2.4.1 Geology, topography and soils

The main geological unit in the area surrounding SCSS is the Cullen Bullen Subgroup of the Illawarra Coal Measures which consists of the Katoomba Seam, Middle River Seam, Irondale Seam, Lidsdale Seam and Lithgow Seam (RPS 2013). The Lithgow Seam is the primary target for local underground mining activities with the seams above this being extracted in open cut operations.

The project application area is within the Coxs River Valley. SCSS slopes towards Wangcol Creek, with an elevation of 985 m Australian Height Datum (AHD) at its southern boundary and 900 m AHD adjacent to Wangcol Creek.

Soils within the project application area have developed on the Illawarra Coal Measures and have naturally low fertility (RPS 2013). The soils have been subject to erosion and physical disturbance due to mining activities. The majority of soils are generally shallow and stony or contain coal material.

### 2.4.2 Water resources and hydrology

SCSS is in the Upper Coxs River sub-catchment, primarily south of Wangcol Creek. The Coxs River is a perennial river that is part of the greater Hawkesbury-Nepean catchment and the Sydney drinking water catchment. The Coxs River flows generally south and discharges into Lake Wallace. Coxs River and a number of its tributaries are impacted by historical and current mining operations, although these impacts have been reduced in recent years.

SCSS drains to Wangcol Creek which drains into the Coxs River approximately 2.5 km east of SCSS. Wangcol Creek has been subject to diversions and instream impacts with its condition varying from partly vegetated to cleared and degraded land. Historically, Wangcol Creek was ephemeral, flowing in response to rainfall. Discharges from MPPS and SCSS now create a more constant flow. Wangcol Creek's tributaries have headwaters in cleared land, mining areas or the Ben Bullen State Forest.

Across the majority of SCSS, drainage flows north-easterly from Ben Bullen State Forest towards Wangcol Creek. There are two major drainage lines within SCSS, referred to as Huon Gully (west side of SCSS) and Lamberts Gully (east side of SCSS). The headwaters of these drainage lines are in undisturbed forest.

There is an ash emplacement for MPPS in Huon Gully. Flow within this waterway terminates at Huon Gully Sediment Pond 1 (SHG1) (Figure 5.1 of Appendix A). SHG1 has no defined outlet; however, has not been observed to overtop its perimeter bank, indicating there is significant seepage into historical mine workings beneath SHG1.

Lamberts Gully is intercepted by sediment control dams in SCSS. Water discharged from these dams continues to flow in Lamberts Gully following treatment by settling.

### 2.4.3 Climate

The region's climate is cool–temperate, with mild summers and cold winters and is influenced by topography, altitude and aspect (RPS 2014). Monthly mean maximum temperatures range between 12 °C and 28 °C and frosts are common (particularly between May and September) (RPS 2014).

# 3 Existing operations

## 3.1 Existing approvals and licences

### 3.1.1 Development consent

The primary activities authorised under SSD-5579 are:

- receipt of up to 9.5 Mtpa of ROM coal at SCSS from:
  - Springvale Mine – up to 5.5 Mtpa;
  - Angus Place Colliery – up to 4 Mtpa; and/or
  - other Centennial sources – up to 1.5 Mtpa.
- transport of:
  - up to 6.3 Mtpa of coal to Lidsdale Siding via overland conveyor;
  - up to 6.7 Mtpa of coal to MPPS via overland conveyor; and
  - up to 1.5 Mtpa of coal from Lidsdale Siding back to SCSS via overland conveyor;
- operation of the existing coal preparation plant and the construction and operation of a new coal preparation plant;
- ancillary infrastructure, including additional conveyors and transfer points, to cater for the coal preparation plant within SCSS;
- a reject emplacement area within SCSS with 25-years' capacity;
- the Link Haul Road to link SCSS with the Mount Piper Haul Road;
- receipt of the residuals waste stream from the water treatment plant at SWTP and emplacement within a reject emplacement area (REA);
- progressive and final rehabilitation;
- transfer of up to 1.5 Mtpa of product coal from Lidsdale Siding back to SCSS via overland conveyor; and
- use of WCS infrastructure, including conveyors, private haul roads, Kerosene Vale Stockpile Area, reject emplacement areas, services, access roads, car parks and buildings.

SCSS is approved to operate 24 hours a day, 7 days per week until 30 June 2039.

No coal extraction activities are undertaken at SCSS under SSD-5579.

The layout of SCSS is shown on Figure 3.1.

Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)

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KEY

- Project application area (SSD-5579)
- Licensed discharge point
- Surface water flowpath (clean)
- Surface water flowpath (dirty)
- Major road
- Minor road
- State forest

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

# Springvale Coal Services Site surface facilities area

Western Coal Services Project
Modification Report
Figure 3.1

EMM
creating opportunities

SSD-5579 has been modified on three occasions (Table 3.1).

**Table 3.1 Summary of modifications**

| Modification number | Summary of modification | Approval authority | Type | Approval date |
|---|---|---|---|---|
| 1 | Allow receipt of waste from SWTP and minor changes to the rehabilitation strategy due to the physical installation of the raw water and residual waste transfer pipelines. | NSW Planning Assessment Commission | 96(2) | 19 June 2017 |
| 2 | Revise the application of noise criteria, increase the amount of coal that can be received at SCSS from Springvale Mine, increase the workforce and increase the capacity of the product coal stockpile. | Minister | 96(2) | 15 December 2017 |
| 3 | Allow coal to be transferred from Lidsdale Siding to SCSS and increase the amount of coal that can be received from sources other than Springvale Mine and Angus Place Colliery. | Minister | 4.55(1A) | 23 August 2019 |

### 3.1.2 Environment protection licence

WCS (including SCSS) operates under EPL 21229.

EPL 21229 is for coal works to a scale of greater than 5 Mtpa handled. The EPL licences water discharge from:

- LDP001 at SCSS (Figure 1.2), that drains from the final filter lagoon (sediment basin) into Wangcol Creek; and
- LDP002 at the overland conveyor at Brays Lane, Lidsdale – which will not be affected by the proposed modification and is not discussed further in this report.

Due to the connectivity of the local groundwater system and the existing surface water management system at SCSS, discharges through LDP001 are predominantly untreated groundwater. The discharge of untreated groundwater into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community.

NSW Environment Protection Authority (EPA) issued Springvale Coal with a Pollution Reduction Program on 18 December 2020 to evaluate options for the long-term management of groundwater being discharged from LDP001. The proposed modification will address the requirements of the EPL 21229 Pollution Reduction Program.

The proposed modification, as outlined in Chapter 4, will operate under EPL 21229 and no variation to EPL 21229 will be required.

## 3.2 Coal handling, storage and transport

WCS is approved to receive ROM coal from Springvale Mine, Angus Place Colliery and other Centennial sources and to transfer up to 6.3 Mtpa of product coal to Lidsdale Siding and up to 6.7 Mtpa of ROM coal to MPPS.

ROM coal from Springvale Mine pit top is transported to MPPS directly or via SCSS using WCS's overland conveyor system. This ROM coal is either stockpiled for subsequent transfer to MPPS or processed in the coal preparation plant.

Product coal can also be transferred to Lidsdale Siding from SCSS, using the return belt of the overland conveyor system for the export market.

ROM coal from Angus Place Colliery is transported by road to MPPS via the Mount Piper Haul Road.

The Link Haul Road from Mount Piper Haul Road to SCSS is approved as part of SSD-5579 but has not been constructed. Once constructed, it will allow the transport of ROM coal from Angus Place Colliery and other Centennial operations to SCSS.

There are four coal stockpiles approved as part of WCS:

- a 150,000 t capacity ROM coal stockpile at SCSS for stockpiling prior to processing;
- a 600,000 t ROM coal stockpile at SCSS for storage of ROM coal if MPPS is unable to receive coal for an extended period or alternatively to blend reject material and store and feed ROM coal from other operations;
- an 80,000 t product coal stockpile at SCSS for coal from the coal preparation plant; and
- a 500,000 t coal stockpile at Kerosene Vale Stockpile Area which provides temporary storage of coal when power stations are unable to accept coal.

## 3.3 Coal processing

The SCSS coal preparation plant has capacity to process up to 2 Mtpa of ROM coal. A new CPP with an additional 5 Mtpa of ROM coal beneficiation capacity is approved to be constructed in the vicinity of the existing CPP.

## 3.4 Reject emplacement

SCSS operates two reject emplacement areas for the disposal of coarse and fine reject material:

- Blackmans Flat Co-disposal storage facility, which is separated into six distinct cells, with four utilised for fine and coarse reject co-disposal and two utilised to hold decant water ('BFCD' on Figure 3.2); and
- REA – a fine and coarse coal reject storage facility within the final void of the Lamberts Gully Open Cut Mine, which incorporates 'A Pit'.

A pipeline from SWTP transfers residuals to REA. The approved maximum daily transfer rate of residuals to REA is 0.43 ML/day with 0.35 ML/day on an annual average basis.

## 3.5 Water management

### 3.5.1 Water sources and demands

Water sources at SCSS include rainfall, runoff and groundwater inflow to the open cut areas and Cooks Dam and small volumes of potable water from Lithgow City Council water main. SCSS receives residual waste (up to 2% solids) from SWTP.

The primary water demands at SCSS are for surface dust suppression, coal washing in the coal preparation plant and staff amenities.

### 3.5.2 Water transfers and pipelines

The residuals stream pipeline transfers residual material from SWTP to REA at SCSS (Figure 1.2). This includes:

- residuals generated from the removal of solids from raw mine water at SWTP; and
- wastewater generated during routine maintenance activities at SWTP.

SCSS is also connected to Lithgow City Council's main town water supply.

### 3.5.3 Water management system

The SCSS water management system is comprised of 'clean' and 'dirty' water systems (Figure 3.2).

#### i Clean water

Clean water runoff is typically from areas of remnant vegetation or rehabilitated catchments where there is no coal storage, transportation, handling or processing. Clean water may contain suspended solids, particularly during/after heavy rain, but is unlikely to be contaminated with coal fines.

Clean runoff is diverted around dirty water and coal-contact catchments to minimise the volume of dirty water generated. Clean water diversions have been progressively implemented at SCSS. This is continuing with further separation of coal processing catchments and disturbed catchments that are undergoing rehabilitation.

Clean water diversions at SCSS (Figure 3.2) are:

- CW1, which currently discharges to the dirty water SHG1 (see below) but will discharge to Huon Gully Diversion Pond once it is constructed;
- CW2, which discharges to the Main Sediment Dam;
- PCW1, which discharges to the Final Polishing Lagoon; and
- PCW2, which discharges to Wangcol Creek.

The clean water diversions have been designed to cater for a minimum of a 5% annual exceedance probability event (dependent upon water levels in upstream storages at the start of the event).

The Final Polishing Lagoon (previously known as the Retention Pond) is a clean water pond which acts as a source of water for SCSS activities including dust suppression and coal washing. The Final Polishing Lagoon overflows to Wangcol Creek downstream of LDP001 effectively removing clean catchment runoff from reporting to LDP001.

Huon Gully Diversion Pond is currently undergoing detailed design, and once constructed will allow transfer runoff from Huon Gully to Lamberts Gully (via pump). The structure will improve clean water management at SCSS and reduce potential groundwater recharge that may be occurring following rainfall events.

A detailed description of the clean water management system at SCSS is provided in Appendix A.

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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)*

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GDA 1994 MGA Zone 56

N

KEY

- Project application area (SSD-5579)
- Licensed discharge point
- Surface water flowpath (clean)
- Surface water flowpath (dirty)
- Surface water storage
- Major road
- Minor road
- State forest

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

# Existing water management system at Springvale Coal Services Site

Western Coal Services Project
Modification Report
Figure 3.2

EMM creating opportunities

### ii Dirty water

Dirty water is runoff from disturbed areas and areas with the potential to contain suspended sediment, oils, grease and hydrocarbons. Dirty water includes coal-contact water is runoff from catchments where coal storage, transportation, handling or processing occurs and is managed within the dirty water management systems.

Dirty runoff is managed in dirty water storages which allow suspended solids to settle out of the water column and store dirty water before it is used on-site, minimising dirty water discharges into the surrounding environment. Dirty water management structures at SCSS are regularly de-silted to maintain their storage capacity.

Dirty water storages at SCSS (Figure 3.2) are:

- Cooks Dam, which receives inflows from the Washery Dam, Stockpile Sediment Pond and SLG6. Cooks Dam is the key collection and management point for dirty water at SCSS. Water can be pumped from Cooks Dam to the coal preparation plant or be discharged to Wangcol Creek via LDP001.

- Main Sediment Pond, which receives overflow from four upstream 'fill and spill' sediment ponds in the Lamberts Gully rehabilitation area (ie SLG2, SLG3, SLG4 and SLG5). The retention time within the Main Sediment Pond allows sediment to settle before water is discharged into a clean water diversion that reports to the Final Polishing Lagoon.

- Stockpile Sediment Pond, which receives runoff from the coal stockpile area, the embankment of the REA and surrounding catchments before water reports to the Washery Makeup Tank for reuse in the coal preparation plant or overflows into SLG6.

- Washery Dam (also referred to as Washery Sediment Pond), which receives runoff from the coal preparation plant and haul roads, administration buildings and surrounding catchments before either overflowing into SLG6 or feeding into Cooks Dam. The EIS (RPS 2013) identified the capacity of the Washery Dam as 3.79 ML, which is consistent with the Western Coal Services Water Management Plan and Mining Operations Plan. Springvale Coal has identified that following desilting and maintenance works, the capacity of the Washery Dam could increase by approximately 2.3 ML.

- Washery Makeup Tank, which receives water from Cooks Dam or Stockpile Sediment Pond for reuse in the coal preparation plant and overflows into a pipe that returns water to the Washery Dam. The tank overflows into a pipe that joins the low flow outlet of the Washery Dam and returns to Cooks Dam.

- Transfer Tower 3 or TT03 sump, which collects coal-contact runoff from the overland conveyor near TT03. Water stored in the TT03 sump is transferred to Huon Gully immediately upstream of SHG1.

- SHG1 in Huon Gully at the truncation of the natural watercourse, which receives runoff from the western side of the REA. SHG1 has not overtopped is perimeter bank, indicating that it is highly likely there is a significant volume of seepage into historical mine workings.

- Historical open cut voids that are not actively managed and are generally in equilibrium with the surrounding shallow groundwater system and include:

    - DML Dam;

    - Council Pit;

    - H Pit East; and

    - H Pit West.

A detailed description of the dirty water management system at SCSS is provided in Appendix A.

#### iii Discharge from SCSS

LDP001 is at the boundary of SCSS in the drain from the overflow point of Cooks Dam to Wangcol Creek (Figure 1.2). While no volumetric discharge limits apply to LDP001, the volume of water discharged is monitored daily during discharge events.

Due to the connectivity of the local groundwater system and the existing surface water management system at SCSS, discharges through LDP001 are predominantly untreated groundwater. This water is characterised by relatively high electrical conductivity (EC) and has elevated concentrations of metals, including cobalt, iron, manganese, nickel and zinc. Further discussion of LDP001 is provided in Section 7.1.

Clean water from Lamberts Gully also discharges to Wangcol Creek downstream of LDP001.

## 3.6 Rehabilitation and final landform

Springvale Coal progressively rehabilitates disturbed areas to reduce and mitigate potential environmental impacts, such as dust generation. Rehabilitated areas and erosion and sediment controls are maintained and monitored on an ongoing basis.

An indicative closure timeline was provided in the *Western Coal Services Project Environmental Impact Statement* (EIS) (RPS 2013). This noted that closure planning will commence 5 years prior to the closure of the facilities approved as part of WCS. This is currently projected to be in 2039. Closure and post-closure activities will continue 10 years after cessation of coal processing and transport.

Springvale Coal will return land disturbed by exploration and mining activities to its pre-mining capacity and the final landform will be consistent with the surrounding environment.

Details of progressive and life of mine rehabilitation are provided in the EIS (RPS 2013) and Mining Operations Plan.

## 3.7 Environmental management

WCS has an established environmental management strategy (EMS) that has been developed in accordance with Centennial's EMS Framework and is generally consistent with the elements of ISO 14001. This EMS provides a framework to ensure the effective management of environmental issues and compliance with regulatory requirements for all activities and areas managed by Springvale Coal. It also provides a means for continued improvements in environmental performance.

As part of the EMS, a comprehensive set of environmental management plans have been developed and implemented at the mine. The implementation of these plans and integration of the EMS Framework is a strong focus at WCS. These plans are reviewed and updated, as necessary, to reflect operational changes and incorporate additional/amended requirements.

The environmental management plans are backed by an environmental monitoring network. Monitoring results are reported monthly on Centennial's website and in WCS's annual review documents.

# 4 Proposed modification

## 4.1 Modification summary

A comparison between existing approved operations and the proposed modification is provided in Table 4.1.

**Table 4.1 Comparison of existing operation and proposed modification**

| Element | Existing operation | Proposed modification |
|---|---|---|
| Project life | Under SSD-5579, coal transportation and processing operations are permitted to 30 June 2039. | No change. |
| Project application area | Area of 339.5 ha as shown in Figure 1 of Appendix 2 to SSD-5579. | Increase to 349.5 ha (an additional 10 ha or 2.95%) as shown in Figure 2.1. |
| Hours of operation | SCSS operates 24 hours per day, 7 days per week. | No change. |
| Employment | WCS currently has provision to employ up to 25 FTE personnel. | No change. |
| Coal processing | Beneficiate coal within SCSS to up to 7 Mtpa. | No change. |
| Coal handling and transport | • Up to 9.5 Mtpa can be received by WCS.<br>• Up to 6.3 Mtpa can be transferred from SCSS to Lidsdale Siding.<br>• Up to 1.5 Mtpa can be transferred from Lidsdale Siding to SCSS.<br>• Up to 6.7 Mtpa can be transferred to MPPS via overland conveyor. | No change. |
| Coal stockpiles | • 150,000 t capacity ROM coal stockpile.<br>• 600,000 t ROM coal stockpile for storage of ROM coal at SCSS if MPPS is unable to receive coal for an extended period.<br>• 80,000 t product stockpile in the vicinity of the CPP.<br>• 500,000 t coal stockpile at Kerosene Vale Stockpile Area. | No change. |
| Reject materials management | Reject emplacement areas at SCSS include:<br>• Co-disposal reject emplacement area; and<br>• REA. | No change. |
| Site access | Access to SCSS is via Castlereagh Highway. | No change. |

## Table 4.1 Comparison of existing operation and proposed modification

| Element | Existing operation | Proposed modification |
|---|---|---|
| Surface water management | Current water management occurs in accordance with the Water Management Plan. | The proposed modification will result in changes to existing water management at SCSS including:<br>• transfer of land within the surface water management system catchment to EnergyAustralia;<br>• construction and operation of:<br>– SCSS Water Transfer System;<br>– Huon Clean Water Pond;<br>– DWP-A;<br>– DWP-B;<br>– bi-directional pipeline between SCSS and MPPS;<br>– an offtake from the Angus Place Colliery Raw Water Pipeline; and<br>– associated pumping, pipelines and drainage lines.<br>• extension of TTO3 sump dewatering pipeline; and<br>• an increase to the capacity of the Washery Dam.<br>Further details provided in Section 4.2.<br>The Water Management Plan will be updated to align with the revised water management approach. |
| Water transfers | Receive and emplace no more than 0.35 ML/day (annual average) or 0.43 ML/day (daily maximum) of residual material from the SWTP (SSD 7592) within REA. | • SCSS Water Transfer System will be used to transfer:<br>– up to 15.6 ML/day of water to the proposed SCSS/Regis Transfer System; and<br>– up to 2.6 ML/day of water to MPPS.<br>• Receipt of up to 2.6 ML/day of water from Angus Place Colliery via the Angus Place Colliery water offtake and transfer system.<br>• No changes to receipt and emplacement of residual waste from SWTP. |
| Rehabilitation | Springvale Coal undertake progressive rehabilitation of disturbed areas (when not required for ongoing operations) and are committed to rehabilitation of the project application area at the end of the project life.<br>The Mining Operations Plan defines primary and secondary domains to facilitate rehabilitation planning and management for WCS. | Replace Condition 45 of Schedule 3 of SSD-5579 with a contemporary condition that aligns with the Mining Amendment Regulation.<br>The proposed project application area has been divided up into 15 primary domains and 6 secondary domains (Figure 7.3 and Figure 7.4). |

## 4.2 Surface water management

The proposed modifications to the water management system at SCSS are:

- Transfer of approximately 50.6 ha of the existing surface water catchment at SCSS to EnergyAustralia as part of the transfer of land from Springvale Coal back to EnergyAustralia. As a result, management of SHG1, H Pit East, H Pit West and Council Pit will be transferred to EnergyAustralia.

- Construction and operation of the Huon Clean Water Pond, which will intercept the clean water catchment of Huon Gully upstream of SHG1 and transfer it to Wangcol Creek via the Lamberts Gully clean water diversion.

- Construction and operation of two new dirty water ponds:

    - DWP-A will be constructed downslope and to the north of the Huon Clean Water Pond to capture dirty water from the coal conveyor corridor and prevent runoff flowing north onto EnergyAustralia's land.

    - DWP-B will be constructed upstream of Cooks Dam and will provide additional dirty water storage capacity at SCSS.

- Extension of the dewatering pipeline from the Transfer Tower 3 or TT03 sump to DWP-A.

- Construction and operation of a bi-directional pipeline between SCSS and MPPS. The pipeline will facilitate the proposed transfer of water to MPPS (Section 4.3.1).

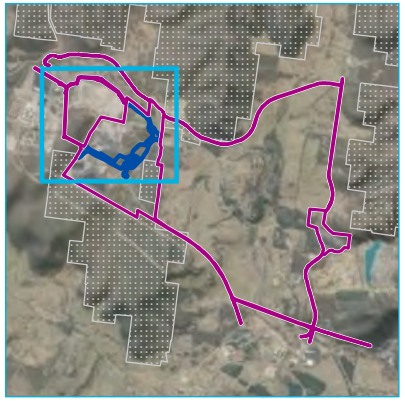
- Construction and operation of an offtake from the Angus Place Colliery Raw Water Pipeline to facilitate the proposed transfer of water from Angus Place Colliery to SCSS (Section 4.3.2).

- Construction and operation of associated pumping, pipelines and drainage channels.

- Increase the capacity of the Washery Dam to 6.1 ML. The material excavated from the Washery Dam during desilting and maintenance works will be utilised on-site at SCSS as part of ongoing rehabilitation works.

Key elements of the proposed modification are labelled on Figure 4.1.

The proposed water management system is shown on Figure 4.2.



KEY

- Proposed project application area
- Construction envelope
- Springvale Coal Services Site
- Licensed discharge point
- Mt Piper Power Station Pond D
- Surface water catchment to be managed by Energy Australia

Proposed modification elements

- Bidirectional pipeline
- Offtake from Angus Place Raw Water Pipeline Project
- General flow direction
- Huon Clean Water Pond
- DWP-A
- DWP-B

Proposed modification area

- Regis and EnergyAustralia water transfer system area
- DWP-B area
- Angus Place water offtake and transfer system area
- DWP-A and clean water diversion area

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline easement
- Springvale Coal Services Site/Regis Transfer System

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- State forest

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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); GA (2011)*

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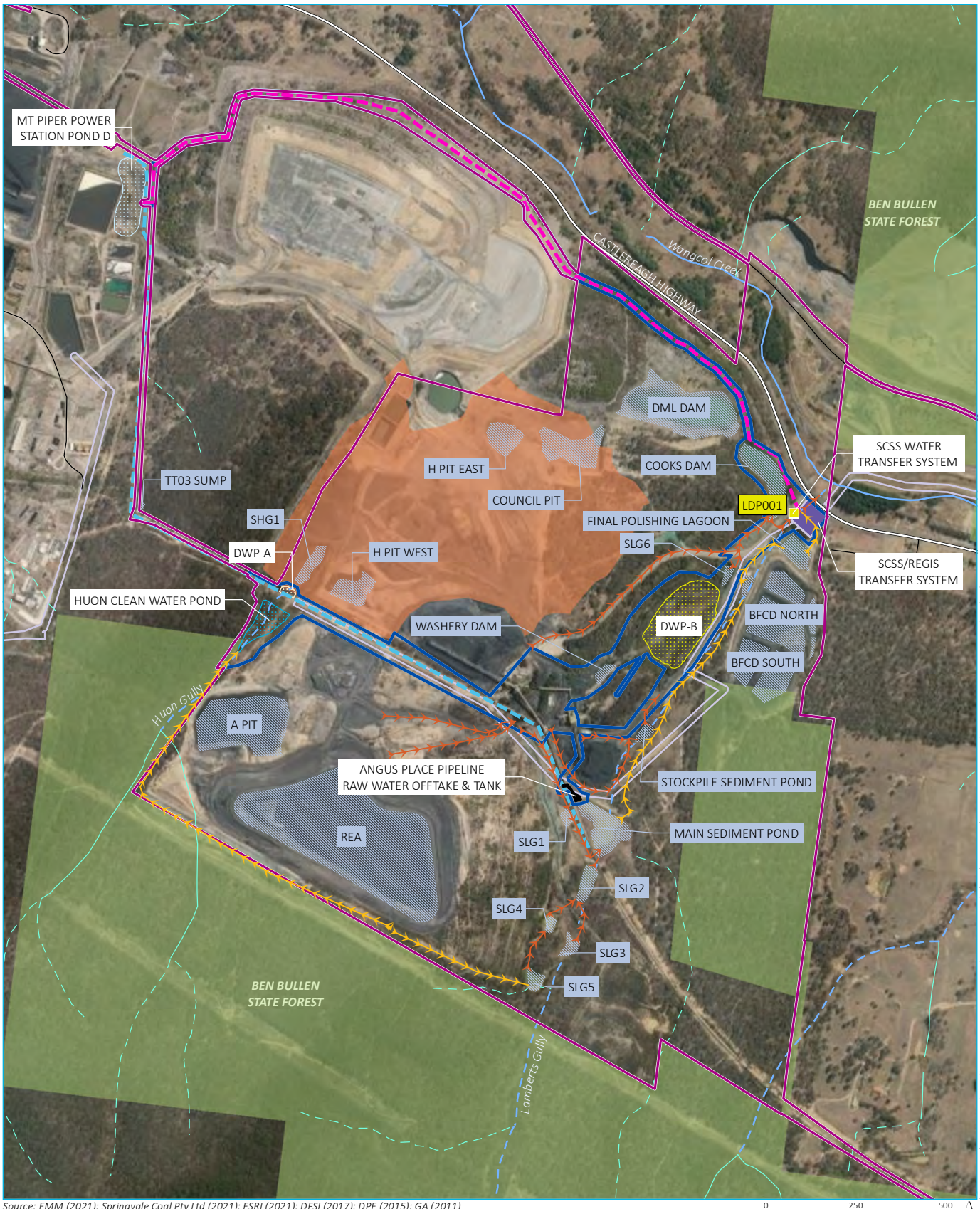
## Proposed modification elements

Western Coal Services Project
Modification Report
Figure 4.1

EMM creating opportunities




*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)*

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## KEY

- Proposed project application area
- Construction envelope
- Licensed discharge point
- Indicative Angus Place Raw Water Pipeline Project
- Mt Piper Power Station Pond D
- Surface water storage
- Surface water catchment to be managed by Energy Australia

Proposed modification elements

- Bidirectional pipeline
- Offtake from Angus Place Raw Water Pipeline Project
- Proposed surface water flowpath (clean)
- Proposed surface water flowpath (dirty)
- Huon Clean Water Pond
- DWP-A
- DWP-B

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline easement
- Springvale Coal Services Site/Regis Transfer System

Existing environment

- Major road
- Minor road
- State forest

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

# Proposed water management system at Springvale Coal Services Site

Western Coal Services Project
Modification Report
Figure 4.2

EMM creating opportunities

## 4.3 Water transfers

### 4.3.1 SCSS Water Transfer System

The SCSS Water Transfer System will be constructed on disturbed land adjacent to the proposed SCSS/Regis Transfer System (Figure 4.1). It will include a new transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001. Once operational, the SCSS Water Transfer System will be used to transfer water from Cooks Dam to McPhillamys Gold Project and MPPS.

#### i Transfer of water to McPhillamys Gold Project

The SCSS Water Transfer System will be used to transfer up to 15.6 ML/day of water from SCSS to the proposed SCSS/Regis Transfer System.

#### ii Transfer of water to MPPS

The SCSS Water Transfer System will be used to transfer up to 2.6 ML/day of water from SCSS to MPPS for treatment and reuse. This aspect of the proposed modification is subject to the successful conclusion of ongoing commercial discussions between Springvale Coal and EnergyAustralia.

### 4.3.2 Receipt of water from Angus Place Colliery

An offtake from the Angus Place Colliery Raw Water Pipeline will be constructed (Figure 4.1). Once constructed, the offtake will allow up to 2.6 ML/day of water from Angus Place Colliery to be used to supplement the coal preparation plant water supply at SCSS.

## 4.4 Construction requirements

### 4.4.1 Construction envelope and project application area

The installation of the SCSS Water Transfer System and redesign of SCSS's water management infrastructure will require construction activities on-site at SCSS and between SCSS and MPPS. Construction activities are required within four areas (Figure 4.1):

- DWP-A and clean water diversion area;
- Regis and EnergyAustralia water transfer systems area;
- DWP-B area; and
- Angus Place water offtake and transfer system area.

Collectively, these four areas form the construction envelope for the proposed modification. The construction envelope and required clearing/disturbance is summarised in Table 4.2.

**Table 4.2 Construction envelope and disturbance areas**

| Modification component | Construction envelope within disturbed land (ha) | Construction envelope requiring clearing (ha) | Total disturbance (ha) |
|---|---|---|---|
| DWP-A and clean water diversion area | 2.72 | 4.10 | 6.82 |
| Regis and EnergyAustralia water transfer systems area | 6.05 | 4.24 | 10.29 |
| DWP-B area | 4.84 | 6.38 | 11.22 |
| Angus Place water offtake and transfer system area | 1.17 | 0.47 | 1.64 |
| **Total disturbance** | **14.78** | **15.19** | **29.97** |

The project application area will need to be extended to accommodate the construction envelope (Figure 4.1). The additional lot and DPs that will be included in Appendix 2 of SSD-5579 and their land ownership status is provided in Table 4.3.

**Table 4.3 Additions to the schedule of land**

| Lot/DP | Land owner |
|---|---|
| 5/804929 | EnergyAustralia |
| 8/804929 | EnergyAustralia |

### 4.4.2 Construction activities

Construction activities will include:

- site preparation (including vegetation clearance, clear and grub and cut and fill activities);
- excavation for dam construction and pipe installation;
- pipe welding and installation;
- installation of pumps and associated infrastructure; and
- fill importation and distribution.

Construction activities associated with the proposed modification are expected to occur over approximately 23 months.

Consistent with Condition 4 of Schedule 3 of SSD-5579, Springvale Coal will only undertake construction activities between 7 am to 6 pm Monday to Friday and 8 am to 1 pm Saturday, with no construction activities on Sundays or public holidays (unless otherwise agreed to by the Secretary).

A construction environmental management plan (CEMP) will be prepared and include measures to manage potential noise, dust, biodiversity, soil and water impacts during construction.

## 4.5 Amendments to rehabilitation management

Condition 45 of Schedule 3 of SSD-5579 requires Springvale Coal to prepare and implement a rehabilitation management plan to the satisfaction of the Resources Regulator.

The NSW Mining Amendment (Standard Conditions of Mining Leases—Rehabilitation) Regulation 2021 (Mining Amendment Regulation) was introduced in July 2021 and sets clear, achievable and enforceable requirements for rehabilitation.

Condition 45 of Schedule 3 of SSD-5579 does not align with the requirements for rehabilitation prescribed by the Mining Amendment Regulation. To avoid unnecessary duplication of documentation for rehabilitation activities at SCSS, approval is sought to replace Condition 45 of Schedule 3 of SSD-5579 with a contemporary condition that references the NSW *Mining Act 1992* and aligns with the Mining Amendment Regulation.

It is proposed to amend Condition 45 of Schedule 3 of SSD-5579 to:

> The Applicant shall prepare and implement a Rehabilitation Management Plan for the development, in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992.

The Mining Operations Plan defines primary and secondary domains to facilitate rehabilitation planning and management for WCS. As a result of the proposed modification, the primary and secondary domains within the project application area will be amended (Section 7.7). Domains for the proposed project application area have been determined in consideration of the specific requirements of the infrastructure components and the local environment. The proposed project application area has been divided up into 15 primary domains and 6 secondary domains (Figure 7.3 and Figure 7.4).

## 4.6 Conditions of consent

The following amendments to SSD-5579 are required to reflect the proposed modification:

- Condition 45 of Schedule 3 of SSD-5579 – amend wording to align with the Mining Amendment Regulation (Section 4.5);
- Appendix 1 (schedule of land) – addition of two land parcels (Table 4.3);
- Figure 1 (development area) of Appendix 2 – amend project application area;
- Figure 1 (SCSS layout) of Appendix 3 – amend project application area and water management structures;
- Figure 1 (receiver locations) of Appendix 4 – amend project application area;
- Figure 1 (Aboriginal cultural heritage sites) of Appendix 6 – amend project application area and include additional AHIMS sites;
- Figure 1 (additional rehabilitation initiatives at SCSS) of Appendix 7 – amend project application area and rehabilitation offset areas; and
- Appendix 8 (statement of commitments) – addition of commitments made as part of modification report.

# 5 Statutory context

## 5.1 Introduction

This chapter describes the relevant Commonwealth and State legislation and regulatory framework under which the proposed modification will be assessed and determined.

## 5.2 Commonwealth legislation

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of Agriculture, Water and the Environment (DAWE). It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined as 'matters of national environmental significance' (MNES). If it is likely that there will be significant impacts to MNES, DAWE can deem that a project is a 'controlled action', requiring approval under the EPBC Act.

As the proposed modification does not involve extraction of coal, in accordance with the EPBC Act, it is not within the definition of a 'large coal mining development' and the water trigger does not apply.

No threatened ecological communities listed under the EPBC Act have been identified within the construction envelope. Three EPBC Act listed species, Black Gum (*Eucalyptus aggregata*), Large-eared Pied Bat (*Chalinolobus dwyeri*) and Greater Glider (*Petauroides volans*) have been found within or close to the construction envelope. Detections of Large-eared Pied Bat and Greater Glider were made as part of previous biodiversity assessments at SCSS not the BDAR (Appendix E).

Spotted-tailed Quoll (*Dasyurus maculatus*) and Bathurst Copper Butterfly (*Paralucia spinifera*) have not been found within or close to the construction envelope; however, both species have been identified as having a moderate or greater likelihood of occurring.

Assessments of significance have been completed for these five species and the proposed modification is considered unlikely to have a significant impact on these species (Appendix E). The proposed modification will impact approximately 15 ha of native vegetation; however, large areas of equal or better-quality habitat are available for these species within the area surrounding the construction envelope.

The proposed modification will not have a significant impact on any MNES as listed in the EPBC Act and consequently has not been referred to DAWE.

## 5.3 NSW State legislation

### 5.3.1 NSW Environmental Planning and Assessment Act 1979

#### i Section 4.55(2) modification

The original application for WCS was approved by the Planning Assessment Commission on 4 April 2014. SSD-5579 was most recently modified on 23 August 2019 (Mod 3).

Springvale Coal is seeking to modify SSD-5579 pursuant to Section 4.55(2) of the EP&A Act to allow for the proposed amendments to water management at SCSS. Compliance of the proposed modification with the requirements of Section 4.55(2) is summarised in Table 5.1.

### Table 5.1 Compliance with Section 4.55(2) requirements

| Section 4.55 (2) requirements | Comment |
|---|---|
| (a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and | The proposed modification will not change the core objective of WCS being a project to facilitate the receipt, handling and processing of coal from Springvale Mine, Angus Place Colliery and other Centennial operations and the transportation of this coal to MPPS. The proposed modification will:<br>• address the requirements of the EPL 21229 Pollution Reduction Program;<br>• create a beneficial reuse for water generated at SCSS;<br>• facilitate the transfer of water from Angus Place Colliery to SCSS;<br>• facilitate the transfer of land back to EnergyAustralia;<br>• increase the capacity of the Washery Dam; and<br>• align the conditions of SSD-5579 with the requirements for rehabilitation prescribed by the Mining Amendment Regulation.<br>Justification for the proposed modification is provided in Section 8.1.<br>The proposed modification constitutes a minor change to an existing approved project that has been operating successfully since 2014. |
| (b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and | Springvale Coal has consulted with NSW Department of Planning, Industry and Environment (DPIE) as part of the preparation of this modification report. DPIE confirmed the approval pathway for the modification is by way of Section 4.55(2) of the EP&A Act. Further consultation information is provided in Chapter 6. |
| (c) it has notified the application in accordance with:<br>i) the regulations, if the regulations so require, or<br>ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and | Clause 118 of the NSW Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) relates to the notification period associated with Section 4.55(2) modifications.<br>Notice of the application must be published in a local newspaper by DPIE. DPIE must also cause notice of the proposed modification to be given to each person who made a submission in relation to the original development application.<br>This modification report will be placed on public exhibition by DPIE. |
| (d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be. | Any submissions made concerning the proposed modification will be reviewed by DPIE and forwarded to Springvale Coal to consider and respond to (via a submissions report). |

### ii Matters for consideration

Modification applications under Section 4.55(2) of Division 4.9 are required to take into consideration the relevant matters referred to in Section 4.15 of the EP&A Act which include:

(a) the provisions of:

(i) any environmental planning instrument, and

(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary

has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and

(iii) any development control plan, and

(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and

(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and

(v) (Repealed)

that apply to the land to which the development application relates,

(b) the likely impacts of that development, including environmental impacts on both the natural and built environment, and social and economic impacts in the locality,

(c) the suitability of the site for the development,

(d) any submissions made in accordance with this Act or the regulations,

(e) the public interest.

Matters a (i), (iii) and (iv) have been addressed in the following sections of this chapter. Matters (b) to (e) are addressed in Chapters 6, 7 and 8.

### 5.3.2 NSW Environmental Planning and Assessment Regulation 2000

Clause 115 of the EP&A Regulation states the required information an application for development consent under Section 4.55(2) of the EP&A Act must include. Table 5.2 provides an outline of where this information is provided. The proposed modification is not considered designated development under the EP&A Regulation.

**Table 5.2 EP&A Regulation Clause 115 information requirements**

| Clause 115 information requirement | Where addressed |
|---|---|
| (a) the name and address of application | Section 1.4 of this modification report. |
| (b) a description of the development to be carried out under the consent (as previously modified) | Chapter 3 of this modification report. |
| (c) the address, and formal particulars of title, of the land on which the development is to be carried out, | Section 2.1, Appendix 1 of SSD-5579 and Appendix G of this modification report. |
| (d) a description of the proposed modification to the development consent, | Chapter 4 of this modification report. |
| (e) a statement that indicates either:<br>i. that the modification is merely intended to correct a minor error, misdescription or miscalculation, or<br>ii. that the modification is intended to have some other effect, as specified in the statement, | Table 5.1 of this modification report. |
| (f) a description of the expected impacts of the modification, | Chapter 7 of this modification report. |
| (g) an undertaking to the effect that the development (as to be modified) will remain substantially the same as the development that was originally approved, | Table 5.1 of this modification report. |

### Table 5.2 EP&A Regulation Clause 115 information requirements

| Clause 115 information requirement | Where addressed |
|---|---|
| (g1) in the case of an application that is accompanied by a biodiversity development assessment report, the reasonable steps taken to obtain the like-for-like biodiversity credits required to be retired under the report to offset the residual impacts on biodiversity values if different biodiversity credits are proposed to be used as offsets in accordance with the variation rules under the *Biodiversity Conservation Act 2016*, | The proposed modification will result in the clearing of 15.18 ha of native vegetation (Section 7.5 and Appendix E). A total of 376 ecosystem credits and 72 species credits are required to offset the impacts of the proposed modification.<br>These credit requirements will be met in accordance with the NSW Biodiversity Offset Scheme through retiring credits, based on like-for-like rules where possible. Payments into the Biodiversity Conservation Fund may be made where suitable credits are not available. |
| (h) if the applicant is not the owner of the land, a statement signed by the owner of the land to the effect that the owner consents to the making of the application (except where the application for the consent the subject of the modification was made, or could have been made, without the consent of the owner), | Landowner's consent is not required for a development application for public notification development if the applicant instead gives notice of the application:<br>• to the owner of the land in writing before the application is made; or<br>• by publishing a notice no later than 14 days after the application is made in a newspaper circulating in the area in which the development is to be carried out.<br>SSD-5579 satisfies the meaning of 'public notification development' as defined in Clause 49 of the EP&A Regulation, which includes SSD as set out in Clause 5 (Mining) of Schedule 1 of State Environmental Planning Policy (State and Regional Development) 2011. |
| (i) a statement as to whether the application is being made to the Court (under Section 4.55) or to the consent authority (under Section 4.56) | The proposed modification application is not being made to the NSW Land and Environment Court. |
| and, if the consent authority so requires, must be in the form approved by that authority. | The form of this application is consistent with DPIE's requirements. |

## 5.3.3 Other relevant NSW State legislation and planning instruments

An outline of other relevant NSW State legislation and planning instruments is provided in Table 5.3.

### Table 5.3 Other relevant NSW State legislation

| NSW legislation | Comment |
|---|---|
| NSW *Protection of the Environment Operations Act 1997* | WCS is a 'premises-based scheduled activity' under the NSW *Protection of the Environment Operations Act 1997*. WCS operates under EPL 21229, which authorises coal works with an annual handling capacity of greater than 5 Mt.<br>Springvale Coal has consulted extensively with EPA regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. The proposed modification will address the requirements of the EPL 21229 Pollution Reduction Program.<br>No changes to EPL 21229 are proposed as part of this modification. The modification, as outlined in Chapter 4, will operate under EPL 21229. |

**Table 5.3 Other relevant NSW State legislation**

| NSW legislation | Comment |
|---|---|
| NSW *Work Health and Safety (Mines and Petroleum Sites) Act 2013* | The NSW *Work Health and Safety (Mines and Petroleum Sites) Act 2013* aims to assist in securing and promoting the health, safety and welfare of people at work at coal operations. Springvale Coal hold all necessary approvals under the Act and operations will continue to be regulated under the provisions of the Act. |
| NSW *Forestry Act 2012* | The project application area includes part of Ben Bullen State Forest, which intersects SCSS and the overland conveyor (Figure 1.2). Springvale Coal does not hold an occupation permit for this land.<br>The construction envelope required to facilitate the proposed modification does not intersect Ben Bullen State Forest and no surface disturbance activities are proposed within Ben Bullen State Forest as part of the proposed modification. |
| NSW *Water Act 1912* | The NSW *Water Act 1912* governs access, trading and allocation of licences associated with surface water and groundwater sources where a water sharing plan is not in place. The Act applies to groundwater interference, bore installation and extraction of groundwater.<br>No additional licenses or allocation under this Act are required as a result of the proposed modification. |
| NSW *Water Management Act 2000* | The NSW *Water Management Act 2000* is intended to ensure that water resources are conserved and properly managed for sustainable use benefitting both present and future generations. Water sharing plans prepared in accordance with the Act include rules for protecting the environment and administrating water licencing and trading.<br>Water sharing plans made under Section 50 of the Act that are relevant to WCS include Greater Metropolitan Region Groundwater Sources 2011 and Greater Metropolitan Region Unregulated River Water Sources 2011.<br>Huon Clean Water Pond and DWP-A are proposed on Huon Gully, a third order watercourse. Springvale Coal will consult with DPIE Water and Natural Resources Access Regulator with regards to the construction and ongoing operation of both Huon Clean Water Pond and DWP-A. |
| NSW *Mining Act 1992* | Under Part 2 of the Mining SEPP, mining may be carried out with consent on land that is the subject of a ML under the NSW *Mining Act 1992*. No changes to Springvale Coal's existing mining tenements are required as part of the proposed modification. |
| NSW *Crown Lands Act 1989* | There is Crown land within the project application area. No operations are currently undertaken on parcels of Crown land as part of WCS. The proposed modification will not impact Crown land. Therefore, no licence is required under the provisions of the NSW *Crown Lands Act 1989*. |
| NSW *Dams Safety Act 2015* | The NSW *Dams Safety Act 2015* establishes Dams Safety NSW as an independent regulator charged with ensuring that any risks to public safety, the environment and economic assets that dams create are at an acceptable level to the community. A dam may be declared if it has a dam wall higher than 15 m, or if it would cause major or catastrophic damage or loss or endanger the life of a person if it failed.<br>Following completion of the detailed design for DWP-B, the dam design and a consequence assessment was submitted to Dams Safety NSW for assessment. If Dams Safety NSW determines the dam to be a declared dam, operation and maintenance plans and emergency management plans will be developed and submitted to Dams Safety NSW prior to commissioning of DWP-B. |

### 5.3.4 State Environmental Planning Policies

#### i State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 applies to land within the Sydney drinking water catchment. The aims of this SEPP are:

- to provide for healthy water catchments that will deliver high quality water while permitting development that is compatible with that goal;

- to provide that a consent authority must not grant consent to a proposed development unless it is satisfied that the proposed development will have a neutral or beneficial effect on water quality; and
- to support the maintenance or achievement of the water quality objectives for the Sydney drinking water catchment.

Clause 10(1) of this SEPP provides that a consent authority must not grant consent to the carrying out of development on land within the Sydney drinking water catchment unless it is satisfied that the carrying out of the proposed development would have a "neutral or beneficial effect" (NorBE) on water quality.

It is noted that Clause 10 of this SEPP does not strictly apply to the modification of a development consent; however, it is recognised that the intention of this SEPP is to protect the Sydney drinking water catchment and as a result the objectives of NorBE on water quality have been considered in Appendix A.

The proposed modification is predicted to reduce the volume and frequency of discharges to Wangcol Creek via LDP001 and result in a significant reduction in the pollutant load of discharges compared to existing conditions. As such, the proposed modification is assessed to have a NorBE on water quality within the Sydney drinking water catchment area in accordance with this SEPP.

#### ii State Environmental Planning Policy (Koala Habitat Protection) 2021

State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala SEPP) regulates the clearing of Koala habitat. However, it does not apply to land dedicated or reserved under the NSW *National Parks and Wildlife Act 1974* (NPW Act) or to land dedicated as a State Forest.

Potential habitat for Koala (*Phascolarctos cinereus*) was identified within the construction envelope. Camera trapping and spotlighting was undertaken in potential habitat consistent with prescribed survey timing. No Koalas were identified and the species was deemed absent from the construction envelope.

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

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) regulates the determination of development applications to carry out a "potentially hazardous industry" or "potentially offensive industry".

With the continued implementation of best management practices for chemicals used at WCS, as well as effective implementation of the approved EMS and occupational health and safety management systems, the proposed modification will not pose any significant risk to human health, life or property or to the biophysical environment beyond that currently approved for WCS.

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

A preliminary hazard analysis was not prepared as part of this report and Clause 13 of SEPP 33 does not apply to the consent authority's determination of the proposed modification.

### 5.4 Local environmental plans

As stated in Section 2.3, SCSS is zoned a mix of RU1 Primary Production, RU3 Forestry and SP2 Infrastructure under the Lithgow LEP (Figure 2.2).

The 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.

Sub-clause 7(1)(d) of the Mining SEPP states that development for the purposes of processing or transporting minerals or mineral-bearing ores on certain land is permissible with development consent. The transportation and processing of minerals, in this case coal, is permissible at SCSS under the Mining SEPP. In relation to any inconsistency between the Mining SEPP and an environmental planning instrument, sub-clause 5(3) of Mining SEPP provides that the Mining SEPP prevails to the extent of the inconsistency.

On this basis, any provision in the Lithgow LEP that would otherwise operate to prohibit the proposed modification has no effect. The proposed modification is therefore permissible with development consent.

# 6 Stakeholder engagement

## 6.1 NSW Department of Planning, Industry and Environment

Springvale Coal wrote to DPIE on 8 April 2021 to introduce the proposed modification, and to seek advice on the assessment pathway and scope of this modification report. DPIE responded on 3 May 2021 to confirm the assessment scope. A copy of this correspondence is provided in Appendix H. Feedback provided by DPIE, and how this has been addressed, is summarised in Table 6.1.

**Table 6.1 Feedback from DPIE and how it has been addressed**

| Matter raised | Response |
|---|---|
| The modification proposes impacts to areas identified in the existing consent as 'Lamberts Gully Rehabilitation Offset Areas' and/or 'Additional Rehabilitation Initiatives areas' (refer to Appendix 7 and conditions 26, 28, 29 and 43 of the development consent). There are a range of existing obligations under the consent and MOP to rehabilitate and manage these areas for conservation. It is understood that these obligations arise from impacts associated with the Lamberts Gully Coal Mine project approval (06-0017). Consultation with Biodiversity, Conservation and Science Directorate (BCS) regarding an appropriate method of assessing and offsetting the impacts on these areas is recommended, with consideration given to the need to account for previous commitments. | The construction envelope for the proposed modification encompasses a total of 29.97 ha, including 7 ha of land within the Lamberts Gully Rehabilitation offset areas and 0.6 ha of land within the Lamberts Gully Rehabilitation Area (subject to maintenance) as nominated in Appendix 7 of SSD-5579. To facilitate the proposed amendments to the water management system at SCSS, vegetation within these areas will be cleared.<br>As discussed in Section 7.5, a total of 376 ecosystem credits and 72 species credits are required to offset the impacts of the proposed modification on biodiversity. This includes impacts on biodiversity within the Lamberts Gully rehabilitation areas. These credit requirements will be satisfied in accordance with the NSW Biodiversity Offset Scheme through retiring credits, based on like-for-like rules where possible. Payments into the Biodiversity Conservation Fund may be made where suitable credits are not available.<br>A Rehabilitation Management Plan will be prepared in accordance with the mining lease and will focus on establishing ecosystems within the project application area including wildlife corridors.<br>Further information is provided in Section 7.7.3. |
| It is noted that the modification proposes works outside the SSD 5579 project application area. The modification report must identify any proposed changes to the project application area, provide an updated schedule of lands and clarify land ownership/tenure for additional parcels, including provision of landowner's consent where required. | Changes to the project application area are required to facilitate the proposed modification. These changes are summarised in Section 4.4.1 and a revised schedule of lands is provided as Appendix G.<br>As discussed in Table 5.2, landowner's consent is not required for the modification application. |
| Provide a detailed justification for all elements of the proposed modification. | A detailed justification for the proposed modification is provided in Chapter 8 of this modification report. |

## Table 6.1 Feedback from DPIE and how it has been addressed

| Matter raised | Response |
|---|---|
| Provide details of existing approvals or additional approvals/modifications necessary to facilitate the proposed works and/or water transfers. | Other approvals necessary to facilitate the proposed modification in its entirety are:<br>• Approval of SSD-9505 (McPhillamys Gold Project), which is required to authorise the construction and operation of the McPhillamys Gold Project pipeline and Springvale Coal Services/LFB Resources NL Transfer System (Section 1.5.1).<br>• Approval of SSD-26254212 (Angus Place West), which is required to authorise the transfer of water from the Angus Place Water Transfer System to SCSS.<br>• A separate modification to SWTP's development consent (SSD-7592), which is required to authorise:<br>– the transfer of water between SWTP and SCSS; and<br>– the temporary storage of water within Pond D at MPPS, treatment of water within MPPS's brine concentrators, transfer of permeate to MPPS's cooling water system and management of brine.<br>The transfer of water to MPPS and McPhillamys Gold Project are also subject to the successful conclusion of ongoing commercial discussions with EnergyAustralia and Regis, respectively. |
| Provide an analysis of statutory requirements, including the relevant matters for consideration under Section 4.15 of the EP&A Act and the relevant objects of the EP&A Act. | The statutory context of the proposed modification is discussed in Chapter 5 (including consideration of Section 4.15 of the EP&A Act) and the proposed modification's consistency with relevant objects of the EP&A Act is discussed in Chapter 8. |
| Explain how the proposal would contribute to achieving water quality objectives for downstream environments. | The construction of DWP-B and increased capacity of the Washery Dam will allow Springvale Coal to store, manage and reuse a greater volume of dirty water on-site at SCSS and reduce the volume of water discharged off-site.<br>The transfer of water generated at SCSS to MPPS and, if constructed, the McPhillamys Gold Mine will reduce, and at times remove, the need to discharge water from LDP001 to Wangcol Creek. Where discharges are required, the mixing of water on-site at SCSS with water from Angus Place Colliery will also improve the quality of water discharged into Wangcol Creek.<br>Water and salt balance modelling (Section 7.1.3) indicates that the proposed modification will reduce the volume and frequency of LDP001 discharges to Wangcol Creek, resulting in significant reductions to the pollutant load of discharges to downstream environments when compared with existing conditions.<br>Once the proposed amendments to the water management system have been implemented, clean water runoff from Huon Gully and Lamberts Gully will be the primary source of surface water discharge from SCSS to Wangcol Creek. This water has lower EC and lower concentrations of some metals when compared with current LDP001 discharges to Wangcol Creek. |

**Table 6.1 Feedback from DPIE and how it has been addressed**

| Matter raised | Response |
|---|---|
| Provide a detailed description of the existing and proposed water management system, including process flow diagrams for both existing and proposed operations. | An overview of the existing water management system at SCSS is provided in Section 3.5 and Figure 3.2 and a detailed description (including process flow diagrams) is provided in Appendix A.<br>An overview of the proposed water management system at SCSS is provided in Section 4.2 and Figure 4.2 and a detailed description (including process flow diagrams) is provided in Appendix A. |
| Undertake consultation with potentially affected local community, the Western Region Community Consultative Committee (CCC), State Forests, Transport for NSW (TfNSW), Heritage NSW, BCS, EPA, DPIE Water and LCC. | The outcomes of the stakeholder engagement activities undertaken as part of the preparation of this report are summarised in Chapter 6 and Appendix H. |

## 6.2 Western Region Community Consultative Committee

The Western Region CCC comprises of representatives from the local community and Lithgow City Council and is independently chaired. The CCC meets at least twice annually and provides a forum for open discussion between Centennial (including representatives from Springvale Mine and Angus Place Colliery), the community, LCC and other stakeholders on issues directly relating to the operation and environmental performance and community relations. Minutes from CCC meetings are made available on Centennial's website.

A letter was sent to the members of the CCC on 22 June 2021 to introduce the proposed modification and notify them that a modification report will be submitted to DPIE (Appendix H). No feedback regarding the proposed modification has been received to date. The proposed modification was also discussed at CCC meetings in February, May and August 2021. No issues relating to the proposed modification elements or proposed impact assessments were raised.

## 6.3 Forestry Corporation of NSW

A letter was sent to Forestry Corporation of NSW on 23 June 2021 to introduce the proposed modification and notify them that a modification report will be submitted to DPIE (Appendix H). No feedback regarding the proposed modification has been received to date.

## 6.4 Transport for NSW

A letter was sent to TfNSW on 18 June 2021 to introduce the proposed modification and notify them that a modification report will be submitted to DPIE (Appendix H). Feedback provided by TfNSW, and how this has been addressed, is summarised in Table 6.2. Further discussion of potential traffic impacts is provided in Section 7.6 and Appendix F.

**Table 6.2 Feedback from TfNSW and how it has been addressed**

| Matter raised | Response |
|---|---|
| Details of any physical works proposed in or in the vicinity of the Castlereagh Highway Road reserve. | The proposed modification will not impact the Castlereagh Highway road reserve. The physical works to the road reserve will be approximately 50 m from the road reserve at their closest point, and are associated with the construction of a bidirectional pipeline between MPPS and SCSS. |

## Table 6.2 Feedback from TfNSW and how it has been addressed

| Matter raised | Response |
|---|---|
| Quantification of the construction and operational traffic expected to be generated by the modification, including categorisation into light and heavy vehicles, for both daily traffic and peak hour traffic. | The highest number of daily vehicles will occur at DWP-A and DWP-B, with up to 14 light vehicles (28 daily light vehicle movements), up to 6 heavy vehicles delivering construction materials (12 daily heavy vehicle movements) and up to 11 heavy construction vehicles that will remain on the site over multiple days (11 daily heavy vehicle movements). Therefore, there will be up to 51 daily traffic movements (28 light vehicle movements and 23 heavy vehicle movements). It has been conservatively assumed that all vehicles will enter or leave the site in the morning or afternoon peak hour.<br>The proposed modification will not generate additional light or heavy vehicle movements during the ongoing operation of SCSS. |
| Consideration of the impact of the traffic generated by the modification on the local road network including key affected intersections. This is to include consideration of capacity, geometry and safety. | The proposed modification will generate a maximum of 51 daily traffic movements (28 light vehicle movements and 23 heavy vehicle movements). This number of vehicles will only be generated if DWP-A and DWP-B are constructed concurrently.<br>All vehicles associated with the proposed modification only require temporary access to SCSS over the approximately 23-month construction period.<br>Due to the low volumes of construction traffic associated with the the proposed modification, impacts on the performance of the site access intersection and capacity along the Castlereagh Highway will be minimal. Further discussion of potential traffic impacts is provided in Section 7.6 and Appendix F. |
| Inclusion of the changes to the design vehicle or staff numbers. | The proposed modification will not result in an increase to the number of staff permanently based at SCSS.<br>During construction, it is anticipated that the majority of the additional workers required will be contractors that are already mobilised by SCSS and regularly form part of the maintenance and servicing requirements associated with existing operations. The peak construction workforce is anticipated to be 22 employees with an average of 15 employees. |
| Changes to any haulage or transportation routes for staff or heavy vehicles required as a part of the modification. | No changes to the existing site access intersection for SCSS are required as part of the proposed modification.<br>Light and heavy vehicles will continue to access SCSS directly from the Castlereagh Highway. The primary off-site transportation route will continue to be a combination of Castlereagh Highway and Great Western Highway. The proposed modification is not seeking to change approved annual coal handling and processing limits under SSD-5579.<br>On-site vehicle movements at SCSS may change temporarily during construction. Site access arrangements during construction will be managed through a Construction Traffic Management Plan, which will include details of any temporary changes to the internal road network at SCSS. |
| Any additional oversize/overmass vehicles that are proposed as a part of the modification. | No additional oversize or overmass vehicles will need to access SCSS as part of the proposed modification. |
| Number of heavy vehicle and light vehicle movements anticipated at the AM and PM peak entering the site from the classified road network per an hour. | The proposed modification will generate a maximum of 51 daily traffic movements (28 light vehicle movements and 23 heavy vehicle movements). This number of vehicles will only be generated if DWP-A and DWP-B are constructed concurrently. It has been conservatively assumed that all vehicles will enter or leave the site in the morning or afternoon peak hour.<br>A breakdown of vehicle movements associated with the proposed modification is provided in Table 7.8. |

**Table 6.2 Feedback from TfNSW and how it has been addressed**

| Matter raised | Response |
|---|---|
| Any proposed access via level crossing or any work within the rail corridor required as a part of modification 4. | No works are required within the designated rail corridor as part of the proposed modification.<br>Due to their low volume in comparison to existing vehicle numbers on the local and regional road network, the additional light and heavy vehicle movements during construction are not expected to have a significant impact on the delay experienced at any level crossings. |
| An assessment of the existing approved workforce, the cumulative work force and the difference between the existing and proposed workforce. | SSD-5579 provides for the employment of 25 full-time equivalent (FTE) personnel at SCSS. In addition, contractors are also on-site daily (as required). The proposed modification will not result in an increase to the number of staff permanently based at SCSS.<br>During construction, it is anticipated that the majority of the additional workers required will be contractors that are already mobilised by SCSS and regularly form part of the maintenance and servicing requirements associated with existing operations. The peak construction workforce is anticipated to be 22 employees with an average of 15 employees. |

## 6.5 Heritage NSW

A letter was sent to Heritage NSW on 18 June 2021 to introduce the proposed modification and notify them that a modification report will be submitted to DPIE (Appendix H). No feedback regarding the proposed modification has been received to date.

## 6.6 Biodiversity, Conservation and Science Directorate

A letter was sent to BCS on 18 June 2021 to introduce the proposed modification and notify them that a modification report will be submitted to DPIE (Appendix H). No feedback regarding the proposed modification has been received to date.

## 6.7 Environment Protection Authority

A letter was sent to EPA 18 June 2021 to introduce the proposed modification and notify them that a modification report will be submitted to DPIE (Appendix H). No feedback regarding the proposed modification has been received to date.

## 6.8 NSW Department of Planning, Industry and Environment – Water

A letter was sent to DPIE – Water on 18 June 2021 to introduce the proposed modification and notify them that a modification report will be submitted to DPIE (Appendix H). No feedback regarding the proposed modification has been received to date.

## 6.9 Lithgow City Council

A letter was sent to LCC on 18 June 2021 to introduce the proposed modification and notify LCC that a modification report will be submitted to DPIE (Appendix H). LCC acknowledged receipt of the letter on 28 June 2021. LCC had no objection to the proposed modification being submitted to DPIE subject to a comprehensive modification report being undertaken.

## 6.10 Aboriginal stakeholders

Aboriginal stakeholders were identified and consulted in accordance with *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010). A detailed description of consultation is presented in Appendix D and a summary is provided in Section 7.4.

## 6.11 Wallerawang Lidsdale Progress Association

A letter was sent to Wallerawang Lidsdale Progress Association on 24 June 2021 to introduce the proposed modification and notify them that a modification report will be submitted to DPIE (Appendix H). No feedback regarding the proposed modification has been received to date.

## 6.12 Lithgow Environment Group

A letter was sent to Lithgow Environment Group on 24 June 2021 to introduce the proposed modification and notify them that a modification report will be submitted to DPIE (Appendix H). No feedback regarding the proposed modification has been received to date.

# 7 Assessment of impacts

This section addresses the potential impacts of the proposed modification.

## 7.1 Water resources

### 7.1.1 Overview

A water resources assessment assessing the groundwater and surface water impacts of the proposed modification was prepared by EMM (Appendix A). The assessment:

- described and characterised the existing surface water and groundwater environment;
- analysed the proposed changes to the water management system at SCSS;
- identified and assessed impacts to surface water and groundwater resources during the construction of the proposed modification elements and ongoing operation of SCSS; and
- identified monitoring and management measures to minimise impacts to surface water and groundwater resources.

The proposed changes to the water management system at SCSS are listed in Section 4.2 and shown on Figure 4.2.

### 7.1.2 Existing environment

Water resources and hydrology are described in detail in Section 2.4.2 and Chapter 4 of Appendix A.

SCSS is in the Upper Coxs River sub-catchment, primarily south of Wangcol Creek. SCSS drains to Wangcol Creek which drains into the Coxs River approximately 2.5 km east of SCSS. Wangcol Creek is a highly modified stream that has been subject to diversions and instream impacts, such as mining, with its condition varying from partly vegetated to cleared and degraded land. Historically, Wangcol Creek has flowed intermittently in response to rainfall. Flows are now influenced by discharges from SCSS and MPPS, creating a more constant flow.

A small number of tributaries enter Wangcol Creek, including Huon Gully and Lamberts Gully, which have headwaters in cleared land, mining areas or the Ben Bullen State Forest. Runoff from upstream of SCSS concentrates in Huon Gully on the west of SCSS and Lamberts Gully to the east. The headwaters of these drainage lines are in undisturbed forest south of SCSS.

The hydrology of SCSS has been significantly modified by open cut and underground mining and related activities. The natural watercourse in Huon Gully now terminates at SHG1, as the gully has been disturbed by open cut mining and the downstream reach has been truncated by the Lamberts North ash emplacement area at MPPS. Lamberts Gully is intercepted by sediment control dams within SCSS, which discharge to Wangcol Creek.

The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge (Section 3.5 and Figure 3.2). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek.

Due to the connectivity of the local groundwater system and SCSS's surface water management system, discharges through LDP001 are predominantly made up of groundwater contributing to Cooks Dam. This water is characterised by relatively high EC and elevated concentrations of metals, including cobalt, iron, manganese, nickel and zinc.

Water stored in Cooks Dam can be recirculated to supply the coal preparation plant. The majority of this water is pumped with fine coal reject material for emplacement in REA. As the fine coal rejects consolidate, water flows through the historical underground workings system and is eventually intercepted by Cooks Dam. This recycling of water through the system has resulted in EC and some metal concentrations increasing over time at SCSS.

### 7.1.3 Impact assessment

#### i Construction

##### a Surface water

The primary risk to surface water quality during construction is ground disturbance during earthworks and other site activities. There is potential that construction works will lead to exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses. Uncontrolled sediment-laden runoff has the potential to increase turbidity and nutrients entering waterways which may have ecological and water quality impacts.

##### b Groundwater

Groundwater is not expected to be intercepted in significant volumes during the construction of the Huon Clean Water Pond, DWP-A or DWP-B. Additionally, DWP-B is proposed to be lined to minimise any interaction with the groundwater environment.

#### ii Operations

##### a Surface water

The proposed modification will reduce the volume and pollutant load of LDP001 discharges by:

- decreasing the connectivity of groundwater with SCSS's surface water management system by supplying the washery with stormwater captured within DWP-B and mine water transferred from Angus Place Colliery;
- decreasing the volume of catchment runoff from Huon Gully contributing to SHG1 and the historical underground workings system through the construction and operation of the Huon Clean Water Pond and diversion to Wangcol Creek; and
- the transfer of excess water generated at SCSS to MPPS and, if constructed, McPhillamys Gold Project.

Water and salt balance modelling indicates that the proposed modification will be effective in reducing the volume and frequency of LDP001 discharges to Wangcol Creek and result in a significant reduction in the pollutant load of discharges compared to existing conditions. Modelling results indicate:

- discharges from SCSS to Wangcol Creek via LDP001 will decrease by approximately 99%, from 616 ML/year on average under existing conditions to less than 5 ML/year on average under proposed conditions; and
- the average salt load associated with LDP001 discharges will decrease by approximately 99% from 1,932 tpa under existing conditions to less than 10 tpa under proposed conditions.

In contrast, discharges from the Lamberts Gully clean water diversion to Wangcol Creek are predicted to increase by 20% with the additional diversion of the Huon Gully catchment (through the construction of Huon Clean Water Pond and its contribution to the Final Polishing Lagoon), from an average of 225 ML/year under existing conditions to an average of 291 ML/year under proposed conditions. The Final Polishing Lagoon overflows to Wangcol Creek downstream of LDP001 effectively removing clean catchment runoff from reporting to LDP001.

Under proposed conditions, LDP001 discharges will typically occur during wet weather periods that comprise several days of material rainfall. Discharges are expected to cease shortly after the wet weather conditions end and are only expected to occur when streamflow in Wangcol Creek and discharge from the Lamberts Gully clean water diversion (via overflows from the Final Polishing Lagoon) are naturally elevated due to catchment runoff.

Overall, surface water discharges from SCSS, consisting of LDP001 discharges and overflows from the Final Polishing Lagoon, are predicted to decrease by around 550 ML/year on average. Surface water runoff from Huon Gully and Lamberts Gully will become the primary source of surface water discharge from SCSS to Wangcol Creek. This water has lower EC and lower concentrations of some metals, compared to current LDP001 discharges to Wangcol Creek.

#### b Groundwater

Due to the connectivity of the local groundwater system and the surface water management system, discharges through LDP001 are predominantly made up of untreated groundwater contributing to Cooks Dam. The proposed amendments to the water management system at SCSS will provide alternative water supply options for the coal preparation plant (DWP-B and Washery Dam) and minimise the contribution of groundwater to LDP001 discharges to Wangcol Creek.

Groundwater is not expected to be intercepted in significant volumes during operation of Huon Clean Water Pond, DWP-A, DWP-B or Washery Dam. DWP-B is proposed to be lined to minimise any interaction with the groundwater environment.

### 7.1.4 Management and mitigation

#### a Construction

An erosion and sediment control plan, incorporating appropriate soil and water management measures in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom 2004) and *Managing Urban Stormwater: Soils and Construction – Volume 2E Mines and Quarries* (DECC 2008), will be included in the CEMP and implemented during construction.

In the event that groundwater is intercepted during construction, this water will be managed within SCSS's existing water management system. Centennial holds a number of groundwater licences within the Sydney Basin, Coxs River water source to account for this take.

#### b Operations

The water monitoring program within the Water Management Plan will be updated to include consideration of:

- surface water quality within DWP-A, DWP-B and the Huon Clean Water Pond, with analytes and monitoring frequency that is consistent with the monitoring of other water management storages at SCSS;
- water levels within DWP-A, DWP-B and the Huon Clean Water Pond; and
- pumped volumes of water, particularly:
  - DWP-A to the Washery Dam;
  - Huon Clean Water Pond to the Main Sediment Pond;
  - DWP-B to the Washery Makeup Tank;
  - Angus Place Colliery to Washery Makeup Tank;

- Cooks Dam to McPhillamys Gold Project; and
- Cooks Dam to Pond D at MPPS.

Monitoring data will be used to further refine the water and salt balance model for SCSS, which is reviewed and revised every three years as a minimum or as necessary when there are changes to operations.

Springvale Coal has commenced the development of a numerical hydrogeological model for SCSS and adjacent MPPS. Once developed, this model will be used to simulate surface water and groundwater interactions at SCSS and further refine predictions of groundwater contribution to the DML Dam, Cooks Dam and Wangcol Creek.

Dam maintenance activities will be undertaken during operations including weed management, removal of excessive sediment accumulation and inspection of dam embankments, spillways and connecting pipework. Corrective maintenance will be undertaken as required to maintain the integrity and function of dam infrastructure.

### 7.1.5 Conclusion

The proposed modification is predicted to reduce the volume and frequency of discharges to Wangcol Creek via LDP001 and result in a significant reduction in the pollutant load of discharges to the receiving environment. **T**he proposed modification is therefore assessed to have at least a neutral or beneficial effect on water quality within the Sydney drinking water catchment area.

Management and mitigation measures will be implemented as part of the CEMP and Water Management Plan to reduce the potential impacts of the proposed modification on surface water and groundwater resources. This will include ongoing water quality monitoring within additional water storages and dam maintenance activities.

## 7.2 Construction noise

### 7.2.1 Overview

A construction noise and vibration impact assessment (CNVIA) was prepared by EMM (Appendix B) and provides an assessment of the construction noise and vibration impacts associated with the proposed modification. The CNVIA was completed with reference to the following guidelines, policies and standards:

- *Noise Policy for Industry* (NPfI) (EPA 2017);
- *Interim Construction Noise Guideline* (ICNG) (DECC 2009); and
- *Assessing Vibration: A Technical Guideline* (DEC 2006).

Operational noise emissions as a result of the proposed modification will be primarily associated with the operation of the SCSS Water Transfer System. The level of operational noise associated with the proposed modification will be negligible when compared to existing noise emissions from SCSS. Consequently, an assessment of noise and vibration impacts associated with the ongoing operation of SCSS and other components of WCS was not considered necessary.

### 7.2.2 Existing environment

In order to determine applicable noise management levels (NMLs), background noise levels have been determined in accordance with methodology provided in the NPfI (EPA 2017). As the surrounding environment is sparsely populated and rural, the applicable minimum rating background noise levels (RBLs) have been used for the purpose of the CNVIA:

- day: 35 dBA;
- evening: 30 dBA; and
- night: 30 dBA.

Noise modelling was conducted at residential receivers B12 to B17 (Table 7.1 and Figure 1.2).

**Table 7.1 Noise assessment locations**

| ID | Address | Distance to construction envelope (m) |
|---|---|---|
| B12 | 1563 Castlereagh Hwy, Blackmans Flat, NSW | 542 |
| B13 | 1549 Castlereagh Hwy, Blackmans Flat, NSW | 601 |
| B14 | 1470 Castlereagh Hwy, Blackmans Flat, NSW | 1,247 |
| B15 | 1449 Castlereagh Hwy, Blackmans Flat, NSW | 1,348 |
| B16 | 130 Karawatha Dr, Lidsdale, NSW | 1,569 |
| B17 | 1411 Castlereagh Highway, Wallerawang, NSW | 1,156 |

### 7.2.3 Assessment criteria

NMLs for residential receivers for standard construction hours and out of hours periods were determined from RBLs using the methods described in the ICNG (DECC 2009).

Construction activities associated with the proposed modification will be undertaken during standard construction hours only. In accordance with the ICNG (DECC 2009), the NMLs adopted for residential receiver assessment locations considered standard construction hours based on proposed activities with a noise affected management level of RBL+10 dB and a highly noise affected management level of greater than 75 dB.

### 7.2.4 Impact assessment

#### i Construction noise

The CNVIA considered potential noise sources associated with vegetation clearing, site preparation, installation of water management infrastructure and importation of fill. Three different scenarios were considered as part of construction noise modelling:

- Scenario 1 – Area 4 water management infrastructure (included construction activities within the DWP-A and clean water diversion area and DWP-B area on Figure 4.1).
- Scenario 2 – Cooks Dam to Pond-D transfer (included construction activities within the Regis and EnergyAustralia water transfer systems area on Figure 4.1); and
- Scenario 3 – Angus Place offtake (included construction activities within the Angus Place water offtake and transfer system area on Figure 4.1).

For the purposes of construction noise modelling, all construction plant was conservatively assumed to operate continuously in any 15-minute period and works associated with the bidirectional pipeline between SCSS Water Transfer System and MPPS were assumed to be operating closes to the assessment locations.

A summary of the results of the modelled scenarios is presented in Table 7.2. Predicted noise levels have been assessed against the relevant criteria for standard construction hours only.

**Table 7.2 Construction noise predictions – standard construction hours**

| Scenario | Assessment locations | Predicted maximum construction noise level $L_{Aeq,15\ minute}$ (dB) | NML / highly noise affected level $L_{Aeq,15\ minute}$ (dB) | Maximum exceedance (dB) (NML / highly affected level) |
|---|---|---|---|---|
| Scenario 1: Area 4 Water Management Infrastructure | B12 | 44 | 45 / 75 | Nil / Nil |
| | B13 | 44 | 45 / 75 | Nil / Nil |
| | B14 | 39 | 45 / 75 | Nil / Nil |
| | B15 | 39 | 45 / 75 | Nil / Nil |
| | B16 | 39 | 45 / 75 | Nil / Nil |
| | B17 | 41 | 45 / 75 | Nil / Nil |
| Scenario 2: Cooks Dam to Pond-D Transfer | B12 | 45 | 45 / 75 | Nil / Nil |
| | B13 | 45 | 45 / 75 | Nil / Nil |
| | B14 | 38 | 45 / 75 | Nil / Nil |
| | B15 | 37 | 45 / 75 | Nil / Nil |
| | B16 | 36 | 45 / 75 | Nil / Nil |
| | B17 | 36 | 45 / 75 | Nil / Nil |
| Scenario 3: Angus Place Offtake | B12 | 36 | 45 / 75 | Nil / Nil |
| | B13 | 36 | 45 / 75 | Nil / Nil |
| | B14 | 32 | 45 / 75 | Nil / Nil |
| | B15 | 33 | 45 / 75 | Nil / Nil |
| | B16 | 34 | 45 / 75 | Nil / Nil |
| | B17 | 40 | 45 / 75 | Nil / Nil |

Notes: Standard hours are 7 am to 6 pm Monday to Friday and 8 am to 1 pm Saturday.

Noise levels generated by all works are expected to comply with the construction NMLs under all scenarios. Noise levels at all receivers are expected to be well below the highly affected noise level under all scenarios.

Construction work is expected to be greatest during Scenario 2 (Cooks Dam to Pond D Transfer) where activities are likely to include area preparation (clear and grub), trench excavation, pipe welding and installation and fill importation. Construction activities associated with Scenario 2 will progress away from receivers as the active work areas move from SCSS towards MPPS. As such, it is expected that construction noise levels at nearby receivers will decrease continually as work progresses along the bidirectional pipeline alignment.

Given that predictions assume all equipment operating simultaneously, it is likely that actual construction noise levels will be less than those predicted for the majority of the time. Hence, these noise level predictions can be considered conservative.

### ii Construction vibration

The potential construction vibration impacts were assessed based on the use of typical vibration-intensive equipment (Chapter 7 of Appendix B). Safe working distances for typical items of vibration-intensive plant are listed in Table 7.3. The safe working distances are quoted for both 'cosmetic damage' and 'human response' in accordance with British Standard BS 7385 and British Standard BS 6472, respectively.

**Table 7.3 Recommended safe working distances for vibration intensive plant**

| Plant item | Rating/description | Safe working distance | |
|---|---|---|---|
| | | Cosmetic damage (BS 7385) | Human response (BS 6472) |
| Vibratory roller | <50 kN (typically 1–2 tonnes (t)) | 5 m | 15–20 m |
| | <100 kN (typically 2–4 t) | 6 m | 20 m |
| | <200 kN (typically 4–6 t) | 12 m | 40 m |
| | <300 kN (typically 7–13 t) | 15 m | 100 m |
| | >300 kN (typically 13–18 t) | 20 m | 100 m |
| | >300 kN (>18 t) | 25 m | 100 m |
| Small hydraulic hammer | (300 kg/5–12 t excavator) | 2 m | 7 m |
| Medium hydraulic hammer | (900 kg/12–18 t excavator) | 7 m | 23 m |
| Large hydraulic hammer | (1,600 kg/18–34 t excavator) | 22 m | 73 m |

Source: Transport Infrastructure Development Corporation (2007), *Construction Noise Strategy (Rail Projects)*.

The nearest residences are greater than 500 m from the construction envelope (Table 7.1) and, therefore, are not expected to be impacted by any vibration-intensive activities associated with the proposed modification.

Therefore, no ground vibration impacts from the proposed works are predicted.

### 7.2.5 Management and mitigation

Noise at SCSS is currently managed in accordance with the *Western Region Noise Management Plan* (Centennial 2021a). Key noise and vibration mitigation measures in place at SCSS include:

- restricting dozer operations to daytime periods only;
- low noise idlers along the CW01 and CW02 sections of the internal on-site conveyor system and OL2 and OL3 sections of the overland conveyor system traversing through SCSS;
- a noise barrier around the OL2/OL3 transfer point drive; and
- cladding around the existing coal preparation plant with noise attenuating panels.

A CEMP will be prepared prior to the commencement of construction and will include measures to manage noise and vibration during construction. This will include:

- providing notification to residences in close proximity to the construction envelope to inform residents of planned construction activities, time periods and expected durations, potential impacts and proposed mitigation measures;
- minimising the number of plant items operating concurrently, where possible;
- planning deliveries and access to occur quietly and efficiently; and

- planning high noise and vibration generating activities to be carried out in continuous blocks during non-sensitive periods.

AS 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites sets out practical recommendations to assist in mitigating construction noise emissions. Additional strategies that could be implemented during construction are listed in Chapter 8 of Appendix B.

### 7.2.6 Conclusion

Construction noise levels have been assessed for standard construction hours. Noise levels generated by all works are expected to comply with the construction NMLs under all scenarios. Vibration impacts are not predicted as a result of the proposed modification.

A CEMP will be prepared prior to the commencement of construction and will include measures to manage noise. The CEMP will include the implementation of notifications to all affected receivers including details of planned activities, time periods and duration, along with potential impacts and mitigation measures.

## 7.3 Construction air quality

### 7.3.1 Overview

An assessment of construction air quality impacts (Appendix C) was prepared by EMM to assess any potential dust impacts resulting from the proposed modification. The assessment followed the *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM 2014).

Air quality impacts during the ongoing operation of SCSS and other components of WCS are not anticipated to change as a result of the proposed modification. Consequently, an assessment of air quality impacts associated with the ongoing operation of SCSS and other components of WCS was not considered necessary.

### 7.3.2 Existing environment

Sensitive receivers which have the potential to be affected by dust generated during construction are residential receivers surrounding the proposed project application area and construction envelope (Figure 1.2).

### 7.3.3 Impact assessment

The IAQM (2014) assessment procedure divides activities at construction sites into four types: demolition, earthworks, construction and track-out. A risk-based study method was used to consider amenity impacts due to soiling by dust deposition, health effects due to an increase in exposure to dust, and harm to ecological receptors. The IAQM (2014) approach aims to identify risks and to recommend appropriate mitigation measures.

The dust soiling impacts and human health risks was determined to be 'low' for all categories.

Details on specific sensitive flora and fauna within 50 m of the construction envelope was not available. It was therefore conservatively assumed that, for all construction activities, there would be ecological receptors within 20 m of the active work areas and that their sensitivity was 'medium' (ie locations with an important species or national designation, and where sensitivity to dust is uncertain or unknown). As a result, for ecological impacts, the risk was determined to be 'medium' for earthworks and construction and 'negligible' for track-out.

### 7.3.4 Management and mitigation

Springvale Coal implement dust mitigation in accordance with the mitigation measures outlined in the *Western Region Air Quality and Greenhouse Gas Management Plan* (Centennial 2021b). Key dust mitigation measures in place at SCSS include:

- signage to display speed limits on all unsealed roads;
- water sprays on unsealed areas during use or windy conditions;
- water sprays (sprinkler system) on the coal product stockpile during dry and windy conditions; and
- maintaining covers on conveyors.

A CEMP will be prepared prior to the commencement of construction and will include measures to manage dust. This will include:

- prior to commencement of construction, appropriate communications will be developed to notify nearby residences of the proposed construction works (duration, types of works, etc) and provide relevant contact details for environmental complaints reporting;
- the site's complaints register will be maintained and published monthly on Springvale Coal's website (details of complaints will be recorded including where and when a complaint is received and the details of the response actions to the complaint);
- any exceptional incidents that cause dust and/or air emissions, either on or off site, will be recorded and the action taken to resolve the situation in the logbook;
- regular site inspections will be carried out and inspection results recorded;
- site fencing and barriers will be kept clean using wet methods, as required;
- materials that have potential to produce dust from the site will be removed as soon as possible, unless being re-used on the site;
- long term stockpiles will be covered, seeded or fenced (if applicable) to prevent wind whipping;
- vehicles will switch off engines when stationary, where practicable;
- a maximum-speed limit of 20 km/h on all internal roads and work areas during construction will be imposed;
- water carts will be deployed to ensure that exposed areas and topsoils/subsoil are kept moist;
- an adequate water supply will be provided for effective dust/particulate matter suppression/mitigation;
- working practices will be modified by limiting clearing, stripping and spoil handling during periods of adverse weather (hot, dry and windy conditions) and when dust is seen leaving the site;
- the extent of clearing of vegetation and topsoil will be limited to the construction envelope;
- drop heights from loading or handling equipment will be minimised;
- earthworks and exposed areas/soil stockpiles will be re-vegetated to stabilise surfaces as soon as practicable;

- scabbling (roughening of concrete surfaces) will be avoided, where possible;
- sand and other aggregates will be stored in bunded areas and not be allowed to dry out unless this is required for a particular process, in which case, appropriate additional control measures will be put in place;
- bulk cement and other fine powder materials will be delivered in enclosed tankers and stored in silos with emission control systems to prevent escape of materials and overfilling during delivery;
- for smaller supplies of fine powder materials, bags will be sealed after use and stored appropriately to prevent dust;
- water-assisted dust sweeper(s) will be used to remove, as necessary, any material tracked out of the site;
- dry sweeping of large areas will be avoided;
- vehicles entering and leaving sites will be covered to prevent escape of materials during transport;
- trips and trip distances will be controlled and reduced where possible, for example by coordinating delivery and removal of materials to avoid unnecessary trips;
- on-site haul routes will be inspected for integrity and the surface will be repaired where needed as soon as possible - haul route inspections will be recorded in a site log book; and
- a laydown area will be established for the delivery and storage of plant and equipment.

### 7.3.5 Conclusion

The proposed mitigation measures will effectively manage the risks of off-site air quality impacts from the construction activities associated with the proposed modification.

## 7.4 Aboriginal cultural heritage

### 7.4.1 Overview

An Aboriginal Cultural Heritage Assessment (ACHA) was completed by RPS (Appendix D) in accordance with the relevant guidelines.

Springvale Coal engaged with the local Aboriginal community and consulted with the established registered Aboriginal parties (RAPs) as part of the preparation of the ACHA. The following RAPs were consulted regarding the proposed modification:

- Wellington Valley Wiradjuri Aboriginal Corporation;
- Bathurst Local Aboriginal Land Council;
- Warrabinga; and
- Mingaan.

The ACHA project area is the construction envelope (Figure 7.1).

### 7.4.2 Existing environment

The entire construction envelope has undergone some form of disturbance, including vehicles moving along the dirt tracks, erosion and clearing. Original vegetation has generally been cleared and landfill materials, including a variety of soils, rocks, building and waste materials, have been applied. Topography is varied between areas of landfill and rehabilitation that are levelled and quarries that have irregular steep sides.

The surrounding area has a good supply of fresh water that would have once provided permanent water sources for Aboriginal occupation and provided diverse flora and fauna food resources.

There are 45 sites registered in the Aboriginal Heritage Information Management System (AHIMS) within an approximately 5 km by 5 km area surrounding the construction envelope (Table 7.4). Of these sites, the majority are either open campsites (44%) or isolated finds (32%).

**Table 7.4 AHIMS sites by site type**

| Site type | Number of sites |
|---|---|
| Open campsite | 20 |
| Isolated find | 14 |
| Potential archaeological deposit (PAD) | 5 |
| Artefact site (number unspecified) | 2 |
| Artefact scatter | 1 |
| Stone arrangement | 1 |
| Shelter with deposit and axe grinding groove | 1 |
| Scarred tree | 1 |
| **Total** | **45** |

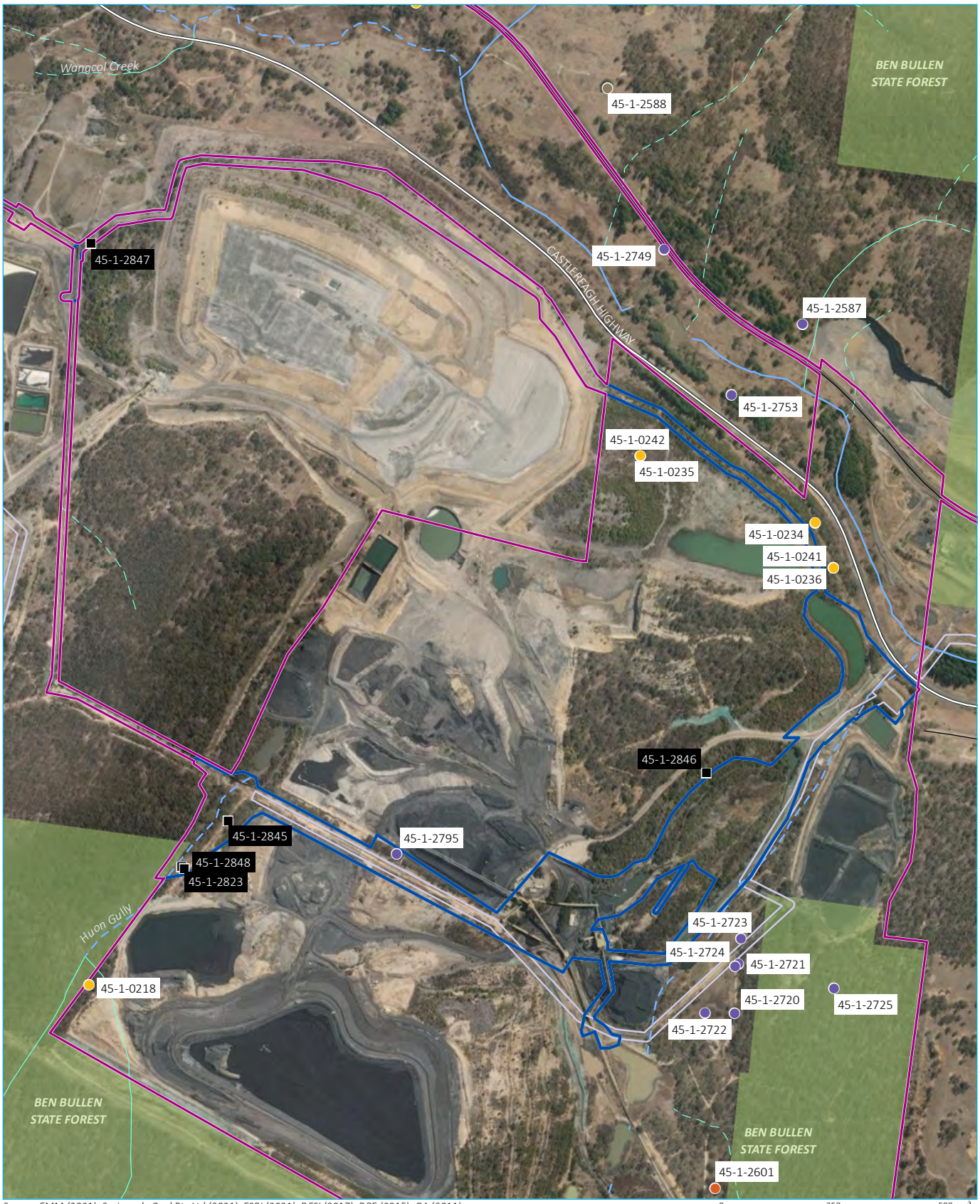
There is one previously identified, AHIMS registered site within the construction envelope (45-1-2795 on Figure 7.1). An open campsite (45-1-0244) was within the construction envelope; however, this site has been destroyed. There are an additional 12 AHIMS sites within 500 m of the construction envelope.

### 7.4.3 Assessment method

#### i Gap analysis

There have been many previous archaeological surveys within the project application area. A gap analysis identified areas within the construction envelope that had not been subject to visual inspections or in which there was a higher probability of identifying Aboriginal cultural heritage sites, such as creek lines.

The gap analysis identified a small section on the western boundary of SCSS that had not undergone recent surveys and contained a less-disturbed environment. This area was surveyed as part of the ACHA (Figure 3 of Appendix D).




Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)

0 250 500 m

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KEY

Proposed project application area
Construction envelope

Existing environment
Major road
Minor road
State forest

Strahler stream order
1st order
2nd order
3rd order
4th order

Sites identified during ACHA survey

AHIMS (site type)
Artefact scatter with PAD
Artefact scatter/site
Isolated find
PAD

# Aboriginal cultural heritage field survey results and AHIMS sites

Western Coal Services Project
Modification Report
Figure 7.1

EMM
creating opportunities

#### ii Survey strategy

Surveys were undertaken on 3 December 2020 and 25 May 2021 and were attended by an archaeologist and nominated RAPs as per Centennial's *Western Region Aboriginal Cultural Heritage Management Plan* (Western Region ACHMP). The survey area is open forest intersected by dirt tracks and was surveyed on foot. Vegetation comprised juvenile trees and low-lying shrubs with surface visibility extremely high on dirt tracks and generally good within the vegetated areas.

### 7.4.4 Impact assessment

Five new Aboriginal cultural heritage sites were identified during the surveys (Figure 7.1):

- two artefact scatters (45-1-2823 and 45-1-2845); and
- three isolated finds (45-1-2848, 45-1-2847 and 45-1-2846).

Three of these sites are in the DWP-A and clean water diversion area (45-1-2823, 45-1-2845 and 45-1-2848), one is in the Regis/EnergyAustralia Water Transfer System area (45-1-2847) and one is in the DWP-B area (45-1-2846).

The cultural and scientific/archaeological significance of the sites were determined in accordance with Section 6.2.2 of the Western Region ACHMP. The cultural significance of all sites was 'extremely high cultural significance' and the scientific/archaeological significance of all sites was 'low local significance'/'low regional significance'.

These five sites within the construction envelope are likely to be impacted by construction activities.

There is one previously identified, AHIMS registered site within the construction envelope that is already listed in the Western Region ACHMP (45-1-2795 on Figure 7.1). This site is an artefact in the DWP-A and clean water diversion area. Potential impacts on this site were not assessed as part of the ACHA (Appendix D).

### 7.4.5 Management and mitigation

It has been agreed with the RAPs that the five new sites will be salvaged prior to construction works commencing. Prior to salvage, the sites will be added to the Western Region ACHMP. The sites will be salvaged in accordance with the methodology presented in Section 6.4.1 of the Western Region ACHMP.

The following management and mitigation measures will be implemented as part of the proposed works:

- construction personnel, Springvale Coal employees and contractors at SCSS will be made aware that it is an offence under Section 86 of the NSW *National Parks and Wildlife Act 1974* to harm or desecrate an Aboriginal object unless that harm or desecration is authorised by an approved ACHMP and the requirements of that plan have been met in relation to mitigation activities; and
- in the event that a previously unrecorded Aboriginal object is identified within the construction envelope, it will be managed in accordance with the protocols outlined in Section 6.7 of the Western Region ACHMP.

Consistent with the Western Region ACHMP, if 45-1-2795 is determined to be at an inappropriate risk of harm from construction activities associated with the proposed modification or the ongoing operation of SCSS, consideration will be given to salvaging the artefact with the aim of returning it to its original location on completion of operations.

The Western Region ACHMP will continue to be applied at SCSS.

### 7.4.6 Conclusion

Five Aboriginal cultural heritage sites were identified within the construction envelope. These sites are likely to be impacted by the construction activities. The sites will be salvaged prior to construction works commencing.

The Western Region ACHMP will continue to be applied at SCSS.

## 7.5 Biodiversity

### 7.5.1 Overview

A biodiversity development assessment report (BDAR) (Appendix E) has been prepared by RPS to assess any potential biodiversity impacts resulting from the proposed modification.

The BDAR has been prepared in accordance with the following legislation and guidance:

- EPBC Act;
- NSW *Biodiversity Conservation Act 2016* (BC Act);
- NSW *Biosecurity Act 2015*; and
- *Biodiversity Assessment Method* (BAM) (DPIE 2020).

The BDAR project area is the construction envelope and encompasses approximately 30 ha (Figure 7.2).

### 7.5.2 Existing environment

#### i Landscape features

##### a Bioregions

The construction envelope is within the South-Eastern Highlands Interim Biogeographic Regionalisation for Australia (IBRA) region and Capertee Uplands subregion.

##### b Watercourses

There are first, second, third and fourth order tributaries of Wangcol Creek are within or immediately downslope of the construction envelope. Wangcol Creek flows into the Coxs River. Both Wangcol Creek and the Coxs River are mapped as key fish habitat. There are no wetlands within the construction envelope (see Section 2.4.2).

##### c Areas of geological significance

There are no areas of geological significance within the construction envelope.

#### ii Native vegetation

##### a Overview

Past disturbance associated with activities at both WCS and MPPS has largely degraded the species richness and habitat function of vegetation within the construction envelope. Vegetation mapping and inspection of recent aerial photography indicates a significant amount of clearing (65.3%) within a 500 m buffer of the construction envelope.

There is approximately 200 ha of vegetation within a 500 m buffer of the construction envelope. The percentage of native vegetation cover within this area was approximately 34.7%. The condition of native vegetation within the construction envelope was variable, ranging from moderate to poor. The native vegetation present is likely to be from past rehabilitation efforts and/or natural regrowth on previously cleared areas.

### b Plant community types

Three plant community types (PCTs) and eight vegetation zones were identified within the construction envelope (Table 7.5 and Figure 7.2).

**Table 7.5 Vegetation zones mapped within the construction envelope**

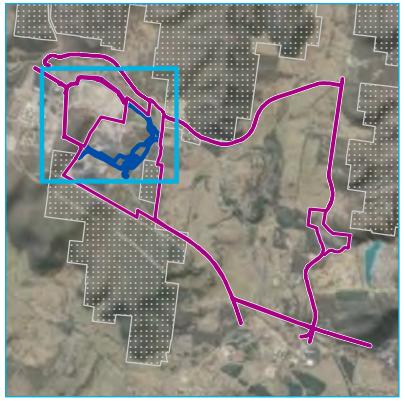
| Vegetation zone | Plant community type (PCT) | Condition | Total area (ha) | Vegetation integrity score | Area of impact (ha) |
|---|---|---|---|---|---|
| 1 | 335 - Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion | Poor | 0.93 | 14.9 | 0.93 |
| 2 | 731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion | Moderate | 0.94 | 70.3 | 0.94 |
| 3 | 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | Moderate | 1.85 | 75.3 | 1.85 |
| 4 | | Rehabilitation | 10.00 | 34.2 | 10.00 |
| 5 | | Regrowth | 1.16 | 51.3 | 1.16 |
| 6 | | Poor (canopy only) | 0.19 | 40.2 | 0.19 |
| 7 | | Poor (understory only) | 0.11 | 3.0 | 0.11 |
| 8 | Disturbed/non-native vegetation | - | 14.78 | - | - |
| | | **Total area** | **29.96** | **-** | **15.18** |

Note: Misalignment of the construction envelope (29.97 ha) and the sum of the total area for the zones and areas of impact listed in this table are due to rounding.

### iii Habitat assessment

A habitat assessment was undertaken at the same time as the vegetation mapping to identify potential fauna habitat within the construction envelope, including:

- habitat trees (including large hollow-bearing trees);
- degraded aquatic habitat (owing to poor water quality);
- flowering shrubs and feed tree species; and
- tributaries of Wangcol Creek.



KEY

- Proposed project application area
- Construction envelope
- Impacts requiring offset

Threatened flora

- Black Gum (*Eucalyptus aggregata*)

Plant community type (condition)

- 1 | PCT335 (Poor)
- 2 | PCT 731 (Moderate)
- 3 | PCT 1191 (Moderate)
- 4 | PCT 1191 (Rehabilitation)
- 5 | PCT 1191 (Regrowth)
- 6 | PCT 1191 (Poor - canopy only)
- 7 | PCT 1191 (Poor - understorey only)
- 8 | Disturbed/ non- native

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- State forest

Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); GA (2011)

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# Vegetation zones and threatened species

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Figure 7.2

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### iv Threatened species

A search of DAWE's Protected Matters Search Tool for MNES, including threatened species likely to occur within the construction envelope was performed as part of the BDAR.

An assessment of habitat constraints for threatened species was undertaken to indicate the likelihood of threatened species being present. Seven threatened species were excluded from further assessment due to the absence of suitable habitat components within the construction envelope.

The following key species were identified as having the potential to be present in the construction envelope:

- Bynoe's Wattle (*Acacia bynoeana*);
- *Acacia melantha*;
- Gang-gang Cockatoo (*Callocephalon fimbriatum*);
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Eastern Pygmy-possum (*Cercartetus nanus*);
- Black Gum;
- Capertee Stringybark (*Eucalyptus cannonii*);
- Silver-leafed Gum (*Eucalyptus pulverulenta*);
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*);
- Little Eagle (Hieraaetus morphnoides);
- Hoary Sunray (*Leucochrysum albicans* var. *tricolor*);
- Booroolong Frog (*Litoria booroolongensis*);
- Square-tailed Kite (*Lophoictinia isura*);
- Barking Owl (*Ninox connivens*);
- Powerful Owl (*Ninox strenua*);
- Bathurst Copper Butterfly;
- Squirrel Glider (*Petaurus norfolcensis*);
- Koala;
- Tarengo Leek Orchid (*Prasophyllum petilum*);
- Silky Swainson-pea (*Swainsona sericea*);
- Austral Toadflax (*Thesium australe*);

- Masked Owl (*Tyto novaehollandiae*); and
- *Veronica blakelyi*.

Targeted flora and fauna surveys were undertaken to identify the presence or absence of these key species in the construction envelope. The only threatened flora species detected within the construction envelope during survey was Black Gum, which is listed as 'vulnerable' under both the BC Act and EPBC Act. No threatened fauna species were detected within the construction envelope during surveys.

As surveys could not be conducted during prescribed survey periods, presence was assumed for Bathurst Copper Butterfly, which is considered as having potential to be present in the construction envelope.

### 7.5.3 Impact assessment

#### i Direct impacts

Direct impacts to native vegetation are summarised in Table 7.5, specifically the removal of 15.18 ha of native vegetation within the construction envelope. The proposed modification will also result in the removal of 32 Black Gum individuals. It is noted that the bidirectional pipeline alignment between SCSS and MPPS has been sited to avoid impacting Black Gum, where possible.

The proposed modification will result in the removal of 0.24 ha of potential habitat for Bathurst Copper Butterfly. Surveys will be undertaken in December 2021 to confirm the presence or absence of this species within the construction envelope.

#### ii Indirect impacts

During construction, indirect impacts to biodiversity that may occur as a result of the proposed modification are:

- inadvertent impacts on adjacent habitat or vegetation;
- reduced viability of adjacent habitat due to noise, dust or light spill; and
- transport of weeds and pathogens from the construction envelope to adjacent vegetation.

During operations, indirect impacts to biodiversity that may occur as a result of the proposed modification are:

- reduced viability of adjacent habitat due to edge effects; and
- disturbance to specialist foraging habitat (eg high flowering shrub density within rehabilitation areas may provide important foraging habitat for nectivorous birds and mammals).

Measures to mitigate and manage indirect impacts to biodiversity are listed in Section 7.5.4.

#### iii Serious and irreversible impacts

Werriwa Cool Temperate Grassy Woodland is a Critically Endangered Ecological Community. The construction envelope is north of the mapped extent of this community; however, floristic similarities suggest that PCT 1191 within the construction envelope is consistent with this community.

The condition of PCT 1191 is highly variable within the construction envelope (ranging from moderate to poor); however, the proposed modification has potential to impact this community, which is considered a potential entity to meet the serious and irreversible impacts (SAII) principle. The assessment for SAII is provided in Chapter 8 of Appendix E.

Vegetation in the construction envelope is highly disturbed and fragmented due to past land management practices associated with the operation of WCS and MPPS. Much of the vegetation to be impacted is rehabilitated vegetation, offering little ecological function (ie no mature trees).

Due to past disturbances and the relatively minor extent of the intact community (ie 1.85 ha within Zone 5), the proposed modification will have a negligible impact on biotic processes within this community and will not significantly contribute to further environmental degradation of Werriwa Cool Temperate Grassy Woodland.

### iv Impacts requiring offsets

The overall offset liability for the proposed modification is:

- 33 ecosystem credits for direct impacts to 0.94 ha of PCT 731 (moderate) (Zone 2);
- 87 ecosystem credits for direct impacts to 1.85 ha of PCT 1191 (moderate) (Zone 3);
- 214 ecosystem credits for direct impacts to 10.00 ha of PCT 1191 (rehabilitation) (Zone 4);
- 37 ecosystem credits for direct impacts to 1.16 ha of PCT 1191 (regrowth) (Zone 5);
- 5 ecosystem credits for direct impacts to 0.19 ha of PCT 1191 (canopy only) (Zone 6);
- 64 species credits for direct impacts to 32 Black Gum individuals in Zone 4 and Zone 5; and
- 8 species credits for direct impacts to 0.24 ha of potential Bathurst Copper Butterfly habitat in Zone 2 and Zone 4.

The ecosystem and species credit liability associated with the four proposed modification elements (Figure 4.1) is provided in in Table 7.6 and Table 7.7. These offset liabilities will be met by Springvale Coal within 12 months of the completion of clearing for each modification element and may therefore be staged to match construction staging. Credit requirements will be satisfied in accordance with the NSW Biodiversity Offset Scheme through retiring credits, based on like-for-like rules where possible. Payments into the Biodiversity Conservation Fund may be made where suitable credits are not available.

**Table 7.6 Offset liability by proposed modification element – ecosystem credits**

| Modification element | Vegetation zone (PCT) | Area (ha) | Ecosystem credits |
|---|---|---|---|
| DWP-A and clean water diversion area | Zone 2 (PCT 731) | 0.66 | 23 |
| | Zone 3 (PCT 1191) | 1.63 | 77 |
| | Zone 4 (PCT 1191) | 1.31 | 28 |
| | Zone 5 (PCT 1191) | 0.50 | 16 |
| Regis and EnergyAustralia water transfer systems area | Zone 3 (PCT 1191) | 0.04 | 2 |
| | Zone 4 (PCT 1191) | 3.93 | 84 |
| | Zone 6 (PCT 1191) | 0.16 | 4 |
| DWP-B area | Zone 2 (PCT 731) | 0.22 | 8 |
| | Zone 3 (PCT 1191) | 0.18 | 8 |
| | Zone 4 (PCT 1191) | 4.61 | 99 |

**Table 7.6 Offset liability by proposed modification element – ecosystem credits**

| Modification element | Vegetation zone (PCT) | Area (ha) | Ecosystem credits |
|---|---|---|---|
| | Zone 5 (PCT 1191) | 0.42 | 13 |
| | Zone 6 (PCT 1191) | 0.03 | 1 |
| Angus Place water offtake and transfer system area | Zone 2 (PCT 731) | 0.06 | 2 |
| | Zone 4 (PCT 1191) | 0.16 | 3 |
| | Zone 5 (PCT 1191) | 0.24 | 8 |

**Table 7.7 Offset liability by proposed modification element – species credits**

| Modification element | Impact | Species credits |
|---|---|---|
| DWP-B area | 31 Black Gum individuals | 62 |
| Angus Place water offtake and transfer system area | 1 Black Gum individual | 2 |
| DWP-A and clean water diversion area | 0.09 ha of potential Bathurst Copper Butterfly habitat | 3 |
| DWP-B area | 0.15 ha of potential Bathurst Copper Butterfly habitat | 5 |

#### v Matters of national environmental significance

No TECs listed under the EPBC Act were detected within the construction envelope. The proposed modification will impact approximately 15 ha of native vegetation; however, large areas of equal or better-quality habitat are available for EPBC Act listed threatened species within the area surrounding the construction envelope. Significant impacts on EPBC Act listed threatened species are unlikely to occur.

### 7.5.4 Management and mitigation

A CEMP will be prepared prior to the commencement of construction and will include measures to manage impacts on biodiversity. Springvale Coal staff and contractors will be made aware of these measures through a site induction and toolbox talks. Proposed management measures include:

- pre-clearance surveys will be completed prior to tree removal;
- procedures will be applied to safely fell habitat trees and identification of release areas for rescued fauna;
- hollow logs and rock habitat within the construction envelope will be retained and carefully placed into adjacent bushland;
- boundaries for vegetation removal will be clearly established prior to clearing using tape;
- all vehicles and equipment accessing construction areas will only use established access locations;
- load/equipment set down areas will be restricted to well within designated impact areas;
- monitoring of dust generated during earthworks, suspending work if more than negligible amounts of dust are blown into adjacent bushland and use of water carts to manage dust;

- good hygiene practices will be used to reduce the risk of spreading weeds and pathogens, including ensuring that all machinery, materials and personnel are clean of any weed seed prior to entering SCSS;
- priority weeds listed under the NSW *Biosecurity Act 2015* will be actively managed on-site to limit the spread of weeds into adjacent forested areas;
- weeds removed from site will be disposed of appropriately at an approved waste facility;
- occurrences of pathogens (eg Myrtle Rust and Phytophthora) will be reported, treated and monitored;
- fire extinguishers will be accessible on-site;
- all waste generated during construction will be collected and deposited off-site at a suitable waste facility;
- clearing of rehabilitated areas (eg areas of high shrub food resources) will be timed to avoid critical life cycle events, such as breeding or nursing, where possible;
- erosion and sediment control measures will be:
    - implemented and maintained to prevent sediment moving off-site and sediment-laden water entering watercourses;
    - regularly inspected for their functionality and cleared if required, especially after rainfall; and
    - designed to prevent permanent or semi-permanent ponding of water;
- excavated material will be stockpiled well away from areas where native vegetation is to be retained and waterways;
- work areas will be stabilised progressively during works;
- dirty water will not be released into clean water drainage lines or waterways;
- all fuels and chemicals will be stored in either self-bunded containers or in a bunded facility;
- an emergency spill kit and emergency spill response plan will be kept on-site where equipment is being used;
- vehicles will adhere to a 40 km/h speed limit; and
- site inductions will include risks associated with vehicle strike.

The complete list of recommended mitigation measures is provided in Chapter 7 of Appendix E.

### 7.5.5 Conclusion

The proposed modification will result in the clearing of 15.18 ha of native vegetation (including 0.24 ha of potential Bathurst Copper Butterfly habitat) and the removal of 32 Black Gum individuals from within the construction envelope. A total of 376 ecosystem credits and 72 species credits are required to offset the direct impacts of the proposed modification. These offset liabilities will be met by Springvale Coal prior to the commencement of construction of each modification element and may be staged to match construction staging.

Additional survey effort will be undertaken to confirm the presence or absence of Bathurst Copper Butterfly within the construction envelope.

A CEMP will be prepared prior to the commencement of construction and will include measures to manage impacts on biodiversity. Springvale Coal staff and contractors will be made aware of these measures through a site induction and toolbox talks.

## 7.6 Traffic

### 7.6.1 Overview

A traffic impact assessment (TIA) was prepared by EMM (Appendix F). The assessment:

- reviewed the existing condition of the road network used to access SCSS;
- calculated daily light and heavy vehicle numbers required to facilitate construction activities;
- considered the impact of traffic associated with the proposed modification on the local road network (including the ongoing performance of the site access intersection); and
- assessed available carparking on-site at SCSS.

### 7.6.2 Existing environment

#### i Roads

Key roads in the vicinity of SCSS are:

- Castlereagh Highway – a two-way, one-lane State Highway connecting the Golden Highway and Great Western Highway with a posted speed limit within proximity of SCSS of 100 km/h; and
- Site Access Road (private) – a two-way, one-lane private road connecting SCSS to Castlereagh Highway with a posted speed limit of 40 km/h and no lane markings.

#### ii Site access intersection

The site access intersection at SCSS is a T-intersection with the Site Access Road on a give-way control. The major road is Castlereagh Highway with a posted speed limit of 100 km/h. The geometry of the intersection is described in detail in Section 3.2 of Appendix F.

#### iii Car parking

On-site parking at SCSS accommodates up to 50 vehicles. Existing peak demand is approximately 25 parking spaces. There are no line-marked parking spaces.

#### iv Safety

Crash data from TfNSW Centre for Road Safety interactive history database for the five years between 2015 and 2019 has been studied in the vicinity of SCSS. Overall, there were 5 crashes on Castlereagh Highway with all crashes taking place north of the site access intersection. There were no fatal incidents.

### 7.6.3 Impact assessment

#### i Construction traffic

Construction activities associated with the proposed modification were assessed across three separate areas:

- DWP-A and DWP-B (including construction activities within the DWP-A and clean water diversion area and DWP-B area on Figure 4.1).
- Cooks Dam to Pond-D transfer (including construction activities within the Regis and EnergyAustralia water transfer systems area on Figure 4.1); and
- Angus Place offtake (including construction activities within the Angus Place water offtake and transfer system area on Figure 4.1).

Construction in each area will occur at separate times (ie construction will not occur simultaneously in two/three areas). Construction traffic associated with these areas is shown in Table 7.8.

**Table 7.8 Construction traffic schedule**

| Project area | Vehicle type | Total light vehicles | Total heavy vehicles | Daily access/egress[1] | AM peak movements | PM peak movements |
|---|---|---|---|---|---|---|
| DWP-A and DWP-B | Light vehicle | 14 | - | Yes | 14 | 14 |
| | Heavy vehicle (delivery) | - | 6 | Yes | 12 | 0 |
| | Heavy vehicle (construction) | - | 11 | No | 11 (mobilisation) | 11 (demobilisation) |
| **Maximum** | | **14** | **17** | | **37** | **25** |
| Cooks Dam to Pond-D Transfer | Light vehicle | 11 | - | Yes | 11 | 11 |
| | Heavy vehicle (delivery) | - | 4 | Yes | 8 | 0 |
| | Heavy vehicle (construction) | - | 4 | No | 4 (mobilisation) | 4 (demobilisation) |
| **Maximum** | | **11** | **8** | | **23** | **15** |
| Angus Place offtake | Light vehicle | 11 | - | Yes | 11 | 11 |
| | Heavy vehicle (delivery) | - | 6 | Yes | 12 | 0 |
| | Heavy vehicle (construction) | - | 6 | No | 6 (mobilisation) | 6 (demobilisation) |
| **Maximum** | | **11** | **12** | | **29** | **17** |

1. Construction personnel light vehicles and delivery heavy vehicles will enter and leave the site on the same day while heavy construction vehicles remain on the site over multiple days.

The highest number of daily vehicles will occur at DWP-A and DWP-B, with up to 14 light vehicles (28 daily light vehicle movements), up to 6 heavy vehicles delivering construction materials (12 daily heavy vehicle movements) and up to 11 heavy construction vehicles that will remain on the site over multiple days (11 daily heavy vehicle movements). Therefore, there will be up to 51 daily traffic movements (28 light vehicle movements and 23 heavy

vehicle movements). It has been conservatively assumed that all vehicles will enter or leave the site in the morning or afternoon peak hour.

The construction vehicles required at SCSS as a result of the proposed modification will be consistent with the types of vehicles already accessing SCSS as part of ongoing operations. The longest vehicle requiring access to SCSS as part of the proposed modification will be a 26-m-long low loader truck (6-m truck, 16-m float/low loader and 4-m dolly). There will be no oversize or overmass vehicle deliveries to SCSS as part of the proposed modification.

#### ii Operational traffic

There will be no operational traffic generated as a result of the proposed modification.

There will be no increase in the operational workforce at SCSS as part of the proposed modification.

#### iii Intersection performance

The proposed modification will generate low hourly construction vehicle volumes (up to 37 movements in the morning peak and up to 25 movements in the afternoon peak during mobilisation/demobilisation). The low volumes of construction traffic are unlikely to have any noticeable impact on the Castlereagh Highway or the site access intersection. Therefore, traffic modelling was not considered warranted.

#### iv Mid-block capacity analysis

Average weekday traffic flow on Castlereagh Highway is approximately 5,800 vehicles per day and the proposed modification is expected to generate a maximum of 51 daily movements (<1% of total flow). Therefore, construction traffic associated with the proposed modification will not affect the capacity of Castlereagh Highway.

#### v Safety assessment

The overall crash rate on the local road network is considered low over the assessed 5-year period, indicating there are no current road safety issues within the vicinity of SCSS. The site access intersection has a reasonably straight geometry with adequate sight distances to the left and right to allow safe turns.

#### vi Car parking

The existing car park at SCSS has ample capacity to accommodate additional parking demand during construction.

### 7.6.4 Management and mitigation

No mitigation works or road infrastructure upgrades are warranted as a result of the proposed modification.

### 7.6.5 Conclusion

Due to the low volumes of construction traffic associated with the the proposed modification, impacts on the performance of the site access intersection and capacity along the Castlereagh Highway will be minimal. Sight distance visibility at the site access intersection is adequate, with no safety or sight distance issues identified. Traffic generated during construction activities associated with the proposed modification will not have any significant impacts on the local road network and no additional traffic will be generated during operations.

## 7.7 Rehabilitation and final landform

### 7.7.1 Overview

Springvale Coal progressively rehabilitates disturbed areas to reduce and mitigate potential environmental impacts, such as dust generation. Rehabilitated areas and erosion and sediment controls are maintained and monitored on an ongoing basis. Details of progressive and life of mine rehabilitation are provided in the EIS (RPS 2013) and the Mining Operations Plan (Centennial 2020).

The Mining Operations Plan defines primary and secondary domains to facilitate rehabilitation planning and management for WCS. As a result of the proposed modification, the primary and secondary domains within the project application area will need to be amended.

### 7.7.2 Rehabilitation planning and management

#### i Domain selection

Domains for the proposed project application area have been determined in consideration of the specific requirements of the infrastructure components and the local environment.

Primary domains are the land management units within the proposed project application area with unique operational and functional purposes and similar geophysical characteristics. Primary domains are shown on Figure 7.3 and listed in Table 7.9 based on the land uses within the proposed project application area.

**Table 7.9 Domain table – Proposed primary domains**

| Domain | Description | Area (ha)[1] |
|---|---|---|
| 1 – Washery[2], coal handling and roads | Coal preparation plant, stockpiles, buildings, laydown areas, other operational areas and the internal road network. | 17.49 |
| 2 – REA | Incorporates the REA. | 23.12 |
| 3 – Co-disposal REA | Incorporates the Co-disposal REA (including old tailings dams). | 7.63 |
| 4 – Water management area | Main water management structures. | 19.24 |
| 5 – Current WCS rehabilitation | Includes early, intermediate and late ecosystem and land use establishment areas and early ecosystem and land use sustainability. | 27.53 |
| 6 – Overburden emplacement | Remaining areas of overburden emplacement. | 15.47 |
| 7 – Conservation sites | Offset areas. | 11.10 |
| 8 – Conveyors | Incorporates the conveyor network. | 14.02 |
| 9 – EnergyAustralia land | Land owned by EnergyAustralia. | 37.55 |
| 10 – EnergyAustralia – Area 4D | Land owned by EnergyAustralia, classified as 4D. | 21.43 |
| 11 – EnergyAustralia – Ash water management area | EnergyAustralia's ash water management areas. | 2.08 |
| 12 – Lithgow City Council land | Management of this area is the responsibility of Lithgow City Council. | 17.54 |
| 13 – Capping materials stockpile | Area of poor-quality rehabilitation to be used as a source of capping material for REA and soil stockpiles. | 17.94 |
| 14 – SWTP infrastructure | Incorporates the already installed underground pipeline associated with SWTP. | 8.47 |

### Table 7.9 Domain table – Proposed primary domains

| Domain | Description | Area (ha)[1] |
|---|---|---|
| 15 – Other areas | Remaining bushland areas within the proposed project application area. | 79.60 |

1. Excludes land within the proposed project application area that is State Forest and the road corridor for the Castlereagh Highway.
2. Referred to elsewhere in this document as the coal preparation plant.

Secondary domains are the land management units within the proposed project application area that are characterised by similar post mining land use objectives. Secondary domains are shown on Figure 7.4 and listed in Table 7.10.

### Table 7.10 Domain table – Proposed secondary domains

| Domain | Description | Area (ha)[1] |
|---|---|---|
| A – Rehabilitation woodland | Areas will be rehabilitated using a woodland seed mix at closure. | 136.61 |
| B – Rehabilitation grassland | Areas will be rehabilitated using a grassland mix at closure. | 88.53 |
| C – Water management | Existing water management infrastructure will remain at closure. | 16.45 |
| D – EnergyAustralia ash emplacement area | Final land use will be the responsibility of EnergyAustralia. | 38.55 |
| E – Lithgow City Council waste emplacement | Final land use will be the responsibility of Lithgow City Council. | 17.54 |
| F – EnergyAustralia Area 4 | Final land use will be the responsibility of EnergyAustralia. | 22.51 |

1. Excludes land within the proposed project application area that is State Forest and the road corridor for the Castlereagh Highway.

#### ii Domain rehabilitation objectives

No changes to the domain rehabilitation objectives defined in the Mining Operations Plan are proposed.

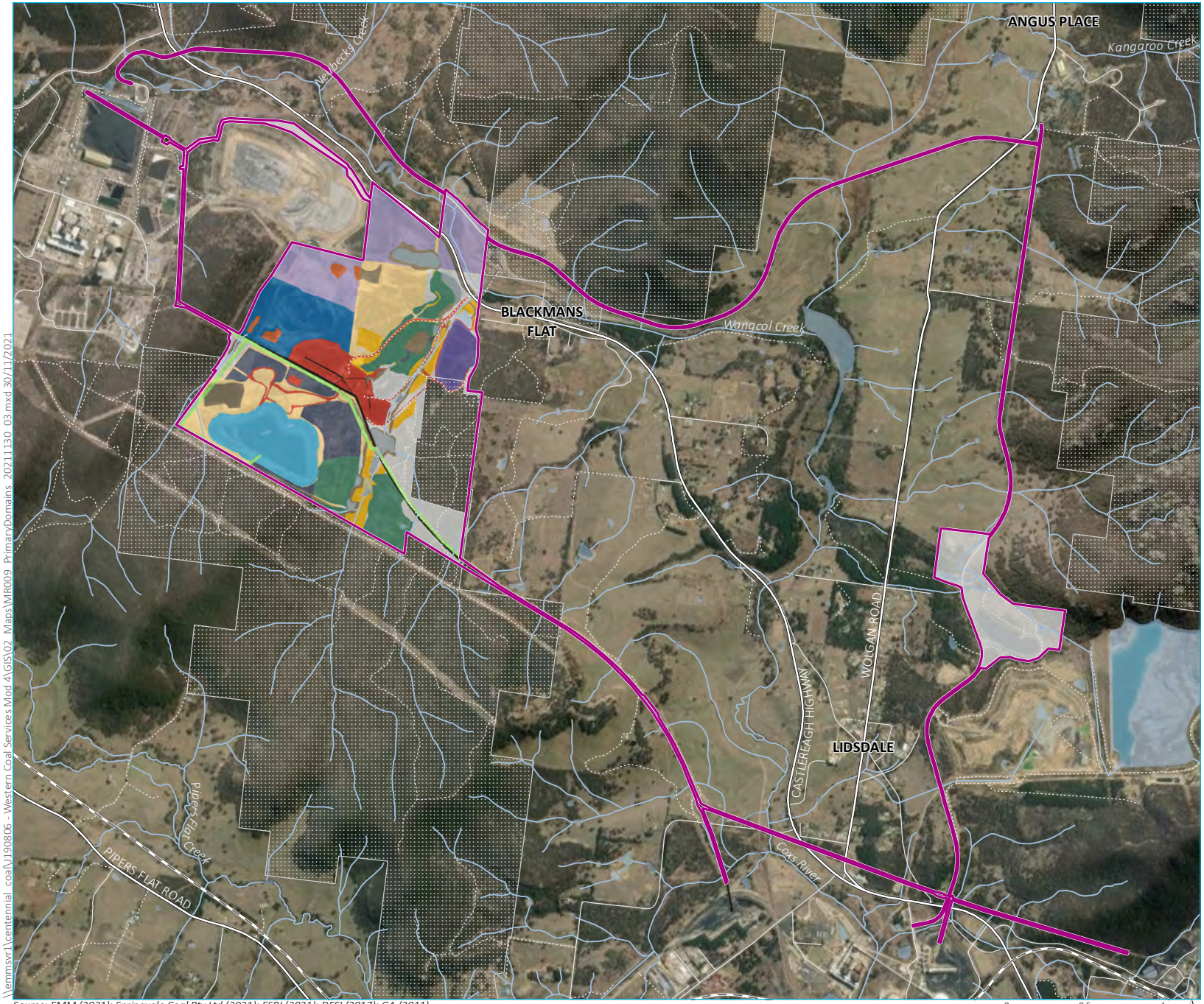
#### iii Rehabilitation phases

Rehabilitation works at SCSS have commenced and are undertaken in accordance with the Mining Operations Plan. No changes to the rehabilitation phases being undertaken within the primary domains are proposed.

#### iv Performance measures

Performance measures are used to quantify the rehabilitation and land management program in terms of efficiency and effectiveness. They are also used to establish indicative timeframes for completion and standards of completion. Performance measures used to quantify rehabilitation will not change and will continue to include:

- inspections for indicators relating to landform design;
- rehabilitation monitoring;
- sampling of materials (reject, overburden and soil); and
- monitoring programs – water and contamination.




KEY

- Proposed project application area

Primary domain

- PD1 | Washery and Coal Handling and Roads
- PD2 | REA
- PD3 | Co-disposal REA
- PD4 | Water Management Area
- PD5 | Current WCS Rehabilitation at the Site
- PD6 | Overburden Emplacement
- PD7 | Conservation Sites
- PD8 | Conveyors
- PD9 | EnergyAustralia Land
- PD10 | EnergyAustralia - Area 4D
- PD11 | EnergyAustralia Ash Water Management Area
- PD12 | Lithgow City Council Land
- PD13 | Capping Materials Stockpile
- PD14 | SWTS Infrastructure
- PD15 - Other Areas

Existing environment

- Major road
- Minor road
- Vehicular track
- Rail line
- Watercourse/drainage line
- Waterbody
- State forest

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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); GA (2011)*

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Primary domains within the proposed project application area

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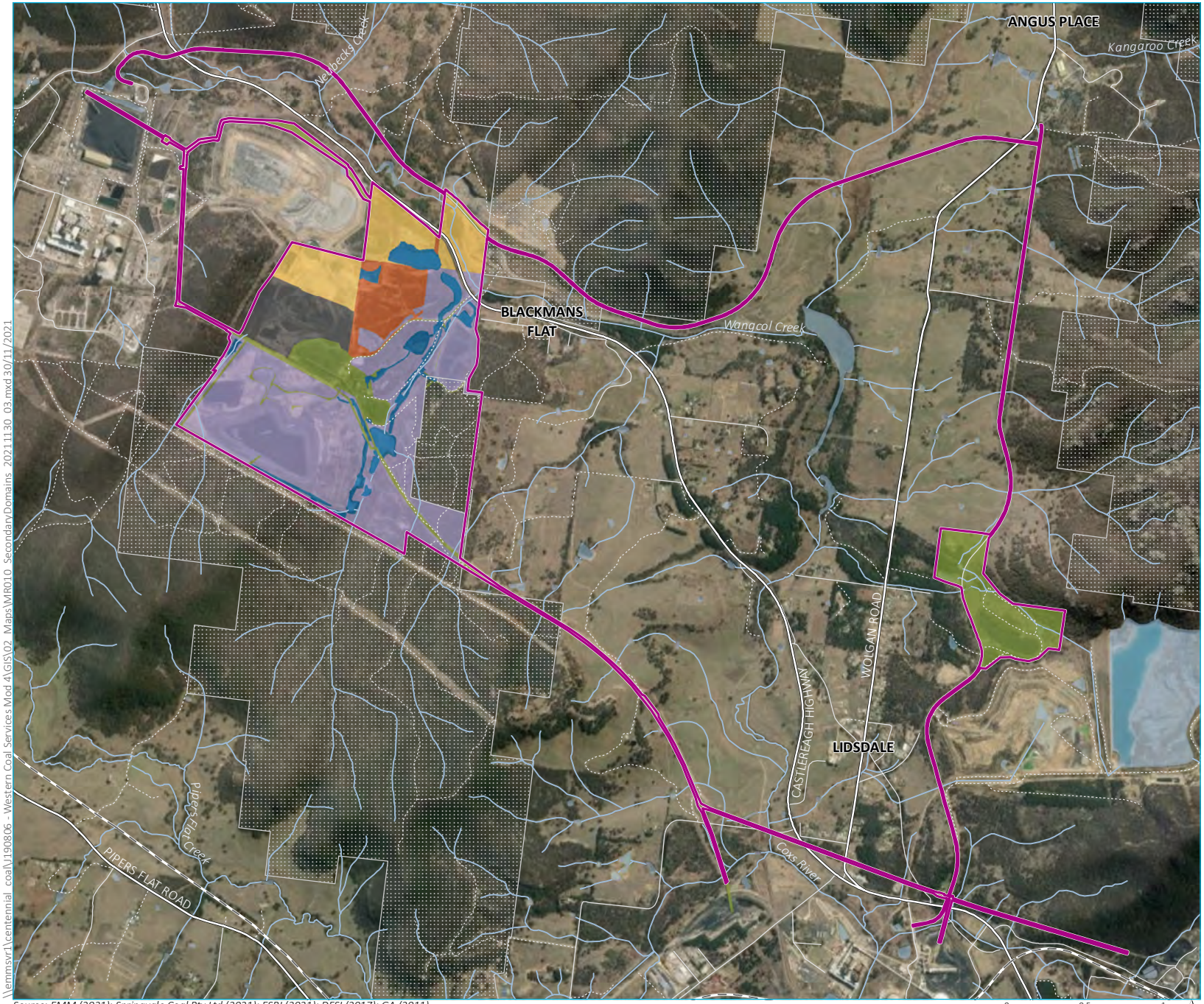


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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); GA (2011)*

Secondary domains within the proposed project application area

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#### v Performance indicators and completion criteria

Performance indicators are used during rehabilitation to assess performance. Indicators relate to both the biophysical and built environment and can be measured consistently over time. Indicators used to assess rehabilitation performance will not change and will continue to include:

- removal of infrastructure upon decommissioning;
- adequate condition of slopes, drainage, and erosion on rehabilitation areas;
- results of hazardous materials audits within specified ranges;
- water management structures are safe, stable and non-polluting;
- soil parameters adequate to sustain ecosystems;
- vegetation communities and structure development consistent with analogue communities; and
- water quality within EPL 21229 and SSD-5579 parameters.

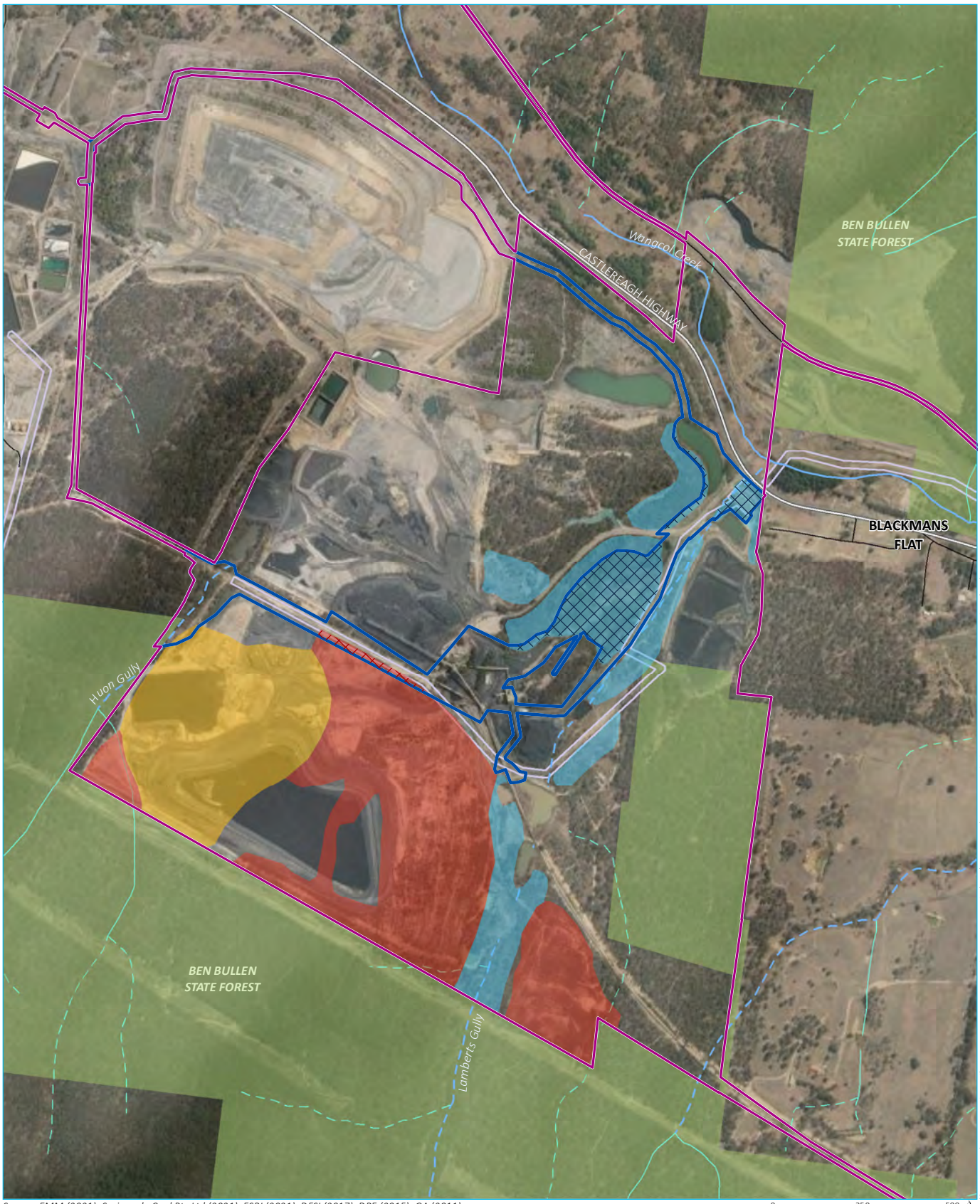
### 7.7.3 Rehabilitation offset areas

In accordance with Condition 26 of Schedule 3 of SSD-5579, Springvale Coal must implement additional rehabilitation initiatives for the Lamberts Gully Creek catchment at SCSS by establishing and enhancing locally endemic native vegetation species and improving fauna habitat in the areas nominated in Appendix 7 of SSD-5579.

The construction envelope for the proposed modification encompasses a total of 29.97 ha, including 7 ha of land within the Lamberts Gully Rehabilitation offset areas and 0.6 ha of land within the Lamberts Gully Rehabilitation Area (subject to maintenance) as nominated in Appendix 7 of SSD-5579. To facilitate the proposed amendments to the water management system at SCSS, vegetation within these areas will be cleared.

As discussed in Section 7.5, a total of 376 ecosystem credits and 72 species credits are required to offset the impacts of the proposed modification on biodiversity. This includes impacts on biodiversity within the Lamberts Gully rehabilitation areas. These credit requirements will be satisfied in accordance with the NSW Biodiversity Offset Scheme through retiring credits, based on like-for-like rules where possible. Payments into the Biodiversity Conservation Fund may be made where suitable credits are not available.

Figure 1 of Appendix 7 of SSD-5579 will be updated to amend the project application area, include the construction envelope and reduce the extent of land within the Lamberts Gully Rehabilitation offset areas and Lamberts Gully Rehabilitation Area (subject to maintenance) (Figure 7.5).




*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)*

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KEY

- Proposed project application area
- Construction envelope

Existing environment

- Major road
- Minor road
- State forest

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

Additional rehabilitation initiatives (Appendix 7 of SSD-5579)

- Lamberts Gully open cut - subject to existing approved reject emplacement area
- Lamberts Gully rehabilitation area
- Lamberts Gully rehabilitation offset area

Proposed amendments to additional rehabilitation initiative

- Lamberts Gully rehabilitation area – to be impacted
- Lamberts Gully rehabilitation offset area – to be impacted

# Proposed amendments to additional rehabilitation initiatives at SCSS

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### 7.7.4 Final landform and land use

The final landform will be consistent with the surrounding environment. The secondary domains shown on Figure 7.4 and listed in Table 7.10 define the final land use at closure. In accordance with Condition 43 of Schedule 3 of SSD-5579, Springvale Coal will return any land disturbed due to exploration or mining activities associated with WCS to their pre-mining capacity.

A large proportion of SCSS falls within Secondary Domain A (Figure 7.4) and these lands will be returned to woodland. The final landform will also include grassland (Secondary Domain B) and permanent water bodies and drainage structures (Secondary Domain E – Water Management). These water management structures will be retained to manage surface water flows and provide water resources for native fauna and stock.

The rehabilitation and establishment of the final landform of other areas of SCSS will be the responsibility of EnergyAustralia and Lithgow City Council.

### 7.7.5 Conclusion

No changes to the existing rehabilitation strategy are proposed. In accordance with the Mining Amendment Regulation and the proposed changes to Condition 45 of Schedule 3 of SSD-5579, Springvale Coal's Mining Operations Plan will transition to a Rehabilitation Management Plan. Progressive rehabilitation and monitoring and maintenance of rehabilitated areas will continue.

As a result of the proposed modification, the primary and secondary domains for WCS will be amended. Domains for the proposed project application area have been determined in consideration of the specific requirements of the infrastructure components and the local environment.

## 7.8 Other environmental aspects

An assessment of other environmental aspects as a result of the proposed modification is provided in Table 7.11.

**Table 7.11 Potential impacts of the proposed modification**

| Environmental consideration | Impact assessment |
|---|---|
| Land and agricultural resources | The land capability and agricultural suitability assessment undertaken as part of the EIS (RPS 2013) classified the project application area as unsuitable for rural production and not suitable for cultivation or grazing.<br>There is currently no agricultural production within SCSS. The proposed modification will not have a significant impact on current land use or agricultural production.<br>An erosion and sediment control plan incorporating appropriate soil and water management measures in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom 2004) and *Managing Urban Stormwater: Soils and Construction – Volume 2E Mines and Quarries* (DECC 2008) will be included in the CEMP and implemented during construction. |
| Historical heritage | There are no listed historical heritage items within the project application area.<br>If during the course of construction any previously unidentified historical archaeological sites/artefacts or heritage items/sites are identified, all work in the area of the item(s) will cease immediately and an appropriately qualified heritage consultant/archaeologist will be consulted in accordance with the *Western Region – Historic Heritage Management Plan*.<br>Historical heritage will continue to be managed in accordance with the *Western Region – Historic Heritage Management Plan.* |

## Table 7.11 Potential impacts of the proposed modification

| Environmental consideration | Impact assessment |
|---|---|
| Visual amenity | The landscape surrounding SCSS assists with the visual absorption of project infrastructure. For example, ridgelines and forested areas in the locality break up industrial elements and result in a reduction of the cumulative impact of multiple elements in the area (eg Pine Dale mine site and MPPS).<br>The majority of the additional infrastructure proposed by Springvale Coal as part of this modification will not cause added cumulative visual impacts to the catchment due to the location of the proposed elements and factors such as topography and vegetation interrupting views to and across SCSS.<br>During the installation of the pipeline between MPPS and SCSS, construction activities may be visible by motorists travelling along the Castlereagh Highway; however, vegetation adjacent to the road corridor will likely provide some screening of active work areas. Further, it is assumed the focus of these motorists will be in line with their direction of travel along the Castlereagh Highway. Construction activities within proximity of the Castlereagh Highway will be temporary (approximately six months) and are unlikely to have any significant visual impacts on passing motorists or nearby receptors.<br>The SCSS Water Transfer System will be constructed on disturbed land adjacent to the proposed SCSS/Regis Transfer System (Figure 4.1). As part of the EIS for the McPhillamys Gold Project (EMM 2019), visual amenity impacts associated with the construction and operation of the SCSS/Regis Water Transfer System were assessed. It was noted that this infrastructure will likely be visible by motorists travelling along the Castlereagh Highway; however, given the substantial infrastructure in the vicinity of this location (including coal stockpiles, mining and power station infrastructure), the addition of the SCSS/Regis Water Transfer System is considered to represent a low impact. Nonetheless, measures to mitigate visual impacts will be implemented by Regis to further minimise the visibility of this infrastructure during construction and operation. These measures will also minimise potential visual impacts associated with the SCSS Water Transfer System.<br>No additional mitigation measures are warranted. |
| Hazards | Potential hazards associated with the proposed modification include:<br>• bushfire;<br>• unauthorised access and risk of damage and/or injury; and<br>• spills of hazardous materials.<br>SCSS operates in accordance with an existing Bushfire Management Plan (2019). The Bushfire Management Plan and site safety protocols, incident management and emergency procedures, including those to manage bushfire risk in accordance with *Planning for Bushfire Protection* (RFS 2006) will continue to be implemented.<br>During construction, all active work areas will have appropriate security provisions such as fencing and signage to warn of the risks associated with unauthorised access.<br>Hazardous materials used during construction will be managed in accordance with Springvale Coal's hazardous substance management procedures and relevant Australian standards and legislation.<br>No additional mitigation measures are warranted. |
| Waste | Springvale Coal's overall objectives are to achieve waste minimisation through maximising reuse and recycling strategies, to ensure environmentally responsible disposal of waste materials not suitable for reuse or recycling, and to ensure environmental protection throughout all stages of waste handling, storage, collection and disposal.<br>Waste generated during construction will be reused or removed from work areas at regular intervals by a suitably qualified contractor and disposed of as required at an approved waste facility. Waste generated during operations will continue to be managed in accordance with the existing Waste Management Plan.<br>No additional mitigation measures are warranted. |
| Greenhouse gas | It is not proposed to modify approved handling, processing or transport operations, the limits on these activities, or the project life.<br>Springvale Coal will continue to implement greenhouse gas management and monitoring procedures in accordance with the *Western Region Air Quality and Greenhouse Gas Management Plan.*<br>No additional mitigation measures are warranted. |

## Table 7.11 Potential impacts of the proposed modification

| Environmental consideration | Impact assessment |
|---|---|
| Socio-economics | The proposed modification will support the ongoing operation of SCSS. Springvale Coal's operations, and the broader mining industry, which are an important part of the economy of the Lithgow LGA and the surrounding region.<br>During construction, it is anticipated that the majority of the additional workers required will be contractors that are already mobilised by SCSS and regularly form part of the maintenance and servicing requirements associated with existing operations. The peak construction workforce is anticipated to be 22 employees with an average of 15 employees.<br>No additional mitigation measures are warranted. |
| Cumulative impacts | Other developments in the vicinity of WCS include MPPS, Pine Dale Coal Mine (care and maintenance), Angus Place Colliery (care and maintenance), Springvale Mine, Wallerawang Power Station (now closed) and Lidsdale Siding. The proposed modification will support the ongoing operation of SCSS; however, it is not proposed to modify the approved handling, processing or transport operations, the limits on these activities, or the project life.<br>The proposed modification may result in construction noise, air quality and traffic impacts over approximately 23 months. No increases in approved noise, air quality or traffic impacts associated with the ongoing operation of SCSS are anticipated.<br>The proposed modification will reduce the volume and frequency of LDP001 discharges to Wangcol Creek and result in a significant reduction in the pollutant load of discharges compared to existing conditions. |

# 8 Justification of the modified project

A description of the need and justification for the proposed modification is provided below with regard to biophysical, social and economic factors; the principles of ecologically sustainable development (ESD); and the consistency of the proposed modification with the objects of the EP&A Act.

## 8.1 Justification

Springvale Coal continuously engages with stakeholders including government agencies, other businesses and the community. As part of this ongoing engagement, Springvale Coal has been discussing the management of water and land at SCSS with:

- EPA;
- Centennial Angus Place Pty Limited – operators of Angus Place Colliery;
- EnergyAustralia – operators of MPPS; and
- Regis – proponents for the McPhillamys Gold Mine project which proposes to use water from WCS via the SCSS/Regis Transfer System.

These discussions have identified opportunities to transfer water to and from other operations in the region.

Due to the connectivity of the local groundwater system and the existing surface water management system at SCSS, discharges through LDP001 are predominantly untreated groundwater. The discharge of untreated groundwater into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community.

EPA issued Springvale Coal with a Pollution Reduction Program in December 2020. The program required a preferred project report be lodged with EPA detailing the preferred option for managing water currently discharged through LDP001. The preferred project report was submitted in January 2021 and aligns with one of the primary objectives of the proposed modification (to reduce the volume and pollutant load of discharges to Wangcol Creek).

The proposed modification will:

- Address the requirements of the EPL 21229 Pollution Reduction Program. The water and salt balance modelling predicts that the proposed modification will reduce the volume and frequency of LDP001 discharges to Wangcol Creek and result in a significant reduction in the pollutant load of discharges compared to existing conditions.
- Create a beneficial reuse for water generated at SCSS. The proposed modification will facilitate the transfer of water from SCSS to MPPS and, if constructed, the McPhillamys Gold Mine. The proposed modification will therefore reduce, and potentially at times remove, the need to discharge water from LDP001 to Wangcol Creek.
- Decrease the volume of runoff from Huon Gully to SHG1 and historical underground workings. The construction and operation of the Huon Clean Water Pond will intercept the clean catchment of Huon Gully upstream of SHG1 and transfer it to Wangcol Creek via the Lamberts Gully clean water diversion. This will also minimise the opportunity for localised groundwater recharge following rainfall.

- Facilitate the transfer of water from Angus Place Colliery to SCSS. Water from Angus Place Colliery is of a higher quality than water already available on-site at SCSS. Mixing this water on-site at SCSS will improve the quality of water discharged into Wangcol Creek.

- Facilitate the transfer of land back to EnergyAustralia. The proposed redesign of the on-site water management system will redirect dirty water at SCSS away from land managed by EnergyAustralia. Dirty water will instead be captured in DWP-A at SCSS and, where suitable, will be available for beneficial reuse on-site or export to MPPS or, if constructed, McPhillamys Gold Mine.

- Increase the capacity of the Washery Dam, allowing Springvale Coal to store, manage and reuse a greater volume of dirty water on-site and reduce the volume of water discharged off-site.

- Align the conditions of SSD-5579 with the requirements for rehabilitation prescribed by the Mining Amendment Regulation.

## 8.2 Alternatives

In consultation with EPA, Springvale Coal has been exploring options to reduce the discharge of untreated groundwater into Wangcol Creek as part of WCS standard operating practice since 2019. Alternatives to the proposed modification that have been considered are:

- Do nothing: The 'do nothing' alternative is continuation of WCS operations. Without the proposed modification, Springvale Coal will not be able to satisfy the requirements of the Pollution Reduction Program. The benefits of the proposed modification, as outlined in Section 8.1, will not be realised.

- Reverse osmosis treatment and discharge of treated water through LDP001 to Wangcol Creek: This alternative would involve the construction and operation of a reverse osmosis water treatment plant on-site at SCSS to treat water prior to discharge via LDP001. This alternative would create an additional waste stream (ie concentrated brine) and would present significant ongoing issues in terms of appropriate waste disposal.

- Transfer water to Angus Place Colliery: This alternative would involve the transfer of water from LDP001 to Angus Place Colliery, from where it would be transferred to SWTP. Water from LDP001 would form part of the total volume of water treated and reused as part of the ongoing operation of SWTP. This alternative would require significant changes to SWTP.

- Treatment using brine concentrators: This alternative would involve the transfer of water from SCSS to brine concentrator units (either existing or new systems). A new system is cost prohibitive and the existing system is constrained in capacity.

## 8.3 Ecological sustainable development

The principles of ESD, for the purposes of the EP&A Act, are provided in Clause 7(4) of Schedule 2 of the EP&A Regulation. The four principles of ESD are:

- precautionary principle – the precautionary principle states that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

- inter-generational equity – the principle of inter-generational equity is that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;

- conservation of biological diversity and maintenance of ecological integrity – the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making; and

- improved valuation and pricing of environmental resources – improved valuation, pricing and incentive mechanisms should be promoted.

The overall objectives of ESD are to use, conserve and enhance natural resources. This ensures that ecological processes are maintained facilitating improved quality of life, now and into the future. Springvale Coal is committed to the principles of ESD and understands that biophysical, social and economic objectives are interdependent. Springvale Coal acknowledges that a well-designed and effectively managed operation will avoid significant and/or costly environmental impacts or degradation.

The proposed amendments to the water management system at SCSS have been designed to avoid impacts where possible. Where impacts are unavoidable, the proposed works have been designed to reduce the impacts to a level which is as low as is reasonably practicable. Appropriate management measures have been identified to mitigate any residual impacts from the proposed modification.

Consideration has been given to appropriately identifying, avoiding, mitigating and managing environmental risks. This demonstrates environmental due diligence and will provide for ongoing and adaptive monitoring and management of WCS in line with the principles of ESD outlined in the following sections.

### 8.3.1 Precautionary principle

This modification report has assessed the potential impacts of the proposed modification on biophysical, social and economic factors based on on-site monitoring, historical data, modelling and surveys. This has included comparing the impacts of approved operations at SCSS with the potential impacts of the proposed modification.

Where existing management controls and mitigation strategies are not already in place to monitor, mitigate and/or manage the potential impacts of the proposed modification, additional safeguards have been proposed. These will be included in the CEMP and implemented during construction.

### 8.3.2 Inter-generational equity

Springvale Coal undertake ongoing environmental monitoring with mitigation measures to provide effective environmental management across its existing operations. This management is provided through planning, communication, documentation, review and feedback. These environmental management measures ensure that the health, diversity and productivity of the environment is maintained or enhanced for future generations.

The proposed modification will reduce the volume, frequency and pollutant load of LDP001 discharges to Wangcol Creek, which will improve the receiving environment for current and future generations.

### 8.3.3 Conservation of biological diversity and maintenance of ecological integrity

The potential environmental impacts of the proposed modification and the existing and/or additional measures to ameliorate these potential impacts are detailed in this modification report.

The proposed modification will result in the clearing of 15.18 ha of native vegetation. A total of 376 ecosystem credits and 72 species credits are required to offset the impacts of the proposed modification. These credit requirements will be satisfied in accordance with the NSW Biodiversity Offset Scheme.

### 8.3.4 Improved valuation and pricing of environmental resources

The proposed modification will create a beneficial reuse for water generated at SCSS. The proposed modification will facilitate the transfer of water from SCSS to MPPS and, if constructed, the McPhillamys Gold Mine.

The construction of DWP-B and increased capacity of the Washery Dam will also allow Springvale Coal to store, manage and reuse a greater volume of dirty water on-site and reduce the volume of this water discharged off-site.

## 8.4 Conclusion

The proposed modification has been designed to avoid and minimise adverse biophysical, social and economic impacts. Appropriate management measures have been identified to mitigate any residual impacts from the proposed modification. These management measures will help to ensure construction activities will have minimal additional environmental impacts when compared with SCSS's existing operations.

The proposed modification is considered to be consistent with the relevant objects of the EP&A Act, including the principles of ESD, and will not change the nature of the development originally approved.

The primary objective of the proposed modification is to address the requirements of the EPL 21229 Pollution Reduction Program by reducing the volume, frequency and pollutant load of LDP001 discharges to Wangcol Creek. Water and salt balance modelling illustrates that this can be achieved.

Environmental management will continue in accordance with SSD-5579 and EPL 21229, approved plans and other elements of the consent. Where required, additional safeguards have been proposed and these will be included in the CEMP and implemented during construction.

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# Abbreviations

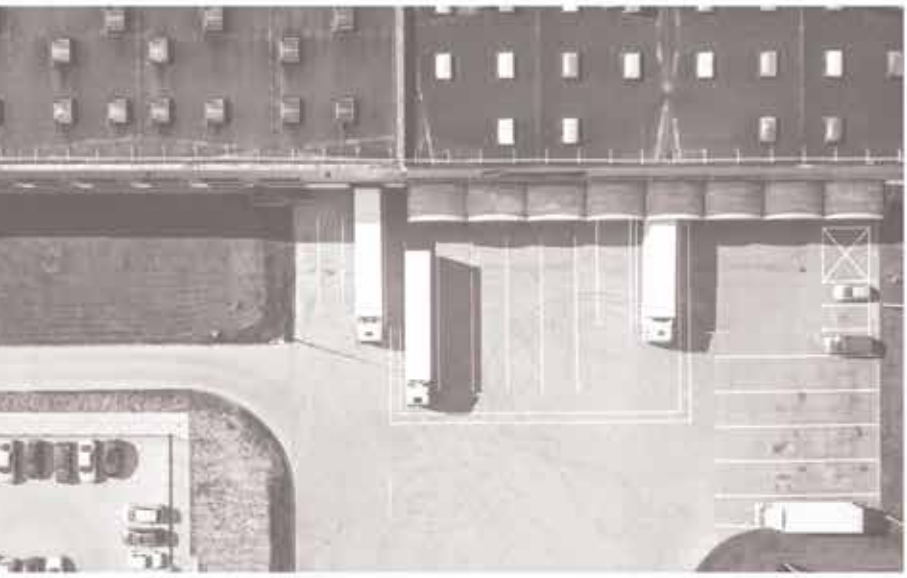
| | |
|---|---|
| ACHA | Aboriginal cultural heritage assessment |
| AHD | Australian height datum |
| AHIMS | Aboriginal Heritage Information Management System |
| BAM | *Biodiversity Assessment Method* |
| Banpu | Banpu Public Company Limited |
| BC Act | NSW *Biodiversity Conservation Act 2016* |
| BDAR | biodiversity development assessment report |
| CCC | community consultative committee |
| CEMP | construction environmental management plan |
| Centennial | Centennial Coal Company Limited |
| CNVIA | construction noise and vibration impact assessment |
| DAWE | Commonwealth Department of Agriculture, Water and the Environment |
| DPIE | NSW Department of Planning, Industry and Environment |
| EC | electrical conductivity |
| EIS | environmental impact statement |
| EMM | EMM Consulting Pty Limited |
| EMS | environmental management strategy |
| EPA | NSW Environment Protection Authority |
| EPBC Act | Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* |
| EPL | environment protection licence |
| EP&A Act | NSW *Environmental Planning and Assessment Act 1979* |
| EP&A Regulation | NSW Environmental Planning and Assessment Regulation 2000 |
| ESD | ecologically sustainable development |
| FTE | full-time equivalent |
| GHG | greenhouse gas |
| ha | hectares |
| km | kilometres |
| IBRA | Interim Biogeographic Regionalisation of Australia |
| LDP | licenced discharge point |

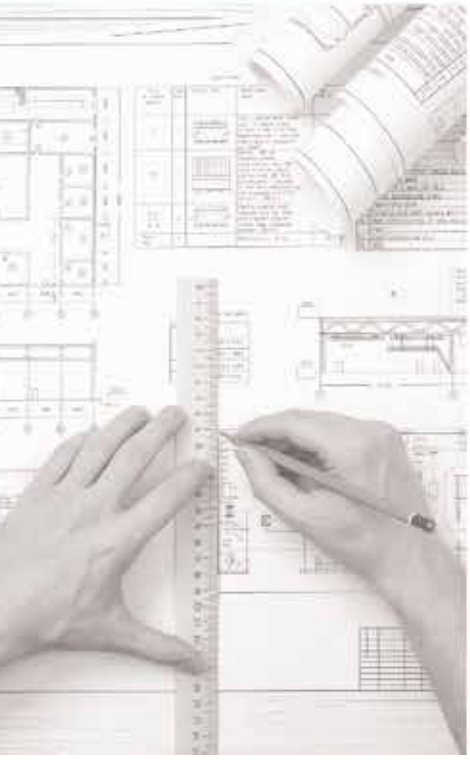
| | |
|---|---|
| LGA | local government area |
| Lithgow LEP | Lithgow Local Environmental Plan 2014 |
| MA Regulation | NSW Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021 |
| Mining SEPP | State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 |
| mm | millimetres |
| MNES | matters of national environmental significance |
| MOP | mining operations plan |
| Mt | million tonnes |
| Mtpa | million tonnes per annum |
| NorBE | Neutral or beneficial effect |
| NSW | New South Wales |
| PAC | Planning Assessment Commission |
| PCT | plant community type |
| POEO Act | NSW *Protection of the Environment Operations Act 1997* |
| RAP | registered Aboriginal party |
| REA | reject emplacement area |
| RF Act | NSW *Rural Fires Act 1997* |
| RFS | NSW Rural Fire Service |
| ROM | run-of-mine |
| SAII | serious and irreversible impact |
| SCSS | Springvale Coal Services Site |
| SEARs | Secretary's environmental assessment requirements |
| SEPP | State Environment Planning Policy |
| Springvale Coal | Springvale Coal Pty Limited |
| SSD | State significant development |
| SWTP | Springvale Water Treatment Project |
| t | tonnes |
| TEC | threatened ecological community |
| TfNSW | Transport for NSW |
| TIA | traffic impact assessment |

| | |
|---|---|
| WCS | Western Coal Services Project |
| Western Region ACHMP | Western Region Aboriginal Cultural Heritage Management Plan |
| WM Act | NSW *Water Management Act 2000* |

# Appendix A

## Water resources impact assessment





# Western Coal Services Project

Water resources impact assessment

Prepared for Springvale Coal Pty Limited
December 2021

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# Western Coal Services Project

## Water resources impact assessment

**Report Number**

J190806 RP#3

**Client**

Springvale Coal Pty Limited

**Date**

3 December 2021

**Version**

v1 Final

| Prepared by | Approved by |
| --- | --- |
| | |
| **Tess Davies**<br>Senior Water Resources Engineer<br>3 December 2021 | **Nick Bartho**<br>Associate Water Resources Engineer<br>3 December 2021 |

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# Executive Summary

## ES1 Introduction

Springvale Coal Pty Limited (Springvale Coal) operates Western Coal Services (WCS), a coal handling, processing, transportation and management operation approximately 15 km north of Lithgow. WCS operates under State significant development (SSD) consent SSD-5579.

Springvale Coal is seeking approval to change the existing water management system at Springvale Coal Services Site (SCSS) to facilitate the transfer of water between WCS and other operations, and to improve the quality of water discharged to Wangcol Creek.

This water resources impact assessment has been prepared to accompany the modification report and assesses the impacts of the proposed modification on existing surface water and groundwater receptors in the surrounding area.

## ES2 Project setting

SCSS is on the western slopes of the north-south oriented sandstone ridgeline of the Great Dividing Range, to the west of the Wollemi and Blue Mountains national parks that form part of the Greater Blue Mountains World Heritage Area. The region consists primarily of undulating hills and mountain tops, with some low-lying areas, particularly around the Coxs River. These low-lying areas have been cleared of natural vegetation for agricultural, commercial and industrial purposes, including coal and shale mining, forestry and power generation.

SCSS is within the catchment of Wangcol Creek, which is a perennial stream that joins the Coxs River approximately 3 km to the east of SCSS and north of Lidsdale Village at the historical Commonwealth Mine open cut void known as 'Blue Lake'. The Coxs River rises within the Ben Bullen State Forest east of Cullen Bullen and flows generally in a south-east direction into Lake Burragorang (impounded by Warragamba Dam), which is the primary reservoir for drinking water supply to Sydney.

Wangcol Creek is a highly modified stream that has been subject to diversions and instream impacts, such as mining, with its condition varying from partly vegetated to cleared and degraded lands. Historically, Wangcol Creek has flowed intermittently in response to rainfall. Flows are now influenced by groundwater and discharges from SCSS, creating a more constant flow.

A small number of tributaries enter Wangcol Creek, including Huon Gully and Lamberts Gully, which have headwaters in cleared land, mining areas or the Ben Bullen State Forest. The runoff from upstream of SCSS concentrates in Huon Gully on the west of SCSS and Lamberts Gully to the east. The headwaters of these drainage lines are in undisturbed forest to the south of SCSS. The hydrology of SCSS has been significantly modified due to historical open cut and underground mining and related activities. The natural watercourse in Huon Gully now terminates at SCSS storage SHG1, as the gully has been disturbed by open cut mining and the downstream reach has been truncated by the Lamberts North ash emplacement area at Mount Piper Power Station (MPPS). Lamberts Gully is intercepted by sediment control dams within SCSS, which discharge to Wangcol Creek.

The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge. Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from SCSS through a licensed discharge point (LDP) LDP001. All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek. Clean water from Lamberts Gully is discharged to Wangcol Creek separately downstream of LDP001.

## ES3 Proposed changes to water management

Springvale Coal has consulted extensively with NSW Environment Protection Authority (EPA) regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. The discharge of untreated groundwater into Wangcol Creek as part of standard operating practice at SCSS is no longer supported by regulators or the community. The proposed modification seeks to reduce the volume and pollutant load associated with LDP001 discharges to Wangcol Creek.

Proposed changes to the existing water management system and expected outcomes include:

- Management of several existing water storages and catchment areas will be transferred to EnergyAustralia as part of the transfer of land from Springvale Coal back to EnergyAustralia.

- Construction and operation of the Huon Clean Water Pond is proposed to intercept the clean catchment of Huon Gully upstream of SHG1 and transfer it to Wangcol Creek via the Lamberts Gully clean water diversion and to minimise the opportunity for localised groundwater recharge following rainfall.

- Construction and operation of two new dirty water ponds (DWPs) as follows:

    - DWP-A is proposed to be constructed immediately downslope and to the north of the Huon Clean Water Pond to capture dirty water from the coal conveyor corridor and prevent runoff flowing north onto EnergyAustralia's property.

    - DWP-B is proposed to be constructed upstream of the existing Cooks Dam to provide additional dirty water storage capacity at SCSS.

- The use of DWP-B will allow Cooks Dam to be maintained at a lower level and have sufficient capacity to manage inflow surges from rainfall events and will lead to reduced discharges to LDP001.

- An increase in the capacity of the Washery Dam from 3.79 megalitres (ML) to 6.1 ML through desilting and maintenance to provide additional dirty water storage capacity at SCSS.

- The pipeline from the Transfer Tower 3 (TT03) sump, which currently discharges to Huon Gully upstream of SHG1, will be extended to DWP-A.

- A bi-directional pipeline between SCSS and MPPS will allow excess water stored at SCSS to be transferred from Cooks Dam to Pond D or alternatively from Pond D or Cooks Dam to McPhillamys Gold Project. The proposed transfer of water off-site seeks to reduce the volume and frequency of LDP001 discharges to Wangcol Creek.

- An offtake from the Angus Place Raw Water Pipeline will allow up to 2.6 megalitres per day (ML/day) of water from Angus Place Colliery to be used to supplement the coal preparation plant (or washery) water supply. Mine water at Angus Place Colliery is of a higher quality than water currently stored on-site at SCSS and the use of this water is expected to improve the quality of water being reused on site and consequently the quality of LDP001 discharges.

## ES4 Impact assessment

### ES4.1 Construction phase

The primary risk to surface water quality during construction is ground disturbance during earthworks and other site activities. There is potential that construction works will lead to exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses. Uncontrolled sediment-laden runoff has the potential to increase turbidity and nutrients entering waterways which may have ecological and water quality impacts.

Potential impacts associated with the construction phase of the proposed modification will be effectively managed through the development and implementation of an erosion and sediment control plan and construction environmental management plan, consistent with industry standards and relevant guidelines.

### ES4.2 Groundwater

Groundwater is not expected to be intercepted in significant volumes during the construction or operation of the Huon Clean Water Pond, DWP-A or DWP-B or the increase in capacity of the Washery Dam. Additionally, DWP-B is proposed to be lined to minimise any interaction with the groundwater environment. In the event that groundwater is intercepted during construction, this water will be managed within the existing water management system.

### ES4.3 LDP001 discharges

The proposed modification seeks to reduce the volume and pollutant load associated with LDP001 discharges to Wangcol Creek through:

- decreasing the connectivity of groundwater with the surface water management system by supplying the washery with stormwater captured within DWP-B and mine water transferred from Angus Place Colliery, which is of a higher quality than water currently stored on-site at SCSS;
- decreasing the volume of catchment runoff from Huon Gully contributing to SHG1 and the historical underground workings system through the construction and operation of the Huon Clean Water Pond and diversion to Wangcol Creek; and
- the transfer of excess water generated at SCSS to McPhillamys Gold Project and Pond D at MPPS.

#### ES4.3.1 Discharge regime

Water balance modelling has been used to estimate the discharge regime to Wangcol Creek from SCSS under both existing and proposed conditions. The proposed modification is predicted to reduce discharges from SCSS to Wangcol Creek via LDP001 by 99%, from 616 ML/year on average under existing conditions to less than 5 ML/year on average under proposed conditions. Discharges from the Lamberts Gully clean water diversion to Wangcol Creek are predicted to increase by 20% with the additional diversion of Huon Gully catchment, from 225 ML/year under existing conditions to 291 ML/year under proposed conditions on average. Overall surface water discharges from SCSS, consisting of LDP001 discharges and clean water from Lamberts Gully, are predicted to decrease by around 550 ML/year on average.

### ES4.3.2 Discharge quality

Due to the connectivity of the local groundwater system and the surface water management system, discharges through LDP001 are predominantly made up of groundwater contributing to Cooks Dam. This water is characterised by relatively high electrical conductivity (EC) and concentrations of some metals such as cobalt, iron, manganese, nickel and zinc. Recirculation of water stored in Cooks Dam to supply the washery occurs as water is associated with fine coal rejects emplaced in the reject emplacement area, which then flows through the groundwater system and is intercepted by Cooks Dam. This recycling of water through the system has resulted in EC and some metal concentrations increasing over time at SCSS.

Salt balance modelling has been used to estimate the salt load associated with LDP001 discharges to Wangcol Creek from SCSS under both existing and proposed conditions. The average salt load associated with LDP001 discharges is predicted to decrease by more than 99% from 1,932 tonnes per annum (tpa) (existing conditions) to less than 10 tpa (proposed conditions).

The proposed modification seeks to minimise the contribution of groundwater to LDP001 discharges to Wangcol Creek. As a result, it is expected that surface water runoff from Huon Gully and Lamberts Gully will be the primary source of surface water discharge from SCSS to Wangcol Creek. This water has lower EC and lower concentrations of some metals, compared to current LDP001 discharges to Wangcol Creek.

The proposed modification is predicted to reduce the volume and frequency of discharges to Wangcol Creek via LDP001 and result in a significant reduction in the pollutant load of discharges compared to existing conditions. As such, the proposed modification is assessed to have at least a neutral or beneficial effect on water quality within the Sydney drinking water catchment area.

# Table of Contents


Executive Summary ES.1

1 Introduction 1

1.1 Background 1

1.1.1 Western Coal Services Project 1

1.1.2 Springvale Coal Services Site water management system 3

1.1.3 Springvale Water Treatment Plant 5

1.1.4 McPhillamys Gold Project 5

1.2 Report objectives 5

1.3 Report structure 6

2 Proposed modification 7

2.1 New SCSS Water Transfer System 7

2.2 Transfer of water to McPhillamys Gold Project 7

2.3 Transfer of water to MPPS 8

2.4 Receipt of water from Angus Place Colliery 8

2.5 Redesign of SCSS's water management system 8

3 Assessment framework 11

3.1 Relevant legislation 11

3.1.1 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* 11

3.1.2 NSW *Protection of the Environment Operations Act 1997* 11

3.1.3 NSW *Water Management Act 2000* 12

3.1.4 NSW *Water NSW Act 2014* 12

3.1.5 NSW *Dam Safety Act 2015* and Dam Safety Regulation 2019 13

3.2 Relevant policies 14

3.2.1 State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 14

3.2.2 State Rivers and Estuaries Policy 14

3.2.3 NSW Aquifer Interference Policy 15

3.3 Relevant guidelines 16

3.3.1 Erosion and sediment control guidelines 16

3.3.2 NSW water quality and river flow objectives 16

3.3.3 Australian and New Zealand guidelines for fresh and marine water quality 18

3.3.4 Neutral or beneficial effect on water quality assessment guideline 19
3.3.5 Guidelines for Groundwater Quality Protection in Australia 19
3.3.6 Guidelines for controlled activities on waterfront land 20
3.3.7 Bunding and spill management guidelines 20
4 Project setting 21
4.1 Site description 21
4.2 Topography 21
4.3 Climate 21
4.4 Geology 22
4.5 Hydrology 23
4.6 Hydrogeology 25
5 Water management 27
5.1 Definitions 27
5.2 Existing operations 27
5.2.1 Clean water management 27
5.2.2 Dirty water management 30
5.2.3 Reject emplacement management 32
5.2.4 Residuals management 32
5.2.5 Groundwater management 33
5.2.6 Potable and wastewater systems 33
5.3 Proposed operations 33
5.3.1 Area 4 hand back 33
5.3.2 Huon Clean Water Pond 34
5.3.3 DWP-A 34
5.3.4 DWP-B 34
5.3.5 TT03 sump 35
5.3.6 Washery Dam 35
5.3.7 Transfer of water 35
6 Monitoring program 38
6.1 Surface water quality 38
6.1.1 Wangcol Creek water quality 40
6.1.2 SCSS site water quality 45
6.1.3 LDP001 discharge monitoring 49

6.1.4 Angus Place Colliery water quality 52
6.2 Groundwater monitoring 53
6.2.1 Physicochemical parameters 54
6.2.2 Nutrients 54
6.2.3 Major ions 56
6.2.4 Metals 57
7 Water and salt balance 59
7.1 Modelling methodology 59
7.1.1 Model description 59
7.1.2 Probabilistic modelling 59
7.1.3 Modelling scenarios 59
7.1.4 Hydrologic modelling 60
7.1.5 Groundwater modelling 60
7.1.6 Salt balance modelling 60
7.1.7 McPhillamys Gold Project demand 60
7.2 Water balance model results 61
7.2.1 Overview 61
7.2.2 Off-site discharges 66
7.3 Salt balance results 69
8 Impact assessment 75
8.1 Construction phase 75
8.1.1 Water quality 75
8.1.2 Water flows 75
8.2 Groundwater 75
8.3 LDP001 discharges 76
8.3.1 Discharge regime 77
8.3.2 Water quality 78
8.4 Water licensing 79
9 Monitoring and management measures 80
9.1 Water management plan 80
9.2 Monitoring program 80
9.3 Inspection and maintenance program 81
9.4 Modelling 81

10 Summary 82
10.1 Project context 82
10.2 Proposed water management system 82
10.3 Impact assessment 83
Abbreviations and units 84
References 86

## Appendices

Appendix A Surface water quality results A.1
Appendix B Groundwater monitoring results B.1
Appendix C Water and salt balance model data C.1

## Tables

Table 3.1 Licensed discharge point 1 water quality concentration limits 11
Table 3.2 Minimal impact criteria for 'less productive' porous rock water source 15
Table 3.3 Water quality and river flow objectives 16
Table 3.4 Site-specific guideline values for the assessment of surface water quality 18
Table 4.1 Key climate statistics 21
Table 4.2 Stratigraphic sequence 23
Table 6.1 Surface water quality monitoring locations and data range 38
Table 6.2 Wangcol Creek water quality monitoring results summary – metals 44
Table 6.3 Springvale Coal Services Site water quality monitoring results summary – metals 49
Table 6.4 LDP001 water quality monitoring results summary – metals 52
Table 6.5 800 Area water quality monitoring results summary – metals 53
Table 6.6 Groundwater monitoring locations and data range 53
Table 6.7 Groundwater quality monitoring results summary – metals 57
Table 7.1 Summary of average predicted water inputs and outputs 65
Table 7.2 Summary of average predicted salt inputs and outputs 73
Table 8.1 Predicted changes to discharge regime to Wangcol Creek 77
Table 8.2 Predicted changes to discharge salt loads and electrical conductivity to Wangcol Creek 78
Table A.1 Surface water quality monitoring results – Wangcol Creek Gauge A.2
Table A.2 Surface water quality monitoring results – Wangcol Creek U/S A.4

| | | |
|---|---|---|
| Table A.3 | Surface water quality monitoring results – Wangcol Creek D/S | A.6 |
| Table A.4 | Surface water quality monitoring results – Wangcol Creek Far D/S | A.8 |
| Table A.5 | Surface water quality monitoring results – Angus Place Colliery 800 Area | A.10 |
| Table A.6 | Surface water quality monitoring results – Cooks Dam | A.12 |
| Table A.7 | Surface water quality monitoring results – LDP001 discharge | A.14 |
| Table B.1 | Groundwater water quality monitoring results – Lithgow Seam (BH01, BH04, BH05, BH06, BH08, BH09, BH10) | B.2 |
| Table B.2 | Groundwater water quality monitoring results – Marrangaroo Formation (BH02, BH11, BH12) | B.3 |
| Table B.3 | Groundwater water quality monitoring results – Overburden (BH03, BH07, BH15) | B.4 |
| Table B.4 | Groundwater water quality monitoring results – Backfill (BH13) | B.5 |
| Table C.1 | Catchment and water storage data | C.5 |
| Table C.2 | Operational data | C.6 |
| Table C.3 | Water transfer rules | C.6 |
| Table C.4 | Summary of modelled inputs and outputs | C.7 |
| Table C.5 | Australian Water Balance Model parameters | C.10 |
| Table C.6 | Salinity data | C.10 |


## Figures


| | | |
|---|---|---|
| Figure 1.1 | Regional context | 2 |
| Figure 1.2 | Local context | 4 |
| Figure 2.1 | Proposed modification elements | 10 |
| Figure 4.1 | Average daily rainfall and evaporation rates | 22 |
| Figure 4.2 | Watercourses | 24 |
| Figure 4.3 | Historical mine workings | 26 |
| Figure 5.1 | Existing water management system | 28 |
| Figure 5.2 | Water management schematic – existing operations | 29 |
| Figure 5.3 | Proposed water management system | 36 |
| Figure 5.4 | Water management schematic – proposed operations | 37 |
| Figure 6.1 | Surface water quality monitoring points | 39 |
| Figure 6.2 | Wangcol Creek gauge – electrical conductivity continuous gauging data | 40 |
| Figure 6.3 | Wangcol Creek – electrical conductivity timeseries | 41 |
| Figure 6.4 | Wangcol Creek – pH timeseries | 41 |
| Figure 6.5 | Wangcol Creek – total suspended solids timeseries | 42 |

| | | |
|---|---|---|
| Figure 6.6 | Wangcol Creek – turbidity timeseries | 42 |
| Figure 6.7 | Wangcol Creek – total nitrogen timeseries | 43 |
| Figure 6.8 | Wangcol Creek – total phosphorous timeseries | 43 |
| Figure 6.9 | Wangcol Creek – nickel timeseries | 45 |
| Figure 6.10 | Cooks Dam – electrical conductivity timeseries | 46 |
| Figure 6.11 | Cooks Dam – pH timeseries | 46 |
| Figure 6.12 | Cooks Dam – total suspended solids timeseries | 47 |
| Figure 6.13 | Cooks Dam – turbidity timeseries | 47 |
| Figure 6.14 | Cooks Dam – total nitrogen timeseries | 48 |
| Figure 6.15 | Cooks Dam –total phosphorous timeseries | 48 |
| Figure 6.16 | Recorded LDP001 discharge volume | 49 |
| Figure 6.17 | LDP001 – electrical conductivity timeseries | 50 |
| Figure 6.18 | LDP001 – pH timeseries | 51 |
| Figure 6.19 | LDP001 – total suspended solids timeseries | 51 |
| Figure 6.20 | LDP001 – turbidity timeseries | 52 |
| Figure 6.21 | Groundwater monitoring points | 55 |
| Figure 6.22 | Groundwater major ions – piper plot | 56 |
| Figure 7.1 | Modelled demand from McPhillamys Gold Project | 61 |
| Figure 7.2 | Annual water transfers – Scenario 1 | 62 |
| Figure 7.3 | Annual water transfers – Scenario 2 | 63 |
| Figure 7.4 | Annual water transfers – Scenario 3 | 64 |
| Figure 7.5 | Predicted LDP001 discharge | 67 |
| Figure 7.6 | Predicted overflows from Final Polishing Lagoon to Wangcol Creek | 68 |
| Figure 7.7 | Predicted DWP-A overflows to SHG1 | 69 |
| Figure 7.8 | Annual salt transfers – Scenario 1 | 70 |
| Figure 7.9 | Annual salt transfers – Scenario 2 | 71 |
| Figure 7.10 | Annual salt transfers – Scenario 3 | 72 |
| Figure 8.1 | Groundwater levels in comparison to DWP-A and DWP-B maximum excavation depths | 76 |
| Figure C.1 | Catchment areas – existing conditions | C.3 |
| Figure C.2 | Catchment areas – proposed conditions | C.4 |

# 1 Introduction

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates Western Coal Services (WCS), a coal handling, processing, transportation and management operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1.1).

WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine (SSD-5594), Angus Place Colliery (SSD 06_0021) and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Development Consent 08_0223). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (SSD-7592).

Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at Springvale Coal Services Site (SCSS) (Figure 1.1), including:

- Centennial Angus Place Pty Limited - operators of Angus Place Colliery;
- EnergyAustralia NSW Pty Ltd (EnergyAustralia) - operators of MPPS; and
- LFB Resources NL, a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis) - proponents of McPhillamys Gold Project.

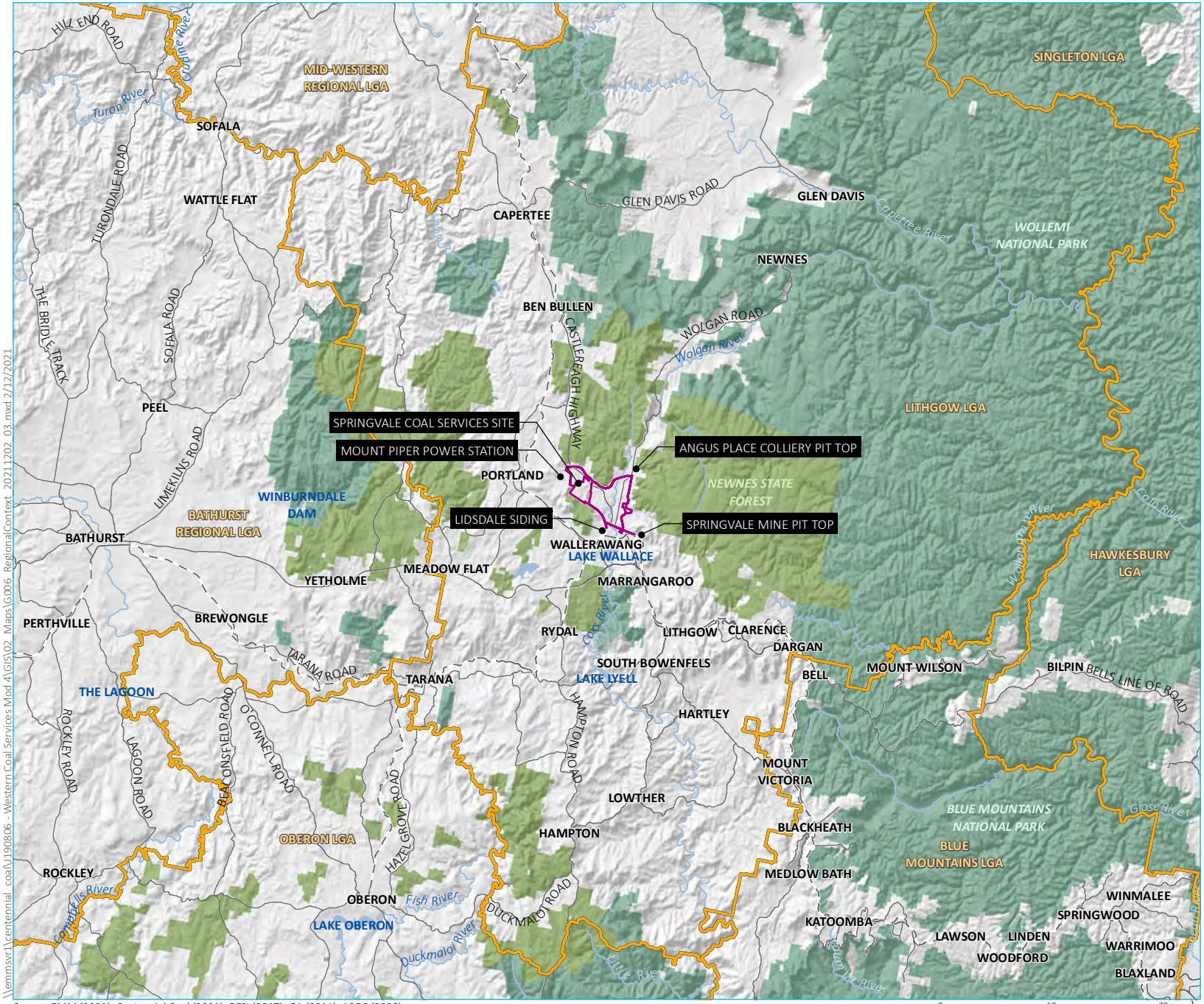
These discussions have identified opportunities to transfer water to and from other operations in the region. To facilitate the transfer of water to these operations, as well as the transfer of land back to EnergyAustralia, Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to modify aspects of WCS water management (herein referred to as the proposed modification). The proposed modification will result in a minor increase to the disturbance footprint within, and extent of, the project application area approved under SSD-5579.

## 1.1 Background

### 1.1.1 Western Coal Services Project

The project application area for WCS is west of the Blue Mountains in the Lithgow LGA (Figure 1.1). Land uses within and surrounding the project application area vary and include industrial, mining, power generation, residential, agricultural and forestry uses. MPPS is immediately west of SCSS, whilst the locality of Blackmans Flat is east of SCSS (Figure 1.1). Pine Dale Coal Mine (currently in care and maintenance) is north of SCSS and sections of Ben Bullen State Forest are within the project application area to the south and north-east of SCSS (Figure 1.1).




Source: EMM (2021); Centennial Coal (2021); DFSI (2017); GA (2011); ASGC (2006)

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Regional context

Western Coal Services Project
Water Resources Impact Assessment
Figure 1.1

EMM
creating opportunities

WCS operations are spread across a number of sites (Figure 1.2). The main components are:

- SCSS – a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP;
- Kerosene Vale Stockpile Area – a coal stockpile area approved under SSD-5579, but managed day-to-day by Angus Place Colliery;
- an overland conveyor system extending from Springvale Mine's pit top to MPPS via SCSS to Lidsdale Siding;
- Mount Piper Haul Road – extending from Angus Place Colliery's pit top to MPPS;
- Wallerawang Haul Road – extending from Angus Place Colliery's pit top to Wallerawang Power Station;
- Link Haul Road – a private road to be constructed between the Mount Piper Haul Road and SCSS; and
- a residual waste stream pipeline – transferring residual waste material from SWTP to SCSS.

### 1.1.2 Springvale Coal Services Site water management system

The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

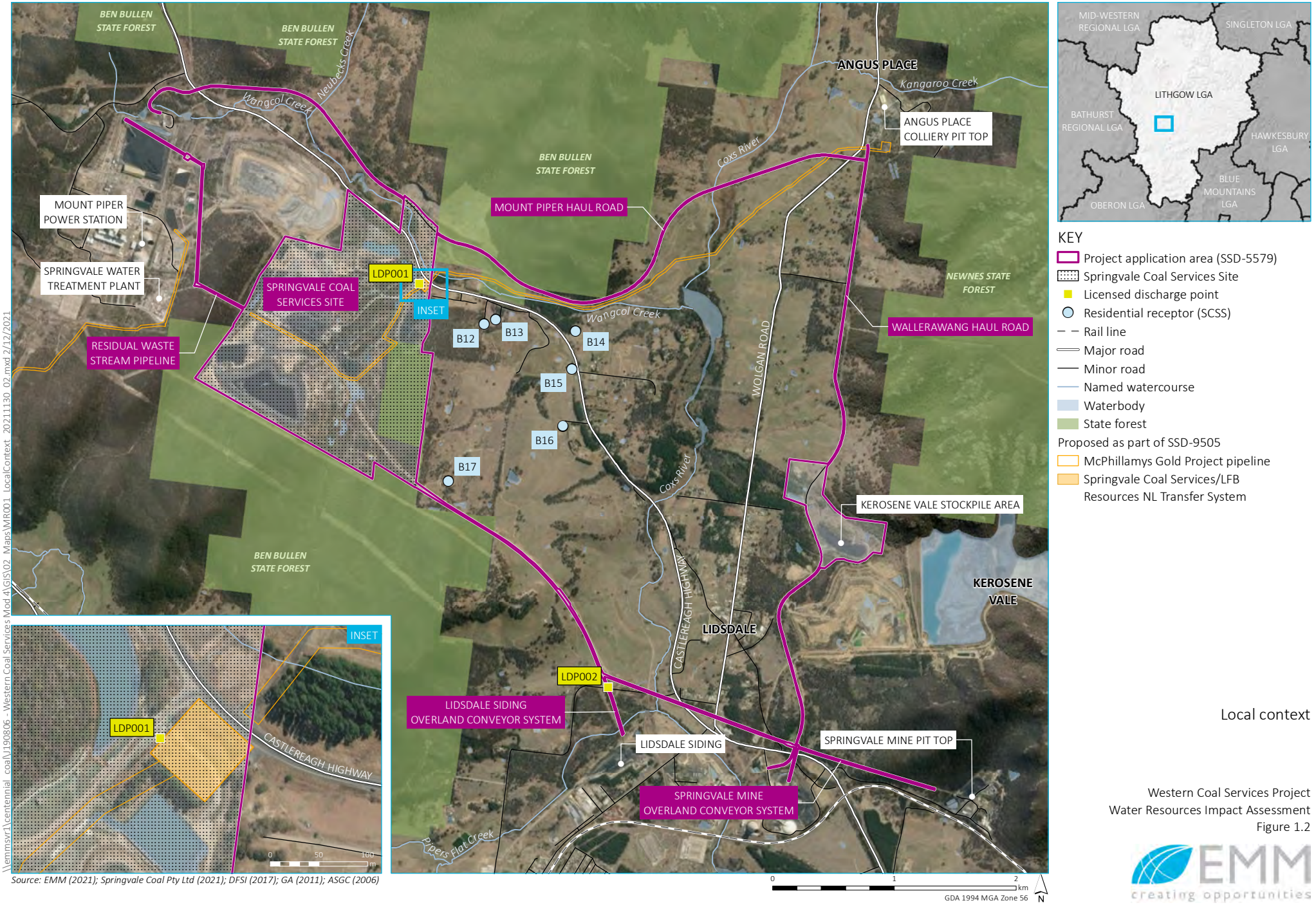
Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek (Figure 1.2). Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

LDP002 is not on-site at SCSS. It is on a drainage channel adjacent to the overland conveyors and transfer tower on Brays Lane (Figure 1.2) and receives runoff from the pad area surrounding the conveyor and transfer system. Discharges from LDP002 occur due to management requirements at the conveyor system. Water balance modelling indicates that discharges from LDP002 to Coxs River are relatively minor compared to LDP001 and are proportional to the small catchment areas contributing to LDP002 (Centennial 2020). No changes to LDP002 are proposed as part of the modification.

The primary objectives of the water management system at SCSS are to:

- provide a secure water supply for coal washing, washdown and dust suppression (including haul roads and coal stockpiles); and
- control the quantity and quality of water discharged into Wangcol Creek via LDP001.

The discharge of excess untreated groundwater into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted extensively with NSW Environment Protection Authority (EPA) regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek.







KEY

- Project application area (SSD-5579)
- Springvale Coal Services Site
- Licensed discharge point
- Residential receptor (SCSS)
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- State forest

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline
- Springvale Coal Services/LFB Resources NL Transfer System

Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)

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Local context

Western Coal Services Project
Water Resources Impact Assessment
Figure 1.2

EMM creating opportunities

### 1.1.3 Springvale Water Treatment Plant

The SWTP (SSD-7592) involves the transfer and treatment of water from existing underground mine dewatering facilities at Springvale Mine and Angus Place Colliery for beneficial reuse at MPPS. It was initiated to improve environmental outcomes for the Coxs River catchment (ie by eliminating mine water discharges at Springvale Mine and Angus Place Colliery).

### 1.1.4 McPhillamys Gold Project

Regis is seeking development consent for the construction and operation of McPhillamys Gold Project (SSD-9505). This is a proposed greenfield open cut gold mine and associated water supply pipeline in the Central West of NSW. The project comprises two key components:

- the mine site where the ore will be extracted and processed; and
- an associated water pipeline which will enable the supply water from near Lithgow to the mine site.

As part of the project, Regis proposes to construct a water pipeline to transfer water from three existing operations to supply water for the gold mine's operations. The water for the project (if approved and constructed) would be supplied from the following sources:

- untreated mine water currently discharged from SCSS through LDP001 to Wangcol Creek;
- process and blowdown water from MPPS; and
- untreated mine water from Angus Place Colliery.

As part of the development application for McPhillamys Gold Project, Regis is seeking approval to construct and operate a pumping station and storage tank close to SCSS that will be used to transfer water from SCSS to the water pipeline (Springvale Coal Services/Regis transfer system on Figure 2.1).

## 1.2 Report objectives

This water resources impact assessment (WRIA) has been prepared to accompany the modification report and assesses the impacts of the proposed modification on existing surface water and groundwater receptors in the surrounding area. It characterises the existing environment, as relevant to surface water and groundwater, based on a combination of desktop-based assessments and field investigations. This WRIA provides commitments to ongoing monitoring and management measures to minimise impacts to surface water and groundwater.

The specific objectives of this WRIA are to:

- describe and characterise the existing surface water and groundwater environment;
- detail the proposed water management system at SCSS;
- identify and assess impacts to surface water and groundwater during construction of the proposed modification elements and ongoing operation of SCSS; and
- describe monitoring and management measures to minimise the impacts to surface water and groundwater resources associated with the construction of the proposed modification elements and ongoing operation of SCSS.

## 1.3 Report structure

An overview of the structure of the WRIA is provided below:

- **Executive summary** provides a brief overview of the proposed modification and the key findings of the assessment;
- **Chapter 1** introduces the key elements of the proposed modification and outlines the objectives of the assessment;
- **Chapter 2** describes the proposed modification in detail;
- **Chapter 3** describes the assessment requirements and provides an overview of relevant industry and government guidelines;
- **Chapter 4** provides a characterisation of the existing environment at SCSS;
- **Chapter 5** describes the existing and proposed water management system;
- **Chapter 6** provides monitoring data for surface water and groundwater resources;
- **Chapter 7** presents the water and salt balance for SCSS under existing and proposed conditions;
- **Chapter 8** assesses the impacts on surface water and groundwater resources;
- **Chapter 9** details proposed monitoring and management measures; and
- **Chapter 10** provides a summary of the proposed modification and assessment.

Several appendices provide supporting information and/or additional data as follows:

- **Appendix A** provides baseline surface water monitoring data;
- **Appendix B** provides baseline groundwater monitoring data; and
- **Appendix C** provides additional information about water and salt balance modelling.

# 2 Proposed modification

Springvale Coal proposes to modify SSD-5579 to allow:

- construction and operation of the SCSS Water Transfer System, consisting of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001;
- transfer of water from the SCSS Water Transfer System:
  - to the SCSS/Regis Transfer System for use at the McPhillamys Gold Mine;
  - to MPPS for treatment and reuse within the MPPS cooling water system;
- receipt of raw water from the Angus Place Water Transfer System for use in the coal preparation plant (or washery) at SCSS;
- changes to the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and to improve the quality of water discharged to Wangcol Creek;
- an increase in the capacity of the Washery Dam at SCSS; and
- administrative changes to Condition 45 of Schedule 3 of SSD-5579 to align with amendments to the NSW *Mining Act 1992* and NSW Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021 (Mining Amendment Regulation).

The upgrade of the water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will require a minor increase to the project application area.

Key components of WCS and elements of the proposed modification are labelled on Figure 1.2 and Figure 2.1.

It is not proposed to modify the approved handling, processing or transport operations, the limits on these activities, or the project life.

## 2.1 New SCSS Water Transfer System

The SCSS Water Transfer System will include the construction of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001. This infrastructure will be constructed on disturbed land adjacent to the proposed Springvale Coal Services/Regis transfer system (Figure 2.1).

## 2.2 Transfer of water to McPhillamys Gold Project

The SCSS Water Transfer System will be used to transfer up to 15.6 megalitres per day (ML/day) of water from SCSS to the proposed Springvale Coal Services/Regis transfer system (Figure 2.1). The transfer systems will facilitate the transfer of water to the proposed water pipeline (Figure 1.2) and will enable the supply of water from SCSS to McPhillamys Gold Project.

As well as supplying water to McPhillamys Gold Project, the proposed modification will reduce, and potentially at times remove, the need to discharge poor quality water from LDP001 to Wangcol Creek. If the gold mine and associated water transfer system are not approved/do not proceed, discharges from LDP001 to Wangcol Creek will continue.

## 2.3 Transfer of water to MPPS

It is proposed to transfer up to 2.6 ML/day of water from the SCSS Water Transfer System at SCSS to MPPS for treatment and reuse. This water is currently discharged through LDP001. This will generally reduce the volume of water discharged through LDP001 and provide spare capacity to discharge water from LDP001 under non-routine water management conditions.

Water transferred to MPPS will be temporarily stored within Pond D at MPPS prior to treatment within MPPS's brine concentrators (Figure 2.1). Permeate from the water treatment process will be transferred to MPPS's cooling water system with brine used to condition ash prior to emplacement within MPPS's ash emplacement areas.

The temporary storage of water within Pond D, treatment of water within MPPS's brine concentrators, transfer of permeate to MPPS's cooling water system and management of brine will require a modification the development consent for SWTP (SSD-7592).

This aspect of the proposed modification is subject to the successful conclusion of ongoing commercial discussions between Springvale Coal and EnergyAustralia.

## 2.4 Receipt of water from Angus Place Colliery

An offtake from the Angus Place Colliery Raw Water Pipeline will be constructed. Once constructed, the offtake will allow up to 2.6 ML/day of water from Angus Place Colliery to be used to supplement the washery water supply at SCSS.

Water from Angus Place Colliery is of a higher quality than water currently used on-site at SCSS. The receipt of water from Angus Place Colliery and its use in coal handling and preparation activities at SCSS is expected to improve the quality of water managed within the reject emplacement area (REA) and discharged from LDP001, as this water will be blended with water currently used on-site.

## 2.5 Redesign of SCSS's water management system

The proposed modifications to the water management system at SCSS are:

- Transfer of approximately 50.6 ha of the existing surface water catchment at SCSS to EnergyAustralia as part of the transfer of land from Springvale Coal back to EnergyAustralia. As a result, management of SHG1, H Pit East, H Pit West and Council Pit will be transferred to EnergyAustralia.

- Construction and operation of the Huon Clean Water Pond, which will intercept the clean water catchment of Huon Gully upstream of SHG1 and transfer it to Wangcol Creek via the Lamberts Gully clean water diversion.

- Construction and operation of two new dirty water ponds:

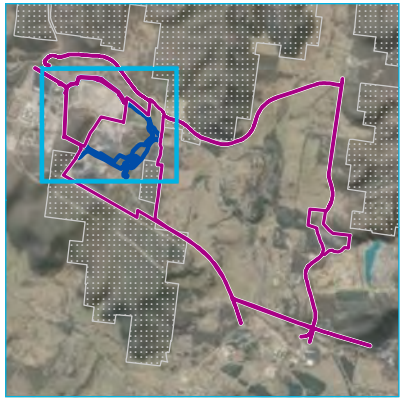
    - DWP-A will be constructed downslope and to the north of the Huon Clean Water Pond to capture dirty water from the coal conveyor corridor and prevent runoff flowing north onto EnergyAustralia's land.

    - DWP-B will be constructed upstream of Cooks Dam and will provide additional dirty water storage capacity at SCSS.

- Extension of the dewatering pipeline from the Transfer Tower 3 or TT03 sump to DWP-A.

- Construction and operation of a bi-directional pipeline between SCSS and MPPS. The pipeline will facilitate the proposed transfer of water to MPPS.
- Construction and operation of an offtake from the Angus Place Colliery Raw Water Pipeline to facilitate the proposed transfer of water from Angus Place Colliery to SCSS.
- Construction and operation of associated pumping, pipelines and drainage channels.
- Increase the capacity of the Washery Dam to 6.1 ML. The material excavated from the Washery Dam during desilting and maintenance works will be utilised on-site at SCSS as part of ongoing rehabilitation works.

Key elements of the proposed modification are labelled on Figure 2.1.



KEY

- Proposed project application area
- Construction envelope
- Springvale Coal Services Site
- Licensed discharge point
- Mt Piper Power Station Pond D
- Surface water catchment to be managed by Energy Australia

Proposed modification elements

- Bidirectional pipeline
- Offtake from Angus Place Raw Water Pipeline Project
- General flow direction
- Huon Clean Water Pond
- DWP-A
- DWP-B

Proposed modification area

- Regis and EnergyAustralia water transfer system area
- DWP-B area
- Angus Place water offtake and transfer system area
- DWP-A and clean water diversion area

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline easement
- Springvale Coal Services Site/Regis Transfer System

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- State forest

Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); GA (2011)

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## Proposed modification elements

Western Coal Services Project
Water Resources Impact Assessment
Figure 2.1

EMM creating opportunities

# 3 Assessment framework

## 3.1 Relevant legislation

### 3.1.1 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places which are defined as 'matters of national environmental significance' (MNES). The EPBC Act was amended in June 2013 to include water resources as a MNES in relation to coal seam gas and large coal mining developments (known as the 'water trigger'). Any action that 'has, will have or is likely to have a significant impact on a matter of national environmental significance' is deemed a 'controlled action' under the EPBC Act and may not be undertaken without prior approval from the Commonwealth Environment Minister.

As the proposed modification does not involve extraction of coal, in accordance with the EPBC Act, it is not within the definition of a 'large coal mining development' and the water trigger does not apply. Therefore, a referral under the EPBC Act for assessment and approval is not required.

### 3.1.2 NSW *Protection of the Environment Operations Act 1997*

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) is administered by EPA, which is the primary environmental regulator for NSW. Under the POEO Act, an EPL is required for 'scheduled activities', generally activities with potentially significant environmental impacts. Licence conditions may relate to pollution prevention and monitoring and can control the air, noise, water and waste impacts of an activity.

SCSS is a scheduled premise covered by EPL 21229, which is held by Springvale Coal. Water is licensed to be discharged from SCSS through LDP001 to Wangcol Creek. LDP001 is at the downstream extent of Lamberts Gully on the overflow point of a broad crested weir, as shown in Figure 1.2, and receives overflows from Cooks Dam.

No volumetric discharge limits are specified by EPL 21229 for LDP001. The volume of discharge is monitored daily (during discharge) by in-line instrumentation. Water quality limits specified by EPL 21229 are provided in Table 3.1. Water quality monitoring of electrical conductivity (EC); dissolved iron, manganese, nickel and zinc; oil and grease; pH; total suspended solids (TSS); and turbidity is also required monthly (during discharge).

**Table 3.1 Licensed discharge point 1 water quality concentration limits**

| Parameter | Units | 100th percentile concentration limits |
|---|---|---|
| Oil and grease | mg/L | 10 |
| pH | pH units | 6.5–8.5 |
| TSS | mg/L | 30 |
| Turbidity | NTU | 50 |

Key conditions of EPL 21229 relevant to water management include:

- Condition L2.5 – the water quality concentration limits do not apply when discharge occurs solely as a result of a rainfall event measured at SCSS which exceeds 56 mm over any consecutive five-day period;

- Condition L2.6 – the concentration limit for TSS is deemed not to have been breached if the water discharged complies with the turbidity limit and the EPA is advised within three working days of the completion of sample testing and analysis of any results above the licence limit;

- Condition L3.1 – allows for residuals from primary treatment of mine water from the SWTP to be disposed at SCSS;

- Condition O5.1 – requires Cooks Dam to be dewatered to maintain the design capacity within five days following rainfall; and

- Condition O5.3 – all sediment basins must be desilted to retain the design storage capacity.

Springvale Coal has consulted extensively with EPA regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. EPA issued Springvale Coal with a pollution reduction program (PRP) on 18 December 2020 following on from previous PRPs to evaluate options for the long-term management of water being discharged from LDP001 at SCSS into Wangcol Creek. The PRP required a preferred project report to be lodged with EPA detailing the preferred option for managing water currently discharged through LDP001. Centennial submitted a preferred project report in January 2021 that outlined elements of the proposed modification presented in Chapter 2 that will reduce the volume and pollutant load of LDP001 discharges into Wangcol Creek.

### 3.1.3 NSW *Water Management Act 2000*

The NSW *Water Management Act 2000* (WM Act) is based on the principles of ecologically sustainable development and the need to share and manage water resources for future generations. The WM Act recognises that water management decisions must consider economic, environmental, social, cultural and heritage factors. It recognises that sustainable and efficient use of water delivers economic and social benefits to the state of NSW. The WM Act provides for water sharing between different water users, including environmental, basic landholder rights and licence holders. The licensing provisions of the WM Act apply to those areas where a water sharing plan (WSP) has commenced.

WSPs are statutory documents that apply to one or more water sources. They define the rules for sharing and managing water resources within water source areas. WSPs describe the basis for water sharing and document the water available and how it is shared between environmental, extractive and other uses. The WSPs outline the water available for extractive uses within different categories, such as local water utilities, domestic and stock, basic landholder rights, irrigation and industrial uses.

The WSPs relevant to SCSS are:

- *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011* – the Wywandy Management Zone within the Upper Nepean and Upstream Warragamba Water Source applies to the surface water in the vicinity of SCSS; and

- *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011* – the Sydney Basin Coxs River Groundwater Source applies to groundwater in the Hawkesbury Sandstone and deeper porous rocks in the vicinity of SCSS.

### 3.1.4 NSW *Water NSW Act 2014*

The NSW *Water NSW Act 2014* defines the functions and objectives of WaterNSW, which is a State-owned corporation formed in 2015 from the merger of the Sydney Catchment Authority and State Water Corporation. WaterNSW is Australia's largest bulk water supplier and NSW's major supplier of raw water.

The principle objectives of WaterNSW under the *Water NSW Act 2014* are:

- to capture, store and release water in an efficient, effective, safe and financially responsible manner;
- to supply water in compliance with appropriate standards of quality;
- to ensure that declared catchment areas and water management works in such areas are managed and protected so as to promote water quality, the protection of public health and public safety and the protection of the environment;
- to provide for the planning, design, modelling and construction of water storages and other water management works; and
- to maintain and operate the works of WaterNSW efficiently and economically and in accordance with sound commercial principles.

The proposed modification involves discharge of water within the upper Coxs River catchment, which is part of the Sydney drinking water catchment. A key responsibility of WaterNSW is identifying and managing impacts on water quality in the declared catchment areas. In order to protect water quality, the Water NSW Regulation 2013 provides for regulatory powers to manage pollution activities that potentially impact water quality.

### 3.1.5 NSW *Dam Safety Act 2015* and Dam Safety Regulation 2019

The NSW *Dams Safety Act 2015* establishes Dams Safety NSW as an independent regulator charged with ensuring that any risks to public safety, the environment and economic assets that dams create are at an acceptable level to the community. A dam may be declared if it has a dam wall higher than 15 m, or if it would cause major or catastrophic damage or loss or endanger the life of a person if it failed.

The objects of the *Dams Safety Act 2015* are:

(a) to ensure that any risks that may arise in relation to dams (including any risks to public safety and to environmental and economic assets) are of a level that is acceptable to the community;

(b) to promote transparency in regulating dam safety;

(c) to encourage proper and efficient management in matters relating to dams safety; and

(d) to encourage the application of risk management and the principles of cost benefit analysis in relation to dams safety.

Under Part 3 of the Dam Safety Regulation 2019, the owner of a declared dam must undertake a consequence assessment which describes the severity of damage and loss which may occur if the dam were to fail, and provide this information to Dam Safety NSW.

Under Part 4 of the regulation, a declared dam owner must create operation and maintenance plans and emergency management plans. The operation and maintenance plans describe details such as operating procedures, alarms and trigger levels, and security arrangements, while the emergency management plans describe the consequence category, dam construction, circumstances which may cause the dam to fail, descriptions of emergency warning systems, and emergency procedures.

Following completion of the detailed design for DWP-B, the dam design and a consequence assessment was submitted to Dam Safety NSW for assessment. If Dam Safety NSW determines the dam to be a declared dam, operation and maintenance plans and emergency management plans will be prepared and submitted to Dam Safety NSW prior to commissioning of the dam.

## 3.2 Relevant policies

### 3.2.1 State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

The aims of State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 (the SEPP) are:

1. to provide for healthy water catchments that will deliver high quality water while permitting development that is compatible with that goal;

2. to provide that a consent authority must not grant consent to a proposed development unless it is satisfied that the proposed development will have a neutral or beneficial effect on water quality; and

3. to support the maintenance or achievement of the water quality objectives for the Sydney drinking water catchment.

The SEPP specifically requires all proposed developments in the Sydney drinking water catchment to demonstrate a neutral or beneficial effect (NorBE) on water quality. It is noted that clause 10 of the SEPP, which requires a NorBE on water quality to be achieved, does not strictly apply to the modification of a development consent (DPE 2017). However, it is recognised that the intention of the SEPP is to protect the Sydney drinking water catchment and as a result the objectives of NorBE on water quality have been considered in this assessment.

### 3.2.2 State Rivers and Estuaries Policy

The NSW Government has an overarching policy to encourage the sustainable management of the natural resources of the State's rivers, estuaries and wetlands in order to halt or reduce:

- declining water quality;
- loss of riparian vegetation;
- damage to river banks and channels;
- declining natural productivity;
- loss of biological diversity; and
- declining natural flood mitigation.

To achieve these goals, the NSW Government seeks to encourage and promote projects and activities that will restore the quality of the river and estuarine systems.

The objectives of the NSW *State Rivers and Estuaries Policy* (NSW Water Resources Council 1993) are to manage the rivers and estuaries of NSW in ways which:

- slow, halt or reverse the overall rate of degradation in the systems;
- ensure the long-term sustainability of their essential biophysical functions; and
- maintain the beneficial use of the resources.

Therefore, adoption of the NSW *State Rivers and Estuaries Policy* (NSW Water Resources Council 1993) means that the sustainability of the river and estuarine resources, their biophysical functions and environmental values are given explicit consideration in resource management decision making.

### 3.2.3 NSW Aquifer Interference Policy

The NSW *Aquifer Interference Policy* (AIP) (DPI 2012) defines the regime for protecting and managing the impacts of aquifer interference activities on NSW's water resources. The AIP requires consideration of the potential impacts of an aquifer interference activity in respect to the water table, water pressure and water quality. Proponents must estimate the water take (including incidental take) from each water source and connected water sources. Changes to water table, water pressure and water quality are assessed against minimal impact considerations for each water source.

The AIP defines water sources as being either 'highly productive' or 'less productive' based on levels of salinity and average available yields. The AIP categorises water sources by lithological character, being one of alluvium, coastal sand, porous rock or fractured rock, and identifies thresholds for minimal impact considerations. Based on the NSW Government's mapped areas of groundwater productivity in NSW (NOW 2013), the project application area is within a 'less productive' groundwater area. Applicable minimal harm considerations for the proposed modification have been reproduced in Table 3.2.

If an activity is assessed as being 'minimal impact' or the impacts are no more than the accuracy thresholds of the model, then it is defined as a 'minimal impact'. Where impacts are predicted to be 'greater than minimal impact' but additional studies show that impacts, although greater than 'minimal', do not prevent the long-term viability of the relevant water dependent asset, then the impacts will be defined as 'acceptable'. Where impacts are predicted to be 'greater than minimal impact' and the long-term viability of the water dependent asset is compromised, then the impact is subject to 'make good' provisions.

**Table 3.2 Minimal impact criteria for 'less productive' porous rock water source**

| Water table | Water pressure | Water quality |
|---|---|---|
| 1. Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 m from any:<br>(a) high priority groundwater dependent ecosystem; or<br>(b) high priority culturally significant site;<br>listed in the schedule of the relevant water sharing plan.<br>A maximum of a 2 m decline cumulatively at any water supply work. | 1. A cumulative pressure head decline of not more than a 2 m decline, at any water supply work. | 1. Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity. |
| 2. If more than 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 m from any:<br>(a) high priority groundwater dependent ecosystem; or<br>(b) high priority culturally significant site;<br>listed in the schedule of the relevant water sharing plan then appropriate studies (including the hydrogeology, ecological condition and cultural function) will need to demonstrate to the Minister's satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or significant site.<br>If more than a 2 m decline cumulatively at any water supply work then make good provisions should apply. | 2. If the predicted pressure head decline is greater than requirement 1 above, then appropriate studies are required to demonstrate to the Minister's satisfaction that the decline will not prevent the long-term viability of the affected water supply works unless make good provisions apply. | 2. If condition 1 is not met then appropriate studies will need to demonstrate to the Minister's satisfaction that the change in groundwater quality will not prevent the long-term viability of the dependent ecosystem, significant site or affected water supply works. |

Source: DPI (2012).

## 3.3 Relevant guidelines

### 3.3.1 Erosion and sediment control guidelines

*Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom 2004) outlines the basic principles for the design, construction and implementation of sediment and erosion control measures to improve stormwater management and mitigate the impacts of land disturbance activities on soils and receiving waters.

Additional guidelines on specific aspects of development and the application of erosion and sediment controls are also available. *Managing Urban Stormwater: Soils and Construction – Volume 2E Mines and Quarries* (DECC 2008) provide specific guidelines, principles and minimum design standards for good management practice in erosion and sediment control during the construction and operation of mines and quarries.

### 3.3.2 NSW water quality and river flow objectives

The *NSW Water Quality and River Flow Objectives* (DECCW 2006) provide agreed environmental values and long-term targets for water quality and river flow in each catchment in NSW. The objectives are intended to be considered in assessing and managing the potential impacts of activities associated with waterways.

Water quality objectives have been agreed for fresh and estuarine surface waters and are consistent with the national framework for assessing water quality provided in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018). River flow objectives are the agreed high-level goals for surface water flow management that identify the key elements of the flow regime that protect river health and water quality for ecosystems and human uses.

SCSS is within the Hawkesbury-Nepean catchment. Although there are no specified objectives for this catchment, the typical water quality and river flow objectives for uncontrolled streams in other catchments in NSW are provided in Table 3.3 for reference.

**Table 3.3 Water quality and river flow objectives**

| Environmental value | Objective | Application to proposed modification |
|---|---|---|
| **Water quality objectives** | | |
| Aquatic ecosystems | Maintaining or improving the ecological condition of water bodies and their riparian zones over the long term. | There are aquatic ecosystems downstream of SCSS. The protection of aquatic ecosystems is the primary water quality objective. |
| Visual amenity | Aesthetic qualities of waters. | There are no public views or access to waterways adjacent to SCSS or immediate downstream areas. |
| Secondary contact recreation | Maintaining or improving water quality for activities such as boating or wading, where there is a low probability of water being swallowed. | There is no public access to waterways adjacent to SCSS or immediate downstream areas. |
| Primary contact recreation | Maintaining or improving water quality for activities such as swimming in which there is a high probability of water being swallowed. | There is no public access to waterways adjacent to SCSS or immediate downstream areas. |
| Livestock water supply | Protecting water quality to maximise the production of healthy livestock. | Some downstream users may extract water from downstream waterways for agricultural purposes. |

## Table 3.3 Water quality and river flow objectives

| Environmental value | Objective | Application to proposed modification |
|---|---|---|
| Irrigation water supply | Protecting the quality of waters applied to crops or pasture. | Some downstream users may extract water from downstream waterways for agricultural purposes. |
| Homestead water supply | Protecting water quality for domestic use in homesteads, including drinking, cooking and bathing. | It is unlikely that any downstream users extract downstream waterways for homestead water supply. |
| Drinking water at point of supply – disinfection only | These objectives apply to all current and future licensed offtake points for town water supply and to specific sections of rivers that contribute to drinking water storages or immediately upstream of town water supply offtake points. The objectives also apply to sub-catchments or groundwater used for town water supplies. | SCSS is within Sydney's drinking water catchment. Receiving waterways drain to Warragamba Dam via the Coxs River system. |
| Drinking water at point of supply – clarification and disinfection | | |
| Drinking water at point of supply – groundwater | | |
| Aquatic foods (cooked) | Refers to protecting water quality so that it is suitable for the production of aquatic foods for human consumption and aquaculture activities. | Recreational fishers may use downstream waterways. However, the trigger values for aquatic foods apply to aquaculture not recreational fishing. The required level of protection will be provided by the objective for aquatic ecosystems. |
| **River flow objectives** | | |
| Protect pools in dry times | Protect natural water levels in pools of creeks and rivers and wetlands during periods of no flows. | The flow regimes of downstream waterways have been extensively modified by land clearing, agriculture, extractive activities and urban and industrial development in the catchment. |
| Protect natural low flows | Share low flows between the environment and water users and fully protect very low flows. | |
| Protect important rises in water levels | Protect or restore a proportion of moderate flows and high flows. | |
| Maintain wetland and floodplain inundation | Maintain or restore the natural inundation patterns and distribution of floodwater supporting natural wetland and floodplain ecosystems. | |
| Maintain natural flow variability | Maintain or mimic natural flow variability in all streams. | |
| Manage groundwater for ecosystems | Maintain groundwater within natural levels and variability, critical to surface flows and ecosystems. | |
| Minimise effects of weirs and other structures | Minimise the impact of instream structures. | The Huon Clean Water Pond and DWP-A (Figure 2.1) are proposed to be constructed on Huon Gully to direct runoff from Huon Gully to Wangcol Creek via the Lamberts Gully clean water diversion. |

### 3.3.3 Australian and New Zealand guidelines for fresh and marine water quality

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018) provides guidance on monitoring, assessing and managing ambient water quality in a wide range of water resource types and according to specified environmental values, such as aquatic ecosystems, primary industries, recreation and drinking water. The guidelines provide a framework for:

- establishing water quality objectives;
- assessing and managing water quality for environmental values; and
- establishing protection levels, water quality indicators and trigger values.

Environmental values associated with the waterways and water sources surrounding the site include primary industry, aquatic ecosystems, recreational users, irrigation and stock watering. Surface water resources in the vicinity of SCSS are considered to be 'slightly to moderately disturbed' systems, due to the impact of disturbance in the catchment associated with past and ongoing agriculture, extractive activities and urban development. SCSS is also classified as an 'upland river' as the elevation of the receiving environment is more than 150 m.

Surface water quality monitoring results have been compared to site-specific guideline values (SSGVs) derived for the receiving environment for the protection of aquatic ecosystems within the *Western Coal Services Water Management Plan* (WMP; Centennial 2020), as shown in Table 3.4. SSGVs were derived based on a review of default guideline values recommended by ANZG (2018) for slightly to moderately disturbed systems and historical water quality monitoring of an upstream reference site (Centennial 2020).

**Table 3.4 Site-specific guideline values for the assessment of surface water quality**

| Parameter | Units | Site-specific guideline value |
|---|---|---|
| **Physical and chemical stressors** | | |
| pH | pH units | 6.5-9[a] |
| TSS | mg/L | 25[a] |
| Turbidity | NTU | 35[a] |
| **Nutrients** | | |
| Ammonia | mg/L | 0.04[a] |
| Total nitrogen | mg/L | 0.5[a] |
| Total phosphorus | mg/L | 0.08[a] |
| **Dissolved metals** | | |
| Aluminium | mg/L | 0.24[a] |
| Arsenic | mg/L | 0.013[b] |
| Boron | mg/L | 0.94[c] |
| Cadmium | mg/L | 0.0026[q] |
| Chromium | mg/L | 0.001[b] |
| Cobalt | mg/L | 0.0014[b] |
| Copper | mg/L | 0.0014[b] |
| Iron | mg/L | 0.31[a] |

**Table 3.4 Site-specific guideline values for the assessment of surface water quality**

| Parameter | Units | Site-specific guideline value |
|---|---|---|
| Lead | mg/L | 0.0034[b] |
| Manganese | mg/L | 1.9[a] |
| Mercury | mg/L | 0.00006[b] |
| Nickel | mg/L | 0.125[a] |
| Selenium | mg/L | 0.011[a] |
| Zinc | mg/L | 0.091[a] |
| **Other** | | |
| Cyanide | mg/L | 0.007[b] |

Notes: 1. Value from WMP (Centennial 2020).
2. Value from ANZG (2018) for slightly-moderately disturbed systems.
3. Value from WMP updated to reflect changes to DGV by ANZG (2018).

### 3.3.4 Neutral or beneficial effect on water quality assessment guideline

Guidelines for the assessment of a NorBE on water quality have been published by WaterNSW (2021) and provide clear direction on what a NorBE means, how to achieve it and how to assess an application. As defined by the guidelines (WaterNSW 2021), a NorBE on water quality is demonstrated when a project:

- has no identifiable potential impact on water quality; or
- will contain any water quality impact on the development site and prevent it from reaching any watercourse, waterbody or drainage depression on the site; or
- will transfer any water quality impact outside the site to a location where it is treated and disposed of to a standard approved by the consent authority.

The type and complexity of the development determines the type and extent of information needed to demonstrate that a development has a NorBE on water quality.

The NorBE assessment undertaken for the proposed modification is summarised in Section 8.3.2.

### 3.3.5 Guidelines for Groundwater Quality Protection in Australia

The *Guidelines for Groundwater Quality Protection in Australia* (DAWR 2013) is part of the National Water Quality Management Strategy and provides a risk-based management framework to protect and enhance groundwater quality for the maintenance of specified environmental values. The framework involves the identification of specific beneficial uses and values for the major groundwater systems, and several protection strategies that can emerge to protect each aquifer, including monitoring for all aquifers.

### 3.3.6 Guidelines for controlled activities on waterfront land

The WM Act defines waterfront land as the bed of any river, lake or estuary and any land within 40 m of the riverbanks, lake shore or estuary mean high water mark. Works undertaken on waterfront land require a controlled activity approval, unless defined as exempt. Guidelines for controlled activities have been prepared by the former NSW Office of Water (NOW) (2012a; 2012b). These guidelines provide information on the design and construction of a controlled activity and other ways to protect waterfront land.

As WCS is categorised as SSD, controlled activity approvals are not required under Section 4.41(1)(g) of the EP&A Act. Notwithstanding, the guidelines for controlled activities have been considered for proposed works on Huon Gully associated with DWP-A and Huon Clean Water Pond.

### 3.3.7 Bunding and spill management guidelines

The following NSW Government guidelines detail best practice storage, handling and spill management procedures for liquid chemicals:

- *Liquid Chemical Storage, Handling and Spill Management: Review of Best Practice Regulation* (DEC 2005); and
- *Storing and Handling Liquids: Environmental Protection: Participant's Manual* (DECC 2007).

# 4 Project setting

## 4.1 Site description

SCSS is on the western slopes of the north-south oriented sandstone ridgeline of the Great Dividing Range, to the west of the Wollemi and Blue Mountains national parks that form part of the Greater Blue Mountains World Heritage Area (Figure 1.1). The nearest large regional urban centre is Lithgow, with other nearby residential areas including Wallerawang, Portland and Cullen Bullen. The region consists primarily of undulating hills and mountain tops, with some low-lying areas, particularly around the Coxs River. These low-lying areas have been cleared of natural vegetation for agricultural, commercial and industrial purposes, including coal and shale mining, forestry and power generation. There are a number of national parks and state forests in the region, including Ben Bullen State Forest and Wolgan State Forest to the north of SCSS and the Newnes State Forest to the east (Figure 1.2). Key operations in the vicinity of SCSS include Angus Place Colliery and Springvale Mine, MPPS and Lidsdale Siding Rail Loading Facility.

## 4.2 Topography

SCSS is within the gently undulating Coxs River valley. The terrain within SCSS is predominantly open and undulating, located on the valley floor with the elevation ranging from 900 m Australian Height Datum (AHD) at Wangcol Creek to the north to 985 m AHD at the southern boundary. Terrain to the south rises to 1,050 m AHD with the overall terrain sloping to the north-east.

## 4.3 Climate

Patched point climate data was obtained from the Scientific Information for Land Owners (SILO) database hosted by the Science Division of the Queensland Government's Department of Environment and Science. SILO patched point data consist of interpolated estimates based on historically observed data from Bureau of Meteorology (BOM) weather stations. For this assessment, SILO data was obtained for the Lidsdale (Maddox Lane) Station (BOM station 63132), which is approximately 3 km south-east of SCSS.

Table 4.1 presents key information and statistical data calculated from the SILO patched point data between 1889 and 2020. Figure 4.1 presents the average daily rainfall and evaporation rates on a monthly basis calculated from the SILO data.

**Table 4.1 Key climate statistics**

| Key annual statistic | Units | Rainfall | Evaporation |
|---|---|---|---|
| Average | mm/year | 749 | 1,191 |
| Minimum | mm/year | 346 | 951 |
| 5th percentile | mm/year | 462 | 1,052 |
| 10th percentile | mm/year | 517 | 1,114 |
| Median | mm/year | 734 | 1,179 |
| 90th percentile | mm/year | 973 | 1,306 |
| 95th percentile | mm/year | 1,105 | 1,368 |
| Maximum | mm/year | 1,484 | 1,577 |

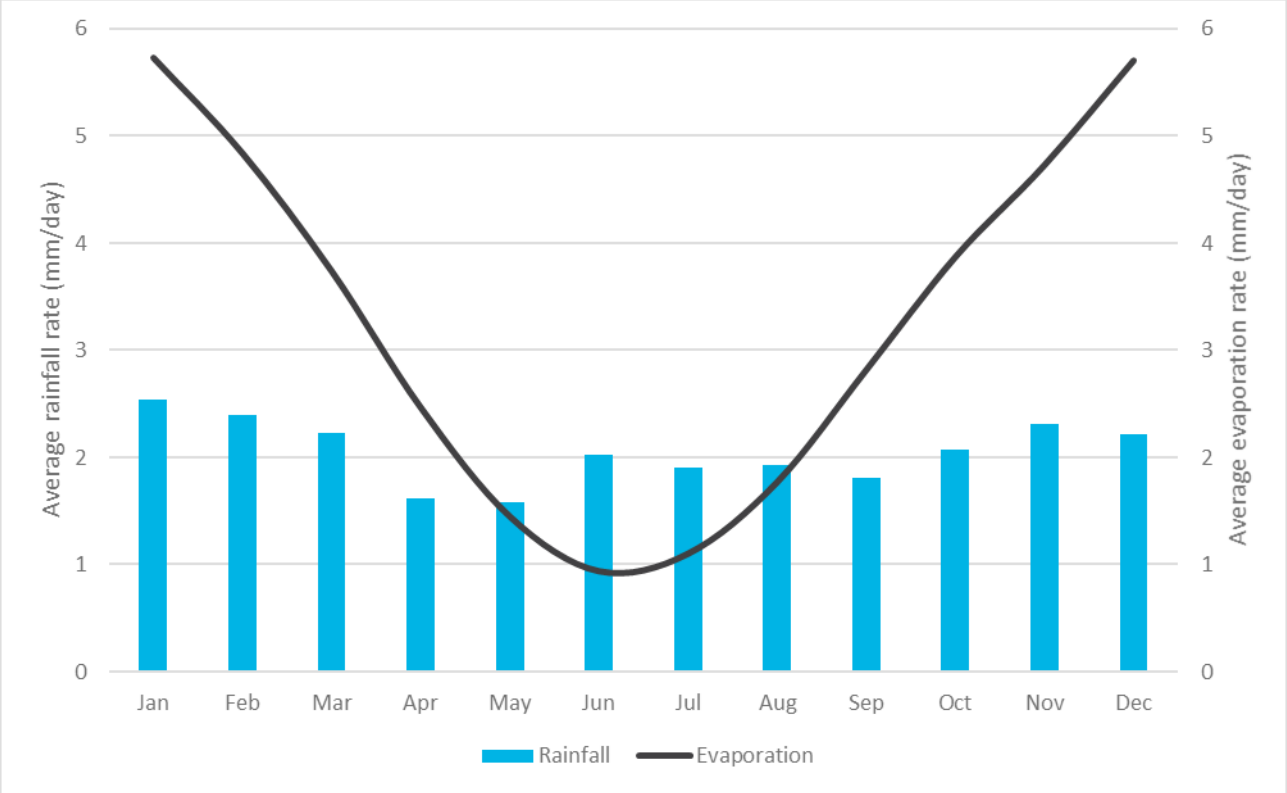


**Figure 4.1 Average daily rainfall and evaporation rates**

## 4.4 Geology

SCSS is in the southern part of the Western Coalfield, on the western edge of the Sydney Basin. The area is underlain by Permian Illawarra Coal Measures, which is underlain by Berry Siltstone of the Shoalhaven Group. The Triassic sandstone of the Narrabeen Group outcrops approximately 700 m to north-east of SCSS.

The stratigraphy at SCSS is summarised in Table 4.2. This information has been sourced from the *Western Coalfield (south) Regional 1:100,000 Geology Map* (Yoo 1992) and borehole logs.

The Sydney Basin is characterised by coal, shale and sandstone sedimentary beds of Permo-Carboniferous age. These form the gently dipping beds of the Illawarra Coal Measures, capped by shale and sandstone from the Wiannamatta and Narrabeen Group (Triassic period) and Basalt from the Tertiary period.

Directly below the Illawarra Coal Measures lies silty, coaly sedimentary rocks of the Nile Subgroup and sandy siltstone of the Berry Siltstone. Basement rocks of Western Sydney are folded Palaeozoic metamorphosed rocks of the Lachlan Fold Belt, Late Carboniferous granites and Early Permian Rylestone Volcanics.

The main geological unit in the area is the Cullen Bullen Subgroup of the Illawarra Coal Measures. The Lithgow Seam was the main target seam of the historical underground Western Main workings, which outcrops to the south of SCSS. The Lidsdale Seam overlies the Lithgow Seam and also outcrops to the south of SCSS and along Wangcol Creek to the north-east. The Irondale Seam outcrops to the north of SCSS and along the northern and southern slopes of the Wangcol Creek valley, including throughout SCSS. The Katoomba Seam outcrops north of SCSS.

Mapped areas of unconsolidated Quaternary alluvium occur along reaches of Wangcol Creek upstream of SCSS and there are deposits of alluvium along the Coxs River to the east and south-east of SCSS.

**Table 4.2 Stratigraphic sequence**

| Period | Stratigraphy | | | Lithology |
|---|---|---|---|---|
| | Group | Subgroup | Formation | |
| Quaternary | Alluvium | | | Silt, clay, sand, gravel |
| Permian | Illawarra Coal Measures | Charbon | Irondale Seam | Sandstone, claystone, coal, mudstone |
| | | | Long Swamp Formation | |
| | | Cullen Bullen | Lidsdale Seam | Clay, claystone, siltstone, mudstone, conglomerate |
| | | | Blackmans Flat Conglomerate | |
| | | | Lithgow Seam | |
| | | | Marangaroo Formation | |
| | Shoalhaven Group | | Berry Siltstone | Siltstone, lithic sandstone, conglomerate |
| Devonian | Metamorphic rocks | | | Quartzite, shale, sandstone, limestone, tuff |

## 4.5 Hydrology

The Coxs River is a perennial river that drains a catchment area of approximately 1,700 km$^2$ and is part of the greater Hawkesbury-Nepean catchment. The Coxs River catchment is bounded to the west by the Great Dividing Range, to the north by the upper Colo River catchment and to the south by the Wollondilly River catchment. The river rises within the Ben Bullen State Forest east of Cullen Bullen and flows generally in a south-east direction into Lake Burragorang (impounded by Warragamba Dam), which is the primary reservoir for drinking water supply to Sydney. The flow in the Coxs River is regulated by three reservoirs: Lake Wallace, Thompsons Creek Reservoir and Lake Lyell, which have historically been used to supply water for power generation activities at MPPS.

SCSS is within the catchment of Wangcol Creek, which is a perennial stream that has a catchment area in the order of 20 km$^2$. The creek is a fourth order stream in the vicinity of SCSS and joins the Coxs River approximately 3 km to the east of SCSS and north of Lidsdale Village at the historical Commonwealth Mine open cut void known as 'Blue Lake'. Wangcol Creek is a highly modified stream that has been subject to diversions and instream impacts, such as mining, with its condition varying from partly vegetated to cleared and degraded lands. Historically, Wangcol Creek has flowed intermittently in response to rainfall. Flows are now influenced by discharges from groundwater and SCSS, creating a more constant flow.

A small number of tributaries enter Wangcol Creek, including Huon Gully and Lamberts Gully, which have headwaters in cleared land, mining areas or the Ben Bullen State Forest. The runoff from upstream of SCSS concentrates in Huon Gully on the west of SCSS and Lamberts Gully to the east. Both Huon Gully and Lamberts Gully are third order streams within SCSS. The headwaters of these drainage lines are in undisturbed forest to the south of SCSS. The hydrology of SCSS has been significantly modified due to historical open cut and underground mining and related activities. The natural watercourse in Huon Gully now terminates at SCSS storage SHG1, as the gully has been disturbed by open cut mining and the downstream reach has been truncated by the Lamberts North ash emplacement area at MPPS. Lamberts Gully is intercepted by sediment control dams within SCSS, which discharge to Wangcol Creek.

Watercourses in the vicinity of SCSS are presented in Figure 4.2.

KEY

- Proposed project application area
- Construction envelope
- Springvale Coal Services Site
- Licensed discharge point
- Major road
- Minor road
- Waterbody
- State forest

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order

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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)*

0 0.5 1 km

GDA 1994 MGA Zone 56

N

## Watercourses

Western Coal Services Project
Water Resources Impact Assessment
Figure 4.2

EMM creating opportunities

## 4.6 Hydrogeology

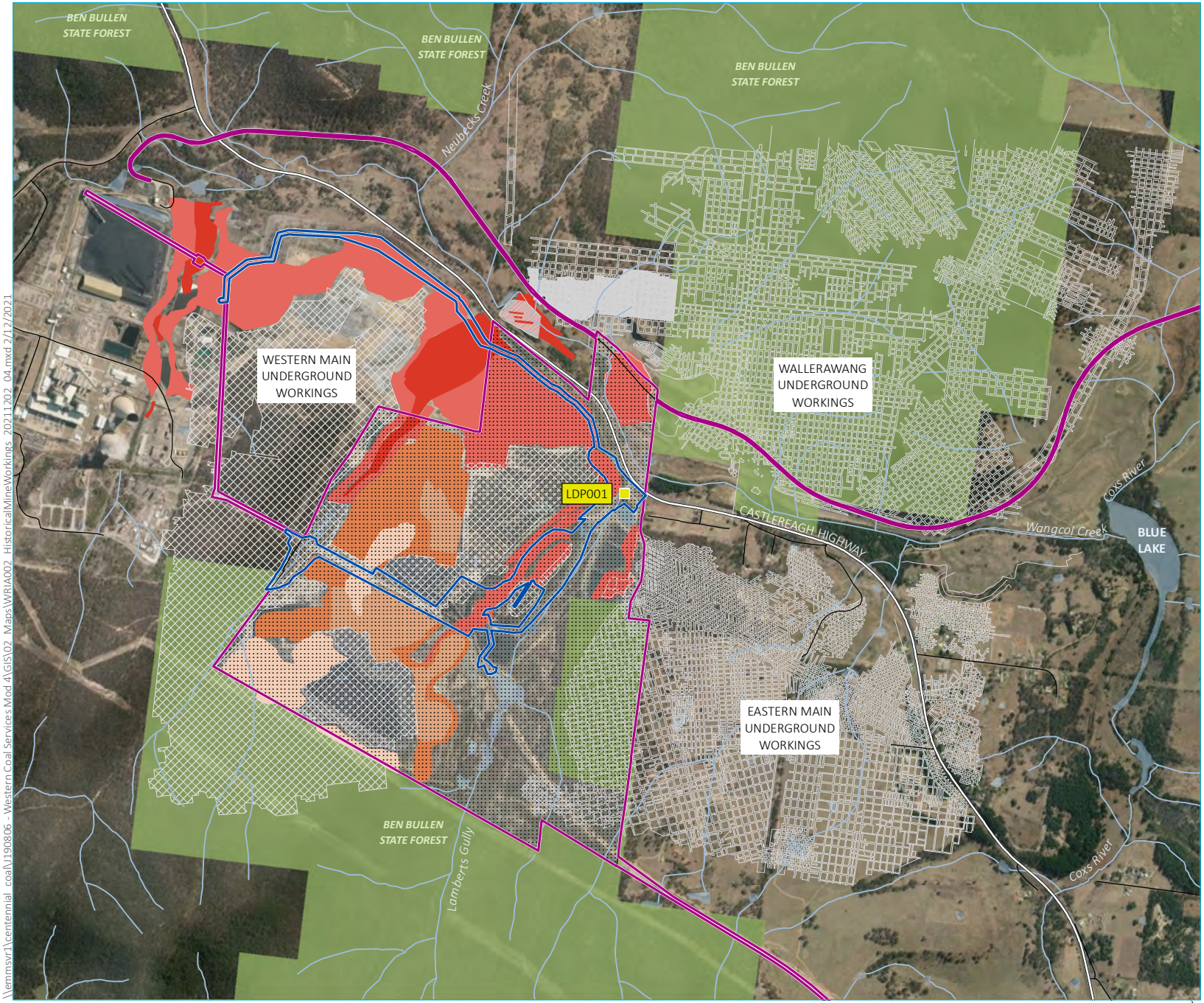
The local hydrogeology at SCSS is highly modified due to activities associated with historical mining, including underground and open cut workings and backfilling of open cut voids. The geological conditions present within the vicinity of SCSS create a range of aquifer systems associated with higher permeability sandstones and coal seams. These are likely separated by lower permeability aquitards associated with mudstones, claystones and shale layers.

Local groundwater flow is influenced by the collection and channelling of infiltrated water into underground mine voids and backfilled areas. Historical mine workings include the Western Main workings under SCSS, the Eastern Main workings east of SCSS and the Wallerawang workings north of SCSS, as shown in Figure 4.3. Open cut workings were undertaken as part of the Western Main and Lamberts Gully mining operations within and surrounding SCSS. Open cut mining involved extraction down to the floor of the Lithgow Seam, including extraction of remining pillars from the Western Main underground workings. Following open cut extraction, the voids were generally backfilled.

Shallow sandstone aquifers are predominant across SCSS and are expected to be associated with the Gap and Ivanhoe sandstone units. These aquifers are likely to be weathered in their near-surface profile, resulting in relatively high permeability with potential for significant hydraulic connection with surface water features, including Wangcol Creek.

Groundwater flow in the deeper strata, including the Marrangaroo Formation and in the underlying weathered sandstone, siltstone and shale of the Berry Siltstone, is generally to the north-east following the dip of the strata. Within shallow strata, groundwater levels generally correspond to topography, with higher groundwater levels in elevated areas and lower groundwater levels along valleys and drainage lines.

The mudstone and siltstone units that are present between the primary coal seams and sandstones throughout the profile significantly retard vertical flow between aquifer units. Much of this material has been extracted through historical mining activities.




\\emmsvr1\centennial coal\J190806 - Western Coal Services Mod 4\GIS\02 Maps\WRIA002 HistoricalMineWorkings 20211202 04.mxd 2/12/2021

Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)

Historical mine workings

Western Coal Services Project
Water Resources Impact Assessment
Figure 4.3

EMM creating opportunities

# 5 Water management

## 5.1 Definitions

Surface water and groundwater described in this report has been categorised as follows, based on water quality and intended use:

- clean water – surface water runoff from undisturbed areas and where there is no coal storage, transportation, handling or processing and therefore is unlikely to be contaminated with coal fines or sediment;
- dirty water – surface water runoff from disturbed areas and areas with the potential to contain suspended sediment, oils, grease and hydrocarbons as well as coal-contact water (mine water) from areas where coal storage, transportation, handling or processing occurs;
- groundwater – water removed from below the ground level, either directly via a bore or passive interception at the surface;
- Angus Place Colliery mine water – water that has been imported from the Angus Place Colliery underground storage for the purposes of beneficial reuse within the washery at SCSS;
- potable water – water that is of a suitable quality for drinking sourced from Lithgow City Council; and
- wastewater – water produced by on-site amenities (ie sewage).

## 5.2 Existing operations

Figure 5.1 presents the existing water management system at SCSS. A schematic of the water management system is presented in Figure 5.2.

Existing water management is described in detail in the WMP, with the following sections providing a brief overview for understanding within the context of the proposed modification.

### 5.2.1 Clean water management

Clean water diversions have been progressively implemented at SCSS to divert clean catchment runoff away from disturbed areas. This is continuing with further separation of coal processing catchments and disturbed catchments that are undergoing rehabilitation. The clean water diversions have been designed to cater for a minimum of a 5% annual exceedance probability (AEP) event (dependent upon water levels in upstream storages at the start of the event).

There is currently only one clean water storage at SCSS, which is the Final Polishing Lagoon (previously known as the Retention Pond). This storage currently collects clean catchment runoff from a large proportion of SCSS and forms part of the ongoing rehabilitation program of Lamberts Gully. The waterway of Lamberts Gully, as part of the clean water diversion works, has been diverted through the Final Polishing Lagoon. The overflow of the Final Polishing Lagoon was modified to connect to Wangcol Creek downstream of LDP001, effectively removing clean catchment runoff from reporting to LDP001.

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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)*

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Springvale Coal Services Site
- Licensed discharge point
- TT03 sump pipeline
- Surface water flowpath (clean)
- Surface water flowpath (dirty)
- Surface water storage
- Major road
- Minor road
- State forest

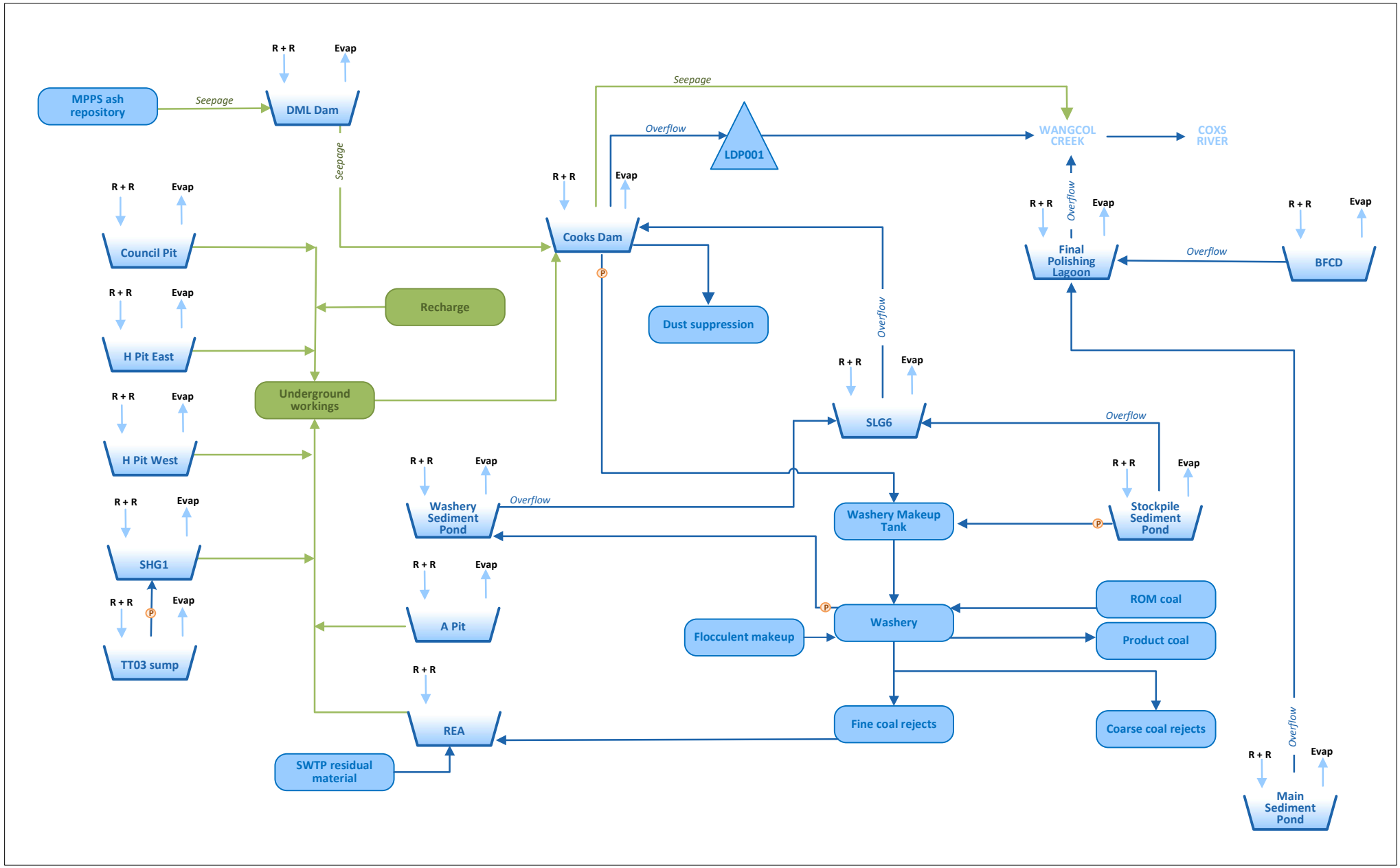
Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

Existing water management system

Western Coal Services Project
Water Resources Impact Assessment
Figure 5.1

EMM creating opportunities




**Water management schematic – existing operations**

Western Coal Services Project

Water Resources Impact Assessment

Figure 5.2

The Final Polishing Lagoon is progressively being rehabilitated into a passive surface water feature rather than an actively managed storage associated with mining activities. This rehabilitation seeks to improve the ability of the dam to attenuate and polish runoff (through the planting of macrophytes) conveyed via the clean water drainage system prior to entering Wangcol Creek.

### 5.2.2 Dirty water management

The dirty water management system forms the basis of sediment control at SCSS. Dirty water runoff (coal-contact and sediment-laden water) is managed by a number of dirty water storages which enable suspended solids to settle out of the water column and also allow for dirty water to be reused in site processes, thereby minimising the potential for dirty water discharges into the surrounding environment. The dirty water management structures are regularly de-silted to retain design storage capacity.

#### i Cooks Dam

Cooks Dam is within a backfilled void created from historical open cut mining operations by the Western Main Colliery. Cooks Dam forms the key collection and management point for dirty water at SCSS. Inflows to the dam are received from the Washery Dam, Stockpile Sediment Dam and SLG6. Decant water from A Pit can also report to Cooks Dam. From Cooks Dam, water can be pumped to the Washery Makeup Tank or is discharged to Wangcol Creek via LDP001.

Inflows to Cooks Dam have been observed to occur from various locations along the western edge of the dam, originating from the underground workings. The storage was constructed using a small (less than 3 m in height) homogeneous earth fill (overburden) bund, around the crest of an existing open cut pit and is not lined. Cooks Dam is at the lowest point within the Lithgow Seam and forms a sink for much of the local groundwater environment.

#### ii Main Sediment Pond

The Main Sediment Pond (also historically known as the Conveyor Dam) is south of the main coal stockpile area. The retention time within the dam allows for sediment settlement before the water is discharged into the primary clean water diversion that reports to the Final Polishing Lagoon. Controlled discharges occur via a pipe with a valve on the downstream outlet that is manually operated as required. Dependent upon the water levels within the dam prior to rainfall, the storage will typically overflow to the Final Polishing Lagoon.

The Main Sediment Pond receives overflow from four upstream ‘fill and spill’ sediment ponds in the Lamberts Gully rehabilitation area: SLG2, SLG3, SLG4 and SLG5. These structures were originally associated with previous rehabilitation works and were retained to attenuate high flows and to further reduce potential sediment loads. As the Main Sediment Pond provides sufficient storage capacity to retain the 95th percentile, five-day rainfall event, active management of these structures is not required.

#### iii Stockpile Sediment Pond

The Stockpile Sediment Pond receives surface water runoff from the coal stockpile area, the embankment of the REA and surrounding contributing catchments. Water levels within the pond are controlled by a manually operated diesel pump, which transfers water to the Washery Makeup Tank for re-use in the washery.

During high rainfall events, water may overflow from the Stockpile Sediment Pond into SLG6 via a combination of open channels and pipe networks, ultimately contributing to Cooks Dam.

### iv Washery Dam

The Washery Dam (referred to in water management schematics as the “Washery Sediment Pond”) receives runoff from the washery, haul roads, administration building areas and surrounding catchments. During high rainfall events, depending on the water levels in the dam, water will overflow from the Washery Dam into SLG6 via overland flow across rehabilitated land and contribute to Cooks Dam.

A low flow gravity pipeline connection between the Washery Dam and Cooks Dam was installed in 2012 to minimise and reduce overflow events from the Washery Dam in high rainfall events.

### v SLG6

SLG6 is a small pond immediately upstream of Cooks Dam. The pond receives overflows from the Stockpile Sediment Pond and Washery Dam and directs water to Cooks Dam.

### vi Washery and Washery Makeup Tank

The washery process separates ROM coal into product coal and coarse and fine rejects. Fine rejects are pumped away as slurry to the REA.

The Washery Makeup Tank is on the top of the ridge north-east of the washery. Water is pumped to this location from Cooks Dam and the Stockpile Sediment Pond to meet the demands of the washery. The tank overflows into a pipe that joins the low flow outlet of the Washery Dam and returns to Cooks Dam.

### vii DML Dam

The DML Dam has historically provided additional volumetric capacity to the dirty water management system. However, due to its location within a backfilled void along with Cooks Dam, it was determined that the use of the dam resulted in an elevated groundwater table locally, contributing to seepage to the Castlereagh Highway and increased seepage to Cooks Dam.

The DML Dam is no longer actively managed with any pumping into or from the dam. The water level in the dam remains relatively constant and is generally representative of the groundwater table and is typically slightly higher than Cooks Dam. The DML Dam is an unlined storage and it is likely that water from the storage infiltrates into the historical underground workings.

### viii TT03 sump

The TT03 sump collects coal-contact runoff from the overland conveyor near TT03. Water stored in the TT03 sump is transferred via pipe and pump to Huon Gully immediately upstream of SHG1.

### ix SHG1

SHG1 is in Huon Gully at the truncation of the natural watercourse and receives runoff from the western side of the REA. Previously Huon Gully contributed to Wangcol Creek; however, it is now intercepted by historical open cut mine workings, with the gully truncated at SHG1 by part of the Lamberts North ash emplacement area at MPPS.

Despite the storage having no defined outlet, SHG1 has not been observed to overtop its perimeter bank. Given that evaporation is unlikely to be sufficient for all captured runoff from the relatively large catchment to be lost, it is highly likely that there is significant volume of seepage into the historical mine workings.

#### x Historical open cut voids

There are a number of historical open cut voids (extraction down to the Lithgow Seam) in the western part of SCSS that typically store water. The water in these voids is connected to the historical mine workings and then down gradient to Cooks Dam. These voids do not have surface outflows (endorheic), are not actively managed and are generally in equilibrium with the surrounding shallow groundwater system. The voids include H Pit West, H Pit East, Council Pit, DML Dam and SHG1.

### 5.2.3 Reject emplacement management

#### i Blackmans Flat Co-Disposal

Blackmans Flat Co-Disposal (BFCD) is separated into six distinct cells, with four utilised for tailings and coarse reject co-disposal and the remaining two (along the eastern side) used to hold decant water. Historically the cells were used to temporarily hold tailings and coarse rejects for a drying period before they were mined out using a long-arm excavator and blended with coal product. This facility is rarely utilised, with the washery currently sending fine rejects to the REA.

#### ii Reject emplacement area

The REA is a fine and coarse coal reject storage facility with an ultimate storage capacity of approximately 12.5 million $m^3$. The REA at SCSS was approved as part of WCS to be constructed up to approximately 1,000 m long and 700 m wide surrounded by a purpose-built dirty water management system. The REA is a progressive structure that incorporates the former A Pit, which is in the final void of the Lamberts Gully Open Cut Mine. Coarse reject material is used to construct the walls of the REA. Fine reject material is pumped from the washery as a slurry (referred to as tailings) into the centre of the REA. Residual waste from the SWTP is also disposed within the REA.

Management of the REA allows for any water captured within the area to be dewatered to the A Pit, which can then be pumped to Cooks Dam. Since construction of the REA, dewatering of A Pit has not been required, as the decant water has infiltrated into historical underground workings and been intercepted by Cooks Dam.

### 5.2.4 Residuals management

Residual waste from the SWTP is transferred to SCSS for disposal with coal rejects from the washery within the REA. The two sources that contribute to the residuals stream to be transferred from the SWTP to the REA are:

- residuals generated from the removal of solids from the raw mine water feed during the pre-treatment (clarification) processes in the SWTP. The residuals stream has a dry solids content of up to 2% solids; and
- clean-in-place waste from the reverse osmosis membrane cleaning at the SWTP.

The residuals transfer pipeline is capable of transferring residuals at a flow rate of up to 30 L/s in batch flow periods. The maximum approved daily transfer rate to the REA from the SWTP is 0.43 ML/day (approximately 157 ML/year).

The residuals transfer pipeline leading into the REA and the header at the end of the pipe are installed above the ground surface to allow for the transfer of the residual material into the REA sub-aerially, similar to the practice of transferring fine coal reject material into the REA.

### 5.2.5 Groundwater management

There is no active management of groundwater resources at SCSS, with activities limited to the monitoring of groundwater levels and quality across SCSS and the protection of groundwater from contamination due to spills or site-related activities. This is due to the extensive connection between surface water and groundwater systems and effectiveness of any potential mitigation strategy.

Commitments have been made to reduce, as far as practicable, opportunities for surface water to recharge the groundwater system. Some of these commitments relate to the construction works that form part of the proposed modification and others are ongoing.

### 5.2.6 Potable and wastewater systems

Potable and ablutions water at SCSS is supplied by a Lithgow City Council main. Drinking water is provided to the site by contractor in the form of bottled water. Wastewater is managed by a site sewage management system from all buildings and is aerobically treated. Treated effluent is removed by tanker truck.

## 5.3 Proposed operations

Changes to the existing water management system at SCSS as part of the proposed modification include:

- transfer of land known as Area 4 to EnergyAustralia;
- construction and operation of:
  - a dewatering pipeline from the TT03 sump to the SCSS water management system;
  - Huon Clean Water Pond;
  - DWP-A;
  - DWP-B; and
  - associated pumping, pipeline and drainage channels;
- transfer of up to 15.6 ML/day of water from Cooks Dam to McPhillamys Gold Project;
- transfer of up to 2.6 ML/day of water from Cooks Dam to Pond D at MPPS; and
- receipt of up to 2.6 ML/day of water from Angus Place Colliery for use within the washery.

The proposed changes to the water management system at SCSS are presented in Figure 5.3. A simplified water cycle schematic of the proposed system is presented in Figure 5.4.

### 5.3.1 Area 4 hand back

Land in the north-west of SCSS, known as Area 4, will be transferred from Springvale Coal to EnergyAustralia. As a result, management of SHG1, H Pit East, H Pit West and Council Pit will be transferred to EnergyAustralia.

### 5.3.2 Huon Clean Water Pond

The Huon Clean Water Pond is proposed to be constructed on Huon Gully upstream of SHG1, to the south of the coal conveyor, as shown in Figure 5.3. The purpose of these works is to direct runoff from Huon Gully to Wangcol Creek via the Lamberts Gully clean water diversion and to minimise the opportunity for localised groundwater recharge following rainfall.

The pond will intercept the clean catchment of Huon Gully and transfer it to the clean water diversion draining to the Main Sediment Pond via a pipe and pump system. The pipeline will be within the conveyor corridor. A diversion bund will be constructed directly north of the conveyor to minimise clean catchment runoff flowing onto EnergyAustralia's property. This bund will be maintained by EnergyAustralia.

The design storage volume of 3.4 ML and a maximum pumping rate of 320 L/s adopted for the Huon Clean Water Pond have been optimised to suit the site constraints in order to manage runoff for up to the 2% AEP, 72 hour design storm event without spilling (GHD 2018a). Any overflows from the Huon Clean Water Pond will flow into DWP-A.

### 5.3.3 DWP-A

DWP-A is proposed to be constructed immediately downslope and to the north of the Huon Clean Water Pond, with an embankment underneath the existing coal conveyor. It has been designed as a concrete sump with a volume of 0.85 ML to provide sufficient storage for a 10% AEP design storm event.

The dam will capture dirty water from the coal conveyor corridor and prevent runoff flowing north onto EnergyAustralia's property. DWP-A will also receive pumped flows from the TT03 sump (Section 5.3.5). Water from DWP-A will be transferred via a pipe and pump system to the Washery Dam for reuse within the washery. Any overflows from DWP-A will flow to SHG1, which will be managed by EnergyAustralia.

Should DWP-A not be constructed, dirty water runoff will flow onto EnergyAustralia's property and will be managed by EnergyAustralia's dirty water management system. The decision to construct DWP-A is subject to commercial agreements between Centennial and EnergyAustralia.

This assessment assumes DWP-A will be constructed and all dirty water will be managed by the SCSS water management system and is therefore considered a conservative assessment.

### 5.3.4 DWP-B

DWP-B is proposed to be constructed upstream of Cooks Dam (Figure 5.3) to provide additional dirty water storage capacity at SCSS. The dam will be suitably lined with a permeability of less than $1x10^{-9}$ m/s (or equivalent performance) in order to minimise any interaction with the groundwater environment. DWP-B has a conceptual size of 50 ML to manage the 1% AEP, 72-hour design storm event. The use of DWP-B as an additional dirty water storage for SCSS will allow Cooks Dam to be maintained at a lower level and have sufficient capacity to manage inflow surges from rainfall events and will lead to reduced discharges to LDP001.

The ROM coal stockpile pad, that currently drains to H Pit West, will be regraded to direct runoff to DWP-B via the Washery Dam. Water stored within DWP-B will be reused within the washery, taking priority over water supply from Cooks Dam. Overflows from DWP-B will be directed to Wangcol Creek via LDP001.

As discussed in Section 3.1.5, following the completion of the detailed design for DWP-B, if required, the dam will be referred to Dam Safety NSW and a consequence assessment will be undertaken prior to construction.

### 5.3.5 TT03 sump

As discussed in Section 0, the TT03 sump collects runoff from the overland conveyor near TT03, with stored water transferred via pipe and pump to Huon Gully immediately upstream of SHG1. As part of the proposed modification to the SCSS water management system, the pipeline will be extended to DWP-A.

### 5.3.6 Washery Dam

The capacity of the Washery Dam is proposed to be increased from 3.79 ML to 6.1 ML through desilting and maintenance activities. The material excavated from the dam will be utilised in on-site rehabilitation works. The increase in capacity will provide additional dirty water storage for SCSS for reuse within the washery and will reduce the requirement to discharge water from the site through LDP001.

### 5.3.7 Transfer of water

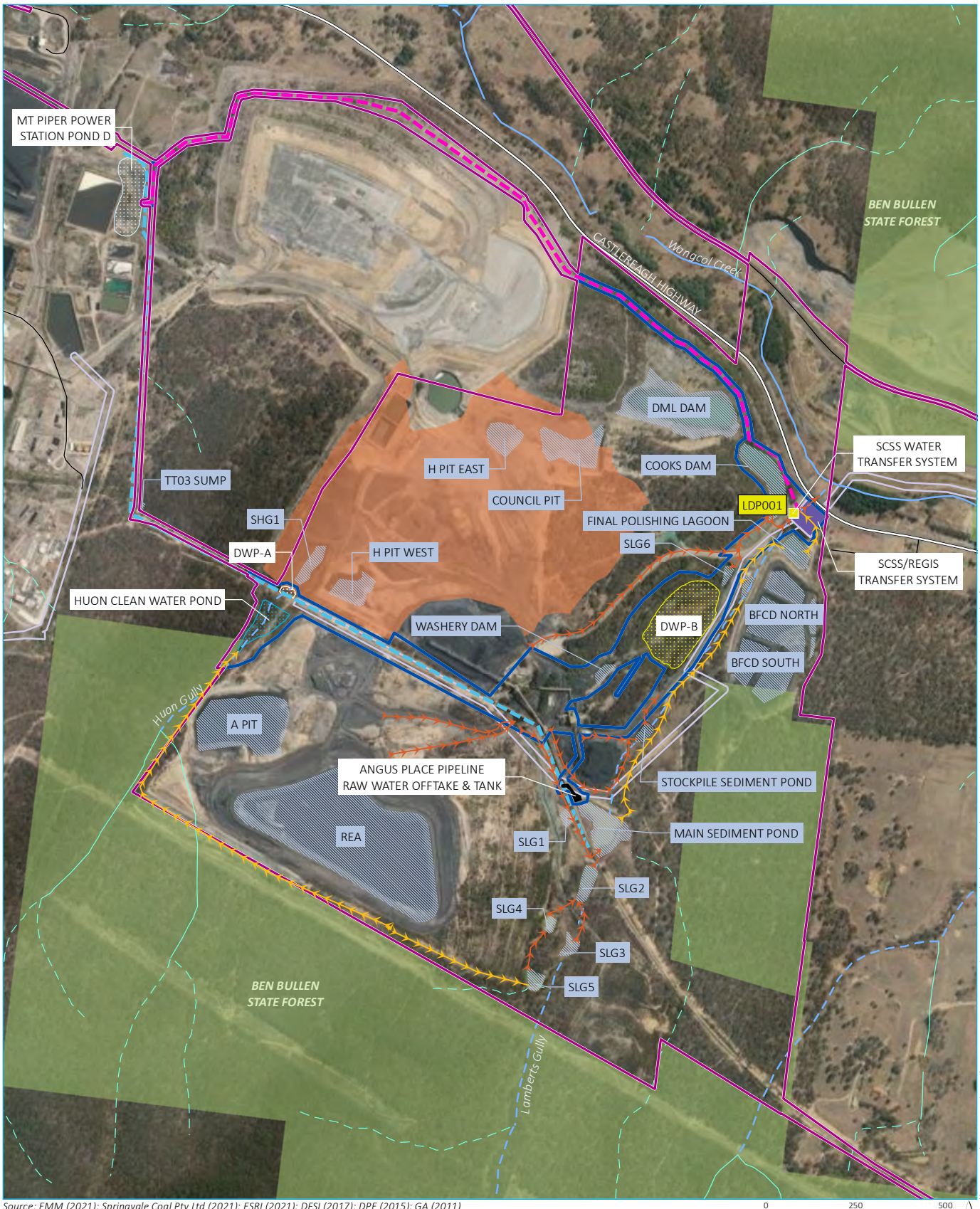
As discussed in Chapter 2, the proposed modification also includes the following transfers of water:

- up to 15.6 ML/day of water from Cooks Dam to the SCSS Water Transfer System for transfer to McPhillamys Gold Project;
- up to 2.6 ML/day of water from Cooks Dam to the SCSS Water Transfer System for transfer to Pond D at MPPS; and
- receipt of up to 2 ML/day of water from the underground storage at Angus Place Colliery to the Washery Makeup Tank at SCSS for use in the washery.

A bi-directional pipeline will be installed between SCSS and MPPS (Figure 2.1), which will include an offtake from Cooks Dam and an offtake and discharge point at Pond D as well as a connection to the Springvale Coal Services/Regis transfer system. The pipeline will be sized up to a capacity of 15.6 ML/day, which is the maximum supply capacity to McPhillamys Gold Project. The pipeline will allow excess water stored at SCSS to be transferred from Cooks Dam to Pond D or alternatively from Pond D or Cooks Dam to McPhillamys Gold Project. The proposed transfer of water off-site seeks to reduce the volume and frequency of LDP001 discharges to Wangcol Creek.

When water is being transferred to McPhillamys Gold Project from both SCSS and MPPS, flow rates will be controlled through pumping and real-time telemetry systems. In the event that either SCSS or MPPS are transferring the full demand of McPhillamys Gold Project, then either source will be isolated to facilitate the use of the pipeline. Prior to and following McPhillamys Gold Project, or during periods of no demand, water from SCSS may be pumped in a reverse flow arrangement to Pond D at MPPS at a maximum rate of 2.6 ML/day. In this way, water will only be transferred from Cooks Dam to Pond D during periods of no demand at McPhillamys Gold Project. The proposed transfer pipeline arrangements (including the pipeline and valve configurations) will be confirmed in the detailed engineering design phase; however, all infrastructure will be located within the proposed easement.

Additionally, an offtake from the Angus Place Raw Water Pipeline (Figure 2.1) that traverses SSCS will be constructed to allow up to 2 ML/day of water from Angus Place Colliery to be transferred to the Washery Makeup Tank for use in the washery. The raw mine water from Angus Place Colliery will be used to supplement washery supply from DWP-B and the Stockpile Sediment Dam. Mine water at Angus Place Colliery is of a higher quality than water currently stored on-site at SCSS and the use of this water is expected to improve the quality of water being reused on site and consequently the quality of LDP001 discharges.




*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)*

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## KEY

- Proposed project application area
- Construction envelope
- Licensed discharge point
- Indicative Angus Place Raw Water Pipeline Project
- Mt Piper Power Station Pond D
- Surface water storage
- Surface water catchment to be managed by Energy Australia

Proposed modification elements

- Bidirectional pipeline
- Offtake from Angus Place Raw Water Pipeline Project
- Proposed surface water flowpath (clean)
- Proposed surface water flowpath (dirty)
- Huon Clean Water Pond
- DWP-A
- DWP-B

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline easement
- Springvale Coal Services Site/Regis Transfer System

Existing environment

- Major road
- Minor road
- State forest

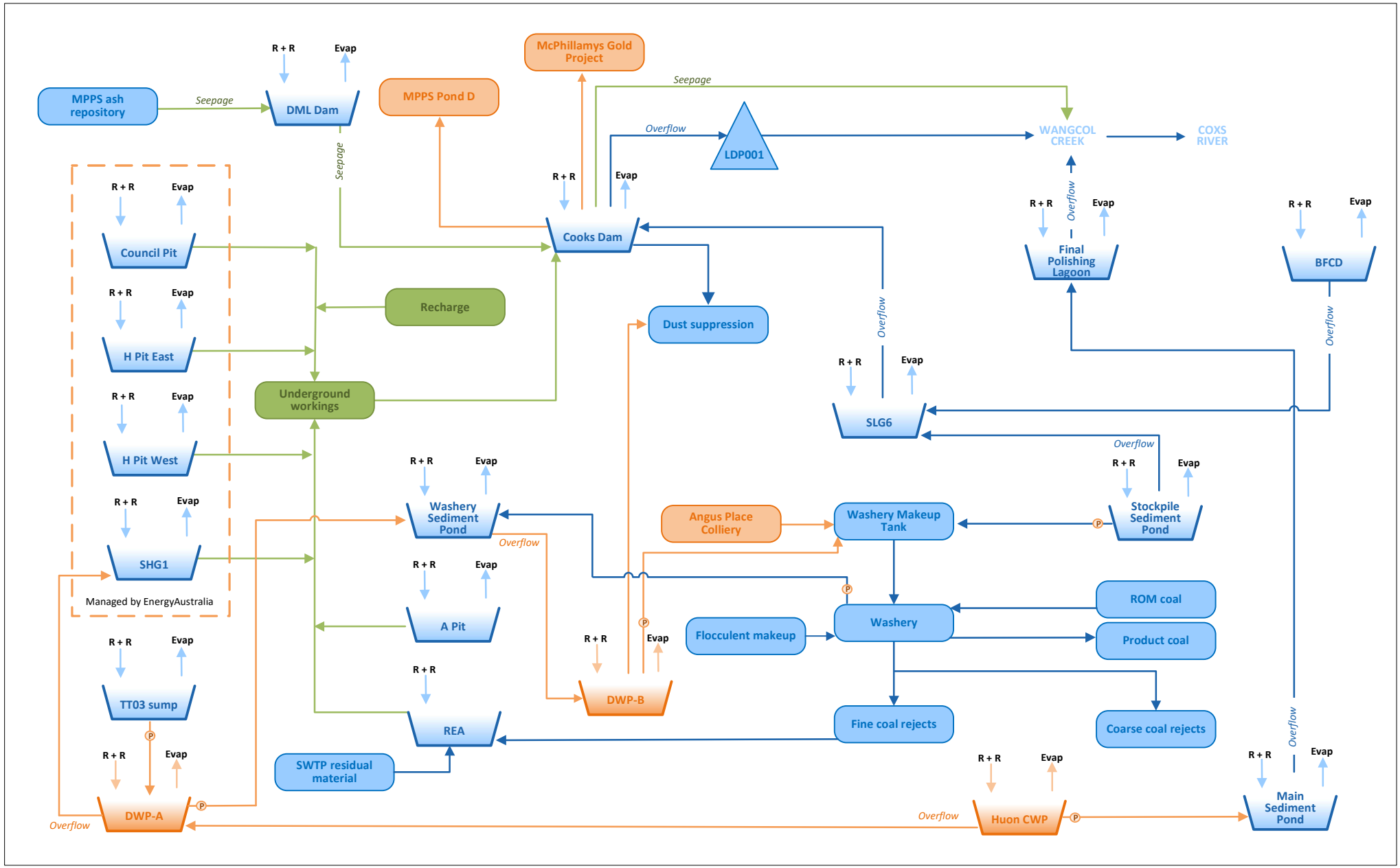
Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

# Proposed water management system at Springvale Coal Services Site

Western Coal Services Project
Water Resources Impact Assessment
Figure 5.3

EMM creating opportunities




**Water management schematic – proposed operations**
Western Coal Services Project
Water Resources Impact Assessment
Figure 5.4

# 6 Monitoring program

## 6.1 Surface water quality

Surface water quality monitoring data from seven monitoring locations have been considered as part of this WRIA (Figure 6.1). The monitoring locations are categorised as:

- upstream monitoring locations – upstream of SCSS within Wangcol Creek catchment;
- downstream monitoring locations – downstream of SCSS on Wangcol Creek; and
- Angus Place Colliery and SCSS monitoring locations.

Monitoring locations are described in Table 6.1 along with the data range considered for this assessment.

**Table 6.1 Surface water quality monitoring locations and data range**

| Monitoring location | Description | Period from | Period to |
|---|---|---|---|
| **Upstream monitoring locations** | | | |
| Wangcol Creek gauge | Wangcol Creek approximately 600 m upstream of LDP001, at the WaterNSW operated gauge (212055 Neubecks Creek Upstream of Wallerawang Colliery). | 05/01/2017 | 02/12/2020 |
| Wangcol Creek U/S | Wangcol Creek immediately upstream of LDP001. | 05/01/2017 | 02/12/2020 |
| **Downstream monitoring locations** | | | |
| Wangcol Creek D/S | Wangcol Creek immediately downstream of LDP001. | 05/01/2017 | 02/12/2020 |
| Wangcol Creek Far D/S | Wangcol Creek approximately 1 km upstream of the confluence with the Coxs River. | 05/01/2017 | 02/12/2020 |
| **Angus Place Colliery and SCSS monitoring locations** | | | |
| Angus Place Colliery 800 Area | 800 Area underground storage representative of the water from Angus Place Colliery proposed to be transferred to SCSS. | 04/12/2018 | 22/12/2020 |
| Cooks Dam | Representative of water stored on-site at SCSS. | 05/01/2017 | 31/12/2020 |
| LDP001 discharge | LDP001 discharge from SCSS to Wangcol Creek. | 05/01/2017 | 02/12/2020 |

A summary of surface water quality monitoring results is provided in Appendix A. Results have been compared to SSGVs presented in Table 3.4 derived for the Wangcol Creek catchment based on default guideline values recommended by ANZG (2018) and historical water quality monitoring of an upstream reference site on Neubecks Creek (Centennial 2020). Monitoring results for LDP001 discharge have been compared to EPL 21229 concentration limits.

Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)

0 0.5 1 km

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KEY

- Springvale Coal Services Site
- Surface water monitoring point
- Surface water storage
- Major road
- Minor road
- State forest
- Waterbody

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

Surface water quality monitoring points

Western Coal Services Project
Water Resources Impact Assessment
Figure 6.1

EMM creating opportunities

### 6.1.1 Wangcol Creek water quality

#### i Physicochemical parameters

EC in Wangcol Creek is monitored as point measurements during Centennial's routine monitoring, as well as at an in situ continuous data logger at the WaterNSW operated gauge (212055 Neubecks Creek Upstream of Wallerawang Colliery) approximately 600 m upstream of LDP001.

Figure 6.2 shows continuous EC monitoring data and streamflow recorded by the gauge (212055). This shows that EC is generally inversely related to streamflow, with low-flow periods corresponding to an increase in EC, indicating the influence of groundwater inflows during low-flow periods.

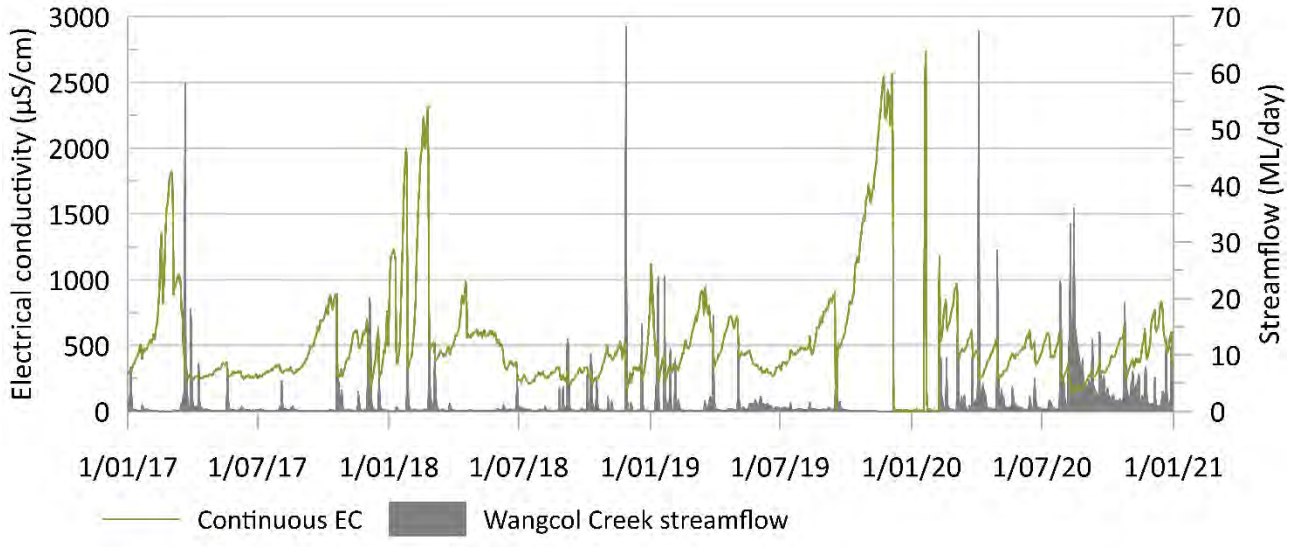



**Figure 6.2 Wangcol Creek gauge – electrical conductivity continuous gauging data**

Figure 6.3 shows routine monitoring data for sites upstream (Wangcol Creek gauge and Wangcol Creek U/S) and downstream (Wangcol Creek D/S and Wangcol Creek Far D/S) of LDP001 discharge on Wangcol Creek. Routine monitoring at upstream sites indicates EC increases with distance downstream, with a median EC of 849 µS/cm at the Wangcol Creek gauge, and 1,354 µS/cm at Wangcol Creek U/S.

Discharge from SCSS at LDP001 influences EC in Wangcol Creek downstream of the discharge point, particularly during dry periods when licensed discharge can account for the majority of streamflow within the creek.

Monitoring results for LDP001 are also shown for context, as is streamflow in Wangcol Creek. Downstream of LDP001, median EC in Wangcol Creek increases to 3,510 µS/cm at Wangcol Creek D/S and 3,145 µS/cm at Wangcol Creek Far D/S.

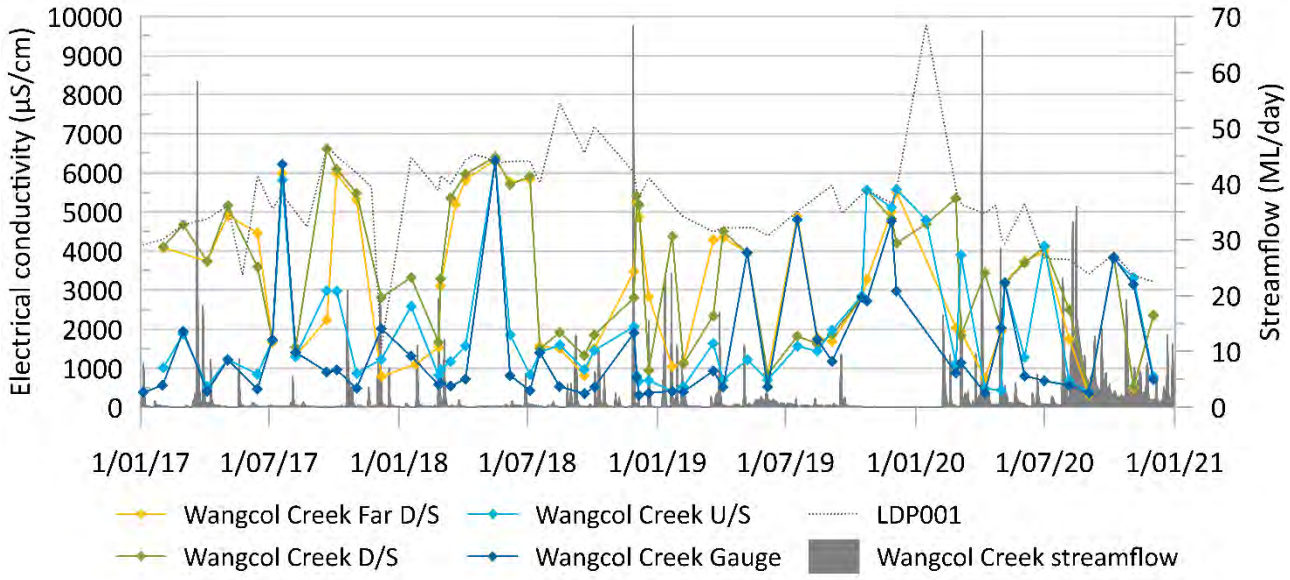



**Figure 6.3 Wangcol Creek – electrical conductivity timeseries**

Wangcol Creek generally has neutral to slightly acidic pH and does not vary greatly between upstream and downstream sites. At all monitoring sites on Wangcol Creek, pH occasionally drops below the lower SSGV of 6.5. This was most pronounced in 2019 and 2020, when the groundwater table likely reduced as a result of below average rainfall conditions and pH was observed to decrease. Figure 6.4 shows pH results for Wangcol Creek monitoring sites, as well as streamflow and the upper and lower SSGV limits.

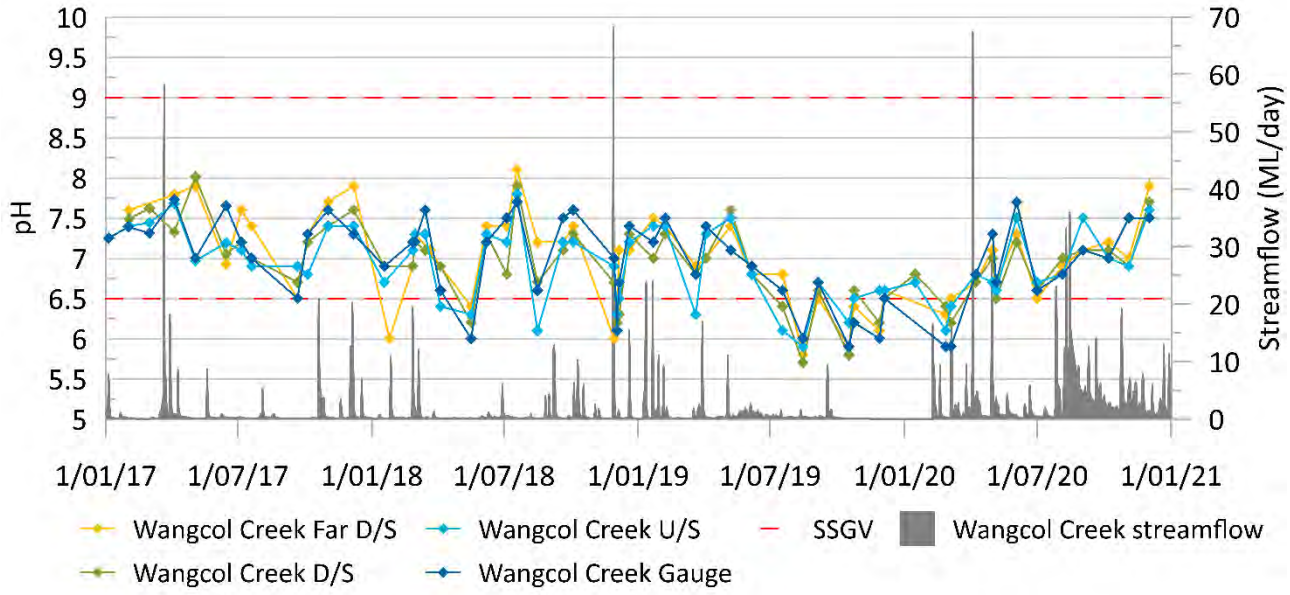



**Figure 6.4 Wangcol Creek – pH timeseries**

TSS concentrations are often below the laboratory limit of reporting (LOR) of 5 mg/L and turbidity is usually below the SSGV of 35 NTU, with some infrequent exceedances. Spikes in turbidity usually coincide with high rainfall periods and data from upstream and downstream locations tends to follow the same trends.

Figure 6.5 and Figure 6.6 show routine monitoring results in Wangcol Creek for TSS and turbidity, respectively.

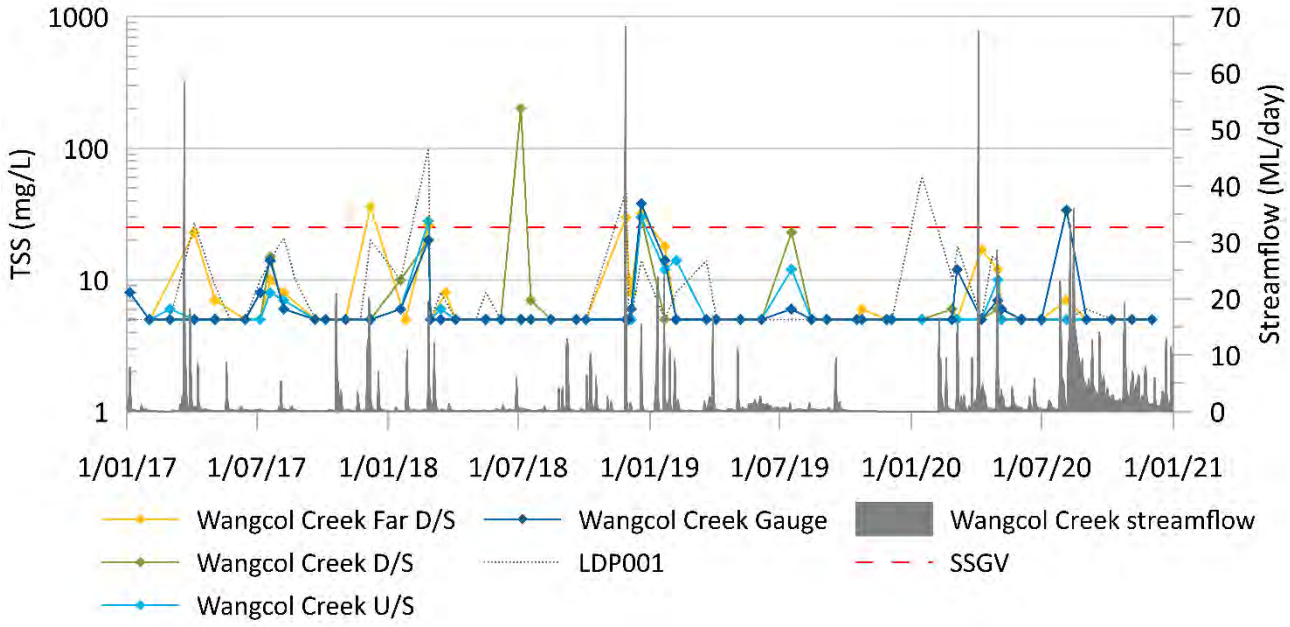



**Figure 6.5 Wangcol Creek – total suspended solids timeseries**

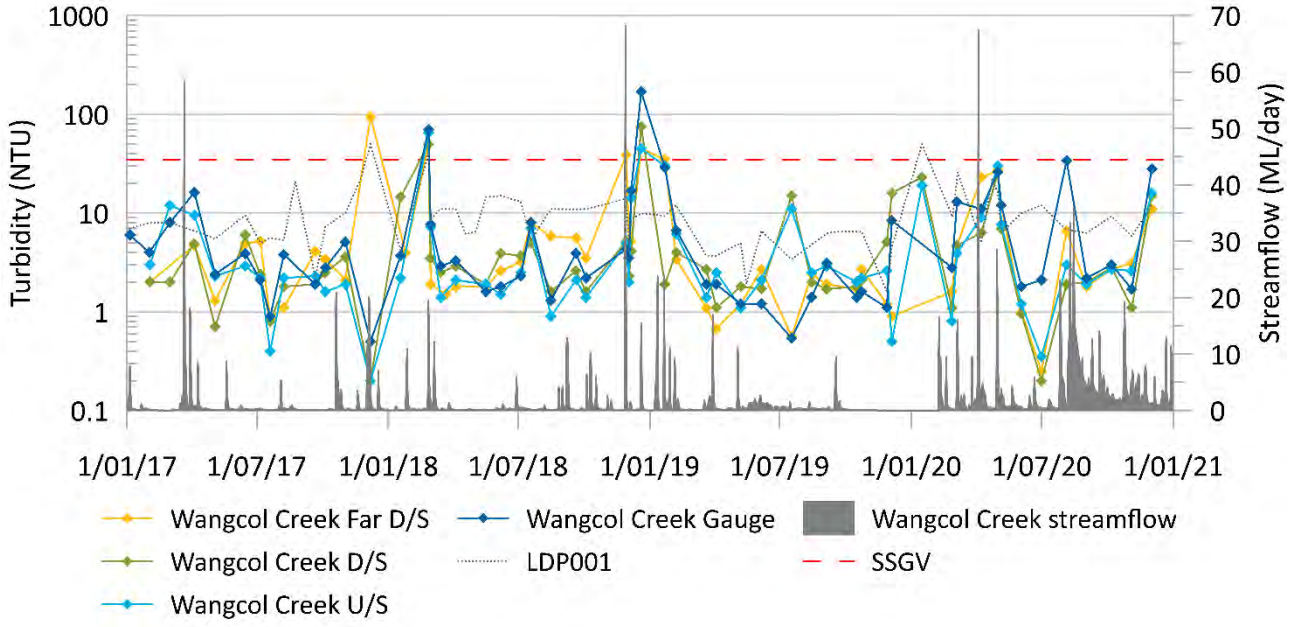



**Figure 6.6 Wangcol Creek – turbidity timeseries**

### ii Nutrients

Nutrient concentrations are generally below the SSGVs, and median total nitrogen concentrations are consistent across the four monitoring sites at 0.2 mg/L (compared to SGGV of 0.78 mg/L). Nitrogen occurs in organic forms, with oxidised nitrogen occurring primarily as nitrate ($NO_3$), and total nitrogen primarily total Kjeldahl nitrogen (TKN). Ammonia ($NH_3$) concentrations exceed the SSGV occasionally and tend to increase slightly downstream at Wangcol Creek Far D/S.

Median total phosphorous concentrations in Wangcol Creek are below the LOR. At all sites, 90th percentile concentrations of phosphorous are below the SSGV.

Nutrient concentrations do not appear to be linked to runoff events, as there is no consistent trend between upstream and downstream sites, and there does not appear to be a relationship between nitrogen and phosphorous concentrations.

Figure 6.7 and Figure 6.8 show timeseries of total nitrogen and total phosphorous concentrations recorded in Wangcol Creek, respectively.

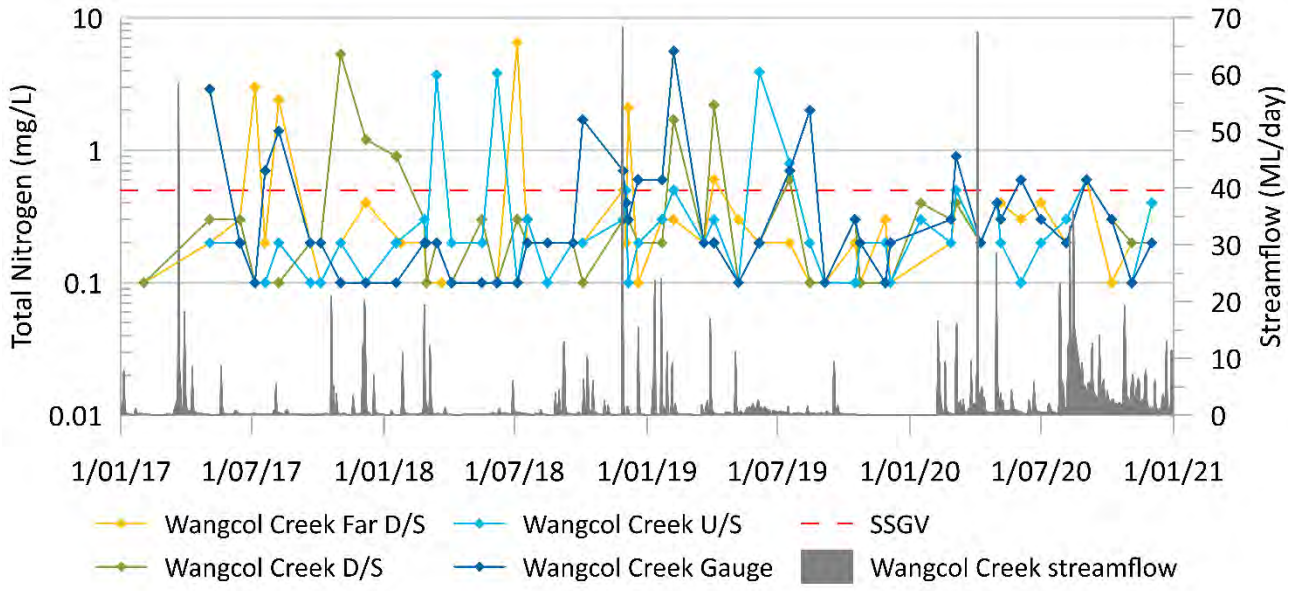



**Figure 6.7 Wangcol Creek – total nitrogen timeseries**

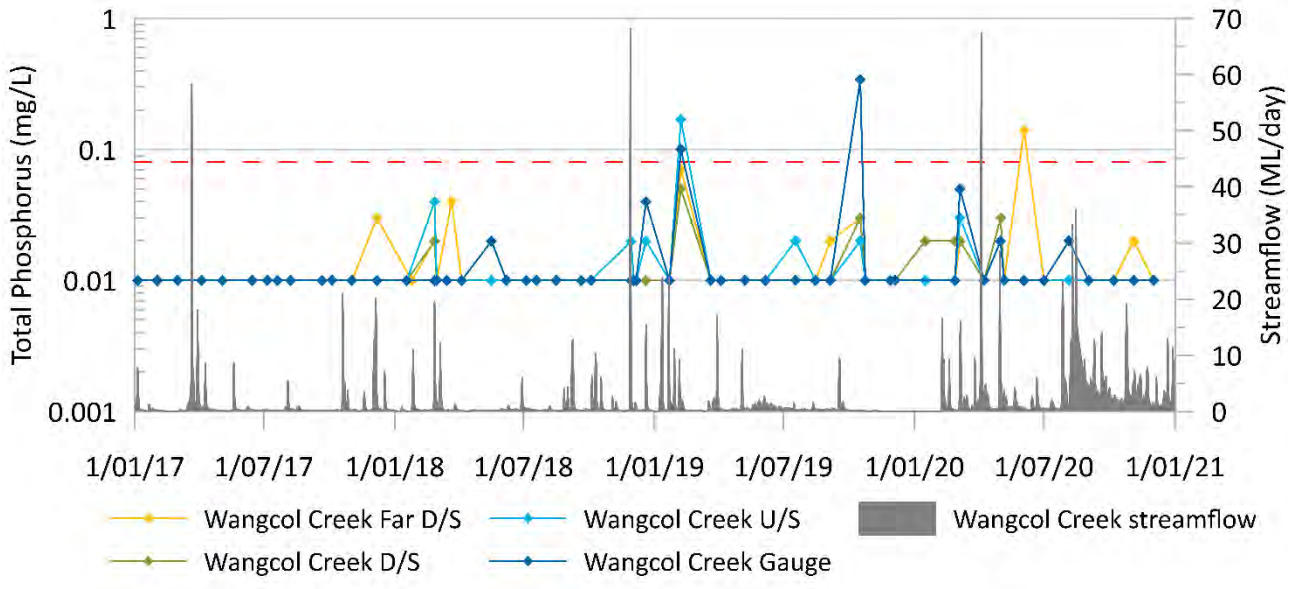



**Figure 6.8 Wangcol Creek – total phosphorous timeseries**

### iii Metals

Routine monitoring includes analysis for the following metals; aluminium, boron, cadmium, iron, manganese, nickel, selenium and zinc. Key metals results for iron, manganese, nickel and zinc are discussed here, as they are specified in the monitoring requirements for EPL 21229. Boron is also discussed, as concentrations of boron frequently exceed SSGV. The full suite of metals is summarised in Appendix A. Table 6.2 presents a summary of results for these key metals.

**Table 6.2 Wangcol Creek water quality monitoring results summary – metals**

| Analyte | SSGV | Units | Samples | Exceedances | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Wangcol Creek gauge** | | | | | | | |
| Boron | 0.94 | mg/L | 53 | 6 | <0.05 | 0.13 | **1.04** |
| Iron | 0.31 | mg/L | 54 | 7 | <0.05 | 0.10 | **0.40** |
| Manganese | 1.9 | mg/L | 52 | 8 | 0.103 | 0.391 | **2.91** |
| Nickel | 0.125 | mg/L | 54 | 11 | 0.009 | 0.027 | **0.193** |
| Zinc | 0.091 | mg/L | 54 | 4 | <0.005 | 0.014 | 0.081 |
| **Wangcol Creek U/S** | | | | | | | |
| Boron | 0.94 | mg/L | 53 | 13 | 0.11 | 0.28 | **1.48** |
| Iron | 0.31 | mg/L | 54 | 6 | 0.05 | 0.12 | **0.33** |
| Manganese | 1.9 | mg/L | 52 | 11 | 0.11 | 0.49 | **3.18** |
| Nickel | 0.125 | mg/L | 54 | 14 | 0.012 | 0.038 | **0.231** |
| Zinc | 0.091 | mg/L | 54 | 3 | <0.005 | 0.010 | 0.068 |
| **Wangcol Creek D/S** | | | | | | | |
| Boron | 0.94 | mg/L | 53 | 28 | 0.22 | **1.04** | **1.83** |
| Iron | 0.31 | mg/L | 54 | 10 | 0.05 | 0.12 | **0.51** |
| Manganese | 1.9 | mg/L | 52 | 18 | 0.17 | 1.19 | **4.10** |
| Nickel | 0.125 | mg/L | 54 | 29 | 0.036 | **0.134** | **0.390** |
| Zinc | 0.091 | mg/L | 54 | 12 | 0.010 | 0.030 | **0.132** |
| **Wangcol Creek Far D/S** | | | | | | | |
| Boron | 0.94 | mg/L | 52 | 25 | 0.20 | 0.86 | **1.76** |
| Iron | 0.31 | mg/L | 52 | 8 | 0.05 | 0.05 | **0.34** |
| Manganese | 1.9 | mg/L | 51 | 17 | 0.41 | 1.22 | **3.26** |
| Nickel | 0.125 | mg/L | 52 | 28 | 0.033 | **0.135** | **0.361** |
| Zinc | 0.091 | mg/L | 52 | 9 | 0.011 | 0.045 | **0.108** |

Notes: **Bold** values indicate values which exceed the SSGV.

At the upstream sites, 90th percentile concentrations exceed the SSGVs for boron, iron, manganese and nickel. At the downstream sites, 90th percentile concentrations exceed the SSGVs for boron, iron, manganese and zinc. Median concentrations of nickel at both downstream sites, and boron at Wangcol Creek D/S, exceed the SSGVs.

Timeseries of nickel concentrations shows that between 2017 and mid-2019, nickel concentrations at the downstream sites generally exceed concentrations upstream; however, since mid-2019 (when the Lamberts Gully clean water diversion was commissioned), nickel concentrations downstream of SCSS have become more consistent with upstream conditions.

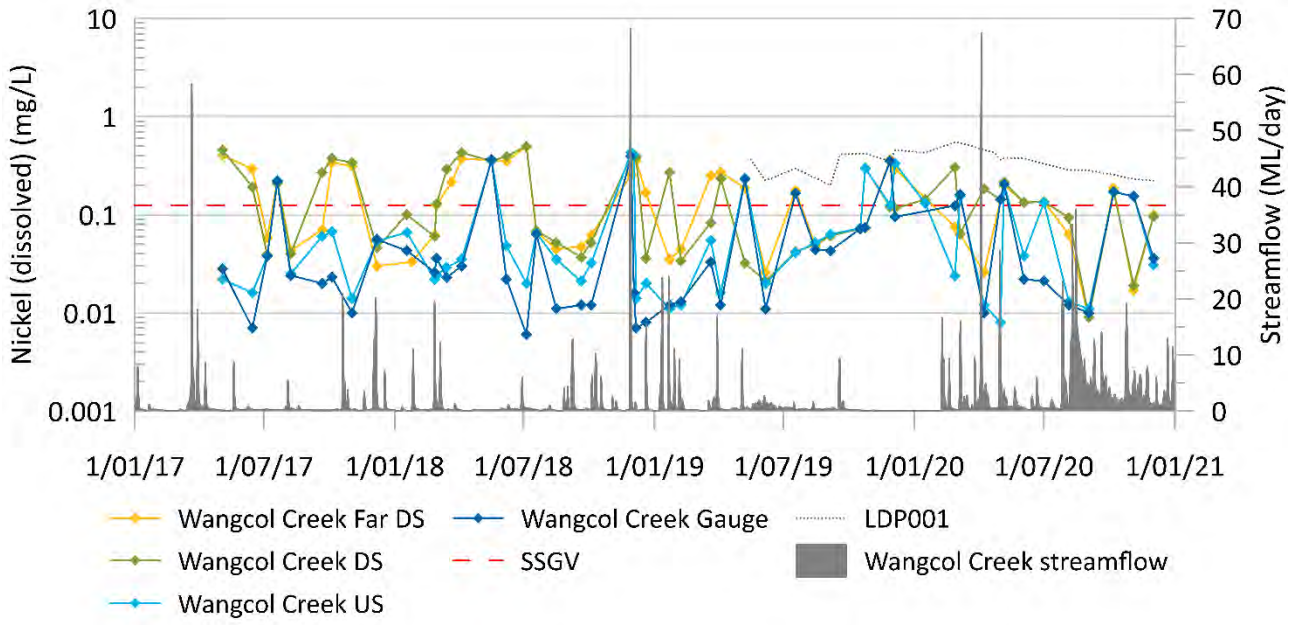



**Figure 6.9 Wangcol Creek – nickel timeseries**

### 6.1.2 SCSS site water quality

#### i Physicochemical parameters

Cooks Dam has relatively high EC when compared to Wangcol Creek, with a 10th percentile of 3,928 µS/cm, and median EC of 5,230 µS/cm. Figure 6.10 shows a timeseries of EC within Cooks Dam against monthly rainfall totals. There appears to be a freshening in the dam during wet periods and a slight increase in EC during dry periods.

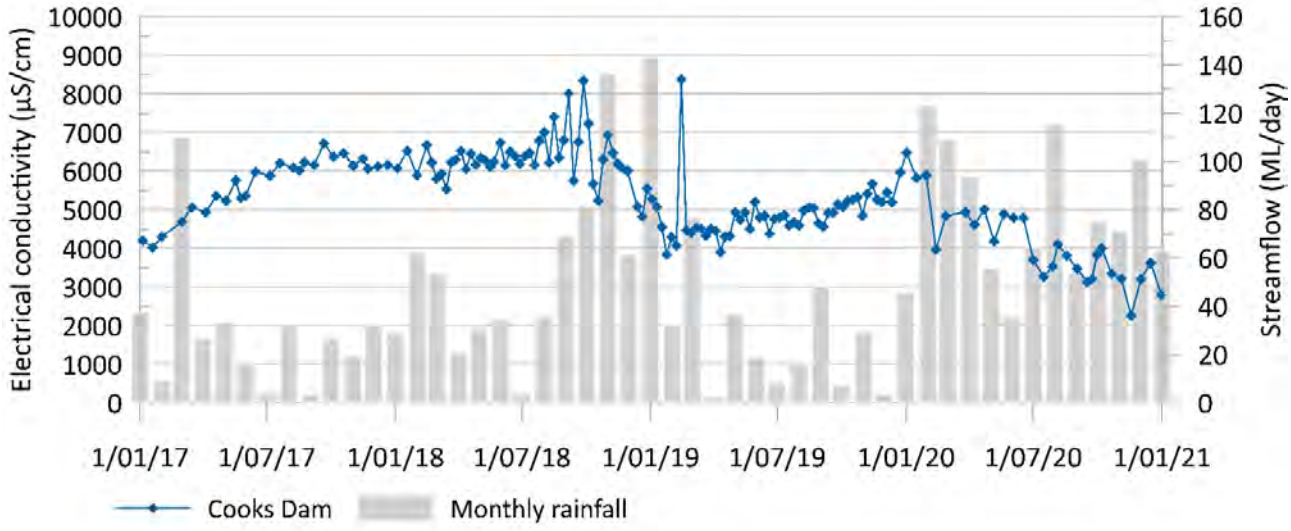



**Figure 6.10 Cooks Dam – electrical conductivity timeseries**

Cooks Dam pH is neutral to slightly acidic and generally within the SSGVs. When exceedance of the SSGVs occur, pH is below the lower limit. There were no exceedances above the upper limit. Timeseries of pH in Cooks Dam is presented in Figure 6.11.

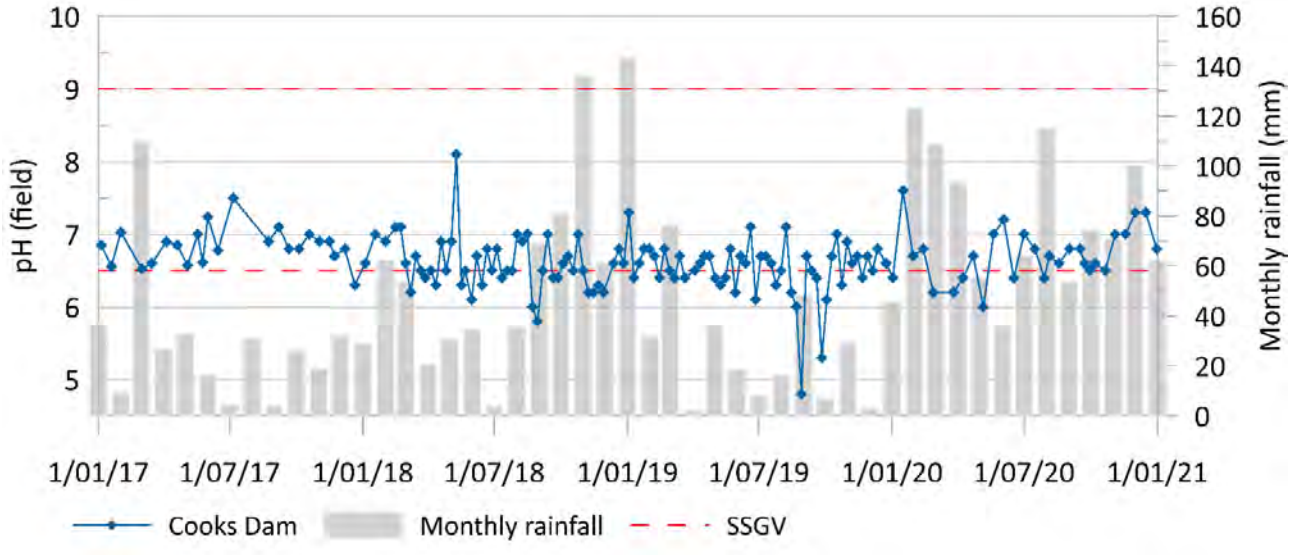



**Figure 6.11 Cooks Dam – pH timeseries**

Turbidity and TSS in Cooks Dam are generally within SSGVs and appear to fluctuate with rainfall. TSS concentrations are generally below the LOR and median turbidity is 11 NTU. Figure 6.12 and Figure 6.13 show TSS and turbidity results for Cooks Dam, respectively.

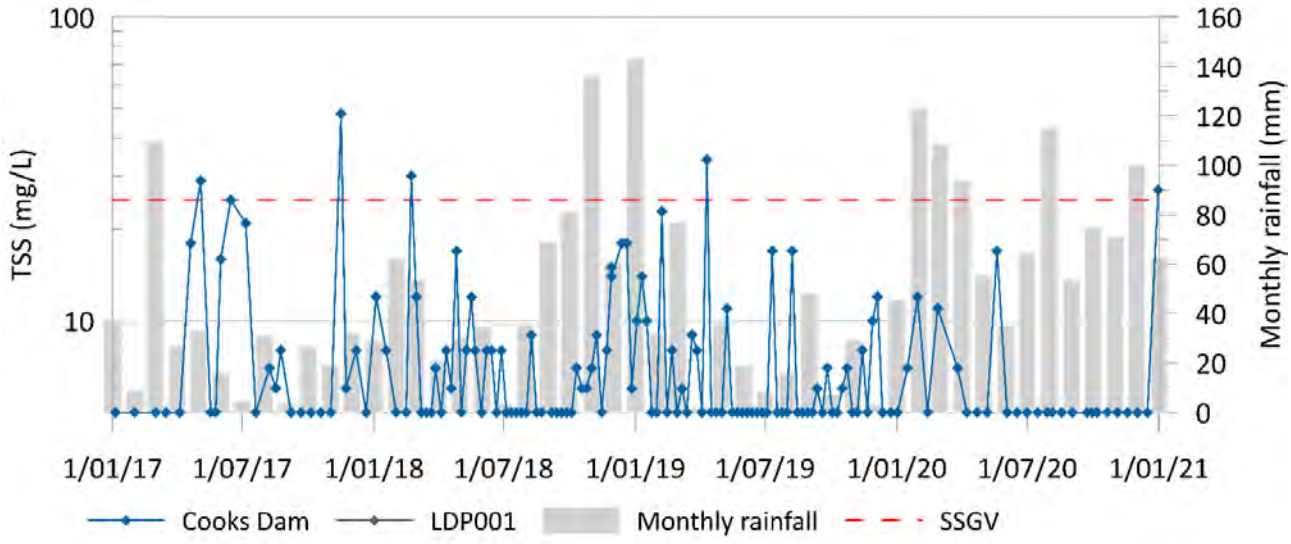



**Figure 6.12 Cooks Dam – total suspended solids timeseries**

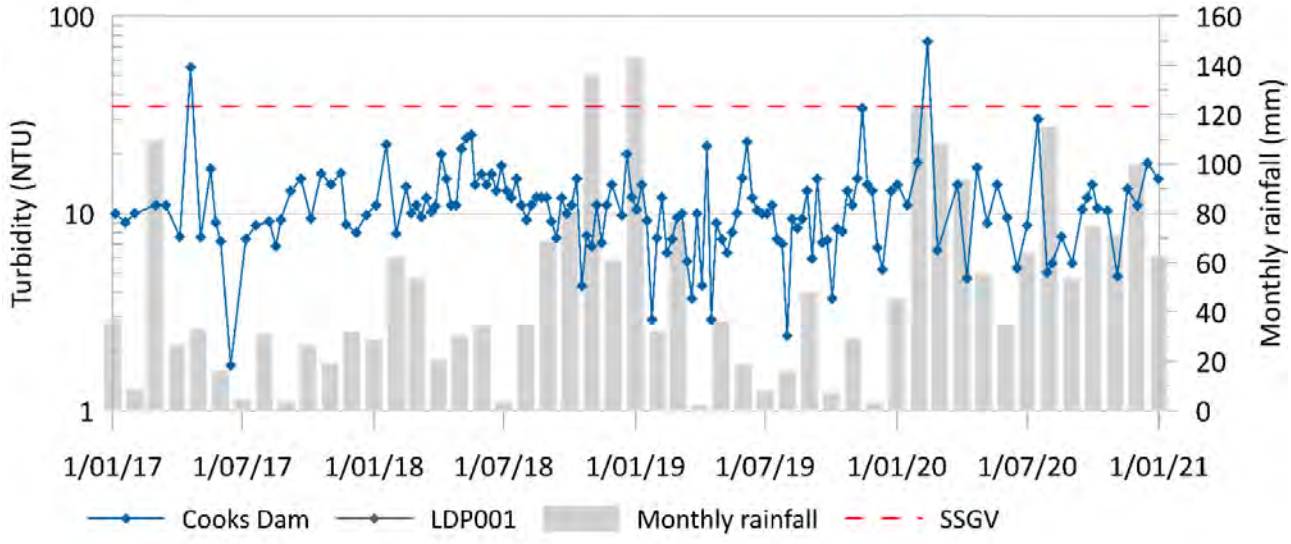



**Figure 6.13 Cooks Dam – turbidity timeseries**

### ii Nutrients

Concentrations of ammonia regularly exceed the SSGV at Cooks Dam, with a median concentration of 0.12 mg/L compared to the SSGV of 0.04 mg/L. Total nitrogen exceeds SSGV infrequently and median concentrations are 0.4 mg/L (below the SSGV of 0.5 mg/L). Nitrogen primarily occurs as TKN and oxidised nitrogen occurs as nitrate.

Phosphorous concentrations are typically below the LOR and 90th percentile concentrations (0.04 mg/L) are below the SSGV (0.08 mg/L).

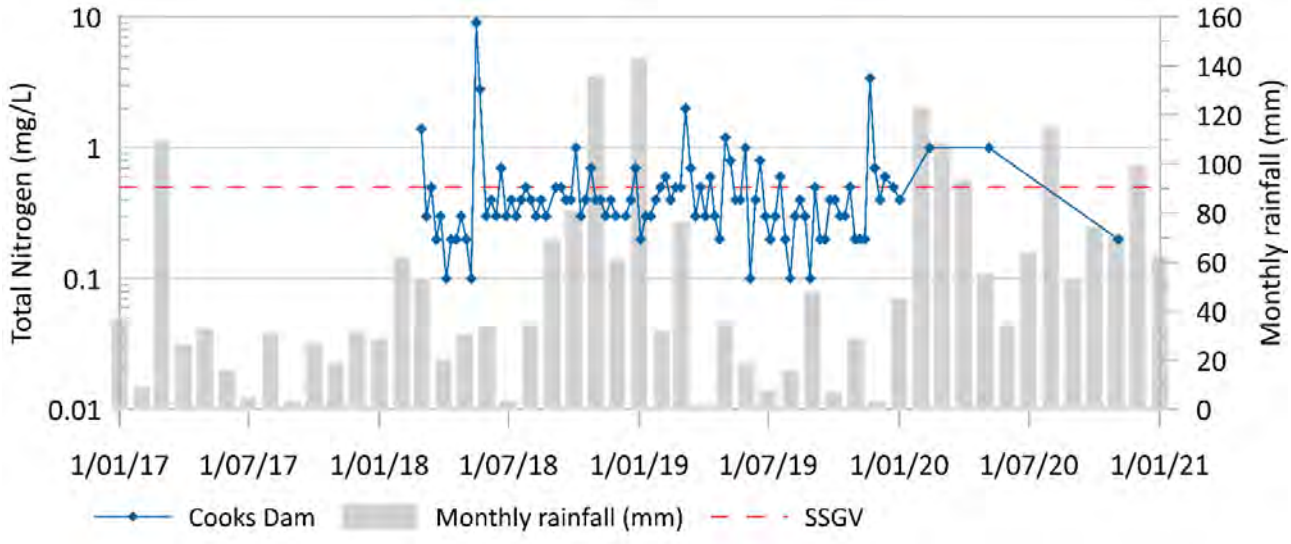



**Figure 6.14 Cooks Dam – total nitrogen timeseries**

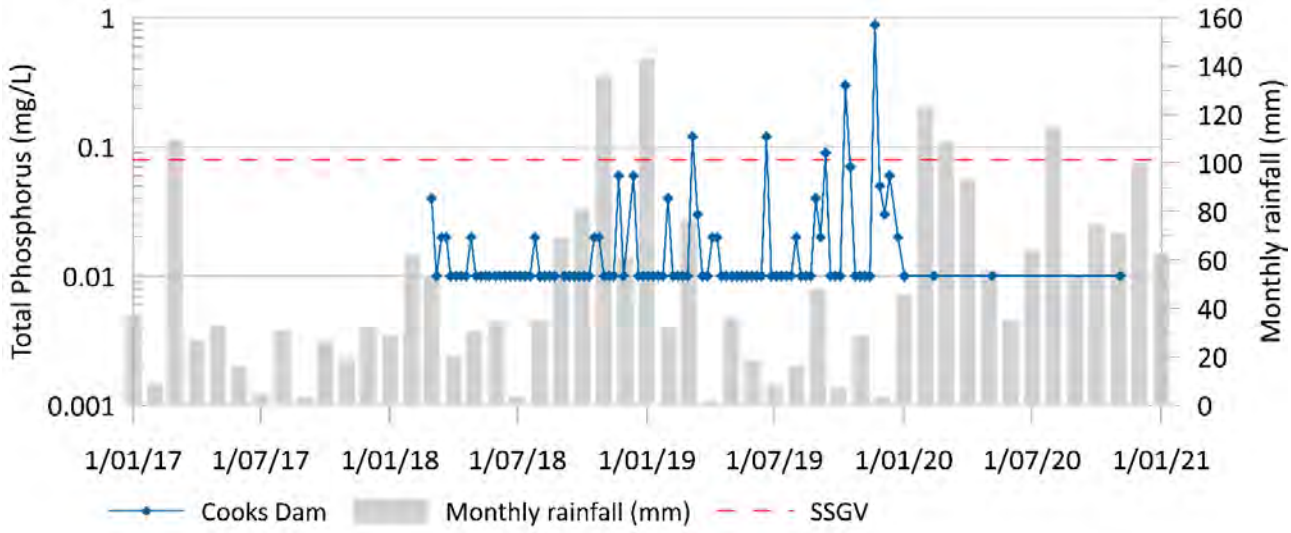



**Figure 6.15 Cooks Dam –total phosphorous timeseries**

### iii Metals

Concentrations of some metals are high in Cooks Dam, with boron, cobalt, iron, manganese, nickel and zinc concentrations regularly exceeding SSGVs. Cobalt, manganese, nickel and zinc concentrations have exceeded SSGVs in all samples taken. Table 6.3 presents summary statistics for these key metals. Full results are presented in Appendix A.3.

**Table 6.3 Springvale Coal Services Site water quality monitoring results summary – metals**

| Analyte | SSGV | Units | Samples | Exceedances | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| Boron | 0.94 | mg/L | 102 | 101 | **1.35** | **1.73** | **2.25** |
| Cobalt | 0.0014 | mg/L | 98 | 98 | **0.0847** | **0.123** | **0.179** |
| Iron | 0.31 | mg/L | 153 | 80 | <0.05 | **0.33** | **0.92** |
| Manganese | 1.9 | mg/L | 153 | 153 | **3.782** | **6.000** | **8.194** |
| Nickel | 0.125 | mg/L | 102 | 102 | **0.343** | **0.462** | **0.652** |
| Zinc | 0.091 | mg/L | 102 | 102 | **0.148** | **0.185** | **0.273** |

Notes: **Bold** values indicate values which exceed the SSGVs.

### 6.1.3 LDP001 discharge monitoring

#### i Discharge volumes

Monitored discharge volumes at LDP001 are presented in Figure 6.16. Discharge volumes are compared against streamflow in Wangcol Creek and monthly rainfall totals. During high flow events discharge from LDP001 makes up a small fraction of streamflow in Wangcol Creek. During dry or average conditions, discharge from LDP001 often makes up the majority of streamflow downstream of SCSS.

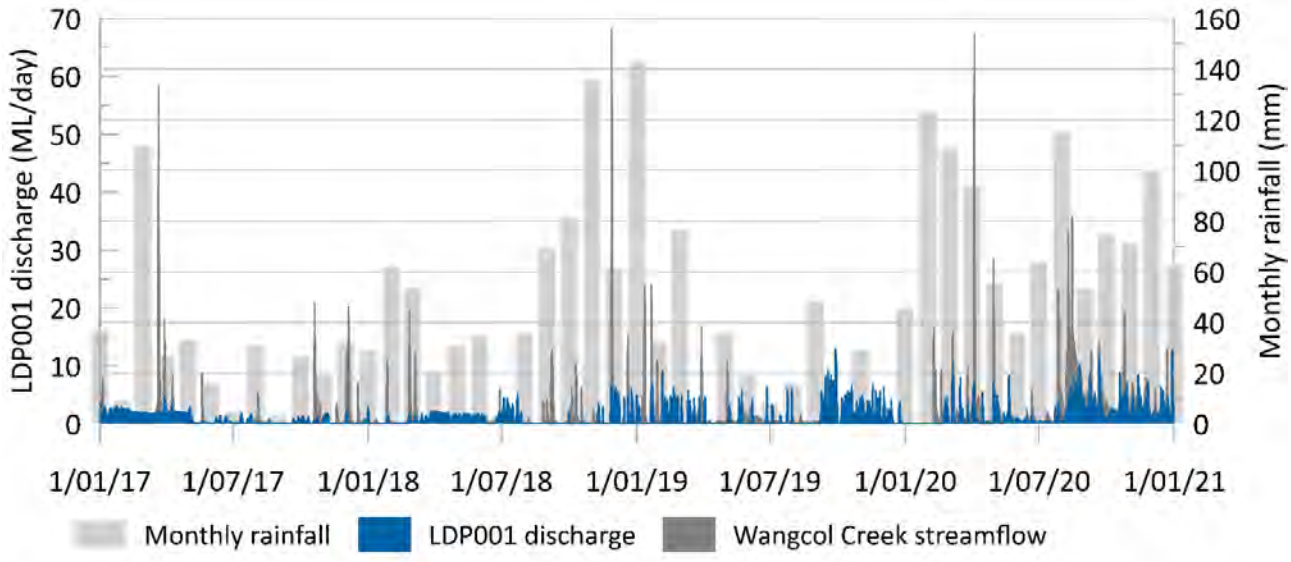



**Figure 6.16 Recorded LDP001 discharge volume**

#### ii Physicochemical parameters

LDP001 is continuously gauged for EC, pH and turbidity at daily intervals, and routinely monitored at monthly intervals in compliance with EPL 21229.

LDP001 has relatively high EC compared with Wangcol Creek, with median EC of 5,200 µS/cm (based on routine monitoring) and 3,506 µS/cm (based on continuous data). EC reached a maximum of 9,810 µS/cm in January 2020 at which time discharge did not occur. Monitoring of LDP001 is undertaken by an online meter within a concrete pit and EC is read regardless of whether the water is discharging through the LDP. During periods of hot weather and low discharge, water held within the concrete pit evaporates resulting in an increase in EC. Once LDP001 resumes discharging, the EC decreases to the overall typical range of 4,000 µS/cm to 5,000 µS/cm. Figure 6.17 shows gauged EC data from LDP001, as well as spot measurements taken during routine monitoring and discharge volumes.

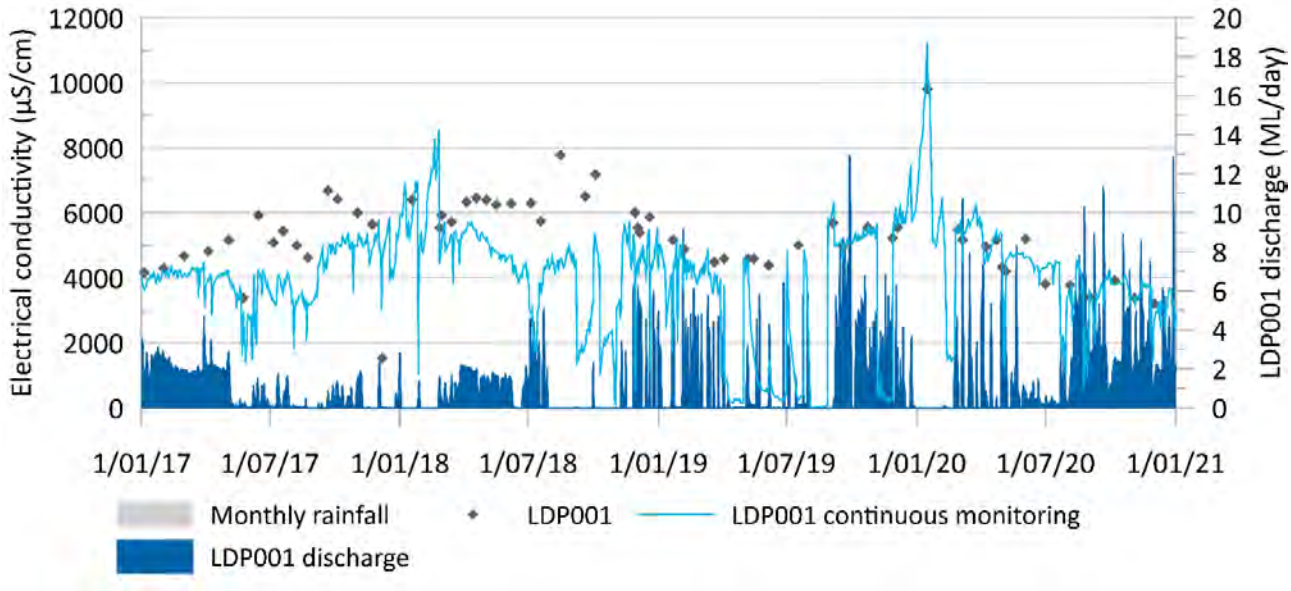



**Figure 6.17 LDP001 – electrical conductivity timeseries**

LDP001 discharge pH is generally neutral and complies with EPL limits. Median pH from continuous gauging is 7.0 and from routine monitoring is 6.9. Spot measurements for pH occasionally drop below the lower limit, although continuous measurements remain within the limits. A timeseries of pH is presented in Figure 6.18.

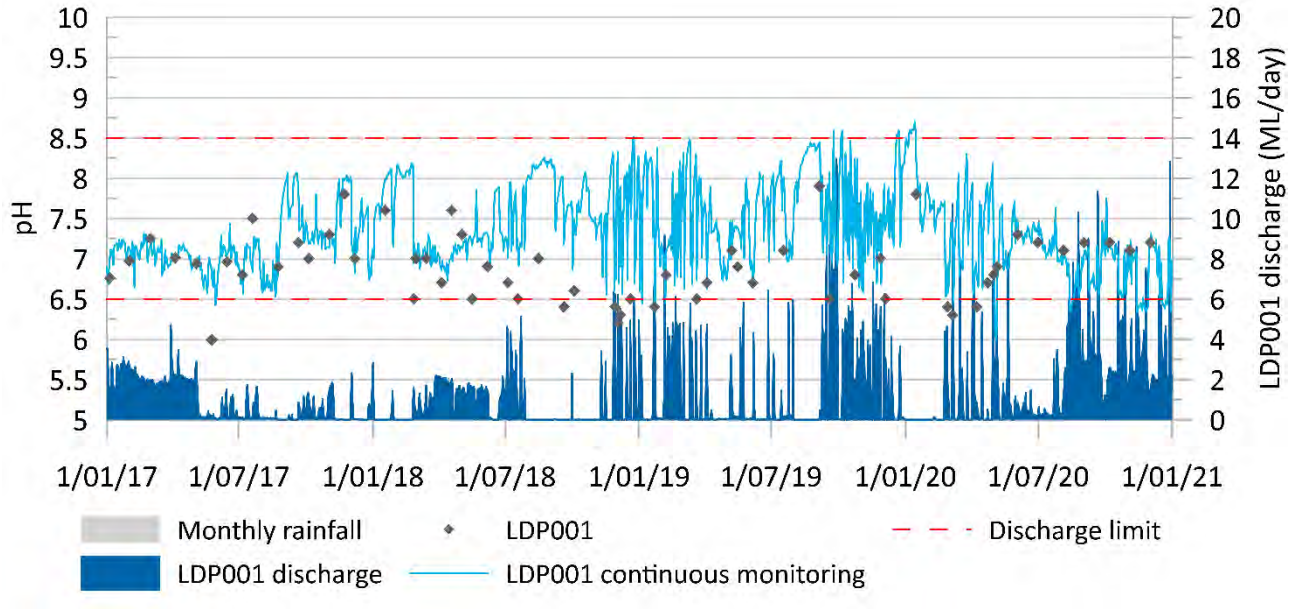



**Figure 6.18 LDP001 – pH timeseries**

TSS concentrations are usually below the LOR and median turbidity is 8 NTU from both routine and continuous monitoring. Timeseries of TSS and turbidity results are presented in Figure 6.19 and Figure 6.20, respectively.

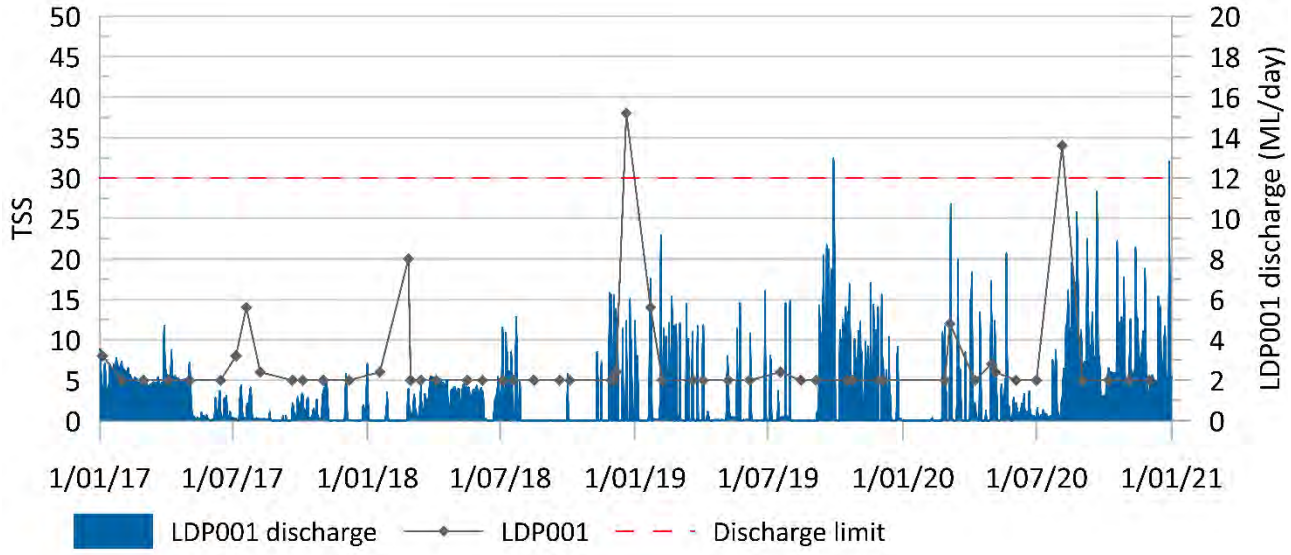



**Figure 6.19 LDP001 – total suspended solids timeseries**

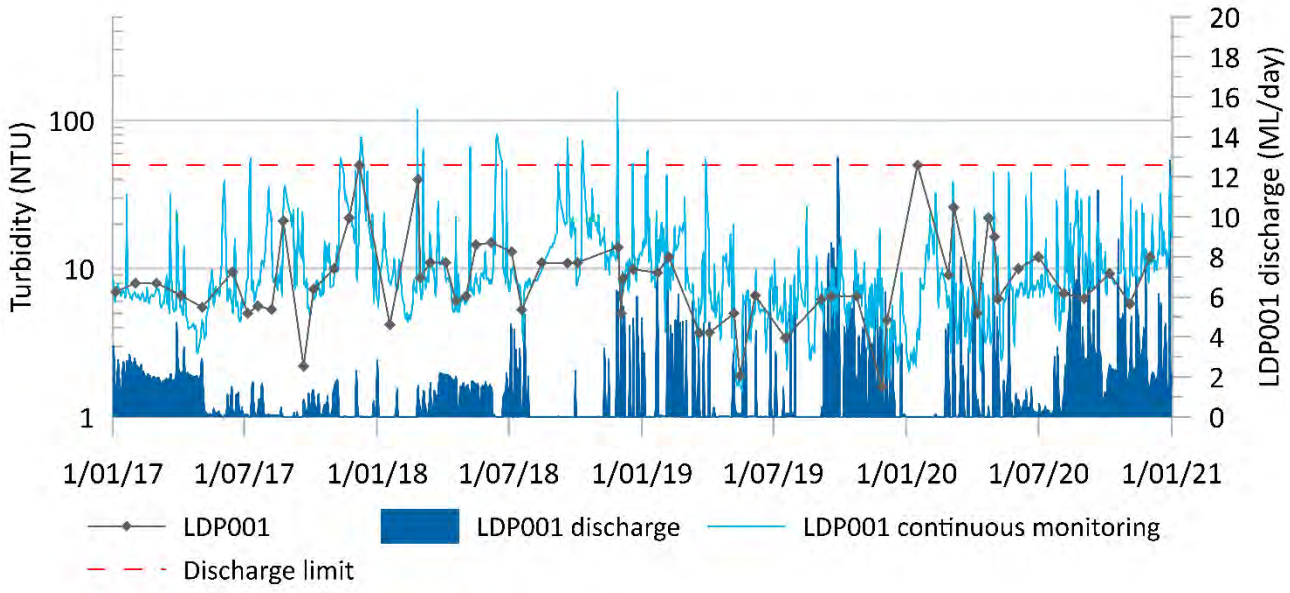



**Figure 6.20 LDP001 – turbidity timeseries**

### iii Nutrients

No data is available for nutrients at LDP001.

### iv Metals

Routine monitoring includes analysis of iron, manganese, nickel and zinc concentrations in LDP001 discharge as a condition of EPL 21229. There are no discharge limits on these parameters, so concentrations are compared against SSGVs for Wangcol Creek for context (Table 6.4).

**Table 6.4 LDP001 water quality monitoring results summary – metals**

| Analyte | SSGV | Units | Samples | Exceedances | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| Iron | 0.31 | mg/L | 57 | 34 | 0.06 | **0.37** | **2.05** |
| Manganese | 1.9 | mg/L | 55 | 50 | **2.082** | **5.180** | **8.050** |
| Nickel | 0.125 | mg/L | 21 | 21 | **0.223** | **0.363** | **0.456** |
| Zinc | 0.091 | mg/L | 21 | 15 | 0.067 | **0.142** | **0.230** |

Notes: **Bold** values indicate values which exceed the SSGV.

Median concentrations of iron and zinc, and 10th percentile concentrations of manganese and nickel, exceed the SSGVs. Metals concentrations at LDP001 are similar to those observed in Cooks Dam.

## 6.1.4 Angus Place Colliery water quality

Water quality sampling at Angus Place Colliery from the 800 Area is representative of the water that is proposed to be transferred to SCSS for use in coal handling and preparation activities.

### i Physicochemical parameters

The 800 Area EC is relatively low compared with water stored on-site at SCSS, with median EC of 1,455 µS/cm, compared with 5,230 µS/cm in Cooks Dam. The pH is neutral and generally in the range of 7.1 (10th percentile) to 7.6 (90th percentile). TSS and turbidity are similar to current site conditions and generally conform with SSGVs.

### ii Nutrients

There is limited nutrient data available from the 800 Area; however, the data that is available suggests concentrations of nitrogen are generally low. However, concentrations of ammonia are high with the majority of samples exceeding SSGVs.

There is no data available for phosphorous concentrations at the 800 Area.

### iii Metals

Metals concentrations at the 800 Area are generally low and below SSGVs. Of the key metals identified as routinely exceeding SSGVs on-site at SCSS (ie boron, iron, manganese, nickel and zinc), only iron concentrations have exceeded the SSGV at the 800 Area. Table 6.5 presents summary statistics for concentrations of these metals at the 800 Area.

**Table 6.5 800 Area water quality monitoring results summary – metals**

| Analyte | SSGV | Units | Samples | Exceedances | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| Boron | 0.94 | mg/L | 30 | 0 | <0.05 | 0.06 | 0.08 |
| Iron | 0.31 | mg/L | 28 | 3 | <0.05 | <0.05 | **0.58** |
| Manganese | 1.9 | mg/L | 30 | 0 | 0.024 | 0.047 | 0.055 |
| Nickel | 0.125 | mg/L | 30 | 0 | 0.002 | 0.004 | 0.005 |
| Zinc | 0.091 | mg/L | 30 | 0 | <0.005 | <0.005 | 0.015 |

Notes: **Bold** values indicate values which exceed the SSGV.

## 6.2 Groundwater monitoring

Groundwater monitoring data from 14 bores have been considered as part of this WRIA (Figure 6.21). Monitoring locations are described in Table 6.6 along with the data range considered for this assessment.

**Table 6.6 Groundwater monitoring locations and data range**

| Monitoring location | Lithology | Depth (m bgl[1]) | Period from | Period to |
|---|---|---|---|---|
| BH01 | Lithgow Seam | 18.3 | 02/03/2017 | 23/12/2020 |
| BH02 | Marrangaroo Formation/Berry Siltstone | 30 | 02/03/2017 | 23/12/2020 |
| BH03 | Saturated overburden | 18.57 | 02/03/2017 | 23/12/2020 |
| BH04 | Lithgow Seam (void) | 27.51 | 02/03/2017 | 23/12/2020 |
| BH05 | Lithgow Seam (unmined pillar) | 30.19 | 02/03/2017 | 23/12/2020 |
| BH06 | Lithgow Seam | 9.3 | 02/03/2017 | 23/12/2020 |

**Table 6.6 Groundwater monitoring locations and data range**

| Monitoring location | Lithology | Depth (m bgl[1]) | Period from | Period to |
|---|---|---|---|---|
| BH07 | Up-gradient saturated overburden | 33 | 02/03/2017 | 23/12/2020 |
| BH08 | Lithgow Seam (void) | 24.4 | 02/03/2017 | 23/12/2020 |
| BH09 | Lithgow Seam (void) | 25.5 | 02/03/2017 | 23/12/2020 |
| BH10 | Lithgow Seam (void) | 25.2 | 02/03/2017 | 23/12/2020 |
| BH11 | Marrangaroo Formation | 34.19 | 02/03/2017 | 23/12/2020 |
| BH12 | Marrangaroo Formation | 18.68 | 02/03/2017 | 23/12/2020 |
| BH13 | Backfill | 12.37 | 02/03/2017 | 23/12/2020 |
| BH15 | Up-gradient overburden | 25.5 | 02/03/2017 | 23/12/2020 |

1. m bgl – metres below ground level

A summary of groundwater monitoring results by lithology is provided in Appendix B. Note BH10 and BH12 have been consistently dry over the monitoring period and therefore no groundwater data are presented for these bores.

### 6.2.1 Physicochemical parameters

Groundwater in the Lithgow Seam is relatively saline, with a median EC of 3,220 µS/cm. EC is variable across the seam, ranging from 10th percentile EC of 481 µS/cm to 90th percentile EC of 6,186 µS/cm. Groundwater in the seam is slightly acidic, with pH typically ranging from 5.7 to 6.7. TSS is high compared to surface water, with a median concentration of 58 mg/L.

Groundwater in the Marrangaroo Formation is fresher than the Lithgow Seam, with median EC of 1,442 µS/cm. pH is neutral to slightly acidic. TSS is generally comparatively high, with median and 90th percentile concentrations of 79 mg/L and 8,487 mg/L, respectively.

Groundwater in the overburden has similar EC to the Marrangaroo Formation, with a median EC of 1,680 µS/cm. Groundwater is acidic, generally ranging in pH from 3.6 to 6.5. The median TSS concentration is 113 mg/L.

Backfill is monitored at BH13 and shows groundwater is relatively saline and slightly acidic, with median EC of 4,090 µS/cm and pH of 6.2. Median TSS concentration is 148 mg/L.

### 6.2.2 Nutrients

Oxidised nitrogen at all locations is primarily nitrate, with nitrite concentrations below the LOR. There is no data available for total nitrogen. Nitrate concentrations are highest in the Marrangaroo Formation, with a median concentration of 0.11 mg/L.

Total phosphorous concentrations are highest in backfill (median concentration of 0.08 mg/L) and lowest in the Lithgow Seam (median concentration of 0.02 mg/L).

Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Springvale Coal Services Site
- Groundwater monitoring point
- Surface water storage
- Major road
- Minor road
- State forest
- Waterbody

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

Groundwater monitoring points

Western Coal Services Project
Water Resources Impact Assessment
Figure 6.21

EMM creating opportunities

\\emmsvr1\centennial_coal\J190806 - Western Coal Services Mod 4\GIS\02_Maps_WRIA\WRIA006_GWMonitoring_20211117_03.mxd 2/12/2021

### 6.2.3 Major ions

Groundwater at SCSS is generally calcium-chloride type or mixed type, except for BH04 and BH05 in the Lithgow Seam which are magnesium-bicarbonate type.

A piper plot of major ions is presented in Figure 6.22. Bores are colour-coded by lithology (Lithgow Seam is represented by blue markers, Marrangaroo Formation by green markers, overburden by orange markers and backfill by yellow markers).

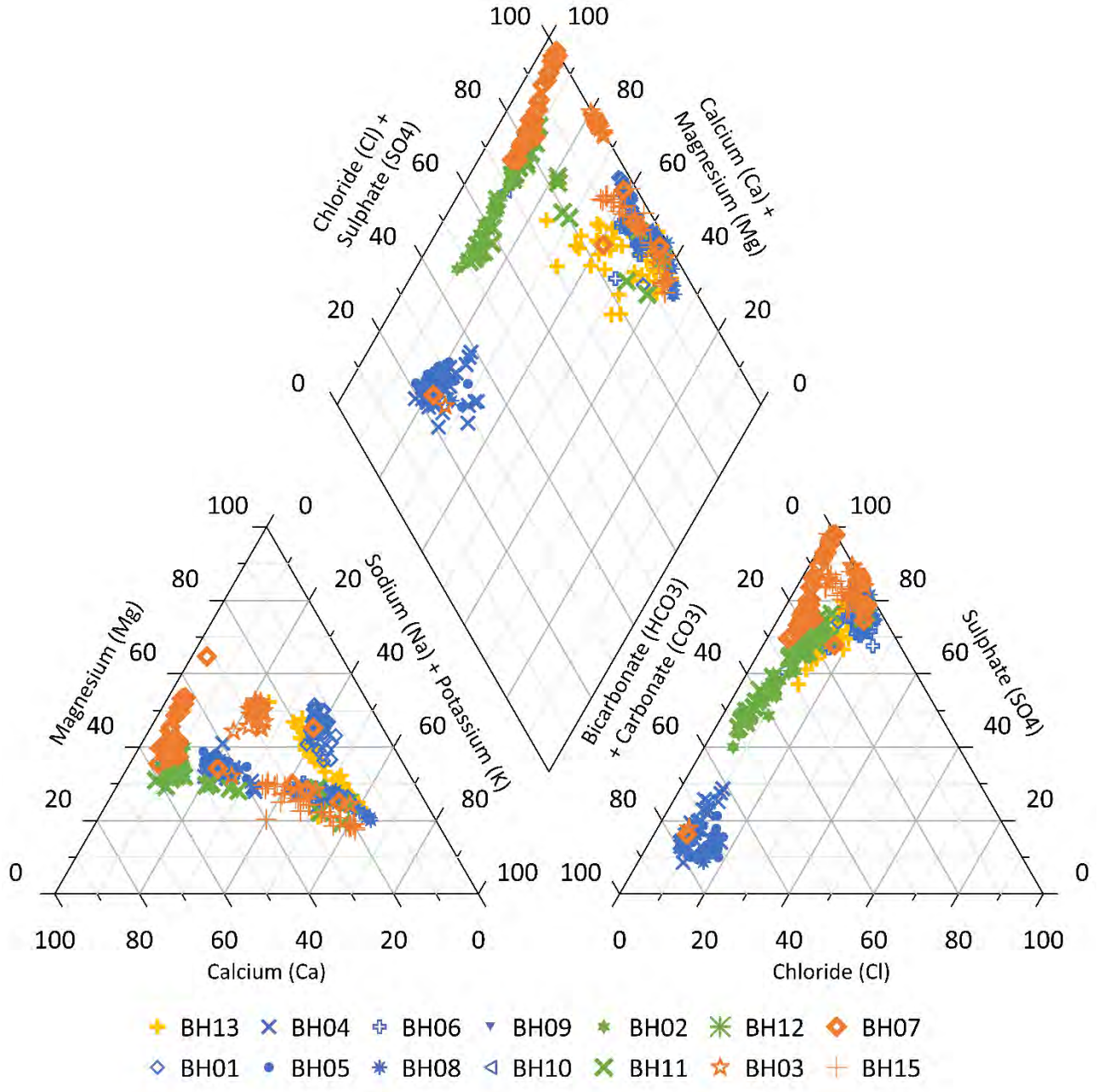



**Figure 6.22 Groundwater major ions – piper plot**

### 6.2.4 Metals

Metals in groundwater are generally high compared with surface water. Table 6.7 presents summary statistics for metals concentrations for the key metals identified in previous sections, as well as aluminium. SSGVs for surface water are provided for context only; the WMP specifies SSGVs for each groundwater bore.

Median concentrations of aluminium for all lithologies exceed the SSGVs and are particularly high in the overburden and backfill where 10th percentile concentrations exceed the SSGVs. Concentrations of boron are generally low, except in backfill where median concentrations exceed the SSGV. In all lithologies, concentrations of iron are high, particularly in the overburden and backfill where 10th percentile concentrations exceed the SSGVs. Median concentrations of manganese, nickel and zinc are generally above the SSGVs, except for groundwater in the Marangaroo Formation.

**Table 6.7 Groundwater quality monitoring results summary – metals**

| Analyte | SSGV | Units | Samples | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|
| **Lithgow Seam** | | | | | | |
| Aluminium | 0.24 | mg/L | 265 | 0.10 | **0.36** | **2.13** |
| Boron | 0.94 | mg/L | 282 | <0.05 | 0.74 | **2.28** |
| Iron | 0.31 | mg/L | 282 | <0.05 | **2.10** | **10.88** |
| Manganese | 1.9 | mg/L | 282 | 0.21 | **3.68** | **10.30** |
| Nickel | 0.125 | mg/L | 282 | 0.008 | **0.177** | **0.863** |
| Zinc | 0.091 | mg/L | 282 | 0.025 | **0.129** | **0.694** |
| **Marrangaroo Formation** | | | | | | |
| Aluminium | 0.24 | mg/L | 73 | 0.14 | **0.48** | **30.80** |
| Boron | 0.94 | mg/L | 78 | <0.05 | 0.08 | 0.12 |
| Iron | 0.31 | mg/L | 78 | <0.05 | 0.30 | **3.61** |
| Manganese | 1.9 | mg/L | 78 | 0.06 | 0.17 | 0.49 |
| Nickel | 0.125 | mg/L | 78 | 0.004 | 0.019 | 0.059 |
| Zinc | 0.091 | mg/L | 78 | 0.012 | 0.036 | **0.135** |
| **Overburden** | | | | | | |
| Aluminium | 0.24 | mg/L | 130 | **0.30** | **3.59** | **13.68** |
| Boron | 0.94 | mg/L | 138 | <0.05 | 0.06 | 0.24 |
| Iron | 0.31 | mg/L | 138 | **0.79** | **10.08** | **82.49** |
| Manganese | 1.9 | mg/L | 138 | 0.48 | **5.35** | **7.79** |
| Nickel | 0.125 | mg/L | 138 | 0.013 | **0.276** | **0.513** |
| Zinc | 0.091 | mg/L | 138 | 0.036 | **0.409** | **1.194** |

## Table 6.7 Groundwater quality monitoring results summary – metals

| Analyte | SSGV | Units | Samples | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|
| **Backfill** | | | | | | |
| Aluminium | 0.24 | mg/L | 44 | **0.27** | **0.84** | **2.85** |
| Boron | 0.94 | mg/L | 48 | 0.71 | **1.07** | **2.25** |
| Iron | 0.31 | mg/L | 48 | **3.17** | **7.16** | **21.70** |
| Manganese | 1.9 | mg/L | 48 | **5.53** | **8.30** | **10.63** |
| Nickel | 0.125 | mg/L | 48 | **0.236** | **0.373** | **0.696** |
| Zinc | 0.091 | mg/L | 48 | 0.080 | **0.135** | **0.447** |

Notes: **Bold** values indicate values which exceed the SSGV. SSGVs for surface water are provided for context only.

# 7 Water and salt balance

## 7.1 Modelling methodology

A water and salt balance model for WCS was developed in 2016 using GoldSim (GHD 2016a). The model is revised regularly to assist in the management of water at SCSS and other components of WCS. The most recent version of this model (GHD 2020) was updated to assess the proposed changes to the water management system at SCSS. A summary of the modelling methodology and data is presented in this chapter. Further detail on the conceptual model, assumptions and model validation is provided by GHD (2020).

The water and salt balance model was developed in GoldSim version 12.1. The model applies a continuous simulation methodology that assesses the performance of the modelled water management system under a range of climatic sequences. The model was created by representing the water and salt cycles as a series of elements, each containing pre-set rules and data, that were linked together to simulate the interaction of these elements.

Details of the input data for the water and salt balance model is provided in Appendix C.

### 7.1.1 Model description

The water and salt balance model simulated the volume of water within each water management storage based on the following balance equation:

*Change in volume over time = inflows – outflows*

where:

- modelled inflows consisted of direct rainfall onto the water surface area of each water management storage, catchment runoff and other transfers of water (eg pumped inflows from other storages, overland channel and gravity pipe flow, seepage); and
- modelled outflows consisted of evaporation from the water surface area of each water management storage and other transfers of water (eg pumped outflows to other storages, overland channel and gravity pipe flow, seepage).

### 7.1.2 Probabilistic modelling

The model simulated the water and salt cycle of SCSS using daily time steps. To assess the influence of climate variability on the water management system, the modelling was completed by applying 131 different climate patterns over the simulation timeline, based on the historical climate record discussed in Section 4.3. To complete this, the simulation timeline was modelled for 131 'realisations', where each realisation represented a single model run. Each realisation began with a different year of the historical climate record, proceeding consecutively through the historical record (and looped to the start of the climate record where required). The results from all realisations were used to generate relevant statistical results. This method effectively includes all recorded historical climatic events in the water and salt balance model, including high, average and low rainfall periods.

### 7.1.3 Modelling scenarios

To assess the impact of the proposed changes to the SCSS water management system, the following scenarios were modelled:

- **Scenario 1** – baseline conditions assuming currently approved operations at SCSS (refer Figure 5.2);

- **Scenario 2** – proposed conditions assuming all elements of the proposed modification to the SCSS water management system are implemented (refer Figure 5.4); and

- **Scenario 3** – proposed conditions assuming that the transfer of water to McPhillamys Gold Project does not occur (ie demand of 0 ML/day), with the other proposed modifications included consistent with Scenario 2.

This assessment is considered to be conservative as it assumes DWP-A will be constructed and therefore all dirty water is managed by the SCSS water management system. Should DWP-A not be constructed, dirty runoff will flow onto EnergyAustralia's property and will be managed by EnergyAustralia's dirty water management system.

### 7.1.4 Hydrologic modelling

Surface runoff from rainfall was estimated using the Australian Water Balance Model (AWBM). The AWBM was developed by Boughton (2004) and is widely used across Australia to estimate runoff. The hydrological model calculates runoff and baseflow components from rainfall after allowing for relevant losses and storage. The AWBM was incorporated into the GoldSim model for SCSS.

### 7.1.5 Groundwater modelling

Hydrogeological modelling of SCSS has been undertaken by RPS (2013) and GHD (2016b). Following the development of the hydrogeology model in 2016 (GHD 2016b), it was determined that the model was limited both spatially and temporally in representing the high connectivity between the historical underground workings and surface water features. The water and salt balance model for SCSS has since been used to predict groundwater contribution where surface water storages connected to the groundwater system are represented by discrete flow paths over short time periods (ie in the order of days).

The site water balance model has been regularly updated by GHD (2018b; 2019), including a validation against monitoring results and use of preliminary results from a numerical hydrogeological model of SCSS and MPPS (commissioned by EnergyAustralia).

Further details on the conceptual groundwater model are provided by GHD (2020) and summarised in Appendix C.

### 7.1.6 Salt balance modelling

The salt balance was developed as an extension of the water balance within GoldSim. The structure of the water balance model remained unchanged, with expected concentrations of salt applied to inputs within the model. The salt balance provides an estimate of the salt load and concentration associated with each water transfer within the water balance. Chemical and physical reactions that may affect salt concentrations have not been incorporated into the salt balance model. Salt transfers were simulated in parallel with the water balance model.

Inputs to the water balance model were assigned a specific concentration of salt depending on the source of water. Salt concentrations were based upon recorded water quality data and typical concentration values for similar sites.

### 7.1.7 McPhillamys Gold Project demand

A water balance model was developed for McPhillamys Gold Project mine development by HEC (2019; 2020), which included the transfer of water from SCSS via the proposed Springvale Coal Services/Regis transfer system. This model was developed with a similar methodology as described in Section 7.1.2, with 131 realisations simulated based on historical daily climatic data between 1889 and 2019.

The demand for water at McPhillamys Gold Project was found to vary over the life of the project as a function of both operational requirements as well as climatic variability. Figure 7.1 presents the predicted daily demand for water at McPhillamys Gold Project (HEC 2020).

The daily demand for water at McPhillamys Gold Project for all 131 realisations modelled by HEC (2020) was input directly into the SCSS water and salt balance model for Scenario 2.

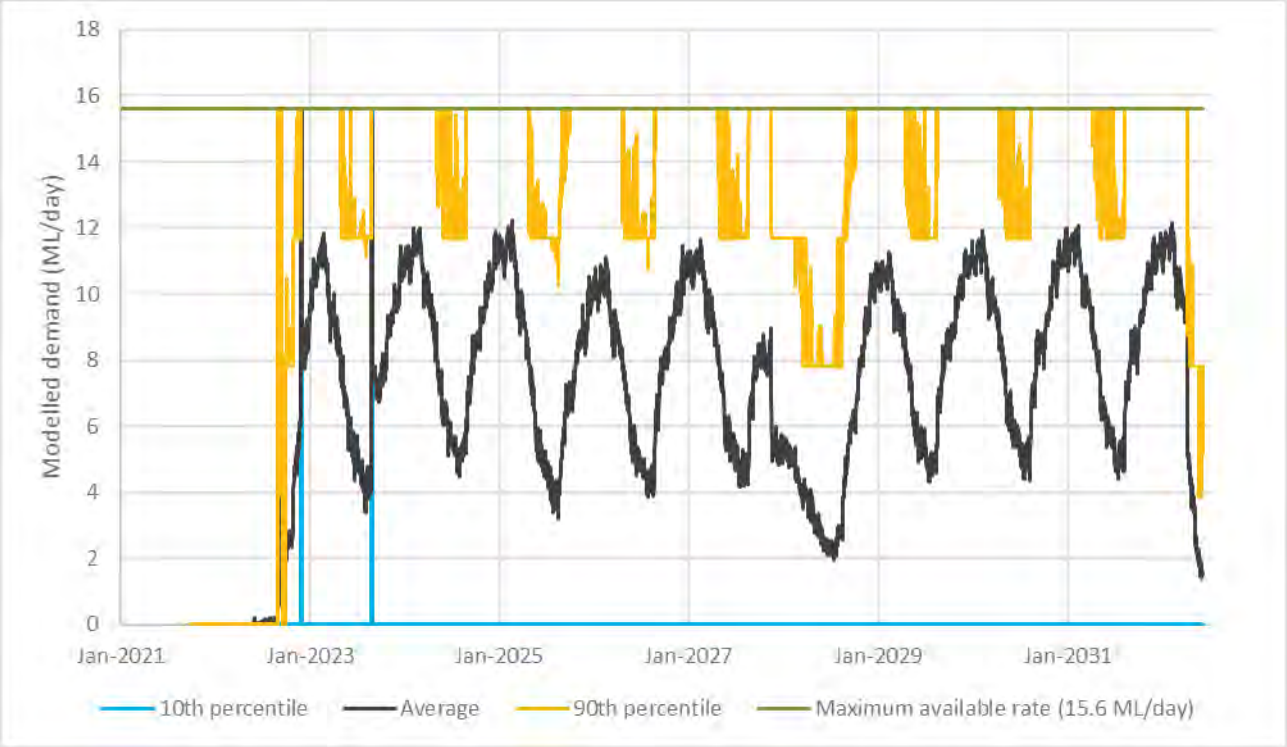


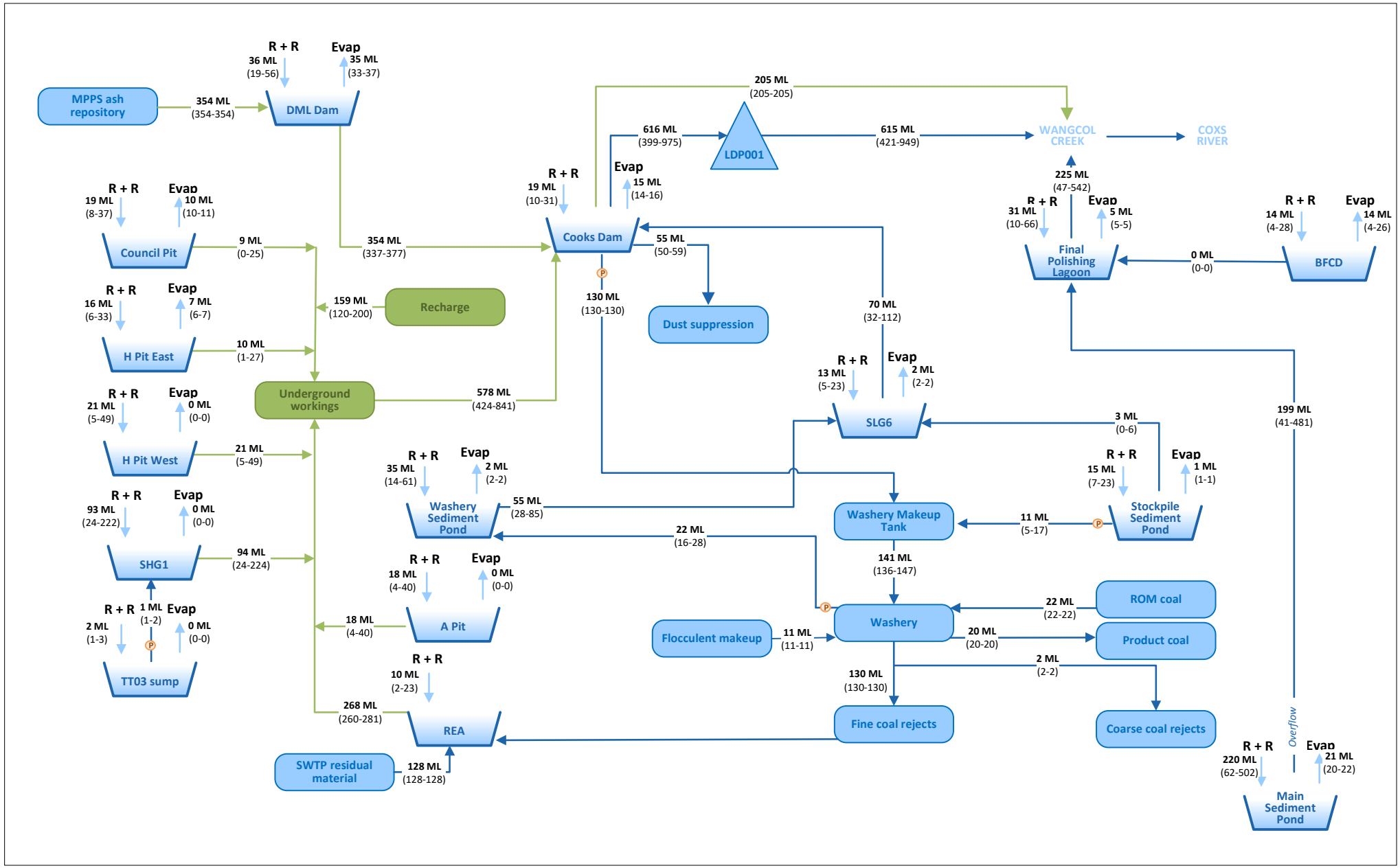

**Figure 7.1 Modelled demand from McPhillamys Gold Project**

Source: HEC (2020).

## 7.2 Water balance model results

### 7.2.1 Overview

The water management system for SCSS was modelled using a total of 131 different climate patterns to consider potential climate variability (Section 7.1.2). The predicted annual values for each of the water transfers for Scenario 1, Scenario 2 and Scenario 3 are provided in Figure 7.2, Figure 7.3 and Figure 7.4, respectively. The results present the average annual transfers between the elements of the water cycle as well as 10th percentile and 90th percentile results to provide an indication of the range of values expected due to possible variations in rainfall. Note the results are compiled from all 131 model realisations and do not represent a single climatic scenario/realisation (eg the average results do not necessarily represent average climate conditions).




**KEY**

Underground process | Surface storage | Surface process | Licensed discharge point | Surface water flow

Groundwater flow | Pumped flow | R + R Rainfall and runoff | X ML (X-X) Average (10th percentile-90th percentile)

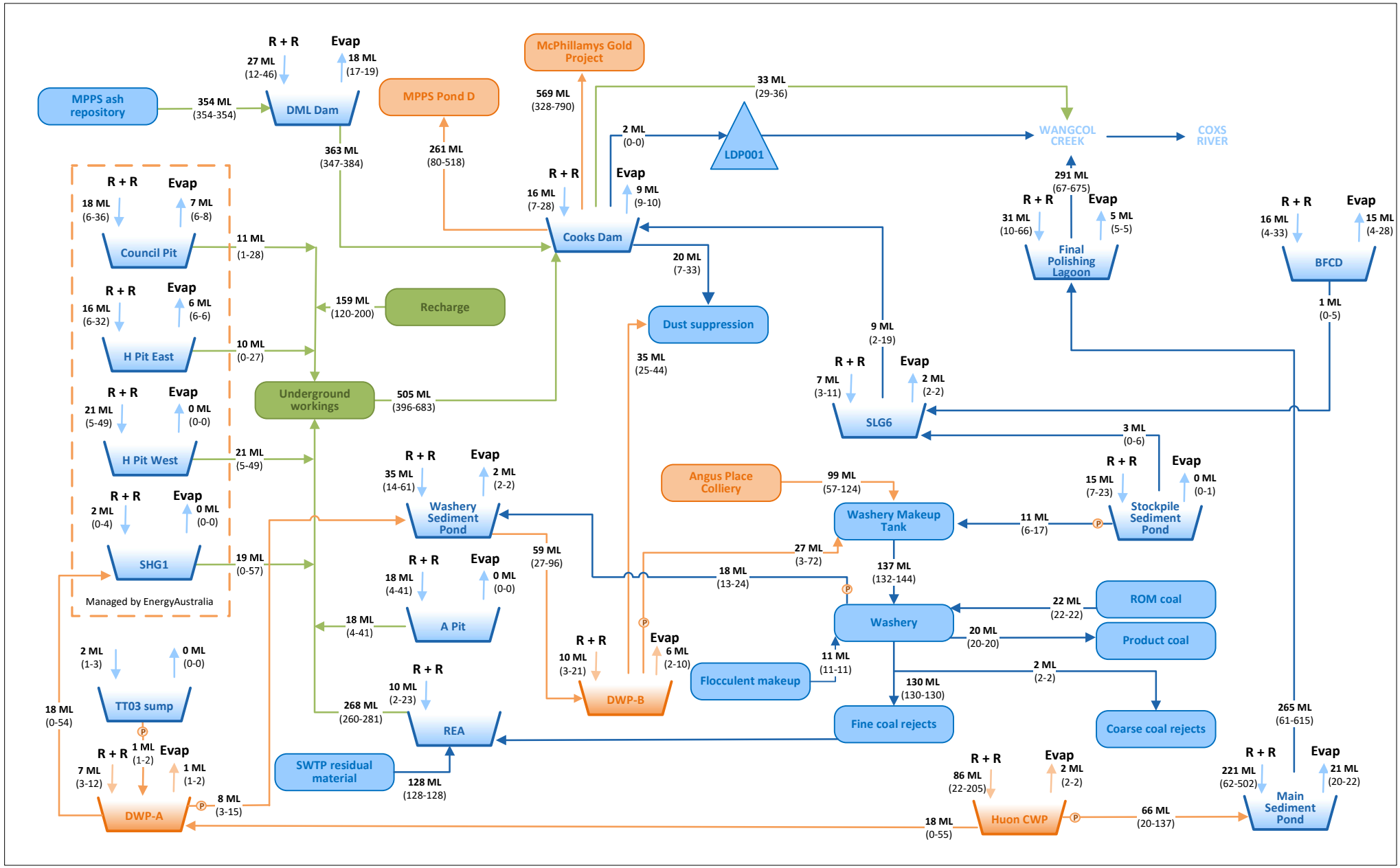
EMM creating opportunities

**Annual water transfers – Scenario 1**

Western Coal Services Project

Water Resources Impact Assessment

Figure 7.2




**KEY**

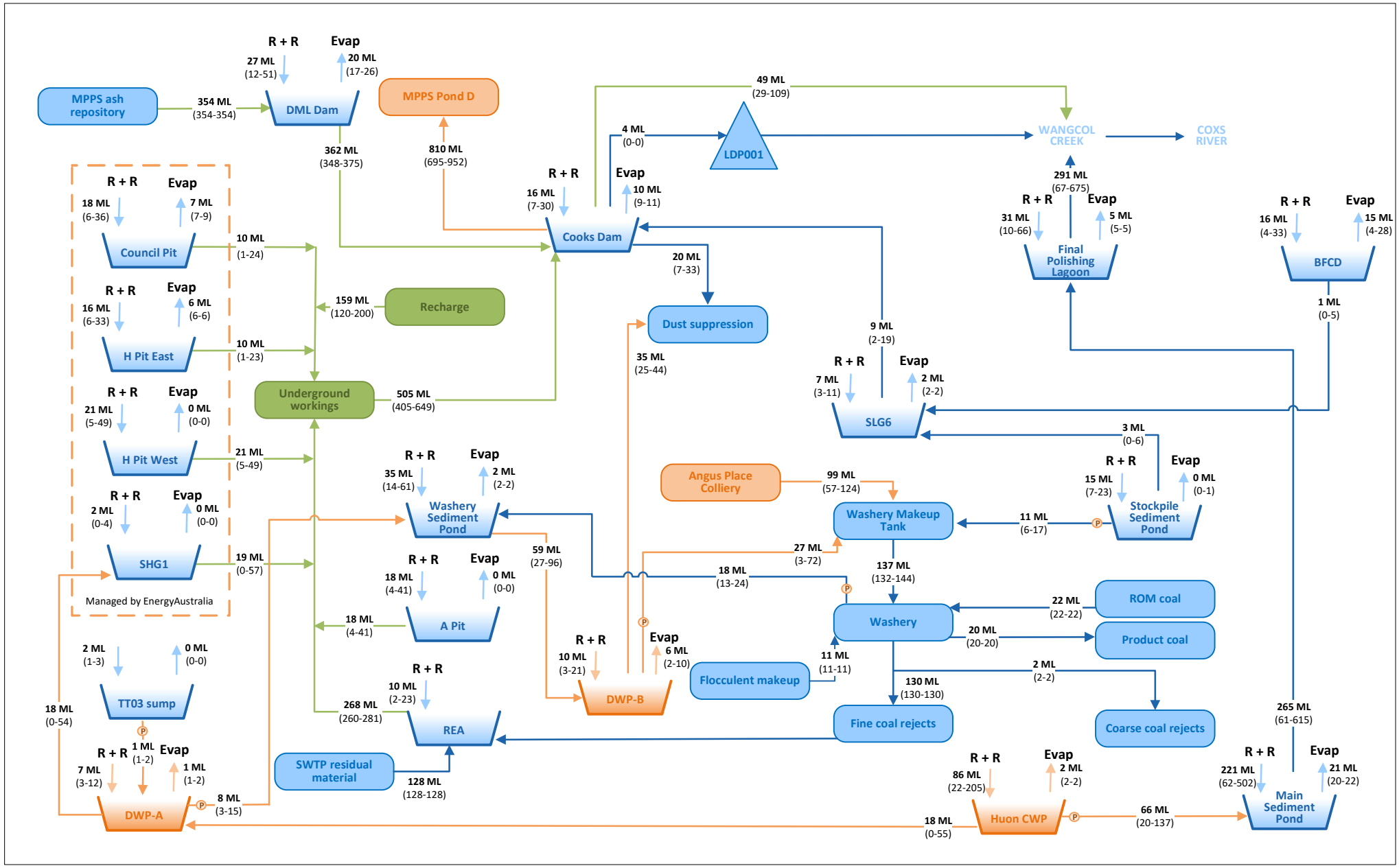
Underground process | Surface storage | Surface process | Licensed discharge point | Surface water flow

Groundwater flow | Proposed water transfer | Pumped flow | **R + R** Rainfall and runoff | **X ML** (X-X) **Average** (10th percentile-90th percentile)

EMM creating opportunities

## Annual water transfers – Scenario 2

Western Coal Services Project
Water Resources Impact Assessment
Figure 7.3




KEY

Underground process | Surface storage | Surface process | Licensed discharge point | Surface water flow

Groundwater flow | Proposed water transfer | Pumped flow | R + R Rainfall and runoff | X ML (X-X) Average (10th percentile-90th percentile)

**Annual water transfers – Scenario 3**

Western Coal Services Project

Water Resources Impact Assessment

Figure 7.4

A summary of the average annual inputs and outputs of the SCSS water management system is presented in Table 7.1. Results have been rounded to the nearest 1 ML/year.

### Table 7.1 Summary of average predicted water inputs and outputs

| Aspect | Scenario 1 (ML/year) | Scenario 2 (ML/year) | Scenario 3 (ML/year) |
|---|---|---|---|
| **INPUTS** | | | |
| Rainfall and catchment runoff | 562 | 556[1] | 556[1] |
| Groundwater recharge | 159 | 159 | 159 |
| SWTP residual material | 128 | 128 | 128 |
| Flocculant makeup | 11 | 11 | 11 |
| ROM coal moisture | 22 | 22 | 22 |
| Seepage from MPPS ash repository | 354 | 354 | 354 |
| Transfer from Angus Place Colliery | – | 99 | 99 |
| **Total inputs** | **1,236** | **1,329** | **1,329** |
| **OUTPUTS** | | | |
| Evaporation | 112 | 94 | 97 |
| Dust suppression | 55 | 55 | 55 |
| Coarse coal reject moisture | 2 | 2 | 2 |
| Product coal moisture | 20 | 20 | 20 |
| Discharge via LDP001 to Wangcol Creek | 616 | 2 | 4 |
| Overflow from Final Polishing Lagoon to Wangcol Creek | 225 | 291 | 291 |
| Seepage from Cooks Dam to Wangcol Creek | 205 | 33 | 49 |
| Transfer to McPhillamys Gold Project | – | 569 | – |
| Transfer to Pond D at MPPS | – | 261 | 810 |
| **Total outputs** | **1,235** | **1,327** | **1,328** |
| **BALANCE** | **1** | **2** | **1** |

1. Rainfall and catchment runoff estimates including to Council Pit, H Pit East, H Pit West and SHG1 which will be managed by EnergyAustralia following handback of Area 4.

The water balance model results presented in Table 7.1 indicate that, on average, rainfall and catchment runoff provides the greatest inflow into the water management system under all scenarios modelled, representing 40% of total inflows.

The transfer of water from Angus Place Colliery modelled under proposed conditions (scenarios 2 and 3) represented 7% of total inflows. A predicted 99 ML/year or 0.3 ML/day on average was modelled to be imported from Angus Place Colliery to supplement water supply to the washery under proposed conditions (scenarios 2 and 3).

The most significant volumetric transfers within the water management system under existing conditions modelled for Scenario 1 occur between Cooks Dam and the REA. Water is supplied to the washery from Cooks Dam, with the majority of this water pumped with the fine coal rejects for emplacement in the REA. As the fine coal rejects consolidate, water flows through the historical underground workings system and is intercepted by Cooks Dam. The proposed modification effectively prevents this recycling of water by supplying the washery with water stored in DWP-B and transferred from Angus Place Colliery.

Under existing conditions modelled for Scenario 1, the majority of outflows from the water management system comprised LDP001 discharge, with 616 ML/year, or 50% of total outflows, on average discharged to Wangcol Creek.

Transfers of water from Cooks Dam to McPhillamys Gold Project and Pond D at MPPS were predicted to form 60% of total outflows from the SCSS water management system under proposed conditions modelled by scenarios 2 and 3. The average transfer of water off-site was 1.6 ML/day (maximum 15.6 ML/day) to McPhillamys Gold Project, 0.7 ML/day (maximum 2.6 ML/day) to MPPS for Scenario 2 and 2.2 ML/day (maximum 2.6 ML/day) to MPPS for Scenario 3. These transfers of water off-site, along with the addition of DWP-B as a central dirty water storage for SCSS and increase in the Washery Dam capacity, are predicted to significantly reduce LDP001 discharges by over 99% to 2 ML/year for Scenario 2 and 4 ML/year for Scenario 3 on average.

The addition of the Huon Clean Water Pond was modelled to intercept runoff from Huon Gully, decreasing the volume of catchment runoff contributing to SHG1 and the groundwater system under existing conditions (Scenario 1) by 75 ML/year on average. Additionally, the volume of water discharging from the clean water diversion system of Lamberts Gully via the Final Polishing Lagoon to Wangcol Creek was predicted to increase by 20% from 225 ML/year for Scenario 1 to 291 ML/year for scenarios 2 and 3 (on average).

### 7.2.2 Off-site discharges

Modelled daily discharges from Cooks Dam to Wangcol Creek via LDP001 for Scenario 1, Scenario 2 and Scenario 3 are presented in Figure 7.5. Under existing conditions (Scenario 1), discharges were predicted to occur every day, between a minimum rate of 0.5 ML/day, average rate of 1.7 ML/day and a maximum rate of 65 ML/day.

Transfers of water from Cooks Dam to McPhillamys Gold Project and Pond D at MPPS under proposed conditions (scenarios 2 and 3), as well as the addition of DWP-B and increase in the Washery Dam capacity, were modelled to result in a significant decrease in LDP001 discharges to Wangcol Creek.

Under proposed conditions modelled for Scenario 2, discharges were predicted to occur less than 1% of the time, with a maximum rate of 16 ML/day. LDP001 discharges modelled under Scenario 3 were predicted to occur slightly more frequently than for Scenario 2, at approximately 1% of the time, with a maximum rate of 16 ML/day.

The average LDP001 discharge rate under proposed conditions modelled for scenarios 2 and 3 was less than 0.01 ML/day.

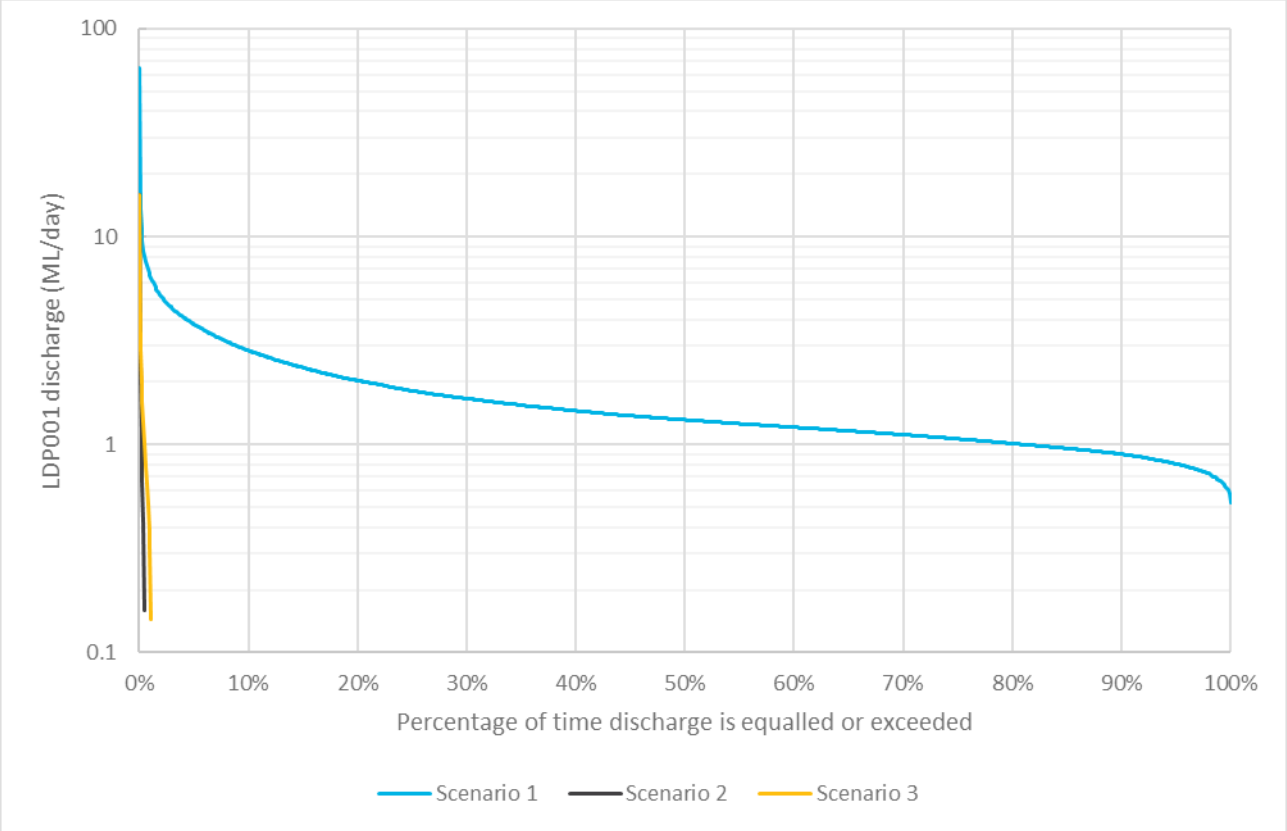



**Figure 7.5 Predicted LDP001 discharge**

Discharges from the Lamberts Gully clean water diversion via the Final Polishing Lagoon to Wangcol Creek predicted by the water balance model are presented in Figure 7.6.

Under existing conditions modelled by Scenario 1, flows to Wangcol Creek were predicted to occur over 70% of the time, with a predicted rate of 0.9 ML/day on average and maximum rate of 293 ML/day.

Under proposed conditions, catchment runoff to Huon Gully upstream of SCSS was modelled to be diverted to the Lamberts Gully clean water diversion via the Huon Gully Clean Water Pond, resulting in a slight increase in the frequency and volume of flows to Wangcol Creek. Overflows from the Final Polishing Lagoon modelled for scenarios 2 and 3 were predicted to occur over 76% of the time, with an average rate of 1 ML/day and maximum rate of 267 ML/day.

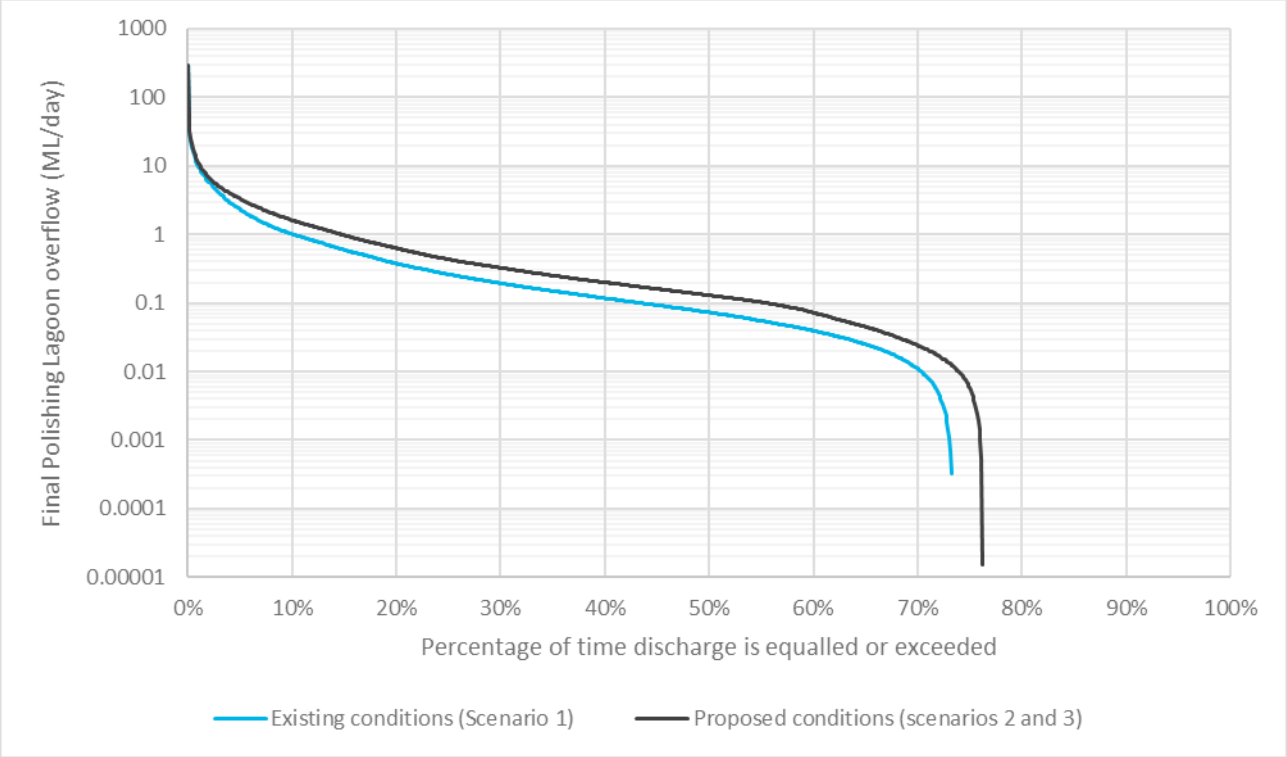



**Figure 7.6 Predicted overflows from Final Polishing Lagoon to Wangcol Creek**

Overflows from DWP-A under proposed conditions in scenarios 2 and 3 intercepted by SHG1 are presented in Figure 7.7. Overflows are predicted to occur infrequently, with no discharge occurring for over 99% of the time. A maximum daily overflow of 117 ML was modelled to occur, due to the overflow of the Huon Clean Water Pond into DWP-A.

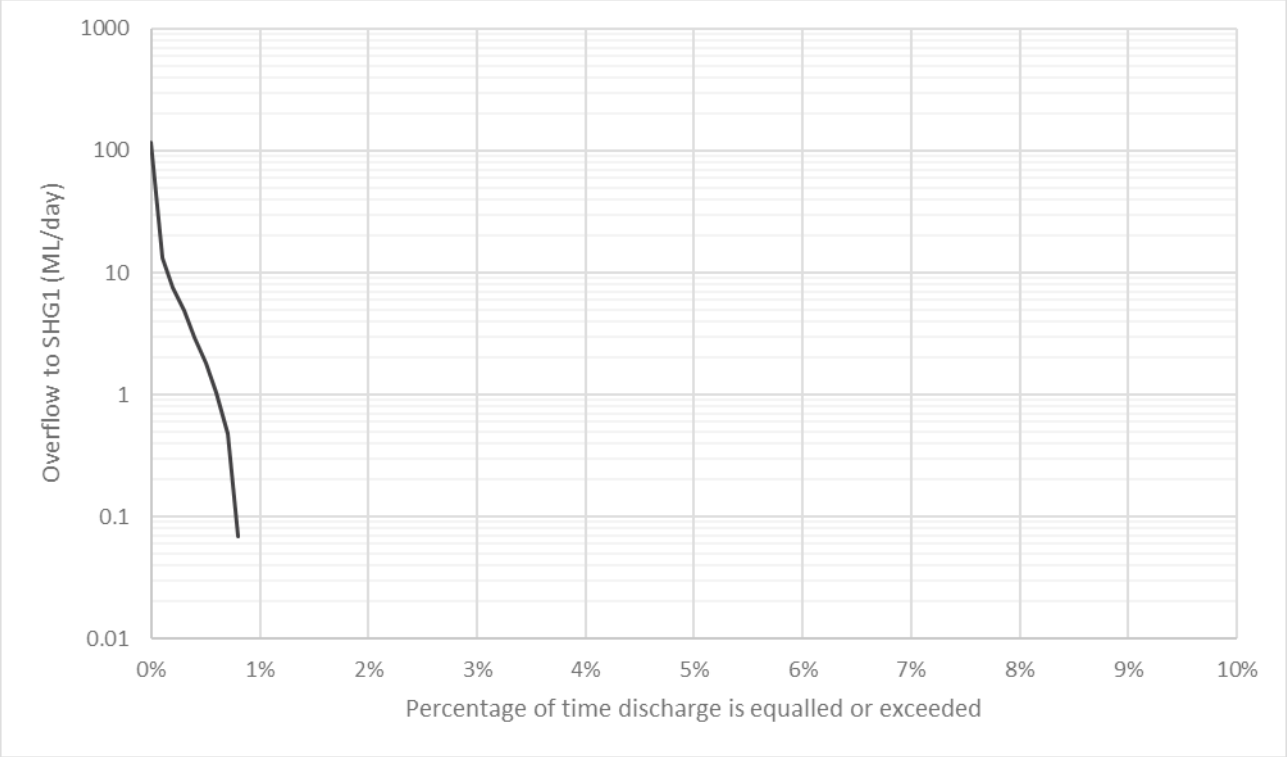
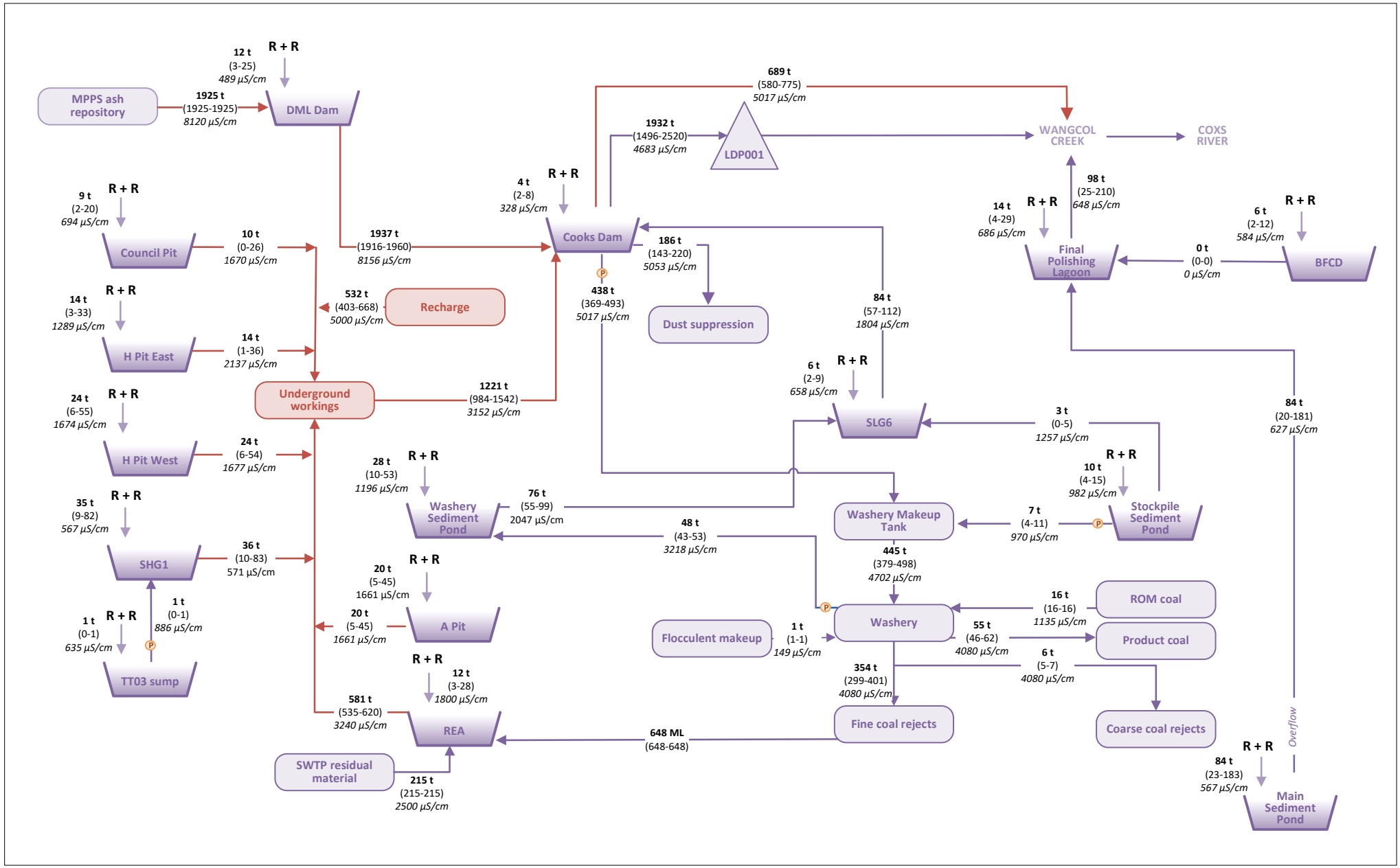



**Figure 7.7 Predicted DWP-A overflows to SHG1**

## 7.3 Salt balance results

The predicted annual values for each of the salt transfers for Scenario 1, Scenario 2 and Scenario 3 are provided in Figure 7.8, Figure 7.9 and Figure 7.10, respectively. The results present the average annual salt transfers between the elements of the water cycle as well as 10th percentile and 90th percentile results to provide an indication of the range of values expected due to possible variations in rainfall and the predicted average EC.




**Annual salt transfers – Scenario 1**

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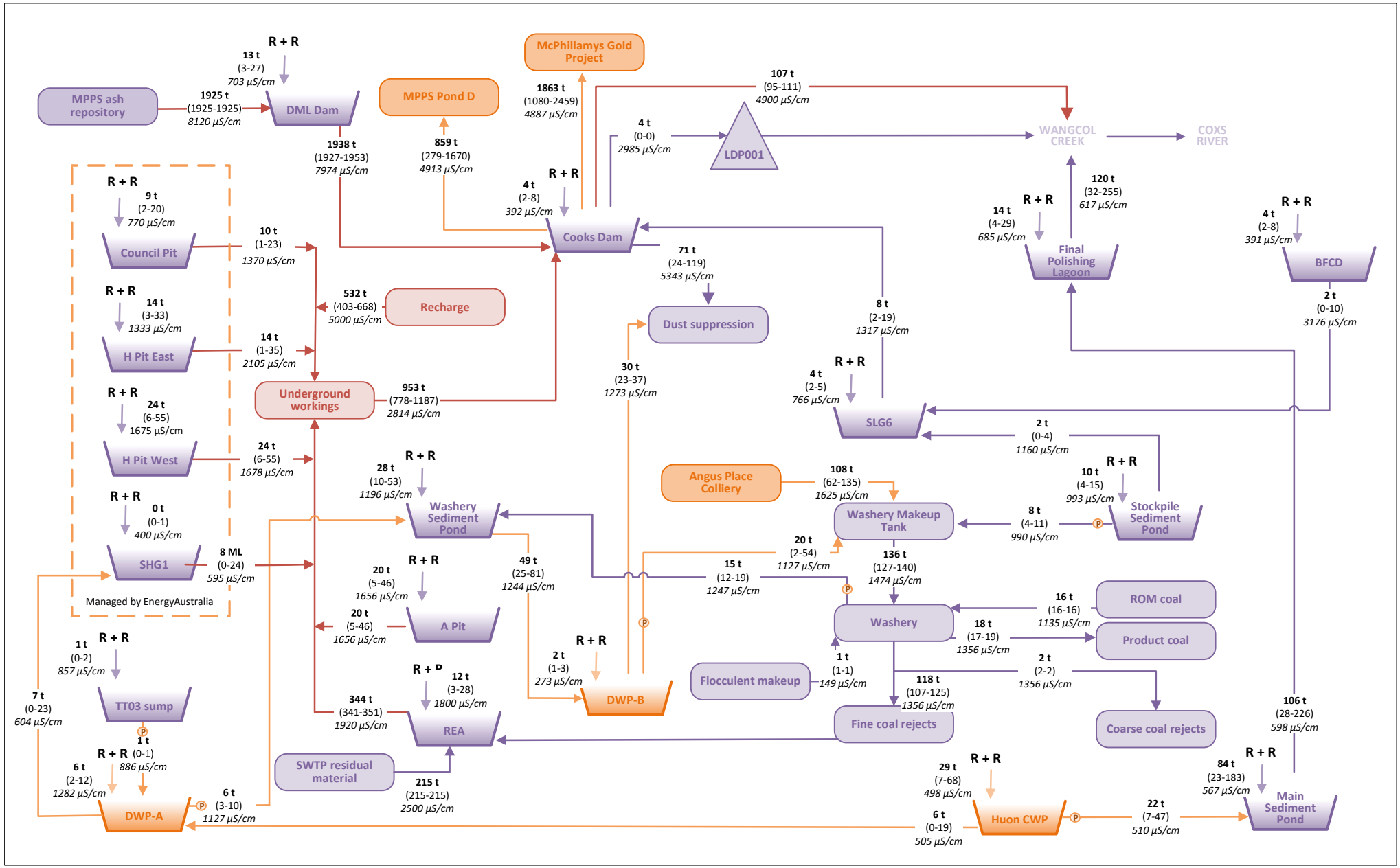
Figure 7.8

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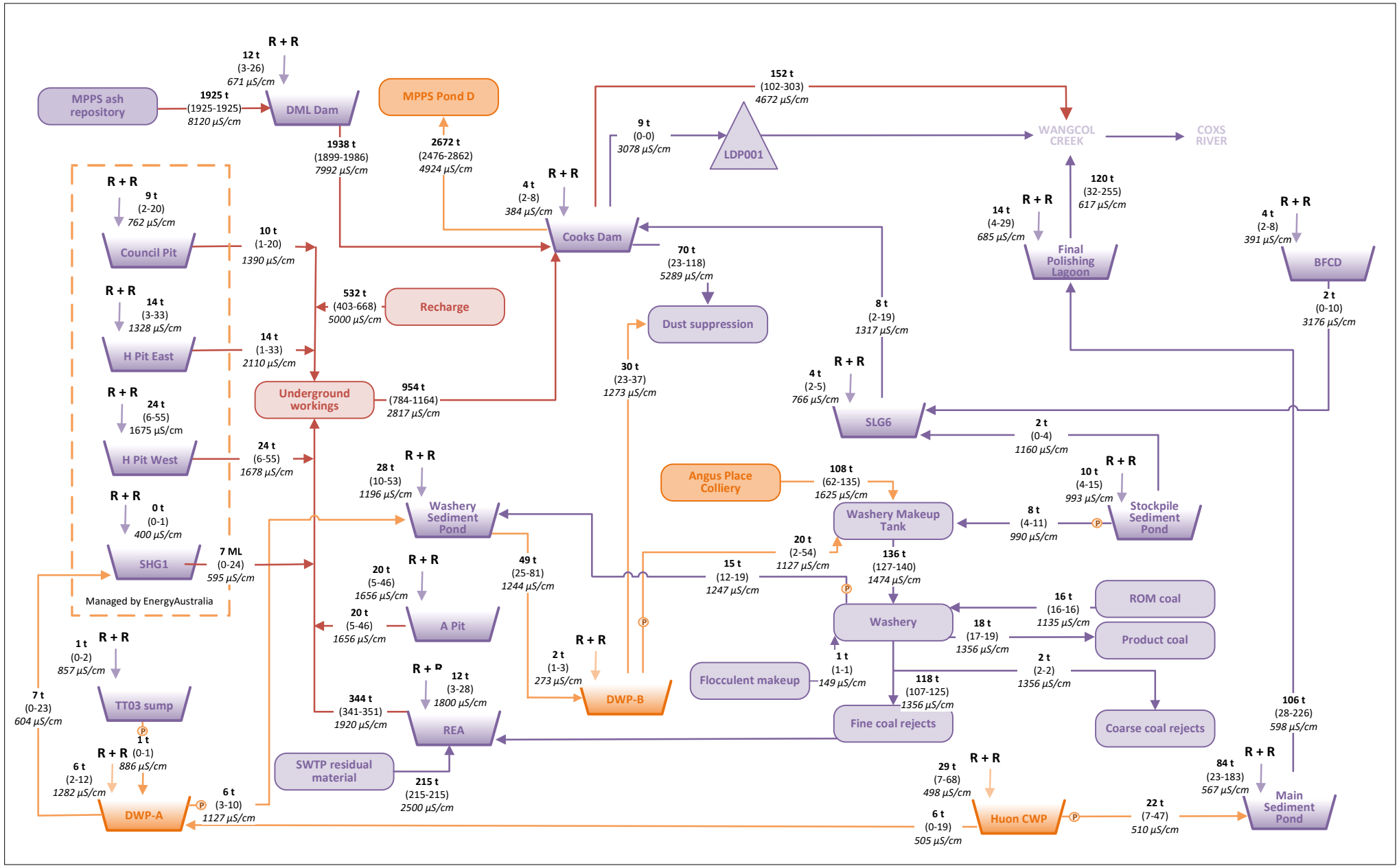
**Annual salt transfers – Scenario 2**

Western Coal Services Project

Water Resources Impact Assessment

Figure 7.9




**KEY**

Underground process | Surface storage | Surface process | Licensed discharge point | Surface water flow

Groundwater flow | Proposed water transfer | Pumped flow | R + R Rainfall and runoff | X t (X-X) X µS/cm | Average (10th percentile-90th percentile) Average EC

EMM creating opportunities

**Annual salt transfers – Scenario 3**

Western Coal Services Project

Water Resources Impact Assessment

Figure 7.10

A summary of the average annual inputs and outputs for the salt balance is presented in Table 7.2. Results have been rounded to the nearest 1 tonne per annum (tpa).

### Table 7.2 Summary of average predicted salt inputs and outputs

| Aspect | Scenario 1 (tpa) | Scenario 2 (tpa) | Scenario 3 (tpa) |
|---|---|---|---|
| **INPUTS** | | | |
| Rainfall and catchment runoff | 278 | 278 | 277 |
| Groundwater recharge | 532 | 532 | 532 |
| SWTP residual material | 215 | 215 | 215 |
| Flocculant makeup | 1 | 1 | 1 |
| ROM coal moisture | 16 | 16 | 16 |
| Seepage from MPPS ash repository | 1,925 | 1,925 | 1,925 |
| Transfer from Angus Place Colliery | – | 108 | 108 |
| **Total inputs** | **2,967** | **3,075** | **3,074** |
| **OUTPUTS** | | | |
| Dust suppression | 186 | 101 | 100 |
| Coarse coal reject moisture | 6 | 2 | 2 |
| Product coal moisture | 55 | 18 | 18 |
| Discharge via LDP001 to Wangcol Creek | 1,932 | 4 | 9 |
| Overflow from Final Polishing Lagoon to Wangcol Creek | 98 | 120 | 120 |
| Seepage from Cooks Dam to Wangcol Creek | 689 | 107 | 152 |
| Transfer to McPhillamys Gold Project | – | 1,863 | – |
| Transfer to Pond D at MPPS | – | 859 | 2,672 |
| **Total outputs** | **2,966** | **3,074** | **3,073** |
| **BALANCE** | **1** | **1** | **1** |

As seen in Table 7.2, the largest average inflows of salt to the SCSS water management system for all modelled scenarios was associated with groundwater interception. Seepage from MPPS's ash repository, which was modelled to be intercepted by the DML Dam, was predicted to contribute 1,925 tpa of salt on average, or 64% of total salt input to the system, with an average EC of 8,120 µS/cm. Groundwater recharge to the underground workings, which was modelled to be intercepted by Cooks Dam, was predicted to contribute 532 tpa of salt on average, with an average EC of 5,000 µS/cm, representing 18% of the total salt input to the system.

The majority of the net salt gained from the groundwater system at SCSS is discharged to Wangcol Creek via LDP001 under existing conditions (Scenario 1). The predicted annual mass of salt associated with LDP001 discharge for Scenario 1 was 1,932 tpa, with an average EC of 4,683 µS/cm. This represents over 60% of the total modelled salt output from SCSS.

Under proposed conditions, salt output from SCSS with LDP001 discharge decreased to less than 10 tpa on average, with an average EC of around 4,000 µS/cm. This was primarily due to the transfer of water to McPhillamys Gold Project and Pond D at MPPS modelled for Scenario 2 and Scenario 3, which accounted for an average of approximately 2,700 tpa of salt, representing over 85% of the total salt output from the system.

The addition of DWP-B, increase in the Washery Dam's capacity and the transfer of water from Angus Place Colliery to supplement supply to the washery (modelled to occur under proposed conditions for scenarios 2 and 3) and subsequent reduction in water recycled from Cooks Dam in the washery has an overall result of reducing EC within the SCSS water management system. This is indicated by the reduction in EC of water flowing from the REA to the historical underground workings system that is intercepted by Cooks Dam from an average of 3,240 µS/cm for Scenario 1 to 1,920 µS/cm for scenarios 2 and 3.

# 8 Impact assessment

## 8.1 Construction phase

### 8.1.1 Water quality

The primary risk to surface water quality during construction is ground disturbance during earthworks and other site activities. There is potential that construction works will lead to exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses. Uncontrolled sediment-laden runoff has the potential to increase turbidity and nutrients entering waterways which may have ecological and water quality impacts.

The risks to water quality during construction can be effectively managed through the development and implementation of an erosion and sediment control plan (ESCP) incorporating appropriate soil and water management measures in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom 2004) and *Managing Urban Stormwater: Soils and Construction – Volume 2E Mines and Quarries* (DECC 2008). This will be formalised as part of detailed design and documented in the construction environmental management plan (CEMP).

Contamination of surface water as a result of accidental spillage of materials such as fuels and chemicals used to support construction activities could also adversely impact water quality. Appropriate controls to manage spills will be incorporated into the CEMP.

### 8.1.2 Water flows

DWP-A and the Huon Clean Water Pond are proposed to be constructed within the bed of Huon Gully, an existing watercourse. Construction methods will be confirmed during detailed design; however, a generalised approach would involve the isolation of construction work sites and soil disturbance from watercourse flows by the installation of coffer dams as required. Coffer dams would be sized to provide sufficient water storage to allow the construction to be completed, or a temporary bypass pumping system may be utilised. Construction methodologies will be detailed in the CEMP and ESCP and will be consistent with guidance provided by NOW (2012a; 2012b) for instream works.

## 8.2 Groundwater

As per Section 3.3 of the AIP (DPI 2012), the proposed construction and operation of the Huon Clean Water Pond, DWP-A and DWP-B and proposed increase in the Washery Dam's capacity are considered minimal impact and do not require groundwater assessment. Available data (ie bore logs, groundwater level data, LiDAR data) suggest groundwater will not be intercepted during the construction or operation of the Huon Clean Water Pond, DWP-A and DWP-B or maintenance activities required to increase the capacity of the Washery Dam.

Groundwater at SCSS flows to the north-east and follows local topography and geological strata. Previously part of the Western Main open cut workings, DML Dam and Cooks Dam receive shallow groundwater discharge from the Lidsdale and Lithgow seams (Centennial 2020). H-Pit West, which is within proximity of the Huon Clean Water Pond and DWP-A, was part of the Lamberts Gully open cut and also receives groundwater discharge from the Lidsdale and Lithgow seams (Centennial 2020). H-Pit West is in equilibrium with the groundwater system and likely has a similar standing water level to BH11 given its proximity (Figure 6.21). Shallowest groundwater levels at SCSS are toward Wangcol Creek.

Figure 6.21 shows the locations of the bores considered when assessing potential groundwater interception during the construction of DWP-A and DWP-B. Figure 8.1 shows the groundwater levels for monitoring bores against the respective maximum excavation depths for DWP-A and DWP-B. Observations are consistent with previous investigations (RPS 2014) and the following conclusions have been made using groundwater level data from January 2015 to October 2020:

- the deepest excavation for DWP-A has a level of 932.8 m AHD, with the standing groundwater level at the closest monitoring bore (BH11) averaging 909.5 m AHD; and

- the deepest excavation for DWP-B has a level of 908.0 m AHD, with the standing groundwater level at the closest monitoring bore (BH03) averaging 903.4 m AHD.

Construction of the Huon Clean Water Pond and increase in Washery Dam capacity do not require excavation below the existing ground surface and is therefore not expected to intercept groundwater.

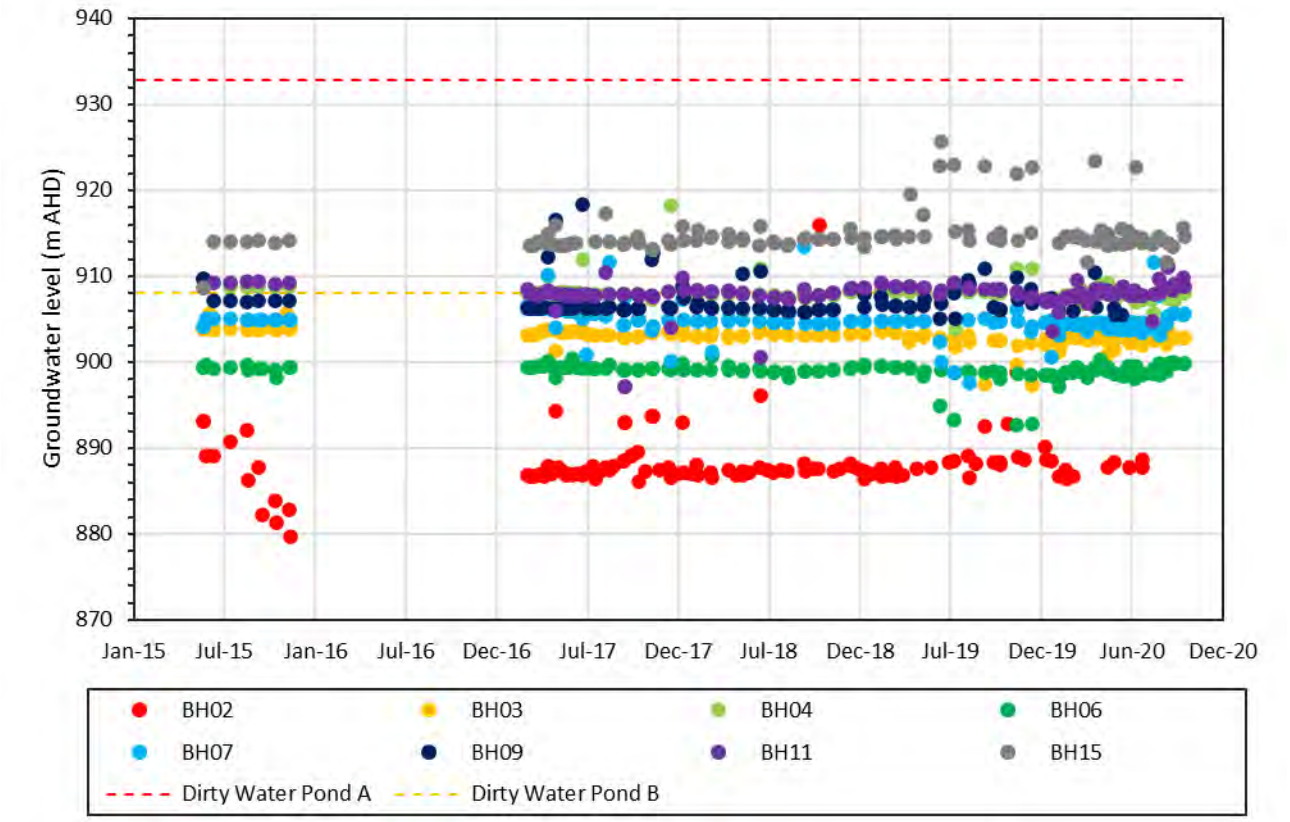



**Figure 8.1 Groundwater levels in comparison to DWP-A and DWP-B maximum excavation depths**

## 8.3 LDP001 discharges

As discussed in Section 1.1.2, the discharge of untreated groundwater into Wangcol Creek as part of standard operating practice at SCSS is no longer supported by regulators or the community. The proposed modification seeks to reduce the volume and pollutant load associated with LDP001 discharges to Wangcol Creek through:

- decreasing the connectivity of groundwater with the surface water management system by supplying the washery with water stored within DWP-B and mine water transferred from Angus Place Colliery, which is of a higher quality than water currently stored on-site at SCSS;

- decreasing the volume of catchment runoff from Huon Gully contributing to SHG1 and the historical underground workings system through the construction and operation of the Huon Clean Water Pond and diversion to Wangcol Creek; and

- the transfer of excess water generated at SCSS to McPhillamys Gold Project and Pond D at MPPS.

### 8.3.1 Discharge regime

Water balance modelling has been used to estimate the discharge regime to Wangcol Creek from SCSS under both existing and proposed conditions. Table 8.1 presents the annual discharge volumes via LDP001 discharge and overflows from the Final Polishing Lagoon.

**Table 8.1 Predicted changes to discharge regime to Wangcol Creek**

| Modelling scenario[1] | Percentile | LDP001 discharges (ML/year) | Overflows from Final Polishing Lagoon (ML/year) | Total discharge (ML/year) |
|---|---|---|---|---|
| Scenario 1 (existing conditions) | 10th percentile | 399 | 47 | 446 |
| | Average | 616 | 225 | 841 |
| | 90th percentile | 975 | 542 | 1,517 |
| Scenario 2 (proposed conditions) | 10th percentile | 0 | 67 | 67 |
| | Average | 2 | 291 | 293 |
| | 90th percentile | 0 | 675 | 675 |
| Scenario 3 (proposed conditions) | 10th percentile | 0 | 67 | 67 |
| | Average | 4 | 291 | 295 |
| | 90th percentile | 0 | 675 | 675 |

1. Refer to Section 7.1.3 for description of modelling scenarios.

As shown in Table 8.1, the proposed modification is predicted by water balance modelling to reduce discharges from SCSS to Wangcol Creek via LDP001 by 99%, from 616 ML/year on average under existing conditions to less than 5 ML/year on average under proposed conditions.

Discharges from the Lamberts Gully clean water diversion to Wangcol Creek are predicted to increase by 20% with the additional diversion of Huon Gully catchment, from 225 ML/year under existing conditions to 291 ML/year under proposed conditions on average.

Overall surface water discharges from SCSS, consisting of LDP001 discharges and overflows from the Final Polishing Lagoon, are predicted to decrease by around 550 ML/year on average.

The proposed modification will be effective in reducing the volume and frequency of LDP001 discharges. Overflows of Cooks Dam under proposed conditions will typically occur during wet weather periods that comprise several days of material rainfall. Discharges are expected to cease shortly after the wet weather conditions end. Discharges are only expected to occur when streamflow in Wangcol Creek and discharge from the Lamberts Gully clean water diversion (via overflows from the Final Polishing Lagoon) are naturally elevated due to catchment runoff.

### 8.3.2 Water quality

Due to the connectivity of the local groundwater system and the surface water management system, discharges through LDP001 are predominantly made up of groundwater contributing to Cooks Dam. This water is characterised by relatively high EC and concentrations of some metals such as cobalt, iron, manganese, nickel and zinc (Section 6.1). Recirculation of water stored in Cooks Dam to supply the washery occurs as water is associated with fine coal rejects emplaced in the REA, which then flows through the groundwater system and is intercepted by Cooks Dam. This recycling of water through the system has resulted in EC and some metal concentrations increasing over time at SCSS.

The proposed modification will be effective in improving the quality of water stored and recirculated on-site through the use of DWP-B as a central dirty water management storage to supply the washery and dust suppression activities on-site, as well as the increase in Washery Dam capacity and the use of mine water from Angus Place Colliery in the washery. By providing alternative supply options for the washery, groundwater intercepted by Cooks Dam will no longer be required to be used for this purpose, which will reduce the concentration of potential contaminants through contributing to a reduction in the recycling of water through the water management system.

In addition, the transfer of excess water stored at SCSS to McPhillamys Gold Project or Pond D at MPPS is predicted to significantly reduce the pollutant load discharged to Wangcol Creek via LDP001. Table 8.2 presents the annual salt loads discharged via LDP001 and overflows from the Final Polishing Lagoon based on the salt balance modelling presented in Section 7.3. The average salt load associated with LDP001 discharges is predicted to decrease by more than 99% from 1,932 tpa (existing conditions) to less than 10 tpa (proposed conditions).

**Table 8.2 Predicted changes to discharge salt loads and electrical conductivity to Wangcol Creek**

| Modelling scenario[1] | Percentile | LDP001 discharges (tpa) | Overflows from Final Polishing Lagoon (tpa) | Total discharge (tpa) |
|---|---|---|---|---|
| Scenario 1 (existing conditions) | 10th percentile | 1,496 | 25 | 1,521 |
| | Average | 1,932 | 98 | 2,030 |
| | 90th percentile | 2,520 | 210 | 2,730 |
| Scenario 2 (proposed conditions) | 10th percentile | 0 | 32 | 32 |
| | Average | 4 | 120 | 124 |
| | 90th percentile | 0 | 255 | 255 |
| Scenario 3 (proposed conditions) | 10th percentile | 0 | 32 | 32 |
| | Average | 9 | 120 | 129 |
| | 90th percentile | 0 | 255 | 255 |

1. Refer to Section 7.1.3 for description of modelling scenarios.

The proposed modification seeks to minimise the contribution of groundwater to LDP001 discharges to Wangcol Creek. As a result, it is expected that surface water runoff from Huon Gully and Lamberts Gully will be the primary source of surface water discharge from SCSS to Wangcol Creek. This water is expected to have lower EC and lower concentrations of some metals, compared to current LDP001 discharges to Wangcol Creek.

The proposed modification is predicted to reduce the volume and frequency of discharges to Wangcol Creek via LDP001 and result in a significant reduction in the pollutant load of discharges compared to existing conditions. As such, the proposed modification is assessed to have a NorBE on water quality within the Sydney drinking water catchment area in accordance with the SEPP.

## 8.4 Water licensing

Dams that are solely for the capture, containment or recirculation of drainage, consistent with best management practice to prevent the contamination of a water source, that are located on a minor stream are considered to be excluded works under Schedule 1, Item 3 of the NSW Water Management (General) Regulation 2018.

DWP-B will be an excluded work under this definition as the primary use of the dam is for water quality control by capturing and retaining dirty water to prevent pollution of the downstream receiving environment.

Water stored within DWP-B is proposed to be reused within the washery. The take of water from DWP-B is exempt from requiring a licence under Schedule 4, item 12 of the NSW Water Management (General) Regulation 2018.

The Huon Clean Water Pond and DWP-A are proposed on Huon Gully, a third order watercourse. Springvale Coal will consult with the NSW Department of Planning, Industry and Environment – Water and the Natural Resources Access Regulator with regards to the construction and ongoing operation of both Huon Clean Water Pond and DWP-A in accordance with the WM Act.

# 9 Monitoring and management measures

## 9.1 Water management plan

Following approval of the proposed modification, the WMP (Centennial 2020) will be updated to include the changes to the water management system at SCSS, in consultation with NSW Department of Planning, Industry and Environment – Water and EPA. The updated WMP will address any specific development consent or licence conditions and will include:

- baseline monitoring data results;
- objectives and performance criteria including trigger levels for investigating any potentially adverse impacts associated with water management;
- details of monitoring, inspection and maintenance programs;
- reporting procedures for the results of the monitoring program; and
- plans to respond to any exceedances of the performance criteria.

A CEMP will be developed for the construction phase of the proposed modification, which will include appropriate soil and water management measures within an ESCP. The plans will document the proposed mitigation and management measures for construction activities and will include water monitoring requirements, reporting requirements, spill management and response, corrective actions and responsibilities for all management measures.

## 9.2 Monitoring program

The objective of the existing monitoring program at SCSS is to collect data to:

- assess the effectiveness of the water management system;
- identify and quantify any water quality impacts to receiving waterways; and
- assess compliance with any relevant development consent and licence conditions.

The existing monitoring program is detailed in the WMP (Centennial 2020) and includes surface water quality, volume of LDP001 discharges, groundwater level and quality, channel stability and aquatic ecology. In addition, the monitoring program at SCSS is recommended to include the following:

- surface water quality within DWP-A, DWP-B and the Huon Clean Water Pond, with analytes and monitoring frequency that is consistent with the monitoring of other water management storages at SCSS;
- water levels within DWP-A, DWP-B and the Huon Clean Water Pond; and
- pumped volumes of water, particularly:
    - DWP-A to the Washery Dam;

- Huon Clean Water Pond to the Main Sediment Pond;
- DWP-B to the Washery Makeup Tank;
- Angus Place Colliery to Washery Makeup Tank;
- Cooks Dam to McPhillamys Gold Project; and
- Cooks Dam to Pond D at MPPS.

## 9.3 Inspection and maintenance program

Site inspections of the water management system, including erosion and sediment controls, are undertaken in accordance with the WMP (Centennial 2020), which is recommended to continue.

Recommended ongoing dam maintenance activities that should be undertaken during construction and operation of the proposed modification include weed management, removal of excessive sediment accumulation and inspection of dam embankments, spillways and connecting pipework. Corrective maintenance should be undertaken as required to maintain the integrity and function of the dam infrastructure.

## 9.4 Modelling

Monitoring data will be used to further refine the water and salt balance model for SCSS, which is reviewed and revised every three years as a minimum or as necessary when there are changes to operations.

The modelling approach for the groundwater system is highly simplified and limited in its ability to simulate the highly modified local hydrogeology and hydraulic connection with surface water features. Springvale Coal has commenced the development of a numerical hydrogeological model for SCSS and adjacent MPPS (separate to the model commissioned by EnergyAustralia). Once developed, this model will be used to simulate surface water and groundwater interactions at SCSS and further refine predictions of groundwater contribution to the DML Dam, Cooks Dam and Wangcol Creek.

# 10 Summary

## 10.1 Project context

Springvale Coal is seeking approval for the proposed modification to allow:

- construction and operation of the SCSS Water Transfer System;
- transfer of up to 15.6 ML/day of water from the SCSS Water Transfer System to the proposed Springvale Coal Services/Regis transfer system;
- transfer of up to 2.6 ML/day of water from SCSS to MPPS for treatment and reuse within the MPPS cooling water system;
- receipt of raw water from Angus Place Water Transfer System for use in the coal handling and preparation plant at SCSS;
- redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia, including:
    - a dewatering pipeline from the TT03 sump to the SCSS water management system;
    - Huon Clean Water Pond;
    - two dirty water ponds (DWP-A and DWP-B);
    - increase in the capacity of the Washery Dam; and
    - installation of associated pumping, pipeline, and drainage channels.

This WRIA has been prepared to accompany the modification report and assesses the impacts of the proposed modification on existing surface water and groundwater receptors in the surrounding area.

## 10.2 Proposed water management system

The proposed modification seeks to reduce the volume and pollutant load associated with LDP001 discharges to Wangcol Creek through:

- decreasing the connectivity of groundwater with the surface water management system by supplying the washery with water stored within DWP-B and mine water transferred from Angus Place Colliery, which is of a higher quality than water currently stored on-site at SCSS;
- decreasing the volume of catchment runoff from Huon Gully contributing to SHG1 and the historical underground workings system through the construction and operation of the Huon Clean Water Pond and diversion to Wangcol Creek; and
- the transfer of excess water generated at SCSS to McPhillamys Gold Project and Pond D at MPPS.

## 10.3 Impact assessment

Potential impacts associated with the construction phase of the proposed modification will be effectively managed through the development and implementation of the CEMP and ESCP, consistent with industry standards and relevant guidelines (Landcom 2004; DECC 2008; NOW 2012a; NOW 2012b).

Groundwater is not expected to be intercepted during the construction or operation of the Huon Clean Water Pond, DWP-A or DWP-B. Additionally, DWP-B is proposed to be lined to minimise any interaction with the groundwater environment.

Water and salt balance modelling indicates that the proposed modification will be effective in reducing the volume and frequency of LDP001 discharges to Wangcol Creek and result in a significant reduction in the pollutant load of discharges compared to existing conditions. Specifically, modelling results indicate:

- discharges from SCSS to Wangcol Creek via LDP001 are predicted to be reduced by 99%, from 616 ML/year on average under existing conditions to less than 5 ML/year on average under proposed conditions;
- the average salt load associated with LDP001 discharges is predicted to decrease by more than 99% from 1,932 t annually (existing conditions) to less than 10 t annually (proposed conditions); and
- discharges from the Lamberts Gully clean water diversion to Wangcol Creek are predicted to increase by 20% with the additional diversion of Huon Gully catchment, from 225 ML/year under existing conditions to 291 ML/year under proposed conditions on average.

# Abbreviations and units

| | |
|---|---|
| AEP | annual exceedance probability |
| AHD | Australian Height Datum |
| AIP | Aquifer Interference Policy |
| AWBM | Australian Water Balance Model |
| BFCD | Blackmans Flat Co-Disposal |
| BOM | Bureau of Meteorology |
| CEMP | construction environmental management plan |
| Centennial | Centennial Coal Company Limited |
| EC | electrical conductivity |
| EnergyAustralia | EnergyAustralia NSW Pty Ltd |
| EP&A Act | *Environmental Planning and Assessment Act 1979* |
| EPA | Environment Protection Authority |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* |
| EPL | environment protection licence |
| ESCP | erosion and sediment control plan |
| ha | hectare |
| kg/L | kilograms per litre |
| km | Kilometre |
| $km^2$ | square kilometre |
| L/s | litres per second |
| LDP | licensed discharge point |
| LGA | local government area |
| LOR | limit of reporting |
| m | metre |
| m bgl | metres below ground level |
| $m^3$ | cubic metre |
| mg/L | milligrams per litre |
| ML | megalitre |
| ML/day | megalitres per day |
| ML/year | megalitres per year |
| mm | millimetre |
| mm/day | millimetres per day |
| mm/year | millimetres per year |
| MNES | matters of national environmental significance |
| MPPS | Mount Piper Power Station |

| | |
|---|---|
| Mtpa | million tonnes per annum |
| NorBE | neutral or beneficial effect |
| NOW | NSW Office of Water |
| NSW | New South Wales |
| NTU | nephelometric turbidity units |
| POEO Act | *Protection of the Environment Operations Act 1997* |
| PRP | pollution reduction program |
| REA | reject emplacement area |
| ROM | run of mine |
| SCSS | Springvale Coal Services Site |
| SEPP | State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 |
| SILO | Scientific Information for Land Owners |
| Springvale Coal | Springvale Coal Pty Limited |
| SSD | State significant development |
| SSGV | site-specific guideline value |
| SWTP | Springvale Water Treatment Project |
| t | tonne |
| $t/m^3$ | tonnes per cubic metre |
| TKN | total Kjeldahl nitrogen |
| tpa | tonnes per annum |
| TSS | total suspended solids |
| TT03 | Transfer Tower 3 |
| WCS | Western Coal Services Project |
| WM Act | *Water Management Act 2000* |
| WMP | water management plan |
| WRIA | water resources impact assessment |
| WSP | water sharing plan |
| µS/cm | microsiemens per centimetre |

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Appendix A

# Surface water quality results

## A.1 Upstream monitoring locations

### Table A.1 Surface water quality monitoring results – Wangcol Creek Gauge

| Parameter | Units | SSGV | Number of samples | Number of exceedances[1] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | | | |
| EC | µS/cm | | 54 | | 386 | 849 | 3,638 |
| pH | pH units | 6.5 - 9 | 53 | 8 | 6.0 | 7.1 | 7.6 |
| TSS | mg/L | 25 | 54 | 2 | 5 | 5 | 11 |
| Turbidity | NTU | 35 | 54 | 2 | 1 | 3 | 23 |
| **Nutrients** | | | | | | | |
| Ammonia | mg/L | 0.04 | 54 | 3 | <0.01 | <0.01 | 0.04 |
| Nitrate | mg/L | | 54 | | <0.01 | 0.04 | 1.39 |
| Nitrite | mg/L | | 54 | | <0.01 | <0.01 | <0.01 |
| Nitrate + nitrite | mg/L | | 54 | | <0.01 | 0.04 | 1.39 |
| TKN | mg/L | | 54 | | <0.1 | 0.2 | 0.5 |
| Total nitrogen | mg/L | 0.5 | 54 | 16 | <0.1 | 0.2 | 1.6 |
| Total phosphorus | mg/L | 0.08 | 54 | 2 | <0.01 | <0.01 | 0.02 |
| **Major ions** | | | | | | | |
| Bicarbonate alkalinity | mg/L | | 54 | | 35 | 69 | 106 |
| Carbonate alkalinity | mg/L | | 54 | | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | | 54 | | <1 | <1 | <1 |
| Total alkalinity | mg/L | | 54 | | 35 | 69 | 106 |
| Calcium | mg/L | | 54 | | 24 | 52 | 173 |
| Chloride | mg/L | | 54 | | 16 | 48 | 270 |
| Magnesium | mg/L | | 54 | | 14 | 34 | 144 |
| Potassium | mg/L | | 54 | | 4 | 6 | 46 |
| Sodium | mg/L | | 54 | | 26 | 68 | 546 |
| Sulfate | mg/L | | 54 | | 80 | 265 | 1,825 |
| Total hardness | mg/L | | 54 | | 110 | 269 | 1,007 |
| **Dissolved metals** | | | | | | | |
| Aluminium | mg/L | 0.24 | 52 | 0 | <0.01 | <0.01 | 0.06 |
| Boron | mg/L | 0.94 | 52 | 6 | <0.05 | 0.13 | 1.06 |
| Cadmium | mg/L | 0.0026 | 53 | 0 | <0.0001 | <0.0001 | <0.0001 |
| Iron | mg/L | 0.31 | 54 | 7 | <0.05 | 0.10 | 0.40 |
| Manganese | mg/L | 1.9 | 52 | 8 | 0.103 | 0.391 | 2.914 |
| Nickel | mg/L | 0.125 | 54 | 11 | 0.009 | 0.027 | 0.193 |

## Table A.1 Surface water quality monitoring results – Wangcol Creek Gauge

| Parameter | Units | SSGV | Number of samples | Number of exceedances[1] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| Selenium | mg/L | 0.011 | 54 | 0 | <0.01 | <0.01 | <0.01 |
| Zinc | mg/L | 0.091 | 54 | 4 | <0.005 | 0.014 | 0.081 |
| **Other parameters** | | | | | | | |
| Oil and grease | mg/L | | 54 | | <5 | <5 | <5 |

1. An exceedance refers to any result that is above the laboratory detection limit and exceeds the SSGV. For pH, exceedances are determined in relation to both the lower and upper limits.

## Table A.2 Surface water quality monitoring results – Wangcol Creek U/S

| Parameter | Units | SSGV | Number of samples | Number of exceedances[1] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | | | |
| EC | µS/cm | | 54 | | 577 | 1,354 | 4,592 |
| pH | pH units | 6.5 - 9 | 53 | 10 | 6.3 | 6.9 | 7.5 |
| TSS | mg/L | 25 | 54 | 2 | 5 | 5 | 9 |
| Turbidity | NTU | 35 | 54 | 2 | 1 | 2 | 15 |
| **Nutrients** | | | | | | | |
| Ammonia | mg/L | 0.04 | 54 | 5 | <0.01 | <0.01 | 0.04 |
| Nitrate | mg/L | | 54 | | <0.01 | 0.04 | 0.23 |
| Nitrite | mg/L | | 54 | | <0.01 | <0.01 | <0.01 |
| Nitrate + nitrite | mg/L | | 54 | | <0.01 | 0.04 | 0.23 |
| TKN | mg/L | | 54 | | <0.1 | 0.2 | 0.4 |
| Total nitrogen | mg/L | 0.5 | 54 | 6 | <0.1 | 0.2 | 0.6 |
| Total phosphorus | mg/L | 0.08 | 54 | 1 | <0.01 | <0.01 | 0.02 |
| **Major ions** | | | | | | | |
| Bicarbonate alkalinity | mg/L | | 54 | | 49 | 72 | 108 |
| Carbonate alkalinity | mg/L | | 54 | | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | | 54 | | <1 | <1 | <1 |
| Total alkalinity | mg/L | | 54 | | 49 | 72 | 108 |
| Calcium | mg/L | | 54 | | 28 | 73 | 240 |
| Chloride | mg/L | | 54 | | 26 | 110 | 402 |
| Magnesium | mg/L | | 54 | | 19 | 59 | 190 |
| Potassium | mg/L | | 54 | | 5 | 9 | 51 |
| Sodium | mg/L | | 54 | | 44 | 140 | 688 |
| Sulfate | mg/L | | 53 | | 165 | 566 | 2,170 |
| Total hardness | mg/L | | 54 | | 150 | 429 | 1,381 |
| **Dissolved metals** | | | | | | | |
| Aluminium | mg/L | 0.24 | 52 | 0 | <0.01 | <0.01 | 0.03 |
| Boron | mg/L | 0.94 | 53 | 13 | 0.11 | 0.28 | 1.48 |
| Cadmium | mg/L | 0.0026 | 53 | 0 | <0.0001 | <0.0001 | <0.0001 |
| Iron | mg/L | 0.31 | 54 | 6 | <0.05 | 0.12 | 0.33 |
| Manganese | mg/L | 1.9 | 52 | 11 | 0.111 | 0.489 | 3.180 |
| Nickel | mg/L | 0.125 | 54 | 14 | 0.012 | 0.038 | 0.231 |
| Selenium | mg/L | 0.011 | 54 | 0 | <0.01 | <0.01 | <0.01 |
| Zinc | mg/L | 0.091 | 54 | 3 | <0.005 | 0.010 | 0.068 |

## Table A.2 Surface water quality monitoring results – Wangcol Creek U/S

| Parameter | Units | SSGV | Number of samples | Number of exceedances[1] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Other parameters** | | | | | | | |
| Oil and grease | mg/L | | 54 | | <5 | <5 | <5 |

1. SSGV is lower than the limit of reporting or laboratory detection limit. Exceedances below the limit of reporting have not been identified.
2. An exceedance refers to any result that is above the laboratory detection limit and exceeds the SSGV. For pH, exceedances are determined in relation to both the lower and upper limits.

## A.2 Downstream monitoring sites

### Table A.3 Surface water quality monitoring results – Wangcol Creek D/S

| Parameter | Units | SSGV | Number of samples | Number of exceedances[2] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | | | |
| EC | µS/cm | | 54 | | 1,374 | 3,510 | 5,781 |
| pH | pH units | 6.5 - 9 | 53 | 19 | 6.2 | 7.0 | 7.6 |
| TSS | mg/L | 25 | 54 | 2 | <5 | <5 | 9 |
| Turbidity | NTU | 35 | 54 | 2 | 1 | 3 | 15 |
| **Nutrients** | | | | | | | |
| Ammonia | mg/L | 0.04 | 54 | 13 | <0.01 | <0.01 | 0.06 |
| Nitrate | mg/L | | 54 | | <0.01 | 0.05 | 0.31 |
| Nitrite | mg/L | | 54 | | <0.01 | <0.01 | <0.01 |
| Nitrate + nitrite | mg/L | | 54 | | <0.01 | 0.05 | 0.31 |
| TKN | mg/L | | 54 | | <0.1 | 0.2 | 0.3 |
| Total nitrogen | mg/L | 0.5 | 54 | 7 | <0.1 | 0.2 | 0.6 |
| Total phosphorus | mg/L | 0.08 | 54 | 0 | <0.01 | <0.01 | 0.02 |
| **Major ions** | | | | | | | |
| Bicarbonate alkalinity | mg/L | | 54 | | 51 | 76 | 99 |
| Carbonate alkalinity | mg/L | | 54 | | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | | 54 | | <1 | <1 | <1 |
| Total alkalinity | mg/L | | 54 | | 51 | 76 | 99 |
| Calcium | mg/L | | 54 | | 62 | 165 | 260 |
| Chloride | mg/L | | 54 | | 74 | 243 | 473 |
| Magnesium | mg/L | | 54 | | 45 | 117 | 210 |
| Potassium | mg/L | | 54 | | 9 | 30 | 59 |
| Sodium | mg/L | | 54 | | 117 | 450 | 792 |
| Sulfate | mg/L | | 54 | | 428 | 1,440 | 2,645 |
| Total hardness | mg/L | | 54 | | 338 | 901 | 1,490 |
| **Dissolved metals** | | | | | | | |
| Aluminium | mg/L | 0.24 | 52 | 52 | 0 | <0.01 | <0.01 |
| Boron | mg/L | 0.94 | 53 | 53 | 28 | 0.22 | 1.04 |
| Cadmium | mg/L | 0.0026 | 53 | 53 | 0 | <0.0001 | <0.0001 |
| Iron | mg/L | 0.31 | 54 | 54 | 10 | 0.05 | 0.12 |
| Manganese | mg/L | 0.125 | 54 | 52 | 18 | 0.17 | 1.19 |
| Nickel | mg/L | 0.011 | 54 | 54 | 29 | 0.04 | 0.13 |

## Table A.3 Surface water quality monitoring results – Wangcol Creek D/S

| Parameter | Units | SSGV | Number of samples | Number of exceedances[2] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| Selenium | mg/L | 0.091 | 54 | 54 | 0 | <0.01 | <0.01 |
| Zinc | mg/L | 0.24 | 52 | 54 | 12 | 0.01 | 0.03 |
| **Other parameters** | | | | | | | |
| Oil and grease | mg/L | | 54 | | <5 | <5 | <5 |

1. SSGV is lower than the limit of reporting or laboratory detection limit. Exceedances below the limit of reporting have not been identified.
2. An exceedance refers to any result that is above the laboratory detection limit and exceeds the SSGV. For pH, exceedances are determined in relation to both the lower and upper limits.

## Table A.4 Surface water quality monitoring results – Wangcol Creek Far D/S

| Parameter | Units | SSGV | Number of samples | Number of exceedances[2] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | | | |
| EC | µS/cm | | 52 | | 854 | 3,145 | 5,743 |
| pH | pH units | 6.5 - 9 | 51 | 25 | 6.3 | 7.1 | 7.7 |
| TSS | mg/L | 25 | 52 | 4 | 5 | 5 | 18 |
| Turbidity | NTU | 35 | 52 | 4 | 1 | 3 | 27 |
| **Nutrients** | | | | | | | |
| Ammonia | mg/L | 0.04 | 52 | 14 | <0.01 | 0.02 | 0.08 |
| Nitrate | mg/L | | 52 | | <0.01 | 0.05 | 0.38 |
| Nitrite | mg/L | | 52 | | <0.01 | <0.01 | <0.01 |
| Nitrate + nitrite | mg/L | | 52 | | <0.01 | 0.05 | 0.38 |
| TKN | mg/L | | 52 | | <0.1 | 0.2 | 0.4 |
| Total nitrogen | mg/L | 0.5 | 52 | 6 | <0.1 | 0.2 | 0.6 |
| Total phosphorus | mg/L | 0.08 | 52 | 1 | <0.01 | <0.01 | 0.02 |
| **Major ions** | | | | | | | |
| Bicarbonate alkalinity | mg/L | | 52 | | 34 | 72 | 89 |
| Carbonate alkalinity | mg/L | | 52 | | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | | 52 | | <1 | <1 | <1 |
| Total alkalinity | mg/L | | 52 | | 34 | 72 | 89 |
| Calcium | mg/L | | 52 | | 51 | 140 | 244 |
| Chloride | mg/L | | 52 | | 54 | 222 | 438 |
| Magnesium | mg/L | | 52 | | 32 | 109 | 200 |
| Potassium | mg/L | | 52 | | 8 | 29 | 56 |
| Sodium | mg/L | | 52 | | 88 | 352 | 760 |
| Sulfate | mg/L | | 52 | | 332 | 1,200 | 2,641 |
| Total hardness | mg/L | | 51 | | 244 | 815 | 1,430 |
| **Dissolved metals** | | | | | | | |
| Aluminium | mg/L | 0.24 | 52 | 1 | <0.01 | 0.03 | 0.08 |
| Boron | mg/L | 0.94 | 52 | 25 | 0.20 | 0.86 | 1.76 |
| Cadmium | mg/L | 0.0026 | 52 | 0 | <0.0001 | <0.0001 | <0.0001 |
| Iron | mg/L | 0.31 | 52 | 8 | 0.05 | 0.05 | 0.34 |
| Manganese | mg/L | 1.9 | 51 | 17 | 0.41 | 1.22 | 3.26 |
| Nickel | mg/L | 0.125 | 52 | 28 | 0.03 | 0.13 | 0.36 |
| Selenium | mg/L | 0.011 | 52 | 0 | <0.01 | <0.01 | <0.01 |
| Zinc | mg/L | 0.091 | 52 | 9 | 0.01 | 0.04 | 0.11 |

## Table A.4 Surface water quality monitoring results – Wangcol Creek Far D/S

| Parameter | Units | SSGV | Number of samples | Number of exceedances[2] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Other parameters** | | | | | | | |
| Oil and grease | mg/L | | 52 | | <5 | <5 | <5 |

1. SSGV is lower than the limit of reporting or laboratory detection limit. Exceedances below the limit of reporting have not been identified.
2. An exceedance refers to any result that is above the laboratory detection limit and exceeds the SSGV. For pH, exceedances are determined in relation to both the lower and upper limits.

## A.3 Angus Place Colliery and Springvale Coal Services Site monitoring locations

### Table A.5 Surface water quality monitoring results – Angus Place Colliery 800 Area

| Parameter | Units | SSGV | Number of samples | Number of exceedances[2] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | | | |
| EC | µS/cm | | 30 | | 1,203 | 1,455 | 1,703 |
| pH | pH units | 6.5-9 | 30 | 0 | 7.1 | 7.3 | 7.6 |
| TSS | mg/L | 25 | 30 | 0 | <5 | <5 | 8 |
| Turbidity | NTU | 35 | 30 | 1 | 4 | 10 | 19 |
| **Nutrients** | | | | | | | |
| Ammonia | mg/L | 0.04 | 16 | 15 | 1.06 | 1.39 | 1.57 |
| Nitrate | mg/L | | 16 | | <0.01 | <0.01 | 0.05 |
| Nitrite | mg/L | | 16 | | <0.01 | <0.01 | 0.03 |
| Nitrate + nitrite | mg/L | | 17 | | <0.01 | <0.01 | 0.05 |
| **Major ions** | | | | | | | |
| Bicarbonate alkalinity | mg/L | | 30 | | 706 | 758 | 1,040 |
| Carbonate alkalinity | mg/L | | 30 | | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | | 30 | | <1 | <1 | <1 |
| Total alkalinity | mg/L | | 30 | | 706 | 758 | 1,040 |
| Calcium | mg/L | | 30 | | 22 | 36 | 44 |
| Chloride | mg/L | | 30 | | 8 | 11 | 19 |
| Magnesium | mg/L | | 30 | | 16 | 28 | 31 |
| Potassium | mg/L | | 30 | | 36 | 46 | 52 |
| Sodium | mg/L | | 30 | | 227 | 240 | 333 |
| Sulfate | mg/L | | 30 | | 1 | 41 | 51 |
| Total hardness | mg/L | | 17 | | 118 | 175 | 218 |
| **Dissolved metals** | | | | | | | |
| Aluminium | mg/L | 0.24 | 30 | 0 | <0.01 | <0.01 | <0.01 |
| Boron | mg/L | 0.94 | 30 | 0 | <0.05 | 0.06 | 0.08 |
| Cadmium | mg/L | 0.0026 | 17 | 0 | <0.0001 | <0.0001 | <0.0001 |
| Iron | mg/L | 0.31 | 28 | 3 | <0.05 | <0.05 | 0.58 |
| Manganese | mg/L | 1.9 | 30 | 0 | 0.024 | 0.047 | 0.055 |
| Nickel | mg/L | 0.125 | 30 | 0 | 0.002 | 0.004 | 0.005 |
| Selenium | mg/L | 0.011 | 17 | 0 | <0.01 | <0.01 | <0.01 |
| Zinc | mg/L | 0.091 | 30 | 0 | <0.005 | <0.005 | 0.015 |

## Table A.5 Surface water quality monitoring results – Angus Place Colliery 800 Area

| Parameter | Units | SSGV | Number of samples | Number of exceedances[2] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Other parameters** | | | | | | | |
| Oil and grease | mg/L | | 29 | | 5 | 5 | 5 |
| Dissolved organic carbon | mg/L | | 16 | | 0.6 | 1.6 | 6.4 |
| Total organic carbon | mg/L | | 16 | | 1.0 | 2.0 | 7.5 |

1. SSGV is lower than the limit of reporting or laboratory detection limit. Exceedances below the limit of reporting have not been identified.
2. An exceedance refers to any result that is above the laboratory detection limit and exceeds the SSGV. For pH, exceedances are determined in relation to both the lower and upper limits.

## Table A.6 Surface water quality monitoring results – Cooks Dam

| Parameter | Units | SSGV | Number of samples | Number of exceedances[2] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | | | |
| EC | µS/cm | | 155 | | 3,928 | 5,230 | 6,492 |
| pH | pH units | 6.5-9 | 153 | 16 | 6.2 | 6.6 | 7.0 |
| TSS | mg/L | 25 | 152 | 5 | <5 | <5 | 16 |
| Turbidity | NTU | 35 | 155 | 2 | 6 | 11 | 17 |
| **Nutrients** | | | | | | | |
| Ammonia | mg/L | 0.04 | 98 | 96 | 0.08 | 0.12 | 0.21 |
| Nitrate | mg/L | | 102 | | 0.04 | 0.07 | 0.39 |
| Nitrite | mg/L | | 102 | | <0.01 | <0.01 | <0.01 |
| Nitrate + nitrite | mg/L | | 102 | | 0.04 | 0.07 | 0.39 |
| TKN | mg/L | | 98 | | 0.2 | 0.3 | 0.5 |
| Total nitrogen | mg/L | 0.5 | 98 | 21 | 0.2 | 0.4 | 0.9 |
| Total phosphorus | mg/L | 0.08 | 98 | 5 | <0.01 | <0.01 | 0.04 |
| **Major ions** | | | | | | | |
| Bicarbonate alkalinity | mg/L | | 102 | | 79 | 96 | 111 |
| Carbonate alkalinity | mg/L | | 102 | | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | | 102 | | <1 | <1 | <1 |
| Total alkalinity | mg/L | | 102 | | 79 | 96 | 111 |
| Calcium | mg/L | | 102 | | 186 | 232 | 293 |
| Chloride | mg/L | | 102 | | 306 | 415 | 530 |
| Magnesium | mg/L | | 102 | | 149 | 189 | 237 |
| Potassium | mg/L | | 102 | | 50 | 60 | 69 |
| Sodium | mg/L | | 102 | | 606 | 752 | 891 |
| Sulfate | mg/L | | 102 | | 2,033 | 2,610 | 3,200 |
| Total hardness | mg/L | | 102 | | 1,072 | 1,340 | 1,700 |
| **Dissolved metals** | | | | | | | |
| Aluminium | mg/L | 0.24 | 98 | 0 | <0.01 | <0.01 | 0.03 |
| Arsenic | mg/L | 0.013 | 98 | 0 | <0.001 | <0.001 | <0.001 |
| Barium | mg/L | | 98 | | 0.01 | 0.01 | 0.02 |
| Boron | mg/L | 0.94 | 102 | 101 | 1.35 | 1.73 | 2.25 |
| Cadmium | mg/L | 0.0026 | 102 | 0 | <0.0001 | <0.0001 | 0.0002 |
| Chromium | mg/L | 0.001 | 98 | 1 | <0.001 | <0.001 | <0.001 |
| Cobalt | mg/L | 0.0014 | 98 | 98 | 0.0847 | 0.123 | 0.179 |
| Copper | mg/L | 0.0014 | 98 | 4 | <0.001 | <0.001 | 0.003 |

## Table A.6 Surface water quality monitoring results – Cooks Dam

| Parameter | Units | SSGV | Number of samples | Number of exceedances[2] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| Iron | mg/L | 0.31 | 153 | 80 | <0.05 | 0.33 | 0.92 |
| Lead | mg/L | 0.0034 | 98 | 1 | <0.001 | <0.001 | <0.001 |
| Manganese | mg/L | 1.9 | 153 | 153 | 3.782 | 6.000 | 8.194 |
| Mercury | mg/L | 0.00006 | 97 | 0 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.125 | 102 | 102 | 0.343 | 0.462 | 0.652 |
| Selenium | mg/L | 0.011 | 102 | 1 | <0.01 | <0.01 | <0.01 |
| Zinc | mg/L | 0.091 | 102 | 102 | 0.148 | 0.185 | 0.273 |
| **Other parameters** | | | | | | | |
| Fluoride (total) | mg/L | | 98 | | 0.2 | 0.2 | 0.3 |
| Oil and grease | mg/L | | 150 | | <5 | <5 | <5 |
| Dissolved organic carbon | mg/L | | 98 | | 2 | 3 | 4 |
| Total organic carbon | mg/L | | 98 | | 2 | 2 | 4 |

1. SSGV is lower than the limit of reporting or laboratory detection limit. Exceedances below the limit of reporting have not been identified.
2. An exceedance refers to any result that is above the laboratory detection limit and exceeds the SSGV. For pH, exceedances are determined in relation to both the lower and upper limits.

## Table A.7 Surface water quality monitoring results – LDP001 discharge

| Parameter | Units | EPL 21229 concentration limits | Number of samples | Number of exceedances[1] | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | | | |
| EC | µS/cm | | 61 | | 3,810 | 5,200 | 6,420 |
| pH | pH units | 6.5–8.5 | 60 | 9 | 6.4 | 6.9 | 7.3 |
| TSS | mg/L | 30 | 62 | 3 | 5 | 5 | 18 |
| Turbidity | NTU | 50 | 60 | 0 | 4 | 8 | 21 |
| **Dissolved metals** | | | | | | | |
| Iron | mg/L | | 57 | | 0.06 | 0.37 | 2.05 |
| Manganese | mg/L | | 55 | | 2.082 | 5.180 | 8.050 |
| Nickel | mg/L | | 21 | | 0.223 | 0.363 | 0.456 |
| Zinc | mg/L | | 21 | | 0.067 | 0.142 | 0.230 |
| **Other parameters** | | | | | | | |
| Oil and grease | mg/L | 10 | 58 | 0 | <5 | <5 | <5 |

1. An exceedance refers to any result that is above the laboratory detection limit and exceeds the EPL 21229 concentration limit. For pH, exceedances are determined in relation to both the lower and upper limits.

Appendix B

# Groundwater monitoring results

## Table B.1 Groundwater water quality monitoring results – Lithgow Seam (BH01, BH04, BH05, BH06, BH08, BH09, BH10)

| Parameter | Units | Number of samples | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | |
| EC | µS/cm | 475 | 481 | 3,220 | 6,186 |
| pH | pH units | 422 | 5.7 | 6.2 | 6.7 |
| TSS | mg/L | 287 | 20 | 58 | 315 |
| **Nutrients** | | | | | |
| Nitrate | mg/L | 282 | <0.01 | 0.04 | 0.64 |
| Nitrite | mg/L | 282 | <0.01 | <0.01 | <0.01 |
| Nitrate + nitrite | mg/L | 282 | <0.01 | 0.04 | 0.64 |
| Total phosphorus | mg/L | 282 | <0.01 | 0.02 | 0.13 |
| **Major ions** | | | | | |
| Bicarbonate alkalinity | mg/L | 282 | 87 | 115 | 226 |
| Carbonate alkalinity | mg/L | 282 | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | 282 | <1 | <1 | <1 |
| Total alkalinity | mg/L | 282 | 87 | 115 | 226 |
| Calcium | mg/L | 282 | 42 | 152 | 293 |
| Chloride | mg/L | 282 | 13 | 253 | 531 |
| Magnesium | mg/L | 282 | 20 | 119 | 274 |
| Potassium | mg/L | 282 | 9 | 18 | 73 |
| Sodium | mg/L | 282 | 18 | 352 | 915 |
| Sulfate | mg/L | 282 | 28 | 1,345 | 2,939 |
| Total hardness | mg/L | 282 | 187 | 957 | 1,760 |
| **Dissolved metals** | | | | | |
| Aluminium | mg/L | 265 | 0.10 | 0.36 | 2.13 |
| Boron | mg/L | 282 | <0.05 | 0.74 | 2.28 |
| Cadmium | mg/L | 265 | <0.0001 | <0.0001 | 0.0004 |
| Iron | mg/L | 282 | <0.05 | 2.10 | 10.88 |
| Manganese | mg/L | 8 | 0.01 | 3.52 | 44.19 |
| Nickel | mg/L | 282 | 0.21 | 3.68 | 10.30 |
| Selenium | mg/L | 282 | 0.008 | 0.177 | 0.863 |
| Zinc | mg/L | 265 | <0.01 | <0.01 | <0.01 |

## Table B.2 Groundwater water quality monitoring results – Marrangaroo Formation (BH02, BH11, BH12)

| Parameter | Units | Number of samples | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | |
| EC | µS/cm | 151 | 1,123 | 1,442 | 2,000 |
| pH | pH units | 138 | 6.1 | 6.6 | 6.9 |
| TSS | mg/L | 78 | 28 | 79 | 8,487 |
| **Nutrients** | | | | | |
| Nitrate | mg/L | 78 | <0.01 | 0.11 | 0.68 |
| Nitrite | mg/L | 78 | <0.01 | <0.01 | <0.01 |
| Nitrate + nitrite | mg/L | 78 | <0.01 | 0.11 | 0.68 |
| Total phosphorus | mg/L | 78 | <0.01 | 0.03 | 2.69 |
| **Major ions** | | | | | |
| Bicarbonate alkalinity | mg/L | 78 | 201 | 273 | 333 |
| Carbonate alkalinity | mg/L | 78 | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | 78 | <1 | <1 | <1 |
| Total alkalinity | mg/L | 78 | 201 | 273 | 333 |
| Calcium | mg/L | 78 | 132 | 168 | 248 |
| Chloride | mg/L | 78 | 22 | 49 | 92 |
| Magnesium | mg/L | 78 | 48 | 70 | 91 |
| Potassium | mg/L | 78 | 14 | 19 | 24 |
| Sodium | mg/L | 78 | 23 | 29 | 97 |
| Sulfate | mg/L | 78 | 255 | 457 | 815 |
| Total hardness | mg/L | 78 | 522 | 703 | 974 |
| **Dissolved metals** | | | | | |
| Aluminium | mg/L | 73 | 0.14 | 0.48 | 30.80 |
| Boron | mg/L | 78 | <0.05 | 0.08 | 0.12 |
| Cadmium | mg/L | 73 | <0.0001 | <0.0001 | 0.00088 |
| Iron | mg/L | 78 | <0.05 | 0.30 | 3.61 |
| Manganese | mg/L | 2 | 29.12 | 138.40 | 247.68 |
| Nickel | mg/L | 78 | 0.06 | 0.17 | 0.49 |
| Selenium | mg/L | 78 | 0.004 | 0.019 | 0.059 |
| Zinc | mg/L | 73 | <0.01 | <0.01 | <0.01 |

## Table B.3 Groundwater water quality monitoring results – Overburden (BH03, BH07, BH15)

| Parameter | Units | Number of samples | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | |
| EC | µS/cm | 237 | 1,082 | 1,680 | 4,004 |
| pH | pH units | 210 | 3.6 | 5.9 | 6.5 |
| TSS | mg/L | 142 | 39 | 113 | 5,266 |
| **Nutrients** | | | | | |
| Nitrate | mg/L | 138 | <0.01 | 0.03 | 0.35 |
| Nitrite | mg/L | 138 | <0.01 | <0.01 | 0.01 |
| Nitrate + nitrite | mg/L | 138 | <0.01 | 0.03 | 0.35 |
| Total phosphorus | mg/L | 138 | <0.01 | 0.04 | 1.69 |
| **Major ions** | | | | | |
| Bicarbonate alkalinity | mg/L | 138 | <1 | 119 | 209 |
| Carbonate alkalinity | mg/L | 138 | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | 138 | <1 | <1 | <1 |
| Total alkalinity | mg/L | 138 | <1 | 119 | 209 |
| Calcium | mg/L | 138 | 45 | 186 | 336 |
| Chloride | mg/L | 138 | 28 | 57 | 246 |
| Magnesium | mg/L | 138 | 46 | 90 | 203 |
| Potassium | mg/L | 138 | 5 | 20 | 30 |
| Sodium | mg/L | 138 | 24 | 44 | 525 |
| Sulfate | mg/L | 138 | 438 | 742 | 2,023 |
| Total hardness | mg/L | 138 | 304 | 844 | 1,670 |
| **Dissolved metals** | | | | | |
| Aluminium | mg/L | 130 | 0.30 | 3.59 | 13.68 |
| Boron | mg/L | 138 | <0.05 | 0.06 | 0.24 |
| Cadmium | mg/L | 130 | <0.0001 | 0.0004 | 0.00161 |
| Iron | mg/L | 138 | 0.79 | 10.08 | 82.49 |
| Manganese | mg/L | 5 | 0.01 | 15.00 | 32.68 |
| Nickel | mg/L | 138 | 0.48 | 5.35 | 7.79 |
| Selenium | mg/L | 138 | 0.013 | 0.276 | 0.513 |
| Zinc | mg/L | 130 | <0.01 | <0.01 | <0.01 |

## Table B.4 Groundwater water quality monitoring results – Backfill (BH13)

| Parameter | Units | Number of samples | 10th percentile | Median | 90th percentile |
|---|---|---|---|---|---|
| **Physicochemical parameters** | | | | | |
| EC | µS/cm | 82 | 3,121 | 4,090 | 5,819 |
| pH | pH units | 73 | 6.0 | 6.2 | 6.6 |
| TSS | mg/L | 49 | 41 | 148 | 671 |
| **Nutrients** | | | | | |
| Nitrate | mg/L | 48 | <0.01 | 0.02 | 0.18 |
| Nitrite | mg/L | 48 | <0.01 | <0.01 | <0.01 |
| Nitrate + nitrite | mg/L | 48 | <0.01 | 0.02 | 0.18 |
| Total phosphorus | mg/L | 48 | 0.02 | 0.08 | 0.51 |
| **Major ions** | | | | | |
| Bicarbonate alkalinity | mg/L | 48 | 157 | 301 | 583 |
| Carbonate alkalinity | mg/L | 48 | <1 | <1 | <1 |
| Hydroxide alkalinity | mg/L | 48 | <1 | <1 | <1 |
| Total alkalinity | mg/L | 48 | 157 | 301 | 583 |
| Calcium | mg/L | 48 | 121 | 205 | 262 |
| Chloride | mg/L | 48 | 176 | 286 | 494 |
| Magnesium | mg/L | 48 | 118 | 229 | 279 |
| Potassium | mg/L | 48 | 24 | 37 | 73 |
| Sodium | mg/L | 48 | 366 | 495 | 882 |
| Sulfate | mg/L | 48 | 1,321 | 1,735 | 2,952 |
| Total hardness | mg/L | 48 | 785 | 1,430 | 1,800 |
| **Dissolved metals** | | | | | |
| Aluminium | mg/L | 44 | 0.27 | 0.84 | 2.85 |
| Boron | mg/L | 48 | 0.71 | 1.07 | 2.25 |
| Cadmium | mg/L | 44 | <0.0001 | 0.0002 | 0.00057 |
| Iron | mg/L | 48 | 3.17 | 7.16 | 21.70 |
| Manganese | mg/L | 1 | 8.78 | 8.78 | 8.78 |
| Nickel | mg/L | 48 | 5.53 | 8.30 | 10.63 |
| Selenium | mg/L | 48 | 0.236 | 0.373 | 0.696 |
| Zinc | mg/L | 44 | <0.01 | <0.01 | <0.01 |

Appendix C

# Water and salt balance model data

## C.1 Climate data

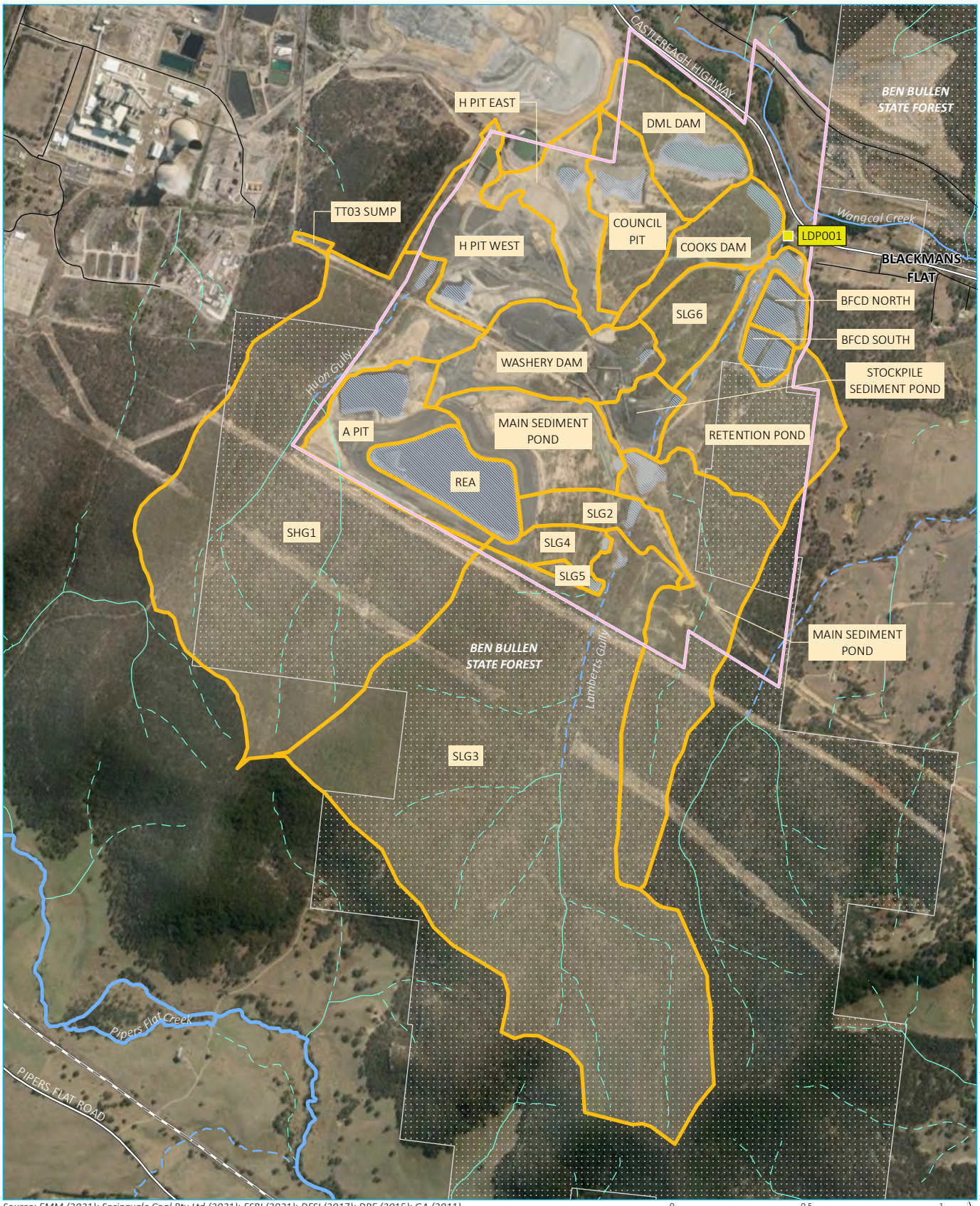
Historical daily rainfall and evaporation data from the Lidsdale (Maddox Lane) Station (BOM station 63132) between 1889 and 2019 was adopted for the water and salt balance model, as discussed in Section 4.3. Daily rainfall was applied to the model to calculate direct rainfall onto the simulated water surface of storages. Morton's shallow lake evaporation data were used to estimate evaporation losses from the simulated water surface of storages. Morton's potential evapotranspiration data were used in AWBM catchment runoff calculations to estimate soil moisture losses.

## C.2 Catchments and water storages data

Catchment areas for the existing operation of SCSS and the proposed changes to the water management system are presented in Figure C.1 and Figure C.2, respectively. Catchments were characterised into the following four different land types, based upon aerial imagery:

- vegetated – undisturbed bushland and grassed areas;
- compacted – roads and working pad areas;
- disturbed – stockpiles, bunds, coarse reject and waste rock emplacement areas; and
- rehabilitated – fully rehabilitated areas.

Table C.1 provides a breakdown of catchment types for the existing/approved conditions and proposed conditions as well as the capacity of each water storage.




Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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KEY

- Springvale Coal Services Site
- Licensed discharge point
- Surface water storage
- Existing surface water catchment
- Rail line
- Major road
- Minor road
- State forest

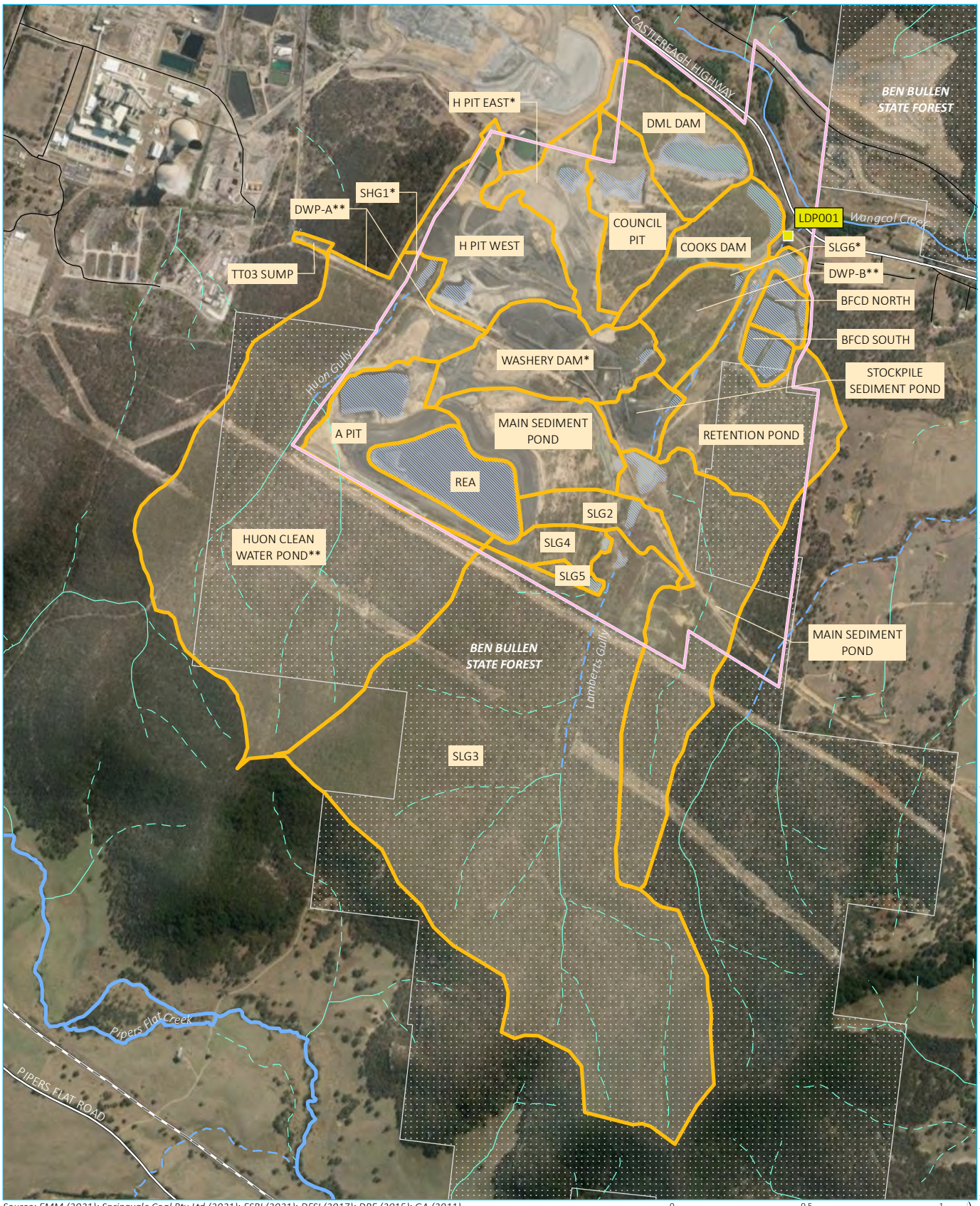
Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order

Catchment areas – existing conditions

Western Coal Services Project
Water Resources Impact Assessment
Figure C.1

EMM creating opportunities




Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); DPE (2015); GA (2011)

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## KEY

- Springvale Coal Services Site
- Licensed discharge point
- Surface water storage
- Proposed surface water catchment
- Rail line
- Major road
- Minor road
- State forest

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order

*Notes:*

** Amended surface water catchment boundary*

*** Proposed new surface water catchment*

# Catchment areas – proposed conditions

Western Coal Services Project
Water Resources Impact Assessment
Figure C.2

EMM creating opportunities

## Table C.1 Catchment and water storage data

| Storage | Existing/approved operations | | | | | | Proposed operations | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Capacity (ML) | Vegetated (ha) | Compacted (ha) | Disturbed (ha) | Rehabilitated (ha) | Total (ha) | Capacity (ML) | Vegetated (ha) | Compacted (ha) | Disturbed (ha) | Rehabilitated (ha) | Total (ha) |
| A Pit | 50.3 | 0.7 | 0.2 | 17.0 | 1.3 | 19.1 | 50.3 | 0.7 | 0.2 | 17.0 | 1.3 | 19.1 |
| BFCD North | 3.8 | 0.0 | 0.0 | 3.8 | 0.0 | 3.8 | 3.8 | 0.0 | 0.0 | 3.8 | 0.0 | 3.8 |
| BFCD South | 197.5 | 0.0 | 0.0 | 2.9 | 0.0 | 2.9 | 197.5 | 0.0 | 0.0 | 2.9 | 0.0 | 2.9 |
| Cooks Dam | 44.6 | 10.9 | 0.9 | 0.0 | 0.2 | 12.0 | 44.6 | 10.9 | 0.9 | 0.0 | 0.2 | 12.0 |
| Council Pit | 19.9 | 7.2 | 0.0 | 4.4 | 4.0 | 15.6 | 19.9 | 7.2 | 0.0 | 4.4 | 4.0 | 15.6 |
| DML Dam | 193.2 | 2.3 | 0.0 | 5.7 | 8.4 | 16.4 | 193.2 | 2.3 | 0.0 | 5.7 | 8.4 | 16.4 |
| DWP-A | n/a | n/a | n/a | n/a | n/a | n/a | 0.85 | 0.0 | 1.2 | 3.1 | 0.0 | 4.3 |
| DWP-B | n/a | n/a | n/a | n/a | n/a | n/a | 50 | 6.9 | 0.3 | 0.0 | 0.0 | 7.2 |
| H Pit East | 10.2 | 0.1 | 0.0 | 12.9 | 1.1 | 14.1 | 10.2 | 0.1 | 0.0 | 12.9 | 1.1 | 14.1 |
| H Pit West | 10.5 | 1.7 | 0.3 | 21.5 | 0.0 | 23.5 | 10.5 | 1.7 | 0.3 | 21.5 | 0.0 | 23.5 |
| Huon Clean Water Pond | n/a | n/a | n/a | n/a | n/a | n/a | 3.4 | 110.4 | 0.7 | 4.6 | 2.4 | 118.0 |
| Main Sediment Pond[1] | 30 | 211.1 | 4.2 | 2.9 | 38.3 | 256.4 | 30 | 211.1 | 4.2 | 2.9 | 38.3 | 256.4 |
| REA | 940.3 | 0.0 | 0.0 | 11.1 | 0.0 | 11.1 | 940.3 | 0.0 | 0.0 | 11.1 | 0.0 | 11.1 |
| Final Polishing Lagoon | 3.9 | 25.3 | 1.9 | 4.8 | 0.0 | 32.0 | 3.9 | 25.3 | 1.9 | 4.8 | 0.0 | 32.0 |
| SHG1 | 9.5 | 112.8 | 1.9 | 7.7 | 2.4 | 124.8 | 9.5 | 2.4 | 0.0 | 0.0 | 0.0 | 2.4 |
| SLG6 | 1.1 | 8.6 | 1.7 | 0.0 | 0.0 | 10.3 | 1.1 | 1.7 | 1.4 | 0.0 | 0.0 | 3.1 |
| Stockpile Sediment Pond | 0.8 | 1.1 | 3.4 | 1.1 | 0.2 | 5.8 | 0.8 | 1.1 | 3.4 | 1.1 | 0.2 | 5.8 |
| TT03 sump | 0.064 | 0.6 | 0.4 | 0.0 | 0.0 | 0.9 | 0.064 | 0.6 | 0.4 | 0.0 | 0.0 | 0.9 |
| Washery Dam | 3.79 | 1.7 | 5.4 | 12.6 | 1.9 | 21.5 | 6.1 | 1.7 | 5.4 | 12.6 | 1.9 | 21.5 |

1. Includes capacity/catchment areas for SLG2, SLG3, SLG4 and SLG5.
2. Individual areas may not sum to totals due to rounding.

## C.3 Operational data

Site-specific operational data used as input to the water and salt balance model are shown in Table C.2. These parameters remained unchanged in the proposed conditions of the model.

### Table C.2 Operational data

| Parameter | Value |
|---|---|
| ROM coal sent to washery | 0.3 Mtpa |
| Coarse coal reject fraction | 7.5% |
| Fine coal reject fraction | 7.5% |
| ROM coal moisture content | 6.7% |
| Coarse coal reject moisture content | 9.0% |
| Product coal moisture content | 7.3% |
| Slurry solids content | 16% solids w/w |
| Fine coal reject particle density | 2.0 kg/L |
| Fine coal reject final dry density | 0.9 t/m$^3$ |
| Dust suppression rainfall threshold | 1 mm/day |
| Road dust suppression demand | 0.136 ML/day |
| Stockpile dust suppression demand | 0.068 ML/day |
| Flocculent makeup | 11 ML/year |
| Residual material flow rate from SWTP to REA | 0.35 ML/day |

Active and passive water transfer rates and operating rules input to the water and salt balance model are presented in Table C.3.

### Table C.3 Water transfer rules

| Transfer | Maximum rate | Operating rules |
|---|---|---|
| Cooks Dam to Washery Makeup Tank (existing conditions) | 38 L/s | First preference for supply to washery under existing conditions. |
| Stockpile Sediment Pond to Washery Makeup Tank | 5.8 L/s | Pump triggered when the Stockpile Sediment Pond exceeds 50% of capacity or as the second preference for supply to washery. |
| TT03 sump to SHG1 (existing conditions) or DWP-A (proposed conditions) | 5 L/s | Pump triggered when the TT03 sump exceeds 10% of capacity. |
| Huon Clean Water Pond to Main Sediment Pond | 320 L/s | Pump triggered when the Huon Clean Water Pond exceeds 10% of capacity. |
| DWP-A to Washery Dam | 58 L/s | Pump triggered when DWP-A exceeds 10% of capacity. |
| Cooks Dam to MPPS Pond D | 2.6 ML/day | Pump triggered when Cooks Dam level exceeds 903 m AHD and no transfers to McPhillamys Gold Project are occurring. |

## Table C.3 Water transfer rules

| Transfer | Maximum rate | Operating rules |
|---|---|---|
| Cooks Dam to McPhillamys Gold Project | Defined by daily demand for water at McPhillamys Gold Project (Section 7.1.7) | Pump triggered when Cooks Dam level exceeds 903 m AHD. |
| DWP-B to Washery Makeup Tank | 38 L/s | First preference for supply to washery under proposed conditions. |
| Angus Place Colliery to Washery Makeup Tank | 2.6 ML/day | Third preference for supply to washery under proposed conditions (after DWP-B and Stockpile Sediment Pond supply). |

A summary of the inputs and outputs modelled for each storage under existing conditions (ie Scenario 1) and proposed conditions (ie Scenarios 2 and 3) is provided in Table C.4. Outputs are numbered in order of priority for each storage.

## Table C.4 Summary of modelled inputs and outputs

| Storage | Existing conditions (Scenario 1) | | Proposed conditions (Scenarios 2 and 3) | |
|---|---|---|---|---|
| | Inputs | Outputs | Inputs | Outputs |
| A Pit | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Seepage to underground | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Seepage to underground |
| BFCD North | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Overflow to Final Polishing Lagoon | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Overflow to SLG6 |
| BFCD South | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Overflow to BFCD North | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Overflow to DWP-B |
| Cooks Dam | • Rainfall<br>• Runoff<br>• Seepage from underground<br>• SLG6 overflow<br>• Seepage from DML Dam | 1. Evaporation<br>2. Dust suppression<br>3. Pump to Washery Makeup Tank<br>4. Seepage to Wangcol Creek<br>5. Overflow to Wangcol Creek via LDP001 | • Rainfall<br>• Runoff<br>• Seepage from underground<br>• SLG6 overflow<br>• Seepage from DML Dam | 1. Evaporation<br>2. Dust suppression<br>3. Transfer to McPhillamys Gold Project (Scenario 2 only)<br>4. Transfer to MPPS Pond D<br>5. Seepage to Wangcol Creek<br>6. Overflow to Wangcol Creek via LDP001 |
| Council Pit | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Seepage to underground | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Seepage to underground |

## Table C.4 Summary of modelled inputs and outputs

| Storage | Existing conditions (Scenario 1) | | Proposed conditions (Scenarios 2 and 3) | |
|---|---|---|---|---|
| | **Inputs** | **Outputs** | **Inputs** | **Outputs** |
| DML Dam | • Rainfall<br>• Runoff<br>• Seepage from MPPS ash repository | 1. Evaporation<br>2. Seepage to Cooks Dam | • Rainfall<br>• Runoff<br>• Seepage from MPPS ash repository | 1. Evaporation<br>2. Seepage to Cooks Dam |
| DWP-A | | | • Rainfall<br>• Runoff<br>• Pump from TT03 Sump<br>• Overflow from Huon Clean Water Pond | 1. Evaporation<br>2. Pump to Washery Dam<br>3. Overflow to SHG1 |
| DWP-B | | | • Rainfall<br>• Runoff<br>• Overflow from Washery Dam<br>• Overflow from BFCD South | 1. Evaporation<br>2. Pump to Washery Makeup Tank<br>3. Dust suppression<br>4. Overflow to LDP001 |
| H Pit East | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Seepage to underground | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Seepage to underground |
| H Pit West | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Seepage to underground | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Seepage to underground |
| Huon Clean Water Pond | | | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Pump to Main Sediment Pond<br>3. Overflow to DWP-A |
| Main Sediment Pond | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Overflow to Final Polishing Lagoon | • Rainfall<br>• Runoff<br>• Pump from Huon Clean Water Pond | 1. Evaporation<br>2. Overflow to Final Polishing Lagoon |
| REA | • Rainfall<br>• Runoff<br>• Fine coal reject material<br>• Residual material from SWTP | 1. Evaporation<br>2. Seepage to underground | • Rainfall<br>• Runoff<br>• Fine coal reject material<br>• Residual material from SWTP | 1. Evaporation<br>2. Seepage to underground |
| Final Polishing Lagoon | • Rainfall<br>• Runoff<br>• BFCD overflow<br>• Main Sediment Pond overflow | 1. Evaporation<br>2. Overflow to Wangcol Creek | • Rainfall<br>• Runoff<br>• Main Sediment Pond overflow | 1. Evaporation<br>2. Overflow to Wangcol Creek |

## Table C.4 Summary of modelled inputs and outputs

| Storage | Existing conditions (Scenario 1) | | Proposed conditions (Scenarios 2 and 3) | |
|---|---|---|---|---|
| | **Inputs** | **Outputs** | **Inputs** | **Outputs** |
| SHG1 | • Rainfall<br>• Runoff<br>• Pump from TT03 sump | 1. Evaporation<br>2. Seepage to underground | • Rainfall<br>• Runoff<br>• Overflow from DWP-A | 1. Evaporation<br>2. Seepage to underground |
| SLG6 | • Rainfall<br>• Runoff<br>• Stockpile Sediment Pond overflow<br>• Washery Dam overflow | 1. Evaporation<br>2. Overflow to Cooks Dam | • Rainfall<br>• Runoff<br>• BFCD North overflow<br>• Stockpile Sediment Pond overflow<br>• Washery Dam overflow | 1. Evaporation<br>2. Overflow to Cooks Dam |
| Stockpile Sediment Pond | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Pump to Washery Makeup Tank<br>3. Overflow to SLG6 | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Pump to Washery Makeup Tank<br>3. Overflow to SLG6 |
| TT03 sump | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Pump to SHG1 | • Rainfall<br>• Runoff | 1. Evaporation<br>2. Pump to DWP-A |
| Underground workings | • Recharge<br>• SHG1 seepage<br>• A Pit seepage<br>• Council Pit seepage<br>• H Pit East seepage<br>• H Pit West seepage<br>• REA decant | 1. Seepage to Cooks Dam | • Recharge<br>• SHG1 seepage<br>• A Pit seepage<br>• Council Pit seepage<br>• H Pit East seepage<br>• H Pit West seepage<br>• REA decant | 1. Seepage to Cooks Dam |
| Washery | • Supply from Washery Makeup Tank<br>• Flocculent makeup<br>• ROM coal | 1. Product coal<br>2. Fine coal rejects to REA<br>3. Coarse coal rejects<br>4. Unused washery supply to Washery Dam | • Supply from Washery Makeup Tank<br>• Flocculent makeup<br>• ROM coal | 1. Product coal<br>2. Fine coal rejects to REA<br>3. Coarse coal rejects<br>4. Unused washery supply to Washery Dam |
| Washery Makeup Tank | • Pump from Cooks Dam<br>• Pump from Stockpile Sediment Pond | 1. Supply to washery | • Pump from Stockpile Sediment Pond<br>• Pump from DWP-B<br>• Transfer from Angus Place Colliery | 1. Supply to washery |
| Washery Dam | • Rainfall<br>• Runoff<br>• Unused washery supply | 1. Evaporation<br>2. Overflow to SLG6 | • Rainfall<br>• Runoff<br>• Unused washery supply<br>• Pump from DWP-A | 1. Evaporation<br>2. Overflow to DWP-B |

## C.4 Hydrologic model data

The runoff parameters adopted for the AWBM within the water and salt balance are presented in Table C.5, sourced from GHD (2020).

**Table C.5 Australian Water Balance Model parameters**

| Parameter | Vegetated catchments | Compacted catchments | Disturbed catchments | Rehabilitated catchments |
|---|---|---|---|---|
| $A_1$, $A_2$, $A_3$ | 0.134, 0.433, 0.433 | 1.0, 0.0, 0.0 | 0.134, 0.433, 0.433 | 0.134, 0.433, 0.433 |
| $C_1$, $C_2$, $C_3$ (mm) | 9.9, 106.7, 213.4 | 5.0, 0.0, 0.0 | 7.5, 76.2, 152.4 | 4.5, 45.7, 91.5 |
| BFI | 0.4 | 0.0 | 0.4 | 0.4 |
| Kb | 0.5 | 0.0 | 0.5 | 0.5 |
| Ks | 0.9 | N/A | 0.9 | 0.9 |

## C.5 Salinity data

The salinity data incorporated into the water and salt balance model is presented in Table C.6. The EC of rainfall and coal moisture was estimated based on regional and site data. The EC of catchment runoff and seepage into Cooks Dam was calibrated to observed salinity in surface storages and LDP001 discharge in 2014 and 2015 (GHD 2020). The EC of mine water from Angus Place Colliery was based on the average EC of monitoring within the underground workings between 2018 and 2020.

**Table C.6 Salinity data**

| Parameter | Value |
|---|---|
| Rainfall | 30 µS/cm |
| Vegetated catchment runoff | 400 µS/cm |
| Compacted catchment runoff | 1,000 µS/cm |
| Disturbed catchment runoff | 1,800 µS/cm |
| Rehabilitated catchment runoff | 1,000 µS/cm |
| ROM coal moisture | 1,135 µS/cm |
| Flocculent makeup | 150 µS/cm |
| Angus Place Colliery mine water | 1,625 µS/cm |

## C.6 Groundwater modelling

The historical underground workings at SCSS were conceptualised as a vertically homogeneous storage, with constant cross-sectional area and bulk porosity. The water level in groundwater bore BH08 (up gradient of Cooks Dam in the historical underground mining area) was assumed to be representative of the water level in the underground workings.

Inflows to the underground storage were modelled to consist of regional rainfall recharge and seepage from endorheic storages (REA, A Pit, H Pit East, H Pit West, Council Pit and SHG1). It was assumed that the potential seepage from the REA and historical open cut voids was sufficient such that the storage volume in the upgradient storages remained constant. Outflows from the underground storage consisted of seepage to Cooks Dam.

Seepage from DML Dam to Cooks Dam, underground workings to Cooks Dam and Cooks Dam to Wangcol Creek were estimated using Darcy's Law, where:

$$Q = KA\,\frac{dh}{dl}$$

*K = hydraulic conductivity*

*A = bulk cross sectional area of flow*

*dh = hydraulic head gradient*

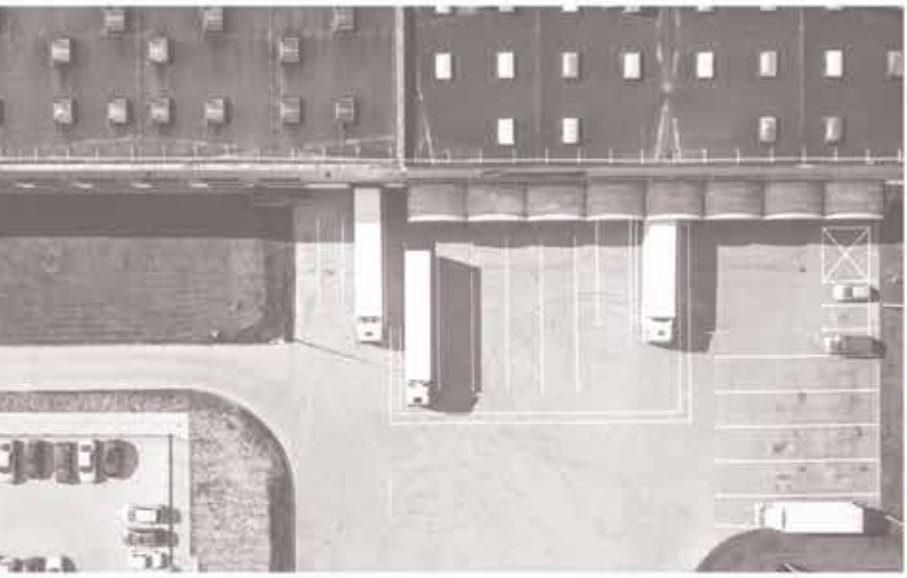
*dl = distance between water bodies*

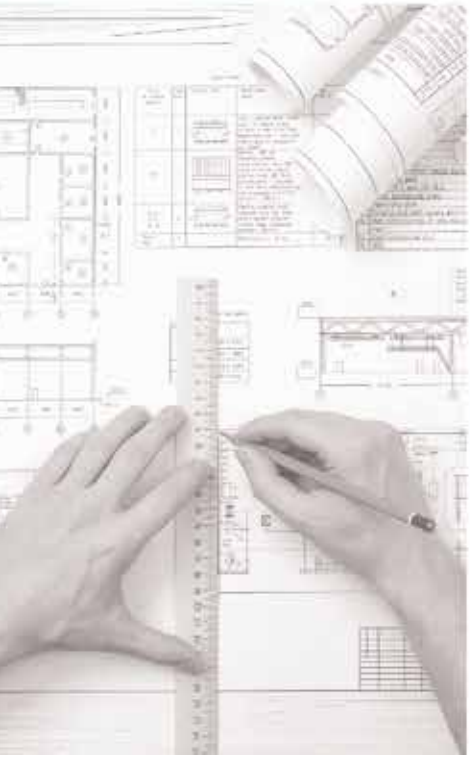
The seepage rates were simulated based on modelled hydraulic head gradients and hydraulic conductivity parameters provided by GHD (2020). Refer to GHD (2020) for further information on the calibration of seepage parameters.

The approach to groundwater modelling applied in the water and salt balance model is extremely simple when compared to the diversity of physical processes at work in the environment. A validation of the modelling approach was undertaken by GHD (2020), which provided an indication that the simplified physical processes represented by the model equations may adequately represent the more complex physical processes. Nevertheless, the modelling approach utilised is a significant simplification of reality and cannot provide detailed or reliable information about individual surface water and groundwater features.

# Appendix B

## Construction noise impact assessment





# Western Coal Services Project

Construction noise and vibration impact assessment

Prepared for Springvale Coal Pty Limited
December 2021

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# Western Coal Services Project

## Construction noise and vibration impact assessment

**Report Number**

J190806 1

**Client**

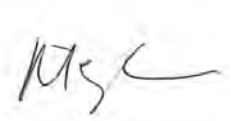
Springvale Coal Pty Limited

**Date**

3 December 2021

**Version**

v1 Final

| **Prepared by** | **Approved by** |
|---|---|
| |  |
| **Andrew Durrer** | **Katie Teyhan** |
| Acoustic Consultant | Associate |
| 3 December 2021 | 3 December 2021 |

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# Executive summary

Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial Coal Company Limited (Centennial), operates the Western Coal Services Project (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW). WCS was granted State significant development (SSD) consent SSD-5579 on 4 April 2014 by the NSW Planning Assessment Commission, as delegate for the then NSW Minister of Planning and Infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), to modify aspects of WCS water management.

This report provides an assessment of potential construction phase noise impacts associated with the proposed modification. Noise impacts during the ongoing operation of Springvale Coal Services Site (SCSS) and other components of WCS are not anticipated to change as a result of the proposed modification. Consequently, an assessment of operational noise impacts has not been included in this report.

This construction noise and vibration assessment follows the methodology provided in the *Interim Construction Noise Guideline* (ICNG) (DECC 2009)*, Road Noise Policy* (RNP) (DECCW 2011) and *Assessing Vibration: a Technical Guideline* (DEC 2006).

The noise assessment procedure investigates noise generating activities occurring on the construction site. The construction noise assessment approach aims to identify potential risks and to recommend appropriate mitigation measures where required. As part of this assessment, potential noise impacts from three different construction scenarios have been assessed.

Noise levels generated by all works are expected to comply with the construction noise management levels (NMLs) under all scenarios. Noise levels at all receivers are expected to be well below the highly affected noise level under all scenarios.

Construction work is expected to be greatest during Scenario 2 (Cooks Dam to Pond D Transfer) where activities are likely to include area preparation (clear and grub), trench excavation, pipe welding and installation and fill importation. Construction activities associated with Scenario 2 will progress away from receivers as the active work areas move from SCSS towards MPPS. As such, it is expected that construction noise levels at nearby receivers will decrease continually as work progresses along the bidirectional pipeline alignment.

The nearest residences are greater than 500 m from the construction envelope and, therefore, are not expected to be impacted by any vibration-intensive activities. All vibration-intensive construction work is expected to comply with relevant criteria.

Recommended mitigation measures include logging noise complaints, carrying out regular measurements and recording results and ensuring that activities are conducted in a manner that emphasises the importance of ensuring low noise emissions.

# Table of Contents


Executive summary ES.1

1 Introduction 1

1.1 Overview 1

1.2 Background 3

1.3 Assessment guidelines and requirements 4

2 Proposed modification 6

2.1 Overview 6

2.2 New SCSS Water Transfer System 6

2.3 Transfer of water to McPhillamys Gold Project 6

2.4 Transfer of water to MPPS 7

2.5 Receipt of water from Angus Place Colliery 7

2.6 Redesign of SCSS's water management system 7

3 Existing noise environment 10

3.1 Project application area 10

3.2 Assessment locations 10

3.3 Background and ambient noise levels 10

4 Assessment criteria 12

4.1 Development consent (SSD_5579) 12

4.2 Construction noise criteria 12

4.3 Operational noise criteria 14

4.4 Construction vibration 14

4.5 Construction blasting 17

5 Noise assessment methodology 18

5.1 Overview 18

5.2 Plant and equipment items 18

5.3 Modelling scenarios for construction activities 19

5.4 Modelling assumptions 20

6 Noise assessment 21

7 Vibration assessment 23

8 Mitigation and management 24

8.1 Construction noise mitigation and management 24
8.2 Adoption of general noise & vibration management practices (AS 2436-2010) 24
8.3 Community enquiries or complaints 25
9 Conclusion 26
References 27
Glossary 28

## Appendices

Appendix A Indicative construction schedule A.1

## Tables

Table 3.1 Assessment locations 10
Table 3.2 Adopted RBLs 10
Table 4.1 ICNG residential criteria 13
Table 4.2 Construction noise management levels 14
Table 4.3 Acceptable vibration dose values for intermittent vibration 15
Table 4.4 Transient vibration guide values - minimal risk of cosmetic damage 16
Table 5.1 Noise source and associated sound power levels 18
Table 5.2 Modelled scenarios 19
Table 6.1 Construction noise predictions – standard construction hours 21

## Figures

Figure 1.1 Regional context 2
Figure 1.2 Local context 5
Figure 2.1 Proposed modification elements 9
Figure 3.1 Assessment locations 11
Figure 4.1 Graph of transient vibration guide values for cosmetic damage 16

# 1 Introduction

## 1.1 Overview

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates Western Coal Services (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1.1).

WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine (SSD-5594), Angus Place Colliery (SSD 06_0021) and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Development Consent 08_0223). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (SSD-7592). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at Springvale Coal Services Site (SCSS), including:

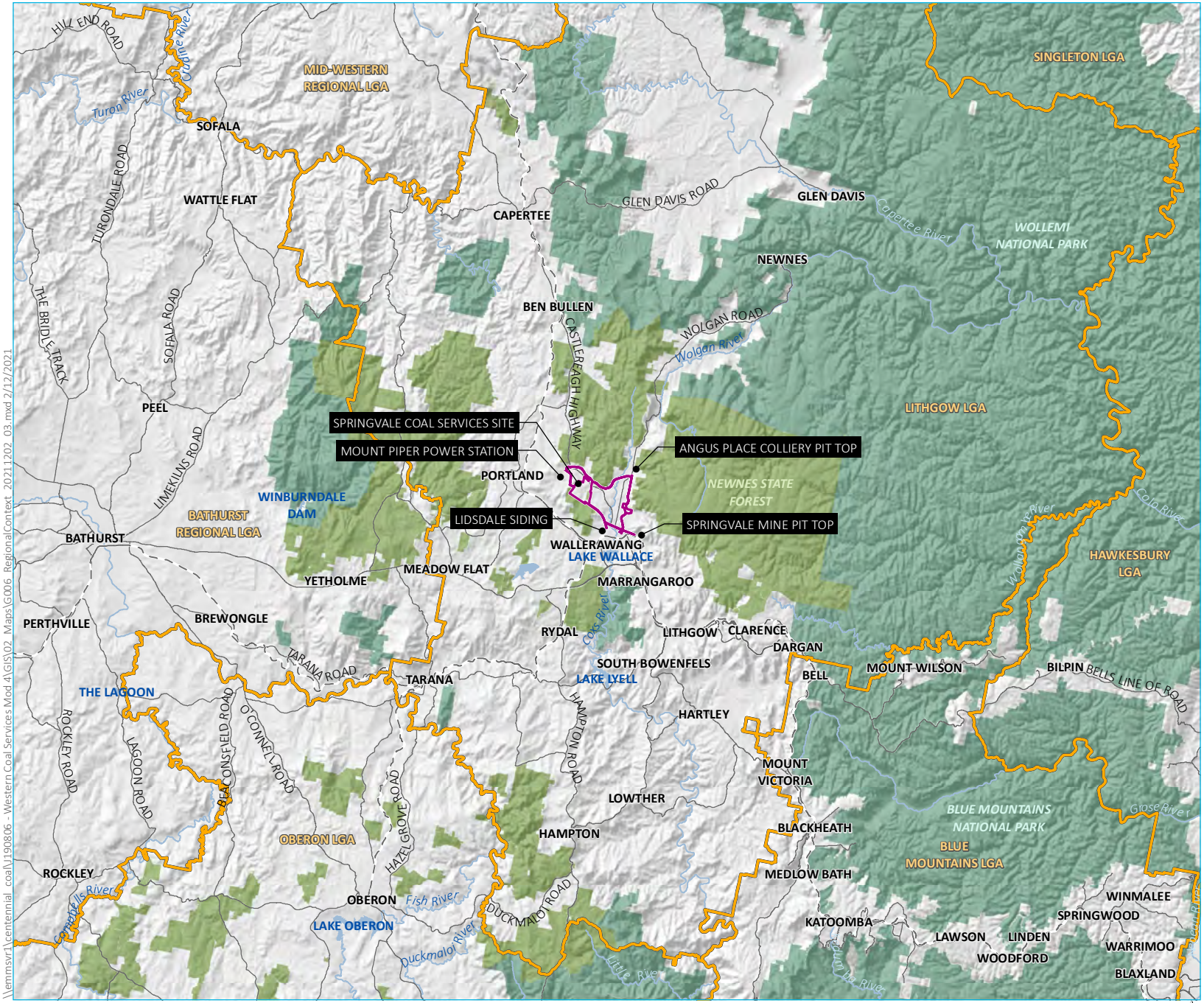
- Centennial Angus Place Pty Limited (operators of Angus Place Colliery);
- EnergyAustralia (operators of MPPS); and
- Regis (proponents of McPhillamys Gold Project).

As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region. To facilitate the transfer of water to these operations, as well as the transfer of land back to EnergyAustralia, Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to change the existing water management system at SCSS to facilitate the transfer of water between WCS and other operations, and to improve the quality of water discharged to Wangcol Creek (herein referred to as the proposed modification).

The upgrade of the water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will require a minor increase to the project application area.

EMM Consulting Pty Limited (EMM) has been engaged by Springvale Coal to prepare a modification report for the proposed modification. This construction noise and vibration impact assessment (CNVIA) provides an assessment of the noise and vibration impacts associated with the construction of the proposed modification.



KEY

- Project application area (SSD-5579)
- Rail line
- Major road
- River
- Named waterbody
- NPWS reserve
- State forest
- Local government area

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2021); Centennial Coal (2021); DFSI (2017); GA (2011); ASGC (2006)

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# Regional context

Western Coal Services Project
Construction Noise & Vibration Impact Assessment
Figure 1.1

EMM creating opportunities

## 1.2 Background

### 1.2.1 Western Coal Services Project

The project application area for WCS is west of the Blue Mountains in the Lithgow LGA (Figure 1.1). Land uses within and surrounding the project application area vary and include industrial, mining, power generation, residential, agricultural and forestry uses.

WCS operations are spread across a number of sites (Figure 1.2). The main components are:

- Springvale Coal Services Site (SCSS) – a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP;
- Kerosene Vale Stockpile Area (KVSA) – a coal stockpile area approved under SSD-5579, but managed day-to-day by Angus Place Colliery;
- an overland conveyor system extending from Springvale Mine's pit top to Mount Piper Power Station (MPPS) via SCSS to Lidsdale Siding;
- Mount Piper Haul Road – extending from Angus Place Colliery's pit top to MPPS;
- Wallerawang Haul Road – extending from Angus Place Colliery's pit top to Wallerawang Power Station;
- Link Haul Road – a private road to be constructed between the Mount Piper Haul Road and SCSS; and
- a residual waste stream pipeline – transferring residual waste material from SWTP to SCSS.

### 1.2.2 Springvale Coal Services Site water management system

The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek. Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

The primary objectives of the water management system at SCSS are to:

- provide a secure water supply for coal washing, washdown and dust suppression (including haul roads and coal stockpiles); and
- control the quantity and quality of water discharged into Wangcol Creek via LDP001.

The discharge of untreated groundwater into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted with NSW Environment Protection Authority (EPA) regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek.

### 1.2.3 Springvale Water Treatment Plant

The SWTP (SSD-7592) involves the transfer and treatment of water from existing underground mine dewatering facilities at Springvale Mine and Angus Place Colliery for beneficial reuse at MPPS. It was initiated to improve environmental outcomes for the Coxs River catchment (ie by eliminating mine water discharges at Springvale Mine and Angus Place Colliery).

### 1.2.4 McPhillamys Gold Project (SSD-9505)

Regis is seeking development consent for the construction and operation of the McPhillamys Gold Project (SSD-9505). This is a proposed greenfield open cut gold mine and associated water supply pipeline in the Central West of NSW. The project comprises two key components:

- the mine site where the ore will be extracted and processed; and
- an associated water pipeline which will enable the supply water from near Lithgow to the mine site.

As part of the project, Regis proposes to construct a water pipeline to transfer water from three existing operations to supply water for the gold mine's operations. The water for the project (if approved and constructed) would be supplied from the following sources:

- untreated mine water currently discharged from SCSS through LDP001 to Wangcol Creek;
- process and blowdown water from MPPS; and
- untreated mine water from Angus Place Colliery.

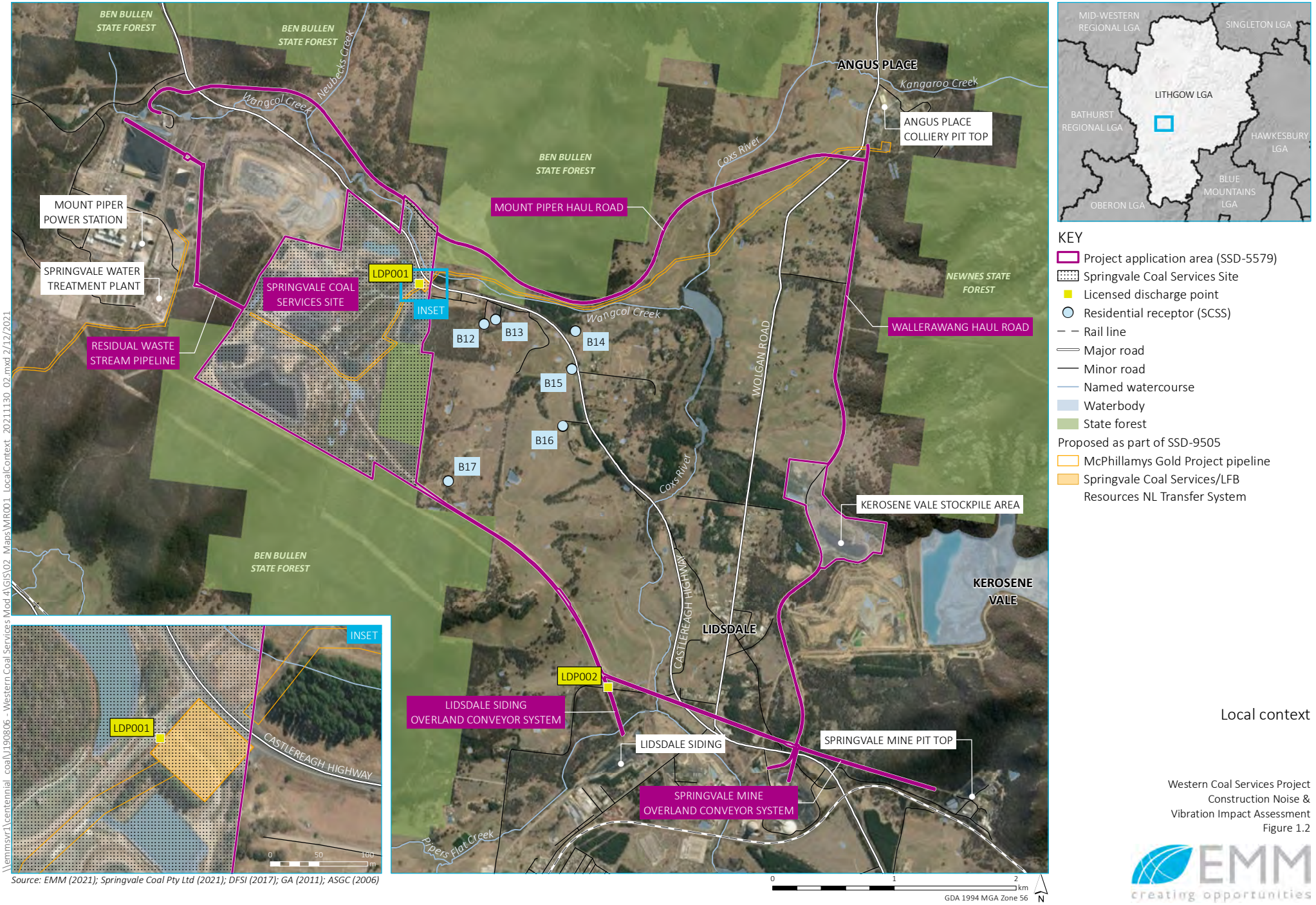
As part of the development application for the McPhillamys Gold Project, Regis is seeking approval to construct and operate a pumping station and storage tank close to SCSS that will be used to transfer water from SCSS to the water pipeline (Figure 1.2).

## 1.3 Assessment guidelines and requirements

This CNVIA has been prepared to accompany the modification report and assesses the construction noise and vibration impacts of the proposed modification on existing noise-sensitive receptors in the surrounding area. This CNVIA has been completed with reference to the following guidelines, policies and standards:

- EPA (2017), *Noise Policy for Industry* (NPfI);
- NSW Department of Environment and Climate Change (DECC) (2009), *Interim Construction Noise Guideline* (ICNG);
- DECC (2011), *Road Noise Policy* (RNP);
- NSW Department of Environment and Conservation (DEC) 2006, *Assessing Vibration: a Technical Guideline*; and
- Australian Standard AS2436-2010 Guide to Noise Control on Construction, Maintenance and Demolition Sites.

A number of technical terms have been utilised throughout this report for the discussion of noise and vibration. These are explained in the glossary.

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Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)

Local context

Western Coal Services Project
Construction Noise & Vibration Impact Assessment
Figure 1.2

EMM creating opportunities

# 2 Proposed modification

## 2.1 Overview

Springvale Coal proposes to modify SSD-5579 to allow:

- construction and operation of the SCSS Water Transfer System, consisting of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001;
- transfer of water from the SCSS Water Transfer System:
  - to the SCSS/Regis Transfer System for use at the McPhillamys Gold Mine;
  - to MPPS for treatment and reuse within the MPPS cooling water system;
- receipt of raw water from the Angus Place Water Transfer System for use in the coal preparation plant at SCSS;
- changes to the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and to improve the quality of water discharged to Wangcol Creek;
- an increase in the capacity of the Washery Dam at SCSS; and
- administrative changes to Condition 45 of Schedule 3 of SSD-5579 to align with amendments to the NSW *Mining Act 1992* and NSW Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021 (Mining Amendment Regulation).

The key components of the proposed modification are shown on Figure 2.1.

The upgrade of the water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will require a minor increase to the project application area.

It is not proposed to modify the approved handling, processing or transport operations, the limits on these activities, or the project life.

## 2.2 New SCSS Water Transfer System

The SCSS Water Transfer System will include the construction of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001. This infrastructure will be constructed on disturbed land adjacent to the proposed Springvale Coal Services/Regis transfer system (Figure 2.1).

## 2.3 Transfer of water to McPhillamys Gold Project

The SCSS Water Transfer System will be used to transfer up to 15.6 ML/day of water from SCSS to the proposed Springvale Coal Services/Regis transfer system (Figure 2.1). The transfer systems will facilitate the transfer of water to the proposed water pipeline and will enable the supply of water from SCSS to the McPhillamys Gold Project.

As well as supplying water to the McPhillamys Gold Mine, the proposed modification will reduce, and potentially at times remove, the need to discharge poor quality water from LDP001 to Wangcol Creek. If the gold mine and associated water transfer system are not approved/do not proceed, discharges from LDP001 to Wangcol Creek will continue.

## 2.4 Transfer of water to MPPS

It is proposed to transfer up to 2.6 ML/day of water from the SCSS Water Transfer System at SCSS to MPPS for treatment and reuse. This water is currently discharged through LDP001. This will generally reduce the volume of water discharged through LDP001 and provide spare capacity to discharge water from LDP001 under non-routine water management conditions.

Water transferred to MPPS will be temporarily stored within Pond D at MPPS prior to treatment within MPPS's brine concentrators (Figure 2.1). Permeate from the water treatment process will be transferred to MPPS's cooling water system with brine used to condition ash prior to emplacement within MPPS's ash emplacement areas.

The temporary storage of water within Pond D, treatment of water within MPPS's brine concentrators, transfer of permeate to MPPS's cooling water system and management of brine will require a modification the development consent for SWTP (SSD-7592).

This aspect of the proposed modification is subject to the successful conclusion of ongoing commercial discussions between Springvale Coal and EnergyAustralia.

## 2.5 Receipt of water from Angus Place Colliery

An offtake from the Angus Place Colliery Raw Water Pipeline will be constructed. Once constructed, the offtake will allow up to 2.6 ML/day of water from Angus Place Colliery to be used to supplement the washery water supply at SCSS.

Water from Angus Place Colliery is of a higher quality than water currently used on-site at SCSS. The receipt of water from Angus Place Colliery and its use in coal handling and preparation activities at SCSS is expected to improve the quality of water managed within the reject emplacement area (REA) and discharged from LDP001, as this water will be blended with water currently used on-site.

## 2.6 Redesign of SCSS's water management system

The proposed modification to SSD-5579 includes redesign of SCSS's water management system, including:

- Transfer of approximately 50.6 ha of the existing surface water catchment at SCSS to EnergyAustralia as part of the transfer of land from Springvale Coal back to EnergyAustralia. As a result, management of SHG1, H Pit East, H Pit West and Council Pit will be transferred to EnergyAustralia.

- Construction and operation of the Huon Clean Water Pond, which will intercept the clean water catchment of Huon Gully upstream of SHG1 and transfer it to Wangcol Creek via the Lamberts Gully clean water diversion.

- Construction and operation of two new dirty water ponds:

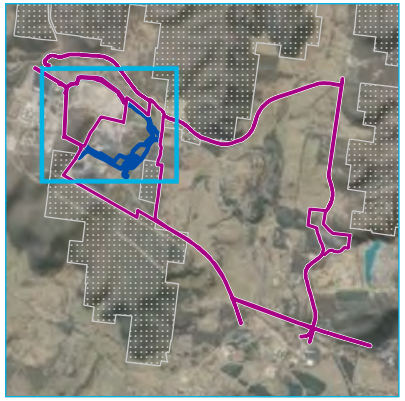
    - DWP-A will be constructed downslope and to the north of the Huon Clean Water Pond to capture dirty water from the coal conveyor corridor and prevent runoff flowing north onto EnergyAustralia's land.

    - DWP-B will be constructed upstream of Cooks Dam and will provide additional dirty water storage capacity at SCSS.

- Extension of the dewatering pipeline from the Transfer Tower 3 or TT03 sump to DWP-A.

- Construction and operation of a bi-directional pipeline between SCSS and MPPS. The pipeline will facilitate the proposed transfer of water to MPPS.
- Construction and operation of an offtake from the Angus Place Colliery Raw Water Pipeline to facilitate the proposed transfer of water from Angus Place Colliery to SCSS.
- Construction and operation of associated pumping, pipelines and drainage channels.
- Increase the capacity of the Washery Dam to 6.1 ML. The material excavated from the Washery Dam during desilting and maintenance works will be utilised on-site at SCSS as part of ongoing rehabilitation works.

Key elements of the proposed modification are labelled on Figure 2.1.



KEY

- Proposed project application area
- Construction envelope
- Springvale Coal Services Site
- Licensed discharge point
- Mt Piper Power Station Pond D
- Surface water catchment to be managed by Energy Australia

Proposed modification elements

- Bidirectional pipeline
- Offtake from Angus Place Raw Water Pipeline Project
- General flow direction
- Huon Clean Water Pond
- DWP-A
- DWP-B

Proposed modification area

- Regis and EnergyAustralia water transfer system area
- DWP-B area
- Angus Place water offtake and transfer system area
- DWP-A and clean water diversion area

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline easement
- Springvale Coal Services Site/Regis Transfer System

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- State forest

Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); GA (2011)

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## Proposed modification elements

Western Coal Services Project
Construction Noise & Vibration Impact Assessment
Figure 2.1

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# 3 Existing noise environment

## 3.1 Project application area

The project application area for WCS is west of the Blue Mountains in the Lithgow LGA in NSW. SCSS is in Blackmans Flat approximately 125 km north-west of Sydney and approximately 18 km north of Lithgow.

MPPS is immediately west of SCSS and the village of Blackmans Flat is east of SCSS. Pine Dale Coal Mine (currently in care and maintenance) is north of SCSS and sections of Ben Bullen State Forest are within the project application area to the south and north-east of SCSS.

## 3.2 Assessment locations

Sensitive receivers which have the potential to be affected by noise from the proposed works are residential receivers (hereafter referred to as assessment locations) surrounding the project application area. Assessment locations used for this assessment are presented in Table 3.1 and shown on Figure 3.1. B4, which is referenced in SSD-5579, was a dwelling owned by Centennial that has been demolished.

**Table 3.1 Assessment locations**

| ID | Address | Type/description | Easting | Northing |
|---|---|---|---|---|
| B12 | 1563 Castlereagh Hwy, Blackmans Flat, NSW | Residential | 226808 | 6304169 |
| B13 | 1549 Castlereagh Hwy, Blackmans Flat, NSW | Residential | 226937 | 6304222 |
| B14 | 1470 Castlereagh Hwy, Blackmans Flat, NSW | Residential | 227546 | 6304122 |
| B15 | 1449 Castlereagh Hwy, Blackmans Flat, NSW | Residential | 227516 | 6303810 |
| B16 | 130 Karawatha Dr, Lidsdale, NSW | Residential | 227442 | 6303343 |
| B17 | 1411 Castlereagh Highway, Wallerawang, NSW | Residential | 226500 | 6302886 |

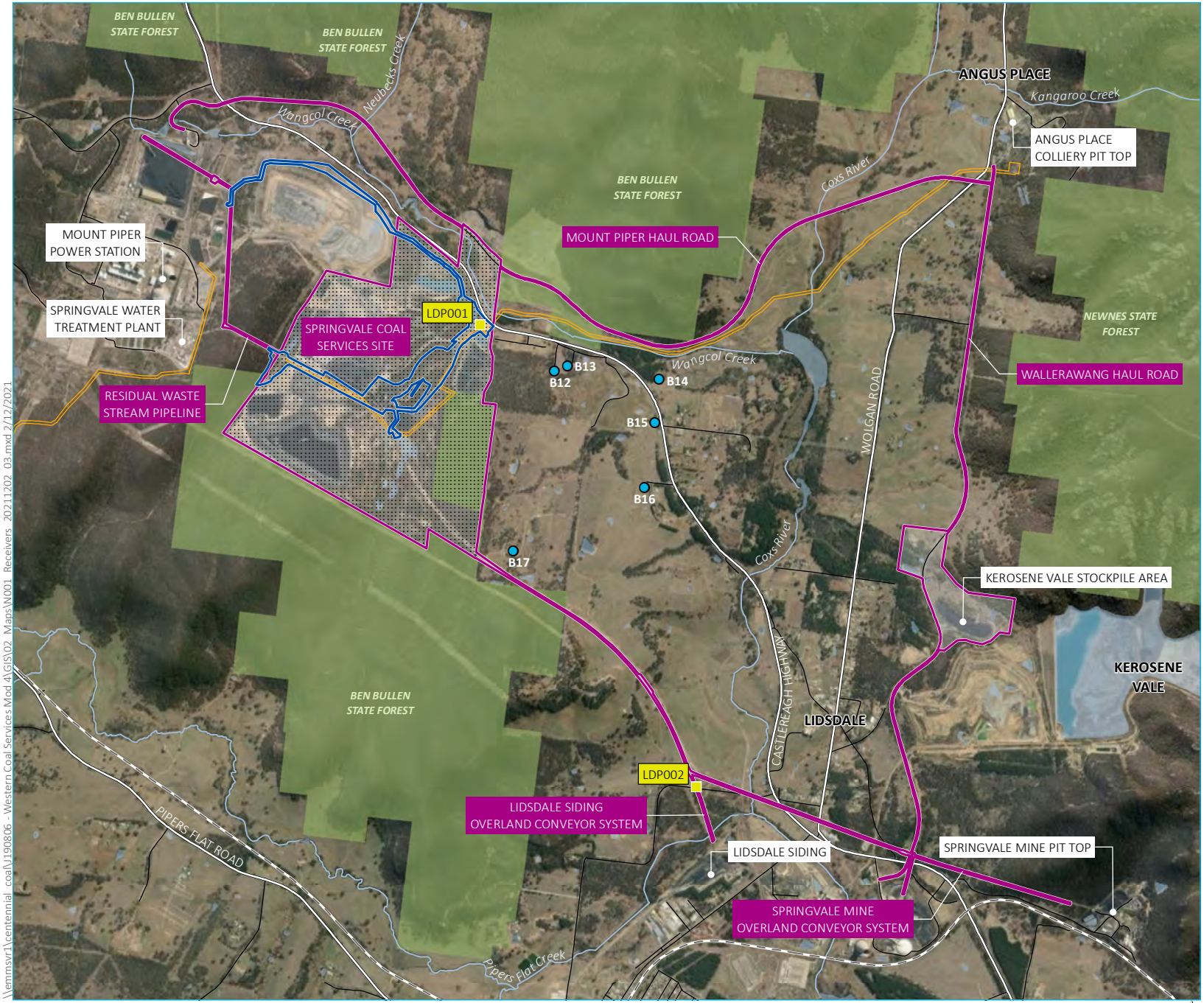
## 3.3 Background and ambient noise levels

In order to determine applicable noise management levels (NMLs), background noise levels have been determined in accordance with methodology provided in the NPfI. As the surrounding environment in the project region is sparsely populated and rural, the applicable minimum rating background noise levels (RBLs) have been used for the purpose of this assessment and are provided in Table 3.2.

**Table 3.2 Adopted RBLs**

| Time of day | Minimum rating background noise level (dBA) |
|---|---|
| Day | 35 |
| Evening | 30 |
| Night | 30 |

Notes: Day: 7 am–6 pm Monday to Saturday; 8 am–6 pm Sundays and public holidays; Evening: 6 pm–10 pm; Night: Remaining periods.




KEY

- Noise assessment location
- Project application area (SSD-5579)
- Construction envelope
- Licensed discharge point
- Springvale Coal Services Site
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- State forest

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline
- Springvale Coal Services/Regis Transfer System

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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011)*

## Assessment locations

Western Coal Services Project
Construction Noise & Vibration Impact Assessment
Figure 3.1

EMM creating opportunities

# 4 Assessment criteria

## 4.1 Development consent (SSD_5579)

SSD_5579 specifies conditions to all relevant activities conducted at WCS, including noise-specific conditions:

> **Construction Noise**
>
> 3. The Applicant must prepare and implement a Construction Noise Management Plan prepared in accordance with the EPA's Interim Construction Noise Guideline 2009 (or any relevant updated version), to the satisfaction of the Secretary. This plan must be prepared in consultation with the EPA, and be approved by the Secretary prior to commencing construction.
>
> **Construction Hours**
>
> 4. The Applicant may only undertake construction activities between the hours of 7am to 6pm Monday to Friday, and 8am to 1pm Saturday, with no construction activities on Sundays or public holidays, unless otherwise agreed to by the Secretary in accordance with condition 5 of Schedule 3.
>
> **Out of Hours Construction Works**
>
> 5. If the Applicant proposes to undertake any construction works outside the hours specified in condition 4 of Schedule 3, then the Applicant must prepare and implement an Out of Hours Work Protocol for these works to the satisfaction of the Secretary. This protocol must be prepared in consultation with the EPA and the residents who would be affected by the noise generated by these works, and be consistent with the requirements of the ICNG. The Applicant must not carry out any out of hours construction works before this protocol has been approved by the Secretary.

## 4.2 Construction noise criteria

The ICNG (DECC 2009) suggests the following time restrictions for construction activities where noise is audible at residential premises:

- Monday to Friday 7 am to 6 pm;
- Saturday 8 am to 1 pm; and
- No construction work on Sundays or public holidays.

These are recommended standard hours for construction activity and these time restrictions are the primary management tool of the ICNG (DECC 2009). Table 4.1 provides NMLs for residential receivers during and outside of the recommended standard construction hours.

### Table 4.1 ICNG residential criteria

| Time of day | Management level $L_{Aeq,15\ minute}$ | How to apply |
|---|---|---|
| Recommended standard hours:<br>Monday to Friday 7 am to 6 pm<br>Saturday 8 am to 1 pm<br>No work on Sundays or public holidays | Noise affected<br>RBL + 10 dB | The noise affected level represents the point above which there may be some community reaction to noise.<br>• Where the predicted or measured $L_{Aeq(15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level;<br>• The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details. |
| | Highly noise affected<br>75 dB | The highly noise affected level represents the point above which there may be strong community reaction to noise.<br>• Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account:<br>i) times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences; and<br>ii) if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. |
| Outside recommended standard hours | Noise affected<br>RBL + 5 dB | A strong justification would typically be required for works outside the recommended standard hours. |
| | | The proponent should apply all feasible and reasonable work practices to meet the noise affected level. |
| | | Where all feasible and reasonable practices have been applied and noise is more than 5 dB (A) above the noise affected level, the proponent should negotiate with the community. |

Source: ICNG (DECC 2009).

Note: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

In summary, the noise goals provided in the ICNG for residences are:

- 10 dB above the existing background levels (RBL + 10 dB) for standard construction hours; and
- 5 dB above the existing background levels (RBL + 5 dB) outside of the standard construction hours, if works are justifiable.

The construction NMLs for the assessment locations presented in Table 4.2 are based on the background noise levels provided in Section 3.3 and in accordance with the ICNG (DECC 2009).

**Table 4.2 Construction noise management levels**

| Assessment location | Period[2, 3, 4] | RBL[1], dB | NML, $L_{Aeq,15\ minute}$, dB |
|---|---|---|---|
| All residential assessment locations | Day (standard hours) | 35 | 45<br>75 (Highly affected) |
| | Day (outside of standard hours) | 35 | 40 |
| | Evening | 30 | 35 |
| | Night | 30 | 35 |

Notes: 1. Minimum RBL as per the NPfI.
2. Standard hours is 7 am-6 pm Monday to Friday, 8 am to 1 pm Saturday.
3. Outside of standard hours is 6 pm to 7 am Monday to Friday and 1 pm Saturday to 7 am Monday.
4. Day: 7 am–6 pm Monday to Saturday; 8 am–6 pm Sundays and public holidays; Evening: 6 pm–10 pm; Night: Remaining periods.

Construction activity associated with the proposed modification will be undertaken during standard construction hours only.

## 4.3 Operational noise criteria

Operational noise emissions as a result of the proposed modification will be primarily associated with the operation of the SCSS Water Transfer System. The level of operational noise associated with the proposed modification will be negligible when compared to existing noise emissions from SCSS. Hence, a detailed assessment of operational noise has not been undertaken.

## 4.4 Construction vibration

### 4.4.1 Human comfort

#### i Overview

*Assessing Vibration: a Technical Guideline* (DEC 2006) (the guideline) is based on advice contained within the British Standard BS 6472 – 2008, Evaluation of human exposure to vibration in buildings (1-80 Hz).

The guideline presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. At vibration values below the preferred values, there is a low probability of adverse comment or disturbance to building occupants. Where all feasible and reasonable mitigation measures have been applied and vibration values are still beyond the maximum value, it is recommended the operator negotiate directly with the affected community.

The guideline defines vibration types and provides direction for assessing and evaluating the applicable criteria. Vibration-generating activities associated with the proposed modification include bulk earthworks and ground compaction. Hence, of relevance to this assessment is intermittent vibration only due to the nature of the proposed activities.

#### ii Intermittent vibration

Intermittent vibration (as defined in Section 2.1 of the guideline) is assessed using the vibration dose concept which relates to vibration magnitude and exposure time.

Section 2.4 of the guideline provides acceptable values for intermittent vibration in terms of vibration dose values (VDV) which requires the measurement of the overall weighted RMS (root mean square) acceleration levels over the frequency range 1 Hz to 80 Hz. The acceptable VDV for intermittent vibration are reproduced in Table 4.3.

**Table 4.3 Acceptable vibration dose values for intermittent vibration**

| Location | Day | | Night | |
|---|---|---|---|---|
| | Preferred value, $m/s^{1.75}$ | Maximum value, $m/s^{1.75}$ | Preferred value, $m/s^{1.75}$ | Maximum value, $m/s^{1.75}$ |
| Critical areas | 0.10 | 0.20 | 0.10 | 0.20 |
| Residences | 0.20 | 0.4 | 0.13 | 0.26 |
| Offices, schools, educational institutions and places of worship | 0.40 | 0.80 | 0.40 | 0.80 |
| Workshops | 0.80 | 1.60 | 0.80 | 1.60 |

Notes: 1. Day is 7 am to 10 pm and night is 10 pm to 7 am.

There is a low probability of adverse comment or disturbance to building occupants at VDV below the preferred values. Adverse comment or complaints may be expected if vibration values approach the maximum values. The guideline states that activities should be designed to meet the preferred values where an area is not already exposed to vibration.

### 4.4.2 Structural vibration criteria

Most commonly specified “safe” structural vibration limits are designed to minimise the risk of threshold or cosmetic surface cracks and are set well below the levels that have potential to cause damage to the main structure.

In terms of the most recent relevant vibration damage criteria, Australian Standard AS 2187.2 – 2006 Explosives – Storage and Use – Use of Explosives recommends the frequency-dependent guideline values and assessment methods given in the British Standard BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2 be used as they are “applicable to Australian conditions”.

The standard sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to give a minimum risk of vibration induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration that are considered in the standard include demolition, blasting, piling, ground treatments (eg compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented in Table 4.4 and shown in Figure 4.1.

**Table 4.4 Transient vibration guide values - minimal risk of cosmetic damage**

| Line | Type of building | Peak component particle velocity in frequency range of predominant pulse | |
|---|---|---|---|
| | | 4 Hz to 15 Hz | 15 Hz and above |
| 1 | Reinforced or framed structures Industrial and heavy commercial buildings | 50 mm/s at 4 Hz and above | |
| 2 | Unreinforced or light framed structures Residential or light commercial type buildings | 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz | 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above |

The standard states that the guide values in Table 4.4 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

In the lower frequencies where strains associated with a given vibration velocity magnitude are higher, the guide values for building types corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz.

The standard also states that minor damage is possible at vibration magnitudes which are greater than twice those given in Table 4.4 and major damage to a building structure may occur at values greater than four times the tabulated values.

Fatigue considerations are also addressed in the standard and it is concluded that unless calculations indicate that the magnitude and number of load reversals are significant (in respect to the fatigue life of building materials), the guide values in Table 4.4 should not be reduced for fatigue considerations.

In order to assess the likelihood of cosmetic damage due to vibration, AS 2187.2 specifies that vibration measurements should be undertaken at the base of the building and the highest of the orthogonal vibration components (transverse, longitudinal and vertical directions) should be compared with the criteria curves presented in Figure 4.1.

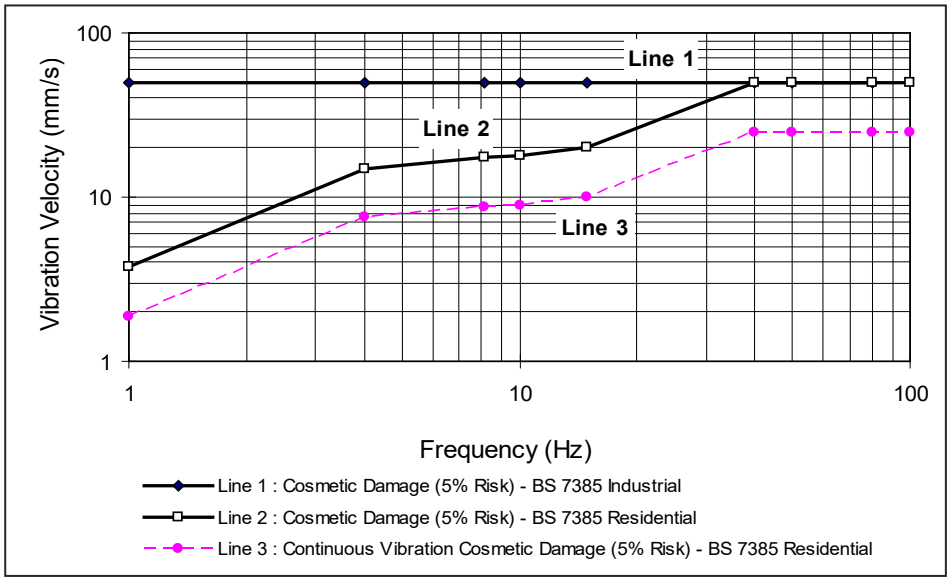


**Figure 4.1 Graph of transient vibration guide values for cosmetic damage**

It is noted that in addition to the guide values nominated in Table 4.4, the standard states that:

> Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.

Also that:

> A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.

## 4.5 Construction blasting

Construction blasting is not required as part of the proposed modification and as such blasting impacts have not been considered as part of this assessment.

# 5 Noise assessment methodology

## 5.1 Overview

This section presents the methods and base parameters used to model and assess noise emissions from construction activity associated with the proposed modification.

Quantitative modelling of construction noise was carried out using the ISO9613 algorithms within DGMR Software *iNoise*. This software calculates total noise levels at receptors from the concurrent operation of multiple noise sources. The model incorporates factors such as:

- the lateral and vertical location of plant and equipment;
- source-to-receptor distances;
- ground effects;
- atmospheric absorption;
- topography; and
- meteorological conditions.

Three-dimensional digitised ground contours of SCSS and surrounding land were incorporated to model topographic effects. Equipment was modelled at locations and heights representative of typical construction activities. The model was used to predict noise levels at each of the assessment locations identified in Table 3.1. The modelling results were then compared against the relevant noise levels described in Chapter 4, to determine potential impacts.

## 5.2 Plant and equipment items

The assessment has adopted plant and equipment sound power levels from the Department of Environment, Food and Rural Affairs (DEFRA) (2005) *Update of Noise Database for Prediction of Noise on Construction and Open Sites*, where available. Otherwise, data was sourced from an EMM database of similar equipment which is based on measurements at other construction sites.

Sound power levels and quantities of plant and equipment adopted during various stages of work for the purpose of predicting noise levels are summarised in Table 5.1.

**Table 5.1 Noise source and associated sound power levels**

| Noise source | Sound power level per unit, $L_W$, dBA[1] |
|---|---|
| Excavator | 120 |
| Front end loader | 114 |
| Compaction roller | 114 |
| Grader | 105 |

**Table 5.1 Noise source and associated sound power levels**

| Noise source | Sound power level per unit, $L_W$, dBA[1] |
|---|---|
| Water truck | 115 |
| Concrete pump truck | 105 |
| Cement mixer truck | 113 |
| Trucks | 102 |
| All-terrain crane/franna | 106 |
| Impact driver | 121 |
| HDPE pipe welder | 74 |

Notes: 1. Within any 15-minute period.

## 5.3 Modelling scenarios for construction activities

The modelling scenarios were based on detailed construction methodologies provided by Springvale Coal. An indicative construction schedule was also used (Appendix A). Activities associated with the proposed modification are expected to occur during standard construction hours over approximately 23 months.

The scenarios considered for noise modelling are:

- Scenario 1 – Area 4 water management infrastructure (included construction activities within the DWP-A and clean water diversion area and DWP-B area on Figure 2.1).
- Scenario 2 – Cooks Dam to Pond-D transfer (included construction activities within the Regis and EnergyAustralia water transfer systems area on Figure 2.1); and
- Scenario 3 – Angus Place offtake (included construction activities within the Angus Place water offtake and transfer system area on Figure 2.1).

Construction activities and equipment considered under each scenario are summarised in Table 5.2.

Various stages of the construction program were modelled to understand the maximum representative noise emissions experienced at the surrounding receptors.

**Table 5.2 Modelled scenarios**

| Scenario | Construction location | Construction activity | Construction equipment | Total SWL (dBA) |
|---|---|---|---|---|
| Scenario 1 | Area 4 water management infrastructure | Area preparation - clear and grub/cut and fill | Excavator, front end loader, water truck, trucks[4] | 122 |
| Scenario 2 | Cooks Dam to Pond-D transfer | Area preparation - clear and grub/excavate trench | Excavator, grader, trucks[4] | 120 |
| | | Weld pipe and install | HDPE pipe welder, all-terrain crane/franna | 106 |
| | | Import fill | Trucks, compaction roller, water trucks[1] | 123 |

**Table 5.2 Modelled scenarios**

| Scenario | Construction location | Construction activity | Construction equipment | Total SWL (dBA) |
|---|---|---|---|---|
| Scenario 3 | Angus Place offtake | Import fill | Concrete pump truck, cement mixer truck, all-terrain crane/franna | 115 |

1. 1 truck movement (in and out) every 15 minutes.

## 5.4 Modelling assumptions

In addition to the sound power levels, other noise modelling assumptions include:

- all construction plant is conservatively assumed to operate continuously in any 15 minute period;
- all pipeline work is conservatively assumed to be operating nearest to the assessment locations; and
- all vehicle movements are 60 km/hr or less on-site, and 100 km/hr on Castlereagh Highway.

# 6 Noise assessment

Construction noise emissions have been predicted at all assessment locations for each of the three scenarios. A summary of the results of the modelled scenarios is provided in Table 6.1. The selected scenarios 1, 2 and 3 represent construction activities occurring around Area 4 water management infrastructure, Cooks Dam to Pond-D transfer and Angus Place offtake, respectively. The scenarios are representative of the construction stages with the greatest potential to generate noise impacts.

Construction noise predictions are for the worst-case scenario for each assessment location based on the scenarios in Table 5.2. The predicted noise levels have been assessed against the relevant criteria for standard construction hours (7 am to 6 pm Monday to Friday and 8 am to 1 pm Saturday).

**Table 6.1 Construction noise predictions – standard construction hours**

| Scenario | Assessment locations | Predicted maximum construction noise level $L_{Aeq,15\ minute}$ (dB) | NML / highly noise affected level $L_{Aeq,15\ minute}$ (dB) | Maximum exceedance (dB) (NML / highly affected level) |
|---|---|---|---|---|
| Scenario 1: Area 4 Water Management Infrastructure | B12 | 44 | 45 / 75 | Nil / Nil |
| | B13 | 44 | 45 / 75 | Nil / Nil |
| | B14 | 39 | 45 / 75 | Nil / Nil |
| | B15 | 39 | 45 / 75 | Nil / Nil |
| | B16 | 39 | 45 / 75 | Nil / Nil |
| | B17 | 41 | 45 / 75 | Nil / Nil |
| Scenario 2: Cooks Dam to Pond-D Transfer | B12 | 45 | 45 / 75 | Nil / Nil |
| | B13 | 45 | 45 / 75 | Nil / Nil |
| | B14 | 38 | 45 / 75 | Nil / Nil |
| | B15 | 37 | 45 / 75 | Nil / Nil |
| | B16 | 36 | 45 / 75 | Nil / Nil |
| | B17 | 36 | 45 / 75 | Nil / Nil |
| Scenario 3: Angus Place Offtake | B12 | 36 | 45 / 75 | Nil / Nil |
| | B13 | 36 | 45 / 75 | Nil / Nil |
| | B14 | 32 | 45 / 75 | Nil / Nil |
| | B15 | 33 | 45 / 75 | Nil / Nil |
| | B16 | 34 | 45 / 75 | Nil / Nil |
| | B17 | 40 | 45 / 75 | Nil / Nil |

Notes: Standard hours are 7 am to 6 pm Monday to Friday and 8 am to 1 pm Saturday

Noise levels generated by all works are expected to comply with the construction NMLs under all scenarios. Noise levels at all receivers are expected to be well below the highly affected noise level ($L_{Aeq,15min}$ 75 dB) under all scenarios.

Construction work is expected to be greatest during Scenario 2 (Cooks Dam to Pond-D Transfer) where activities are likely to include area preparation (clear and grub), trench excavation, pipe welding and installation and fill importation. Construction activities on the Cooks Dam to Pond-D Transfer will progress away from the nearby receivers as the work continues. As such, it is expected that construction noise levels at the nearby receivers will decrease continually as work progresses west along the pipeline alignment.

Given that predictions assume all equipment operating simultaneously, it is likely that actual construction noise levels will be less than those predicted for the majority of the time. Hence, these noise level predictions can be considered conservative.

# 7 Vibration assessment

As a guide, safe working distances for items of vibration-intensive plant likely to be utilised for the proposed modification are listed in Table 7.1. The safe working distances are quoted for both 'cosmetic damage' (refer British Standard BS 7385) and 'human comfort' (refer British Standard BS 6472-1).

**Table 7.1 Recommended safe working distances for vibration intensive plant**

| Plant item | Rating/description | Safe working distance | |
|---|---|---|---|
| | | Cosmetic damage (BS 7385) | Human response (BS 6472) |
| Vibratory roller | <50 kN (typically 1-2 tonnes (t)) | 5 m | 15 to 20 m |
| | <100 kN (typically 2-4 t) | 6 m | 20 m |
| | <200 kN (typically 4-6 t) | 12 m | 40 m |
| | <300 kN (typically 7-13 t) | 15 m | 100 m |
| | >300 kN (typically 13-18 t) | 20 m | 100 m |
| | >300 kN (>18 t) | 25 m | 100 m |
| Small hydraulic hammer | (300 kg – 5-12 t excavator) | 2 m | 7 m |
| Medium hydraulic hammer | (900 kg – 12-18 t excavator) | 7 m | 23 m |
| Large hydraulic hammer | (1,600 kg – 18-34 t excavator) | 22 m | 73 m |

Source: Transport Infrastructure Development Corporation 2007, *Construction Noise Strategy (Rail Projects)*.

The safe working distances presented in Table 7.1 are indicative and will vary depending on the particular item of plant and local geotechnical conditions. They apply to cosmetic damage of typical buildings under typical geotechnical conditions.

In relation to human comfort response, the safe working distances in Table 7.1 relate to continuous vibration and apply to residential receivers. For most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels, occurring over shorter periods are allowed, as discussed in BS 6472-1.

The nearest residences are greater than 500 m from the construction envelope and, therefore, are not expected to be impacted by any vibration-intensive activities.

# 8 Mitigation and management

The proposed mitigation and management measures reflect current best practice noise management for construction sites and have been selected to limit the generation of noise from the proposed modification and minimise the potential for noise impacts on surrounding receivers.

Site-specific noise and vibration mitigation and management measures that are to be considered during construction works are listed in Section 8.1. Subsequent sections provide further good practice recommendations.

A construction environmental management plan (CEMP) will be produced and include measures to manage noise.

## 8.1 Construction noise mitigation and management

The following measures are recommended to be implemented during construction works with the aim of minimising impacts and reducing construction noise and vibration levels below the relevant goals:

- Provide notification to residences in close proximity to the proposed construction areas (ie the assessment locations considered in this assessment) to inform residents of planned construction activities, time periods and expected durations, potential impacts and proposed mitigation measures. Notification should be completed prior to the start of the proposed works.
- Minimise the number of plant items operating concurrently where possible.
- Plan deliveries and access to occur quietly and efficiently.
- Plan high noise and vibration generating activities to be carried out in continuous blocks during non-sensitive periods.

## 8.2 Adoption of general noise & vibration management practices (AS 2436-2010)

AS 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites sets out numerous practical recommendations to assist in mitigating construction noise emissions. Examples of strategies that could be implemented during the construction works are listed below.

### 8.2.1 Universal work practices

These include:

- regular reinforcement (such as at toolbox talks) of the need to minimise noise;
- regular identification of noisy activities and adoption of improvement techniques;
- avoiding the use of portable radios, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents;
- developing routes for the delivery of materials and parking of vehicles to minimise noise;
- minimising the movement of materials and plant and unnecessary maximum noise events; and
- minimising vehicle movements.

### 8.2.2 Plant and equipment

Additional measures for plant and equipment include:

- choosing quieter plant and equipment based on the optimal power and size to perform the required tasks most efficiently;
- using temporary noise barriers to shield intensive construction noise activities from residences;
- operating plant and equipment in the quietest and most efficient manner; and
- regularly inspecting and maintaining plant and equipment to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.

### 8.2.3 Work scheduling

Additional measures to be considered during work scheduling include:

- scheduling activities to minimise impacts by undertaking all possible work during hours that will least adversely affect sensitive receivers and by avoiding conflicts with other scheduled events;
- optimising the number of deliveries to the site by amalgamating loads where possible and scheduling arrivals within designated hours; and
- include contract conditions that include penalties for non-compliance with reasonable instructions by the principal to minimise noise or arrange suitable scheduling.

## 8.3 Community enquiries or complaints

With regard to potentially offensive noise events associated with construction activities, AS 2436 – 2000 provides the following:

> An effective community relations program is essential to keep the stakeholders informed throughout the project development process, to obtain valuable data related to the project, and to become aware of any project-related impacts in a timely manner. Additionally, the community is likely to be more understanding and accepting of the noise and vibration where the information provided is frank, does not attempt to understate the likely noise and vibration impacts and if commitments made are firmly adhered to.

To effectively manage any requests for information or respond to any public concerns in relation to the proposed construction activities, the site's existing Community Complaints and Enquiries Procedure would be utilised as described in Section 6.2 of Centennial's (2021) *Noise Management Plan Western Region*.

# 9 Conclusion

This CNVIA considers the potential for noise and vibration impacts from the proposed works and has been prepared in accordance with the methodology outlined in the NPfI (EPA 2017), ICNG (DECC 2009), as well as other relevant guidelines and standards.

Noise levels generated by all works are expected to comply with the construction NMLs under all scenarios. Noise levels at all receivers are expected to be well below the highly affected noise level under all scenarios.

Construction work is expected to be greatest during Scenario 2 (Cooks Dam to Pond D Transfer) where activities are likely to include area preparation (clear and grub), trench excavation, pipe welding and installation and fill importation. Construction activities associated with Scenario 2 will progress away from receivers as the active work areas move from SCSS towards MPPS. As such, it is expected that construction noise levels at nearby receivers will decrease continually as work progresses along the bidirectional pipeline alignment.

Vibration levels generated by proposed construction activities are not expected to occur within the minimum offset distances for any nearby occupied buildings. As such, vibration impacts are not predicted as a result of the proposed modification.

A CEMP will be produced and will include measures to manage noise. Construction noise mitigation and management recommendations will include the implementation of notifications to all affected receivers including details of planned activities, time periods and duration, along with potential impacts and mitigation measures. Other mitigation measures include logging noise complaints, minimising the number of plant items operating concurrently where possible and regularly reinforcing the need to minimise noise.

# References

Australian Standard AS 2436-2010 Guide to Noise Control on Construction, Maintenance and Demolition Sites.

NSW Department of Environment and Climate Change (DECC) 2009, *Interim Construction Noise Guideline*.

NSW Department of Environment, Climate Change and Water (DECCW) 2011, *Road Noise Policy*.

NSW Department of Environment and Conservation (DEC) 2006, *Assessing Vibration: a technical guideline*.

NSW Environment Protection Authority (EPA) 2017, *NSW Noise Policy for Industry*.

# Glossary

Technical terms typically utilised in a noise assessment report are explained in Table G.1.

### Table G.1 Glossary of acoustic terms and abbreviations

| Abbreviation or term | |
|---|---|
| ABL | The assessment background level (ABL) is defined in the INP as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured $L_{A90}$ statistical noise levels. |
| Amenity noise criteria | The amenity noise criteria relate to the overall level of industrial noise. Where existing levels of industrial noise (excluding the subject development) approach the acceptable amenity noise criteria, then noise levels from new industries need to demonstrate that they will not be an additional contributor to existing industrial noise. |
| A-weighting | There are several different weightings utilised for describing noise, the most common being the 'A-weighting'. This attempts to closely approximate the frequency response of the human ear. |
| CEMP | Construction environment management plan |
| C-weighting | There are several different weightings utilised for describing noise, with the 'C-weighted' scale typically used to assess low frequency noise and is also utilised in the assessment of occupational noise. |
| Day period | Monday–Saturday: 7.00 am to 6.00 pm, on Sundays and public holidays: 8.00 am to 6.00 pm. |
| dB | Noise is measured in units called decibels (dB). |
| DPIE | NSW Department of Planning, Industry and Environment |
| EMM | EMM Consulting Pty Limited |
| EP&A Act | NSW *Environmental and Planning Assessment Act 1979* (NSW) |
| EPA | NSW Environment Protection Authority (formerly the Department of Environment, Climate Change and Water). |
| Evening period | Monday–Saturday: 6.00 pm to 10.00 pm, on Sundays and public holidays |
| ICNG | Interim Construction Noise Guideline |
| Intrusive noise criteria | The intrusive noise criteria refer to noise that intrudes above the background level by more than 5 dB. The intrusiveness criterion is described in detail in Section 3.1.1. |
| $L_{A1}$ | The A-weighted noise level exceeded for 1% of the time. |
| $L_{A10}$ | The A-weighted noise level which is exceeded 10% of the time. It is roughly equivalent to the average of maximum noise level. |
| $L_{A90}$ | The A-weighted noise level that is exceeded 90% of the time. Commonly referred to as the background noise level. |
| $L_{Aeq}$ | The A-weighted energy average noise level. This is the equivalent continuous sound pressure level over a given period. The $L_{Aeq(15\text{-}minute)}$ descriptor refers to an $L_{Aeq}$ noise level measured over a 15 minute period. |
| Linear peak, $L_{peak}$ | The peak level of an event is normally measured using a microphone in the same manner as linear noise (i.e. unweighted), at frequencies both in and below the audible range. |
| $L_{Amax}$ | The maximum A-weighted sound pressure level received during a measurement interval. |
| Night period | Monday–Saturday: 10.00 pm to 7.00 am, on Sundays and public holidays: 10.00 pm to 8.00 am. |
| NML | Noise management level |

## Table G.1 Glossary of acoustic terms and abbreviations

| Abbreviation or term | |
|---|---|
| NMP | Noise management plan |
| NPfI | Noise Policy for Industry |
| POEO Act | NSW *Protection of the Environment Operations Act 1997* (NSW) |
| PNTL | Project noise trigger level |
| PSNL | The project-specific noise level (PSNL) is criteria for a particular industrial noise source or industry. The PSNL is the lower of either the intrusive noise criteria or amenity noise criteria. |
| RBL | The rating background level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the average background levels. |
| RNP | Road Noise Policy |
| Sound power level ($L_w$) | A measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment. |
| Temperature inversion | A meteorological condition where the atmospheric temperature increases with altitude. |

It is useful to have an appreciation of decibels (dB), the unit of noise measurement. Table G.2 gives an indication as to what an average person perceives about changes in noise levels. Examples of common noise levels are provided in Figure G.1.

## Table G.2 Perceived change in noise

| Change in sound level (dB) | Perceived change in noise |
|---|---|
| 3 | Just perceptible |
| 5 | Noticeable difference |
| 10 | Twice (or half) as loud |
| 15 | Large change |
| 20 | Four times (or quarter) as loud |

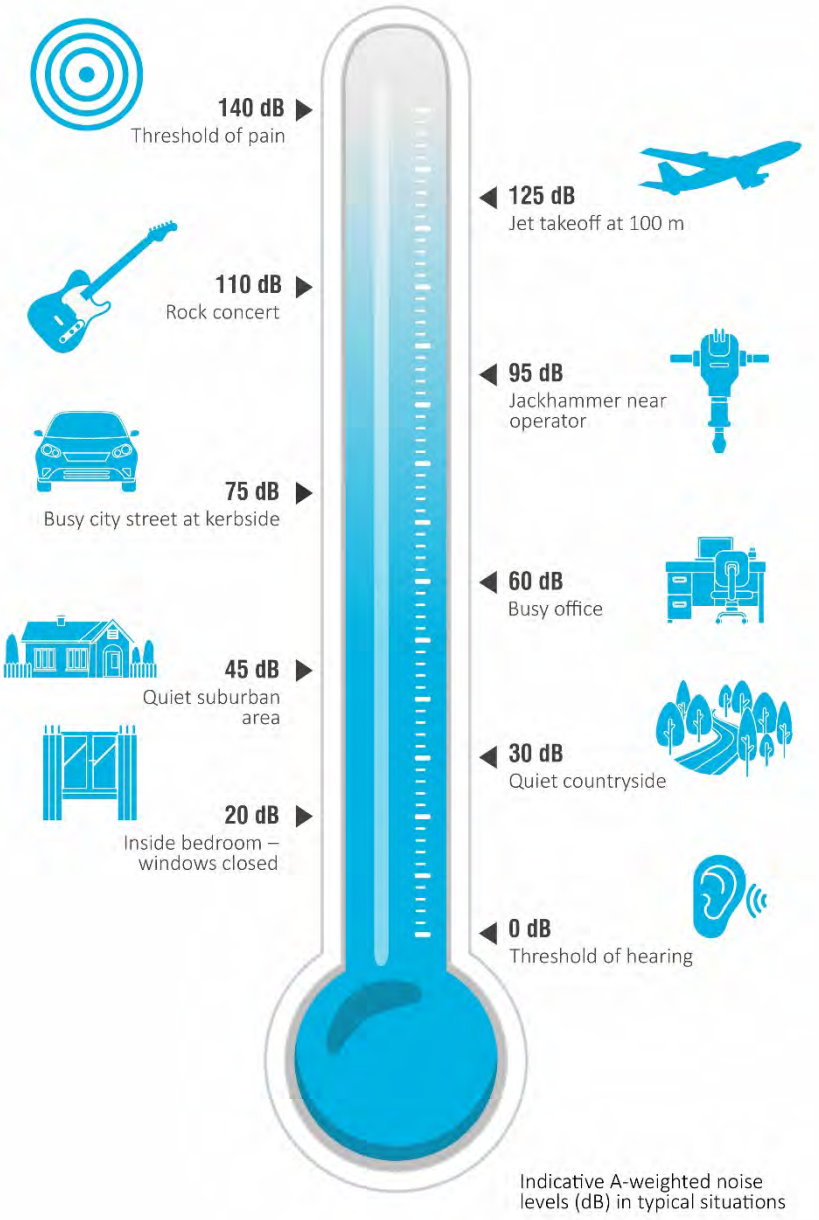


**Figure G.1 Common noise levels**

Appendix A

# Indicative construction schedule

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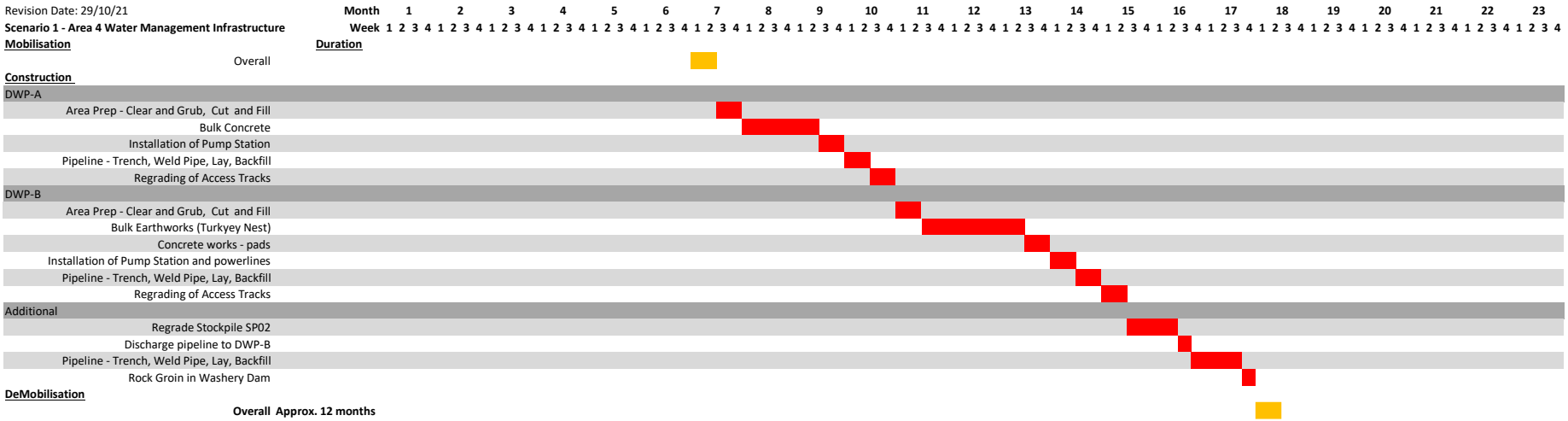
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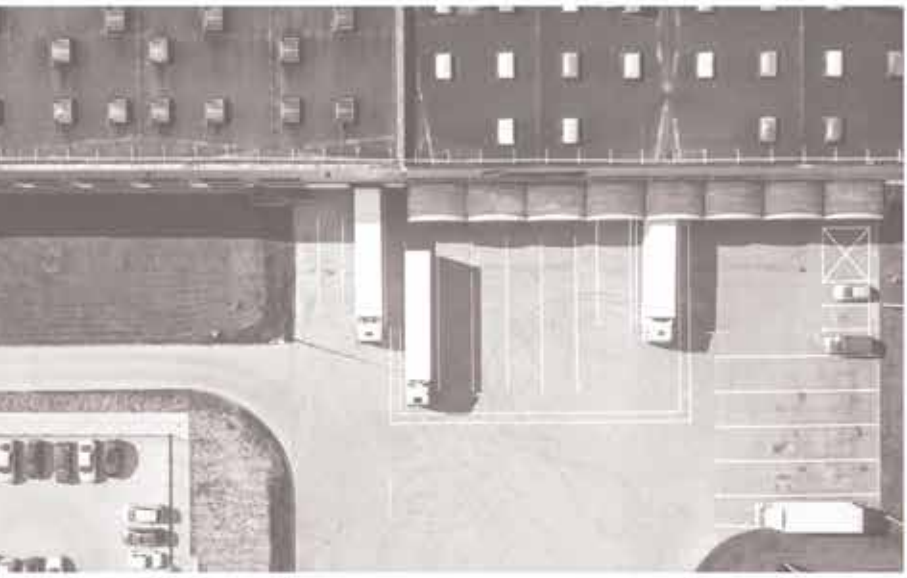
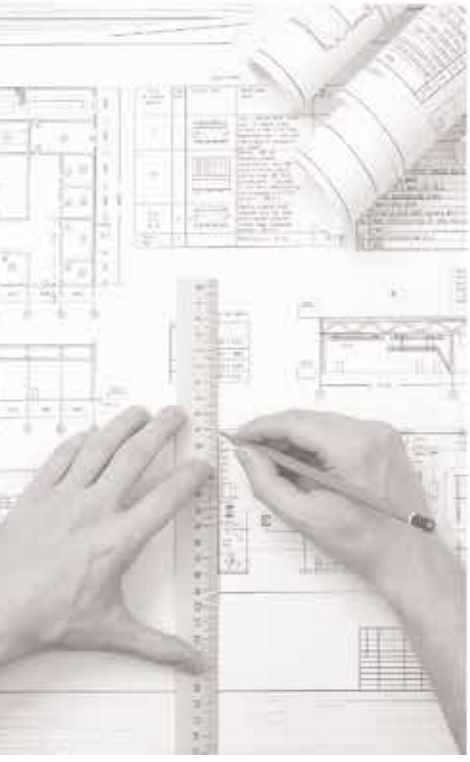
# Appendix C

## Construction air quality assessment





# Western Coal Services Project

Air quality construction dust assessment

Prepared for Springvale Coal Pty Limited
December 2021

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# Western Coal Services Project

## Air quality construction dust assessment

**Report Number**

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**Client**

Springvale Coal Pty Limited

**Date**

3 December 2021

**Version**

v1 Final

**Prepared by**

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3 December 2021

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3 December 2021

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# Executive Summary

Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial Coal Company Limited (Centennial), operates Western Coal Services (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1.1). WCS was granted State significant development (SSD) consent SSD-5579 on 4 April 2014 by the NSW Planning Assessment Commission, as delegate for the then NSW Minister of Planning and Infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), to change the existing water management system at Springvale Coal Services Site (SCSS) to facilitate the transfer of water between WCS and other operations, and to improve the quality of water discharged to Wangcol Creek.

This report provides an assessment of construction phase air quality impacts arising from the proposed modification. Air quality impacts during the ongoing operation of SCSS and other components of WCS are not anticipated to change as a result of the proposed modification. Consequently, an assessment of operational air quality impacts has been excluded from this report. This assessment follows the *Guidance on the Assessment of Dust from Demolition and Construction* published by the Institute of Air Quality Management in the United Kingdom (IAQM 2014).

In the IAQM (2014) assessment procedure, activities at construction sites are divided into four types: demolition, earthworks, construction and track-out. A risk-based study method was used to consider amenity impacts due to soiling by dust deposition, health effects due to an increase in exposure to dust and harm to ecological receptors. The IAQM (2014) approach aims to identify risks and to recommend appropriate mitigation measures.

In relation to dust soiling impacts and human health, the risk was determined to be low for all categories. For ecological impacts, the risk was determined to be medium for earthworks and construction and negligible for track-out.

A construction environmental management plan (CEMP) will be produced and include measures to manage dust. Recommended mitigation measures include logging dust complaints, carrying out regular inspections and recording results, providing adequate water supply for dust suppression and ensuring that vehicles entering and leaving sites are covered to prevent escape of materials during transport. The complete list of recommended mitigation measures is provided in Section 3 of this report.

The proposed mitigation measures are considered sufficient to ensure off-site impacts from the construction phase of the proposed modification are effectively managed.

# Table of Contents


Executive Summary ES.1

1 Introduction 1

1.1 Overview 1

1.2 Background 3

1.2.1 Western Coal Services Project 3

1.2.2 Springvale Coal Services Site water management system 3

1.2.3 Springvale Water Treatment Plant 4

1.2.4 McPhillamys Gold Project (SSD-9505) 4

1.3 Proposed modification 6

1.3.1 New SCSS Water Transfer System 6

1.3.2 Transfer of water to McPhillamys Gold Project 6

1.3.3 Transfer of water to MPPS 7

1.3.4 Receipt of water from Angus Place Colliery 7

1.3.5 Redesign of SCSS's water management system 7

2 Construction dust risk assessment 10

2.1 Overview 10

2.2 Step 1 – Screening 13

2.3 Step 2 – Assessment of risk of dust impacts 13

2.3.1 Step 2A – Scale and nature of works 14

2.3.2 Step 2B – Sensitivity of area 14

2.3.3 Step 2C – Definition of risk of impacts 16

2.3.4 Step 3: Recommended mitigation measures 17

2.3.5 Step 4: Significance of risks 17

3 Mitigation measures 18

4 Conclusion 20

5 References 21


## Appendices


Appendix A IAQM criteria A.1

## Tables


| | | |
|---|---|---|
| Table 2.1 | Results of Step 1 | 13 |
| Table 2.2 | Dust emission potential | 14 |
| Table 2.3 | Numbers of human receptors for dust soiling impacts | 15 |
| Table 2.4 | Summary of sensitivity of area to dust soiling impacts | 15 |
| Table 2.5 | Numbers of human receptors for human health impacts | 15 |
| Table 2.6 | Summary of sensitivity of area to human health impacts | 16 |
| Table 2.7 | Summary of sensitivity of area to ecological impacts | 16 |
| Table 2.8 | Summary of risk assessment | 17 |


## Figures


| | | |
|---|---|---|
| Figure 1.1 | Regional context | 2 |
| Figure 1.2 | Local context | 5 |
| Figure 1.3 | Proposed modification elements | 9 |
| Figure 2.1 | Procedure for the assessment of construction dust | 12 |

# 1 Introduction

## 1.1 Overview

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates Western Coal Services (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1.1).

WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine (SSD-5594), Angus Place Colliery (SSD 06_0021) and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Development Consent 08_0223). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (SSD-7592). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

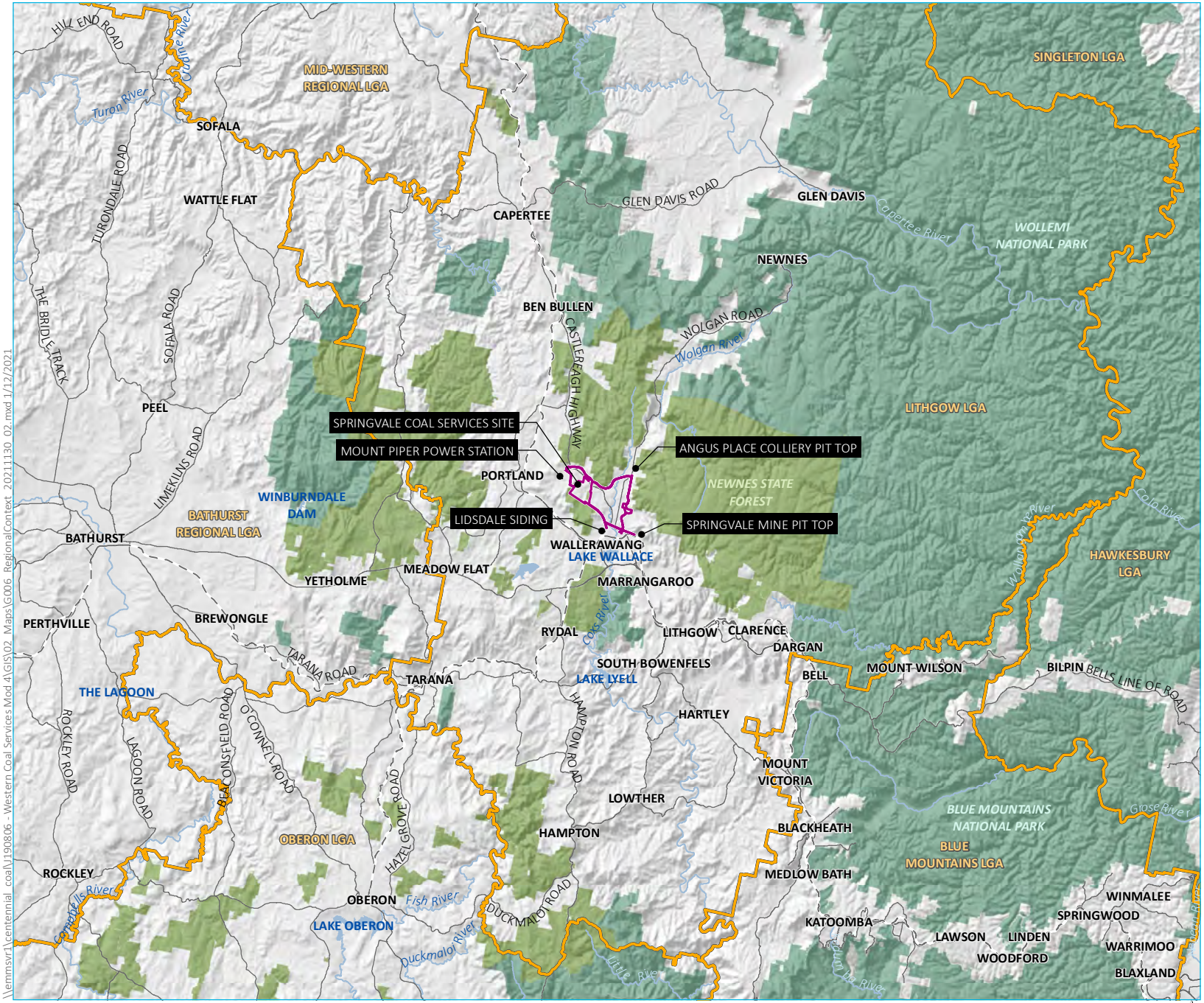
Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at Springvale Coal Services Site (SCSS), including:

- Centennial Angus Place Pty Limited (operators of Angus Place Colliery);
- EnergyAustralia (operators of MPPS); and
- Regis (proponents of McPhillamys Gold Project).

As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region. To facilitate the transfer of water to these operations, as well as the transfer of land back to EnergyAustralia, Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to modify aspects of WCS water management (herein referred to as the proposed modification). The proposed modification will result in a minor increase to the disturbance footprint within, and extent of, the project application area approved under SSD-5579.

EMM Consulting Pty Limited (EMM) has been engaged by Springvale Coal to prepare a modification report for the proposed modification. This report provides an assessment of the dust impacts associated with the construction of the proposed modification. The assessment follows the *Guidance on the Assessment of Dust from Demolition and Construction* published by the Institute of Air Quality Management in the United Kingdom (IAQM 2014).



KEY

- Project application area (SSD-5579)
- Rail line
- Major road
- River
- Named waterbody
- NPWS reserve
- State forest
- Local government area

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2021); Centennial Coal (2021); DFSI (2017); GA (2011); ASGC (2006)

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# Regional context

Western Coal Services Project
Construction Air Quality Assessment
Figure 1.1

EMM creating opportunities

## 1.2 Background

### 1.2.1 Western Coal Services Project

The project application area for WCS is west of the Blue Mountains in the Lithgow LGA (Figure 1.1). Land uses within and surrounding the project application area vary and include industrial, mining, power generation, residential, agricultural and forestry uses. MPPS is immediately west of SCSS, whilst the locality of Blackmans Flat is east of SCSS (Figure 1.1). Pine Dale Coal Mine (currently in care and maintenance) is north of SCSS and sections of Ben Bullen State Forest are within the project application area to the south and north-east of SCSS (Figure 1.1).

WCS operations are spread across a number of sites (Figure 1.2). The main components are:

- Springvale Coal Services Site (SCSS) – a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP;
- Kerosene Vale Stockpile Area (KVSA) – a coal stockpile area approved under SSD-5579, but managed day-to-day by Angus Place Colliery;
- an overland conveyor system extending from Springvale Mine's pit top to Mount Piper Power Station (MPPS) via SCSS to Lidsdale Siding;
- Mount Piper Haul Road – extending from Angus Place Colliery's pit top to MPPS;
- Wallerawang Haul Road – extending from Angus Place Colliery's pit top to Wallerawang Power Station;
- Link Haul Road – a private road to be constructed between the Mount Piper Haul Road and SCSS; and
- a residual waste stream pipeline – transferring residual waste material from SWTP to SCSS.

### 1.2.2 Springvale Coal Services Site water management system

The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek (Figure 1.2). Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

The primary objectives of the water management system at SCSS are to:

- provide a secure water supply for coal washing, washdown and dust suppression (including haul roads and coal stockpiles); and
- control the quantity and quality of water discharged into Wangcol Creek via LDP001.

The discharge of untreated groundwater into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted extensively with NSW Environment Protection Authority (EPA) regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek.

### 1.2.3 Springvale Water Treatment Plant

The SWTP (SSD-7592) involves the transfer and treatment of water from existing underground mine dewatering facilities at Springvale Mine and Angus Place Colliery for beneficial reuse at MPPS. It was initiated to improve environmental outcomes for the Coxs River catchment (ie by eliminating mine water discharges at Springvale Mine and Angus Place Colliery).

### 1.2.4 McPhillamys Gold Project (SSD-9505)

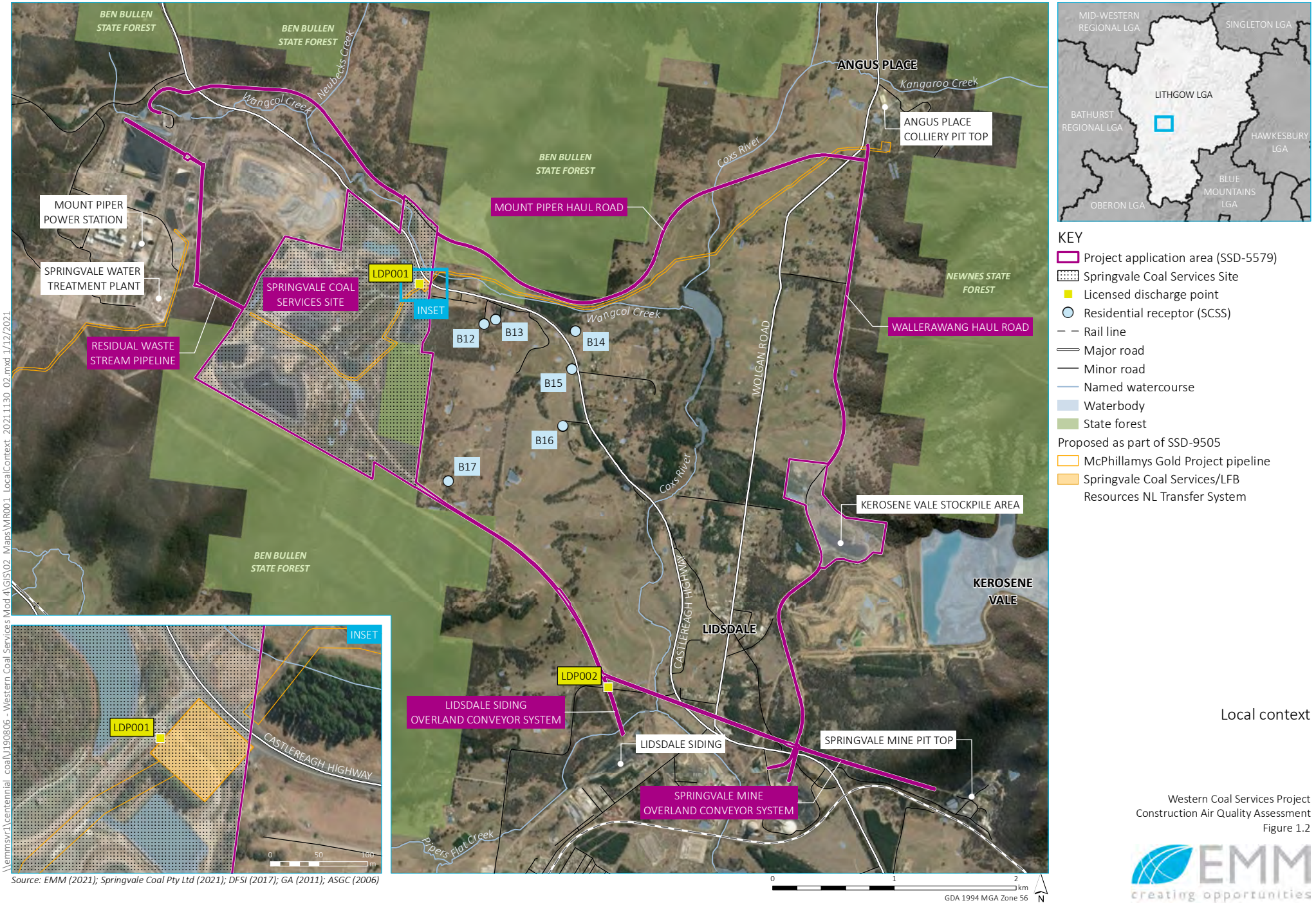
Regis is seeking development consent for the construction and operation of the McPhillamys Gold Project (SSD-9505). This is a proposed greenfield open cut gold mine and associated water supply pipeline in the Central West of NSW. The project comprises two key components:

- the mine site where the ore will be extracted and processed; and
- an associated water pipeline which will enable the supply water from near Lithgow to the mine site.

As part of the project, Regis proposes to construct a water pipeline to transfer water from three existing operations to supply water for the gold mine's operations. The water for the project (if approved and constructed) would be supplied from the following sources:

- untreated mine water currently discharged from SCSS through LDP001 to Wangcol Creek;
- process and blowdown water from MPPS; and
- untreated mine water from Angus Place Colliery.

As part of the development application for the McPhillamys Gold Project, Regis is seeking approval to construct and operate a pumping station and storage tank close to SCSS that will be used to transfer water from SCSS to the water pipeline (Springvale Coal Services/Regis transfer system on Figure 1.3).

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Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)

Local context

Western Coal Services Project
Construction Air Quality Assessment
Figure 1.2

EMM creating opportunities

## 1.3 Proposed modification

Springvale Coal proposes to modify SSD-5579 to allow:

- construction and operation of the SCSS Water Transfer System, consisting of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001;
- transfer of water from the SCSS Water Transfer System:
  - to the SCSS/Regis Transfer System for use at the McPhillamys Gold Mine;
  - to MPPS for treatment and reuse within the MPPS cooling water system;
- receipt of raw water from the Angus Place Water Transfer System for use in the coal preparation plant at SCSS;
- changes to the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and to improve the quality of water discharged to Wangcol Creek;
- an increase in the capacity of the Washery Dam at SCSS; and
- administrative changes to Condition 45 of Schedule 3 of SSD-5579 to align with amendments to the NSW *Mining Act 1992* and NSW Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021 (Mining Amendment Regulation).

The key components of WCS and the proposed modification are shown on Figure 1.2 and Figure 1.3.

The upgrade of the water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will require a minor increase to the project application area.

It is not proposed to modify the approved handling, processing or transport operations, the limits on these activities, or the project life.

### 1.3.1 New SCSS Water Transfer System

The SCSS Water Transfer System will include the construction of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001. This infrastructure will be constructed on disturbed land adjacent to the proposed Springvale Coal Services/Regis transfer system (Figure 1.3).

### 1.3.2 Transfer of water to McPhillamys Gold Project

The SCSS Water Transfer System will be used to transfer up to 15.6 ML/day of water from SCSS to the proposed Springvale Coal Services/Regis transfer system (Figure 1.3). The transfer systems will facilitate the transfer of water to the proposed water pipeline (Figure 1.3) and will enable the supply of water from SCSS to the McPhillamys Gold Project.

As well as supplying water to the McPhillamys Gold Mine, the proposed modification will reduce, and potentially at times remove, the need to discharge poor quality water from LDP001 to Wangcol Creek. If the gold mine and associated water transfer system are not approved/do not proceed, discharges from LDP001 to Wangcol Creek will continue.

### 1.3.3 Transfer of water to MPPS

It is proposed to transfer up to 2.6 ML/day of water from the SCSS Water Transfer System at SCSS to MPPS for treatment and reuse. This water is currently discharged through LDP001. This will generally reduce the volume of water discharged through LDP001 and provide spare capacity to discharge water from LDP001 under non-routine water management conditions.

Water transferred to MPPS will be temporarily stored within Pond D at MPPS prior to treatment within MPPS's brine concentrators (Figure 1.3). Permeate from the water treatment process will be transferred to MPPS's cooling water system with brine used to condition ash prior to emplacement within MPPS's ash emplacement areas.

The temporary storage of water within Pond D, treatment of water within MPPS's brine concentrators, transfer of permeate to MPPS's cooling water system and management of brine will require a modification the development consent for SWTP (SSD-7592).

This aspect of the proposed modification is subject to the successful conclusion of ongoing commercial discussions between Springvale Coal and EnergyAustralia.

### 1.3.4 Receipt of water from Angus Place Colliery

An offtake from the Angus Place Colliery Raw Water Pipeline will be constructed. Once constructed, the offtake will allow up to 2.6 ML/day of water from Angus Place Colliery to be used to supplement the washery water supply at SCSS.

Water from Angus Place Colliery is of a higher quality than water currently used on-site at SCSS. The receipt of water from Angus Place Colliery and its use in coal handling and preparation activities at SCSS is expected to improve the quality of water managed within the reject emplacement area (REA) and discharged from LDP001, as this water will be blended with water currently used on-site.

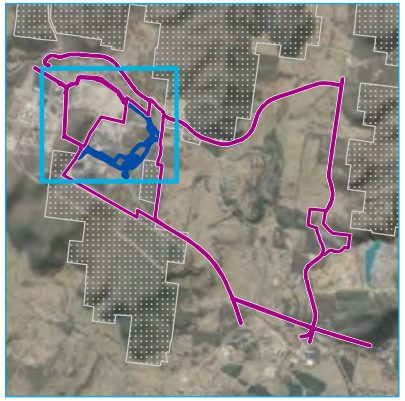
### 1.3.5 Redesign of SCSS's water management system

The proposed modifications to the water management system at SCSS are:

- Transfer of approximately 50.6 ha of the existing surface water catchment at SCSS to EnergyAustralia as part of the transfer of land from Springvale Coal back to EnergyAustralia. As a result, management of SHG1, H Pit East, H Pit West and Council Pit will be transferred to EnergyAustralia.
- Construction and operation of the Huon Clean Water Pond, which will intercept the clean water catchment of Huon Gully upstream of SHG1 and transfer it to Wangcol Creek via the Lamberts Gully clean water diversion.
- Construction and operation of two new dirty water ponds:
    - DWP-A will be constructed downslope and to the north of the Huon Clean Water Pond to capture dirty water from the coal conveyor corridor and prevent runoff flowing north onto EnergyAustralia's land.
    - DWP-B will be constructed upstream of Cooks Dam and will provide additional dirty water storage capacity at SCSS.
- Extension of the dewatering pipeline from the Transfer Tower 3 or TT03 sump to DWP-A.

- Construction and operation of a bi-directional pipeline between SCSS and MPPS. The pipeline will facilitate the proposed transfer of water to MPPS.
- Construction and operation of an offtake from the Angus Place Colliery Raw Water Pipeline to facilitate the proposed transfer of water from Angus Place Colliery to SCSS.
- Construction and operation of associated pumping, pipelines and drainage channels.
- Increase the capacity of the Washery Dam to 6.1 ML. The material excavated from the Washery Dam during desilting and maintenance works will be utilised on-site at SCSS as part of ongoing rehabilitation works.

Key elements of the proposed modification are labelled on Figure 1.3.



KEY

- Proposed project application area
- Construction envelope
- Springvale Coal Services Site
- Licensed discharge point
- Mt Piper Power Station Pond D
- Surface water catchment to be managed by Energy Australia

Proposed modification elements

- Bidirectional pipeline
- Offtake from Angus Place Raw Water Pipeline Project
- General flow direction
- Huon Clean Water Pond
- DWP-A
- DWP-B

Proposed modification area

- Regis and EnergyAustralia water transfer system area
- DWP-B area
- Angus Place water offtake and transfer system area
- DWP-A and clean water diversion area

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline easement
- Springvale Coal Services Site/Regis Transfer System

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- State forest

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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); GA (2011)*

0 250 500 m

GDA 1994 MGA Zone 56

N

# Proposed modification elements

Western Coal Services Project
Construction Air Quality Assessment
Figure 1.3

EMM creating opportunities

# 2 Construction dust risk assessment

## 2.1 Overview

This section of the report provides an assessment of the dust impacts associated with the construction of the project. The assessment follows the *Guidance on the Assessment of Dust from Demolition and Construction* published by IAQM (2014).

The main air pollution and amenity issues[1] at construction sites are:

- annoyance due to dust deposition (soiling of surfaces) and visible dust plumes;
- elevated particulate matter less than 10 micrometres (µm) in aerodynamic diameter ($PM_{10}$) concentrations due to dust-generating activities; and
- particulate matter exhaust emissions from diesel-powered construction equipment[2].

Very high levels of soiling can also damage plants and affect the diversity of ecosystems.

Dust emissions can occur during the preparation of the land (eg demolition and earthmoving) and during construction itself. They can vary substantially from day to day depending on the level of activity, the specific operations being undertaken, and the weather conditions.

The risk of dust impacts from a construction site is related to the following:

- the nature of the activities being undertaken;
- the duration of the activities;
- the size of the site;
- the meteorological conditions (wind speed, direction and rainfall), as adverse impacts are more likely to occur downwind of the site and during drier periods;
- the proximity of receptors to the activities;
- the sensitivity of the receptors to dust;
- the adequacy of the mitigation measures applied to reduce or eliminate dust.

Any effects of construction on air pollution and amenity would generally be temporary and relatively short-lived. Moreover, mitigation should be straightforward, as most of the necessary measures are routinely employed as 'good practice' on construction sites. The IAQM (2014) approach aims to identify risks and to recommend appropriate mitigation measures.

1 There are other potential impacts, such as the release of heavy metals, asbestos fibres or other pollutants during the demolition of certain buildings. These issues need to be considered on a site by site basis (IAQM 2014).

2 Exhaust emissions from on-site plant and site traffic are unlikely to have a significant impact on local air quality, and in the majority of cases they will not need to be quantitatively assessed (IAQM 2014).

In the IAQM (2014) assessment procedure, activities at construction sites are divided into four types:

1. Demolition, which is any activity that involves the removal of existing structures.

2. Earthworks, which covers the processes of soil stripping, ground levelling, excavation and landscaping. Earthworks will primarily involve excavating material, haulage, tipping and stockpiling.

3. Construction, which is any activity that involves the provision of new structures, modification or refurbishment.

4. Track-out, which involves the transport of dust and dirt by vehicles from the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

The assessment method considers three separate dust impacts:

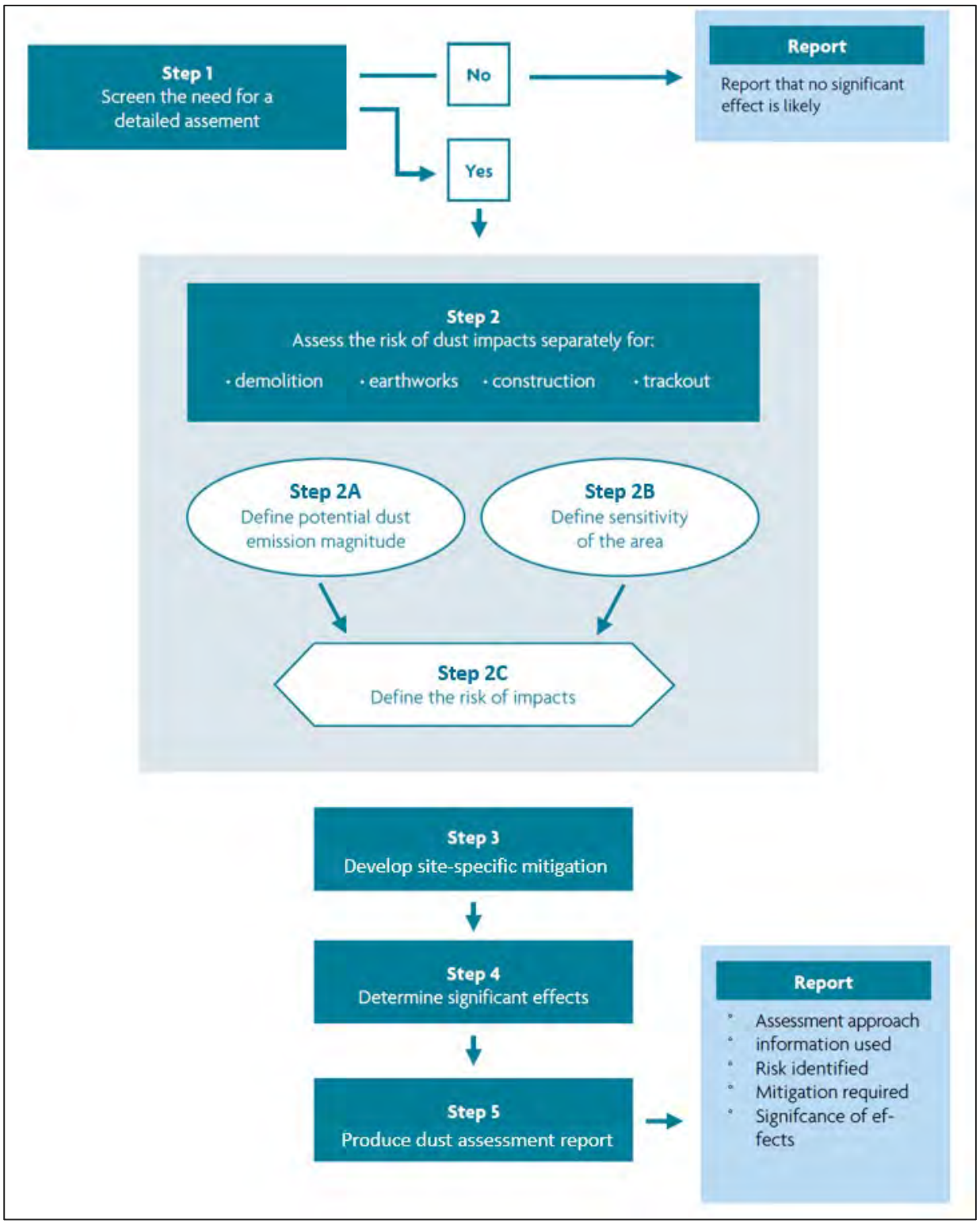
- annoyance due to dust soiling;
- the risk of health effects due to an increase in exposure to $PM_{10}$; and
- harm to ecological receptors.

The procedure for assessing risk is shown in Figure 2.1. Professional judgement is required in some cases, and where justification cannot be given, a precautionary approach is adopted. The assessment is used to define appropriate mitigation measures to ensure that there will be no significant residual effects.

The key steps in the procedure are as follows:

- Step 1 – a screening requirement for a detailed assessment based on the proximity of surrounding receptors;
- Step 2 – an assessment of the risk of dust impacts and the sensitivity of surrounding receptors;
- Step 3 – a determination of site-specific mitigation;
- Step 4 – consideration of residual effects and significance; and
- Step 5 – an assessment report (this document).

The following sections document the construction dust assessment for the proposed modification and recommended mitigation measures are addressed in Chapter 3.




Source: IAQM (2014)

**Figure 2.1 Procedure for the assessment of construction dust**

## 2.2 Step 1 – Screening

The IAQM (2014) guidance specifies that a detailed construction dust assessment should be undertaken if:

- a human receptor[3] is within 350 m of the site boundary;
- an ecological receptor[4] is within 50 m of the site boundary; or
- a human/ecological receptor is within 50 m of a route used by construction vehicles up to 500 m from a site entrance.

The construction envelope required to facilitate construction activities associated with the proposed modification is shown in Figure 1.3.

The results of Step 1 are summarised in Table 2.1. As there were human receptors within 350 m of the boundary of the construction envelope and ecological receptors within 50 m of the boundary, the proposed construction activities triggered the requirement for a detailed assessment of construction impacts.

**Table 2.1 Results of Step 1**

| Human receptors | | Ecological receptors | | Detailed assessment required |
|---|---|---|---|---|
| **Within 350 m of site boundary** | **Within 50 m of route used by construction vehicles** | **Within 50 m of site boundary** | **Within 50 m of route used by construction vehicles** | |
| Yes | No | Yes | Yes | Yes |

It is noted that the closest human receptors are workers at MPPS. B4, which is referenced in SSD-5579, was a dwelling owned by Centennial that has been demolished. The closest residence is more than 500 m from the construction envelope.

## 2.3 Step 2 – Assessment of risk of dust impacts

The IAQM (2014) guidance dictates that the risk category for dust impacts from construction activities should be allocated based on the following:

- the scale and nature of works (Step 2A); and
- the sensitivity of the area to dust impacts (Step 2B).

These factors are then combined to determine the risk of impacts from the construction activities (Step 2C). The risk rating process is addressed in the following sections.

[3] A 'human receptor' refers to any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to $PM_{10}$ over a time period relevant to air quality standards and goals. In terms of annoyance effects, this will most commonly relate to dwellings, but may also refer to other premises such as museums, galleries, vehicle showrooms, food manufacturers, electronics manufacturers, amenity areas and horticultural operations.

[4] An 'ecological receptor' refers to any sensitive habitat affected by dust soiling. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna (eg on foraging habitats).

### 2.3.1 Step 2A – Scale and nature of works

The scale and nature of demolition, earthworks, construction and track-out were determined. The IAQM (2014) guidance prescribes a range of criteria that classify the magnitude of each activity as either large, medium or small (Table A.1 of Appendix A). The construction activities associated with the proposed modification were reviewed in order to allocate a potential dust emission magnitude in accordance with the guidance and the findings are summarised in Table 2.2.

**Table 2.2 Dust emission potential**

| Activity | Project details | Potential dust emission magnitude |
|---|---|---|
| Demolition | No demolition required. | Nil |
| Earthworks | It is anticipated that there will be 20,000–100,000 tonnes (t) of material moved through cut and fill activities.<br>There will be less than five pieces of earth-moving equipment operating at any one time. | Medium |
| Construction | This will include construction of a 500 kL tank and small pump stations that may require on-site batching. | Medium |
| Track-out | The main works will be localised and material haul routes will not use public roads. It is anticipated that there will be less than 10 heavy vehicles transporting materials in any one day. | Small |

### 2.3.2 Step 2B – Sensitivity of area

In determining the sensitivity of the area to dust impacts, soiling, human health and ecological receptors are treated separately.

#### i Dust soiling effects on people and property

For dust soiling impacts, the sensitivity of the local area is defined based on the sensitivity of receptors and their number (Table A.2 of Appendix A). For earthworks, construction and track-out, the receptors within 350 m of the construction envelope were allocated a 'high' sensitivity rating for dust soiling.

The numbers of buildings in each distance band were estimated using Google Earth and receptor information provided by Springvale Coal. The exact counting of the number of human receptors is not required by the guidance. Instead, it is recommended that judgement is used to determine the approximate number of buildings within each distance band.

For buildings which are not dwellings professional judgement should be used to determine the number of human receptors. For this assessment, the following numbers of human receptors were assumed:

- workplace = 50

The 'workplace' category refers to MPPS, which is adjacent to the construction envelope. A value of 50 has been selected to represent MPPS as the exact number of staff working at any one time is not known.

The resulting numbers of human receptors and IAQM distance bands are shown in Table 2.3.

### Table 2.3 Numbers of human receptors for dust soiling impacts

| | Number of human receptors by distance from disturbance footprint or routes for construction traffic | | | |
|---|---|---|---|---|
| **Activity** | **<20 m** | **20-50 m** | **50-100 m** | **100-350 m** |
| Earthworks, construction, track-out | 0 | 0 | 50 | 0 |

Based on the receptor sensitivity and the numbers of receptors within certain distances from construction activities, the sensitivity to dust soiling effects for earthworks and construction was determined to be 'low' for earthworks, construction and track-out.

### Table 2.4 Summary of sensitivity of area to dust soiling impacts

| **Activity** | **Sensitivity of local area to dust soiling impacts** |
|---|---|
| Demolition | Nil |
| Earthworks | Low |
| Construction | Low |
| Track-out | Low |

#### ii Human health impacts

The IAQM (2014) guidance defines the approach to categorise the sensitivity of the local area to human health impacts, taking into account the sensitivity of receptors in the area, the proximity and number of receptors and annual mean concentrations of $PM_{10}$ (Table A.3 of Appendix A).

For earthworks, construction and track-out activities, the receptor in the vicinity of the construction activities associated with the proposed modification was allocated a 'medium' sensitivity rating given that it is a workplace.

Table 2.5 shows the IAQM distance bands for construction and the receptors for human health impacts. For human health impacts the 200 m distance is included.

### Table 2.5 Numbers of human receptors for human health impacts

| | Number of human receptors by distance from construction footprint boundary or routes for construction traffic | | | | |
|---|---|---|---|---|---|
| **Activity** | **<20 m** | **20-50 m** | **50-100 m** | **100-200 m** | **200-350 m** |
| Earthworks, construction, track-out | 0 | 0 | 50 | 0 | 0 |

Springvale Coal operates a Tapered Element Oscillating Microbalance (TEOM) which collects $PM_{10}$ concentrations on a daily basis. The TEOM is within approximately 5 m of the construction envelope. Data from the TEOM between 2016 and 2020 has been analysed for the purposes of this assessment. The annual average $PM_{10}$ concentration at the TEOM, based on a five-year period from 2016 to 2020 was 14.2 µg/m$^3$. It is noted that the annual average $PM_{10}$ concentration in 2019 was significantly higher than in previous years due to the NSW bushfires which occurred towards the end of the year. Adopting the background value of 14.2 µg/m$^3$ for the site, $PM_{10}$ concentrations would be in the <15 µg/m$^3$ IAQM category.

Based on these assumptions, the sensitivity of the local area to human health impacts for earthworks and construction was determined to be 'low' for all categories (Table 2.6).

**Table 2.6 Summary of sensitivity of area to human health impacts**

| Activity | Sensitivity of local area to human health impacts |
|---|---|
| Demolition | Nil |
| Earthworks | Low |
| Construction | Low |
| Track-out | Low |

#### iii Ecological impacts

For ecological impacts, the sensitivity of the local area is defined based on the sensitivity of locations and their distance from the proposed construction activities (Table A.4 of Appendix A).

Details on specific sensitive flora and fauna within 50 m of the construction envelope was not available. It is understood; however, that Ben Bullen State Forest contains several sensitive ecological communities and threatened flora and fauna species (OEH 2019; Cumberland Ecology 2012).

It was therefore conservatively assumed that, for all construction activities, there would be ecological receptors within 20 m of the construction envelope, and that their sensitivity was 'medium' (ie locations with an important species or national designation, and where sensitivity to dust is uncertain or unknown).

As a result, for all construction activities, the sensitivity of the local area to ecological impacts was determined to be 'medium' (Table 2.7).

**Table 2.7 Summary of sensitivity of area to ecological impacts**

| Activity | Sensitivity of local area to ecological impacts |
|---|---|
| Demolition | Nil |
| Earthworks | Medium |
| Construction | Medium |
| Track-out | Medium |

### 2.3.3 Step 2C – Definition of risk of impacts

To determine the risk of impacts with no mitigation applied, the IAQM (2014) guidance requires that the dust magnitude rating is combined with the sensitivity of the local area for each of the four activity categories (ie demolition, earthworks, construction and track-out). Using the tables in the guidance (Table A.5 of Appendix A), risk ratings for each type of activity were allocated and are presented in Table 2.8.

For earthworks and construction, the unmitigated risk was determined to be low for dust soiling and human health and medium for ecological impacts. For track out, the unmitigated risk was determined to be negligible for all categories. The unmitigated risk ratings in Table 2.8 are useful to help focus and target mitigation measures (Step 3), such that these unmitigated risks are reduced to 'not significant'.

**Table 2.8 Summary of risk assessment**

| Activity | Step 2A: Potential for dust emissions | Step 2B: Sensitivity of area | | | Step 2C: Risk of dust impacts | | |
|---|---|---|---|---|---|---|---|
| | | Dust soiling | Human health | Ecological | Dust soiling | Human health | Ecological |
| Demolition | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| Earthworks | Medium | Low | Low | Medium | Low risk | Low risk | Medium risk |
| Construction | Medium | Low | Low | Medium | Low risk | Low risk | Medium risk |
| Track-out | Small | Low | Low | Medium | Negligible | Negligible | Negligible |

### 2.3.4 Step 3: Recommended mitigation measures

The dust impact risk allocations in Step 2C relate to unmitigated construction dust emissions. Based on the risk of dust impacts identified in Table 2.8, Step 3 involved identifying mitigation measures for each of the three potential activities in Step 2 to further reduce the residual risk for impacts on the surrounding area. The proposed modification elements will be constructed according to conventional methods and will be guided by a construction environmental management plan (CEMP) to effectively manage site environmental impacts. The measures recommended for inclusion in the CEMP are summarised in Chapter 3.

### 2.3.5 Step 4: Significance of risks

Once the appropriate dust mitigation measures have been identified in Step 3, the next step in the IAQM (2014) procedure is to determine whether there are residual significant effects arising from construction. For almost all construction activities, the aim should be to prevent significant effects on receptors through effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant' (IAQM 2014).

Given the distance between the construction envelope and most receptors, construction dust is unlikely to represent a serious ongoing problem at SCSS, assuming the recommended mitigation measures outlined in Chapter 3 are implemented. Therefore, the residual risk for impacts on the surrounding area following mitigation will be 'not significant'.

# 3 Mitigation measures

The proposed modification will be constructed according to conventional methods and will be guided by a CEMP to effectively manage off-site environmental impacts. The CEMP may include (but will not be limited to) the recommended mitigation measures listed below. These measures are routinely employed as 'good practice' on construction sites.

The following mitigation measures are recommended:

- prior to commencement of construction activities, develop appropriate communications to notify nearby residences of the proposed construction works (duration, types of works, etc) and provide relevant contact details for environmental complaints reporting;
- the sites complaints register will be maintained and published monthly on the Centennial website. Details of complaints will be recorded including where and when a complaint is received and the details of the response actions to the complaint;
- record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation in the logbook;
- carry out regular site inspections and record inspection results;
- keep site fencing and barriers clean using wet methods (such as through application of sprays), as required;
- remove materials that have a potential to produce dust from the site as soon as possible, unless being re-used on the site;
- cover, seed or fence long term stockpiles (if applicable) to prevent wind whipping;
- ensure vehicles switch off engines when stationary where practicable;
- impose a maximum-speed limit of 20 km/h on all internal roads and work areas during construction;
- deploy water carts to ensure that exposed areas and topsoils/subsoil are kept moist;
- provide an adequate water supply on the construction site for effective dust/particulate matter suppression/mitigation;
- modify working practices by limiting clearing, stripping and spoil handling during periods of adverse weather (hot, dry and windy conditions) and when dust is seen leaving the site;
- limit the extent of clearing of vegetation and topsoil to the designated footprint required for construction and appropriate staging of any clearing;
- minimise drop heights from loading or handling equipment;
- re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- avoid scabbling (roughening of concrete surfaces) where possible;

- ensure that sand and other aggregates are stored in bunded areas and are not allowed to dry out unless this is required for a particular process, in which case, ensure that appropriate additional control measures are in place;
- ensure that bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with emission control systems to prevent escape of materials and overfilling during delivery;
- for smaller supplies of fine powder materials, ensure that bags are sealed after use and stored appropriately to prevent dust;
- use water-assisted dust sweeper(s), to remove, as necessary, any material tracked out of the site;
- avoid dry sweeping of large areas;
- ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- trips and trip distances should be controlled and reduced where possible, for example by coordinating delivery and removal of materials to avoid unnecessary trips;
- inspect on-site haul routes for integrity and repair the surface where needed as soon as possible - haul route inspections should be recorded in a site log book; and
- establish a laydown area for the delivery and storage of plant and equipment.

Visual monitoring by construction personnel will represent an effective means of dust monitoring during construction. Visual monitoring should comprise of the following:

- Undertaking daily on-site and off-site inspections, where receptors are nearby, to monitor dust. The inspection results should be recorded in a specific log. Inspection should include regular dust soiling checks of surfaces such as street furniture and cars.
- At the commencement of each day's activities, the local meteorological forecast should be reviewed, including the timing of notable increases in wind speed and/or temperature. Appropriate increased intensity or additional mitigation measures should be planned for the day based on this forecast review. The likely meteorological conditions and implications for dust emissions and impacts should be discussed at the morning toolbox meeting.
- Increasing the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. Should notable visual dust emissions be observed leaving the site boundary, increased intensity or additional mitigation measures should be deployed.

# 4 Conclusion

This assessment followed the *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM 2014). A risk-based methodology was used to consider amenity impacts due to dust soiling, health effects due to an increase in exposure to $PM_{10}$ and harm to ecological receptors.

For earthworks and construction, the unmitigated risk was determined to be low for dust soiling and human health and medium for ecological impacts. For track out, the unmitigated risk was determined to be negligible for all categories.

Assuming recommended mitigation measures are implemented for the construction works, the residual risk for impacts on the surrounding area following mitigation will be 'not significant'.

Recommended mitigation measures include logging dust complaints, carrying out regular inspections and recording results, providing adequate water supply for dust suppression and ensuring that vehicles entering and leaving sites are covered to prevent escape of materials during transport. These measures are routinely employed as 'good practice' on construction sites and should be included in the CEMP for the proposed construction works.

# 5 References

Cumberland Ecology 2012, *Coalpac Consolidation Project: Ecological Impact Assessment*, prepared by Cumberland Ecology for Hansen Bailey on behalf of Coalpac, March 2012.

IAQM 2014, *Guidance on the assessment of dust from demolition and construction*, Version 1.1, Institute of Air Quality Management, London, www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.

NSW Office of Environment and Heritage (OEH) 2019, *Clandulla Geebung profile* website, accessed May 2021.

Appendix A

# IAQM criteria

The assessment criteria in the IAQM guidance are summarised in the following tables.

## Table A.1 Site categories (scale of works)

| Type of activity | Site category definitions | | |
|---|---|---|---|
| | **Large** | **Medium** | **Small** |
| Demolition | Building volume >50,000 $m^3$, potentially dusty construction material (eg concrete), on-site crushing and screening, demolition activities >20 m above ground level. | Building volume 20,000–50,000$m^3$, potentially dusty construction material, demolition activities 10-20 m above ground level. | Building volume <20,000 $m^3$, construction material with low potential for dust release (eg metal cladding, timber), demolition activities <10 m above ground and during wetter months. |
| Earthworks | Site area >10,000 $m^2$, potentially dusty soil type (eg clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth-moving vehicles active at any one time, formation of bunds>8 m in height, total material moved >100,000 tonnes. | Site area 2,500-10,000 $m^2$, moderately dusty soil type (eg silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4-8 m in height, total material moved 20,000-100,000 tonnes. | Site area <2,500 $m^2$, soil type with large grain size (eg sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months. |
| Construction | Total building volume >100,000 $m^3$, piling, on site concrete batching; sandblasting | Building volume 25,000-100,000 $m^3$, potentially dusty construction material (eg concrete), piling, on site concrete batching. | Total building volume <25,000 $m^3$, construction material with low potential for dust release (eg metal cladding or timber). |
| Track-out | >50 HDV (>3.5t) OUTWARD movements in any one day, potentially dusty surface material (eg high clay content), unpaved road length >100 m. | 10-50 HDV (>3.5t) OUTWARD movements in any one day, moderately dusty surface material (eg high clay content), unpaved road length 50–100 m. | <10 HDV (>3.5t) OUTWARD movements in any one day, surface material with low potential for dust release, unpaved road length <50 m. |

## Table A.2 Sensitivity of area to dust soiling impacts

| Receptor sensitivity | Number of receptors | Distance from source (m) | | | |
|---|---|---|---|---|---|
| | | **<20** | **<50** | **<100** | **<350** |
| High | >100 | High | High | Medium | Low |
| | 10-100 | High | Medium | Low | Low |
| | 1-10 | Medium | Low | Low | Low |
| Medium | >1 | Medium | Low | Low | Low |
| Low | >1 | Low | Low | Low | Low |

## Table A.3 Sensitivity of area to human health impacts

| Receptor sensitivity | Annual mean $PM_{10}$ concentration | Number of receptors | Distance from the source (m) | | | | |
|---|---|---|---|---|---|---|---|
| | | | <20 | <50 | <100 | <200 | <350 |
| High | >20 µg/m³ | >100 | High | High | High | Medium | Low |
| | | 10-100 | High | High | Medium | Low | Low |
| | | 1-10 | High | Medium | Low | Low | Low |
| | 17.5 - 20 µg/m³ | >100 | High | High | Medium | Low | Low |
| | | 10-100 | High | Medium | Low | Low | Low |
| | | 1-10 | High | Medium | Low | Low | Low |
| | 15 – 17.5 µg/m³ | >100 | High | Medium | Low | Low | Low |
| | | 10-100 | High | Medium | Low | Low | Low |
| | | 1-10 | Medium | Low | Low | Low | Low |
| | <15 µg/m³ | >100 | Medium | Low | Low | Low | Low |
| | | 10-100 | Low | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low | Low |
| Medium | >20 µg/m³ | >10 | High | Medium | Low | Low | Low |
| | | 1-10 | Medium | Low | Low | Low | Low |
| | 17.5 - 20 µg/m³ | >10 | Medium | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low | Low |
| | 15 – 17.5 µg/m³ | >10 | Low | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low | Low |
| | <15 µg/m³ | >10 | Low | Low | Low | Low | Low |
| | | 1-10 | Low | Low | Low | Low | Low |
| Low | - | >1 | Low | Low | Low | Low | Low |

## Table A.4 Sensitivity of area to ecological impacts

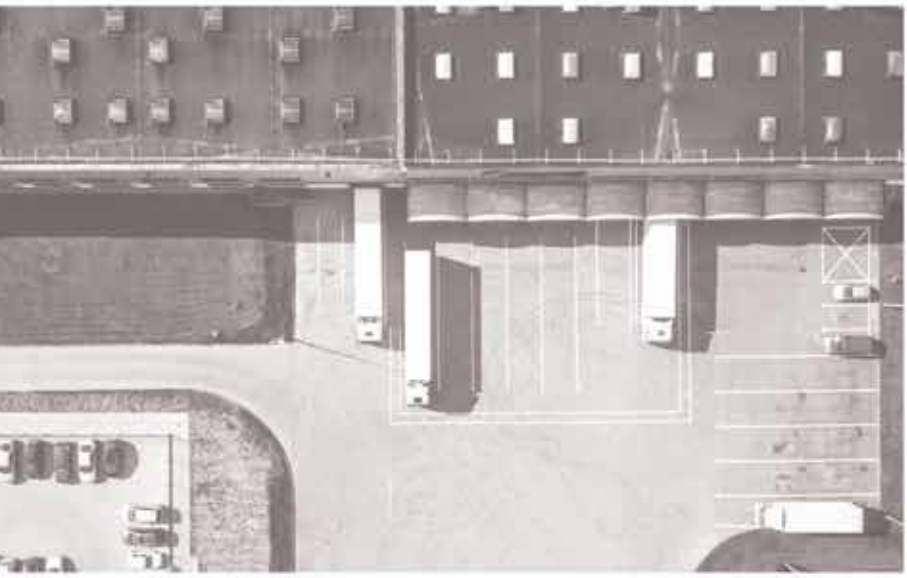
| Receptor sensitivity | Distance from source (m) | |
|---|---|---|
| | <20 | 20-50 |
| High | High | Medium |
| Medium | Medium | Low |
| Low | Low | Low |

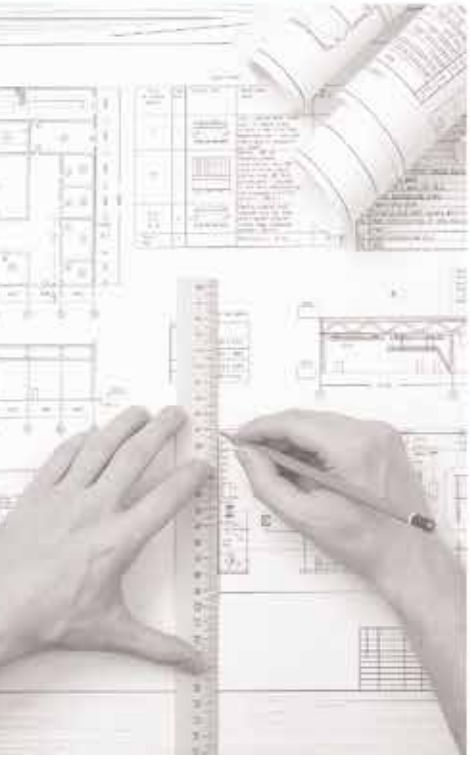
## Table A.5 Risk of dust impacts

| Type of activity | Sensitivity of area | Dust emission potential | | |
|---|---|---|---|---|
| | | **Large** | **Medium** | **Small** |
| Demolition | High | High Risk | Medium Risk | Medium Risk |
| | Medium | High Risk | Medium Risk | Low Risk |
| | Low | Medium Risk | Low Risk | Negligible |
| Earthworks | High | High Risk | Medium Risk | Low Risk |
| | Medium | Medium Risk | Medium Risk | Low Risk |
| | Low | Low Risk | Low Risk | Negligible |
| Construction | High | High Risk | Medium Risk | Low Risk |
| | Medium | Medium Risk | Medium Risk | Low Risk |
| | Low | Low Risk | Low Risk | Negligible |
| Track-out | High | High Risk | Medium Risk | Low Risk |
| | Medium | Medium Risk | Low Risk | Negligible |
| | Low | Low Risk | Low Risk | Negligible |

# Appendix D

## Aboriginal cultural heritage assessment





# ABORIGINAL HERITAGE IMPACT ASSESSMENT

## Western Coal Services MOD4, Springvale Coal Services Site

PR148221
5
7 September 2021

rpsgroup.com

## Document status

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## Approval for issue

Ben Slack 7 September 2021

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# Contents

**EXECUTIVE SUMMARY** ..... **1**

**1 INTRODUCTION** ..... **2**
1.1 Background ..... 2
1.1.1 Western Coal Services Project ..... 2
1.1.2 Springvale Coal Services Site water management system ..... 3
1.1.3 Springvale Water Treatment Plant ..... 3
1.2 Proposed Modification ..... 3
1.2.1 New SCSS Water Transfer System ..... 4
1.2.2 Transfer of water to MPPS ..... 4
1.2.3 Receipt of water from Angus Place Colliery ..... 4
1.2.4 Redesign of SCSS's water management system ..... 4
1.3 Project Area ..... 7
1.4 Project Description ..... 7
1.5 Information and Privacy ..... 7
1.5.1 Restricted Information ..... 7
1.5.2 Confidentiality ..... 7
1.5.3 Copyright ..... 7
1.6 Authorship and Acknowledgements ..... 7

**2 LEGISLATIVE CONTEXT** ..... **9**
2.1 National Parks and Wildlife Act 1974 ..... 9
2.1.1 Notification of Aboriginal Objects ..... 9
2.2 National Parks and Wildlife Regulation 2019 ..... 9
2.3 Due Diligence and Codes of Practice ..... 10
2.3.1 Due Diligence Code of Practice for the Protection of Aboriginal Objects New South Wales (DECCW 2010) ..... 10
2.3.2 NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects (Minerals Council 2010) ..... 10

**3 ABORIGINAL COMMUNITY CONSULTATION** ..... **11**
3.1 Aboriginal Cultural Heritage Consultation Requirements ..... 11
3.1.1 Stage 1 – Notification of project and registration of interest ..... 11
3.1.2 Stage 2- Presentation of information about the proposed project ..... 11
3.1.3 Stage 3- Gathering information about cultural significance ..... 11
3.1.4 Stage 4- Review of draft cultural heritage assessment report ..... 11
3.2 Consultation ..... 11

**4 ENVIRONMENTAL CONTEXT** ..... **13**
4.1 Geology and Soils ..... 13
4.2 Topography and Hydrology ..... 13
4.3 Flora and Fauna ..... 14
4.4 Summary ..... 14

**5 ARCHAEOLOGICAL CONTEXT** ..... **15**
5.1 Aboriginal Heritage Information Management System (AHIMS) ..... 15
5.2 Literature Review ..... 17
5.3 Gap Analysis ..... 18
5.4 Summary of the Aboriginal Heritage Context ..... 18

**6 ABORIGINAL HERITAGE SURVEY AND FIELD RESULTS** ..... **20**
6.1 Survey Methodology ..... 20
6.2 Survey and Field Results 2020 ..... 20
6.2.1 Summary of Aboriginal Sites Identified During 2020 Survey ..... 21
6.3 Survey and Field Results 2021 ..... 21

6.3.1 Summary of Aboriginal Sites Identified During 2021 Survey....24
6.3.2 Cultural and Scientific Rankings of Aboriginal Sites....24
6.4 Previous Impacts....27
6.5 Proposed Activity....27
6.6 Impact Assessment....27
**7 CONCLUSIONS AND RECOMMENDATIONS....28**
**8 REFERENCES....29**

## Tables

Table 1 RAPs who attended the 2020 field survey....12
Table 2 RAPs who attended the 2021 field survey....12
Table 3 Invalid AHIMS sites within the searched coordinates....15
Table 4 Summary of valid AHIMS sites within the searched coordinates....15
Table 5 Valid AHIMS sites within the searched coordinates....16
Table 6 Scientific Rankings....25
Table 7 Impact Assessment of AHIMS sites within the Project Area....27

## Plates

Plate 1: View north-west....20
Plate 2: View south-west....20
Plate 3: Quartz artefacts....20
Plate 4: Context shot of site location....20
Plate 5: Fencing erected around the site....21
Plate 6: Low visibility in the south....21
Plate 7: Exposures revealing quartzite, quartz and sandstone....21
Plate 8: IF1 22
Plate 9: Tuff flake-core in AS1....22
Plate 10: Two broken quartz flakes in AS1....22
Plate 11: Pink quartz flake in AS1....22
Plate 12: Broken white chert blade in AS1....22
Plate 13: Dirt track south of AS1....22
Plate 14: IF3 potential quartz flake....23
Plate 15: IF3 spray painted for later fencing....23
Plate 16: Low visibility in the west....23
Plate 17: Maintenance of revegetated area....23
Plate 18: South-west of IF2, very disturbed land....24
Plate 19: IF2 white chert core....24
Plate 20: High surface visibility....24
Plate 21: Monitoring bore, star pickets, pipe....24

## Figures

Figure 1. 1 WCS Project Regional Context (EMM 2021)....5
Figure 1. 2 Components of the WCS Project and the proposed modification (EMM 2021)....6
Figure 1. 3 Project Area (MOD4 Impact Assessment Area)....8

Figure 2 Areas Previously Surveyed....19
Figure 3 Survey Results....26

# Appendices

Appendix A Extensive AHIMS Search
Appendix B Site Card
Appendix C Consultation Documents

# EXECUTIVE SUMMARY

RPS has been engaged by Springvale Coal Pty Limited (Springvale Coal) to prepare an Aboriginal Cultural Heritage Impact Assessment (ACHIA) for a proposed modification to SSD-5579 for the Western Coal Services Project. The proposed modification seeks approval for upgrades to the on-site water management system at the Springvale Coal Services Site (SCSS) in the Lithgow Local Government Area (LGA).

The proposed modification will involve the construction and operation of a new water transfer system, water transfers to multiple locations, receipt of raw water from Angus Place Water Transfer System and redesign of the on-site water management system.

This heritage impact assessment was conducted in accordance with Centennial's Western Region Aboriginal Cultural Heritage Management Plan (2016) (ACHMP).

This report has been undertaken in accordance with the guiding principles of *the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (2010)* ("Due Diligence Code"), the *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects (Minerals Council 2010)* ("Minerals Due Diligence Code"), the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010).

A field survey of the initial MOD4 impact assessment area was undertaken on 3rd December 2020 which revisited AHIMS sites 45-1-0209, 45-1-210, 45-1-0218, and 45-1-2749 and identified one new surface artefact site. This has been registered on the Aboriginal Heritage Information Management System (AHIMS) database as 45-1-2823. Due to the location of the artefact scatter, the site will require collection under the Centennial Western Region ACHMP to ensure no damage occurs to it during construction works. A second survey was conducted on 25th May 2021 on the updated and expanded MOD4 impact assessment area which identified three isolated finds and one artefact scatter. The sites have been cordoned off and will require collection under the Centennial Western Region ACHMP to ensure no damage occurs during construction works. No other previously registered AHIMS sites will be impacted during the proposed works.

The following recommendations are made:

### Recommendation 1 Salvage of identified sites

The newly identified AHIMS site 45-1-2823, IF1, IF2, IF3 and AS1 should be salvaged under the Centennial Western Region ACHMP prior to works commencing. This would be undertaken under section 6.4.1 of the ACHMP. Prior to this occurring, the sites are to be added to the ACHMP.

### Recommendation 2 Recording Keeping

This Aboriginal Cultural Heritage Impact Assessment (ACHIA) must be kept by Springvale Coal so that it can be presented, if needed, as a defence from prosecution under Section 86(2) of the *National Parks and Wildlife Act 1974*.

### Recommendation 3: Unexpected finds procedure, Aboriginal object/s

If unrecorded Aboriginal object/s are identified in the Project Area (MOD4 impact assessment area) during works, all works in the immediate area must cease and the area cordoned off. The area is to be managed in accordance with the procedures outlined in *Centennial's Western Region ACHMP*.

### Recommendation 4: Unexpected finds procedure, historic

If, during the course of development works, suspected historic cultural heritage material is uncovered, work should cease in that area immediately. Protocols under the *Historic Heritage Management Plan – Western Region* are to be followed and works may recommence only when an appropriate and approved management strategy is implemented.

# 1 INTRODUCTION

RPS has been engaged by Springvale Coal Pty Limited (Springvale Coal) to prepare an Aboriginal Cultural Heritage Impact Assessment (ACHIA) for a proposed modification to SSD-5579 for the Western Coal Services Project. The proposed modification seeks approval for upgrades to the on-site water management system at the Springvale Coal Services Site (SCSS) in the Lithgow Local Government Area (LGA).

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal, a wholly owned subsidiary of Centennial, operates the Western Coal Services Project (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow LGA of New South Wales (NSW) (Figure 1.1).

WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine (SSD-5594), Angus Place Colliery (SSD 06_0021) and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Development Consent 08_0223). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (SSD-7592). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at SCSS, including:

- Centennial Angus Place Pty Limited (operators of Angus Place Colliery);
- EnergyAustralia (operators of MPPS); and
- LFB Resources NL (proponents of McPhillamys Gold Project).

As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region. To facilitate the transfer of water to these operations, as well as the transfer of land back to EnergyAustralia, Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to modify aspects of WCS water management (herein referred to as the proposed modification). The proposed modification will result in a minor increase to the disturbance footprint within, and extent of, the project application area approved under SSD-5579.

## 1.1 Background

### 1.1.1 Western Coal Services Project

The project application area for WCS is west of the Blue Mountains in the Lithgow LGA (Figure 1.1). Land uses within and surrounding the project application area vary and include industrial, mining, power generation, residential, agricultural and forestry uses. MPPS is immediately west of SCSS, whilst the locality of Blackmans Flat is east of SCSS (Figure 1.1). Pine Dale Coal Mine (currently in care and maintenance) is north of SCSS and sections of Ben Bullen State Forest are within the project application area to the south and north-east of SCSS (Figure 1.1).

WCS operations are spread across a number of sites (Figure 1.2). The main components are:

- Springvale Coal Services Site (SCSS) – a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP;
- Kerosene Vale Stockpile Area (KVSA) – a coal stockpile area approved under SSD-5579, but managed day-to-day by Angus Place Colliery;
- an overland conveyor system extending from Springvale Mine's pit top to Mount Piper Power Station (MPPS) via SCSS to Lidsdale Siding;
- Mount Piper Haul Road – extending from Angus Place Colliery's pit top to MPPS;

- Wallerawang Haul Road – extending from Angus Place Colliery's pit top to Wallerawang Power Station;
- Link Haul Road – a private road to be constructed between the Mount Piper Haul Road and SCSS; and
- a residual waste stream pipeline – transferring residual waste material from SWTP to SCSS.

### 1.1.2 Springvale Coal Services Site water management system

The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek. Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

The primary objectives of the water management system at SCSS are to:

- provide a secure water supply for coal washing, washdown and dust suppression (including haul roads and coal stockpiles); and
- control the quantity and quality of water discharged into Wangcol Creek via LDP001.

The discharge of excess raw mine water into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted extensively with NSW Environment Protection Authority (EPA) regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek.

### 1.1.3 Springvale Water Treatment Plant

The SWTP (SSD-7592) involves the transfer and treatment of water from existing underground mine dewatering facilities at Springvale Mine and Angus Place Colliery for beneficial reuse at MPPS. It was initiated to improve environmental outcomes for the Coxs River catchment (ie by eliminating mine water discharges at Springvale Mine and Angus Place Colliery).

## 1.2 Proposed Modification

Springvale Coal proposes to modify SSD-5579 to allow:

- construction and operation of the SCSS Water Transfer System;
- transfer of up to 15.6 ML/day of water from the SCSS Water Transfer System to the proposed Springvale Coal Services/LFB Resources NL transfer system;
- transfer of up to 2.6 ML/day of water from SCSS to MPPS for treatment and reuse within the MPPS cooling water system;
- receipt of raw water from Angus Place Water Transfer System for use in the coal handling and preparation plant at SCSS; and
- redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia.

The key components of WCS and the proposed modification are shown on Figure 1.2.

The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the project application area.

The proposed modification is not seeking to change approved annual coal handling and processing limits under SSD-5579.

### 1.2.1 New SCSS Water Transfer System

The SCSS Water Transfer System will include the construction of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001. This infrastructure will be constructed on disturbed land adjacent to the proposed Springvale Coal Services/LFB Resources NL transfer system.

### 1.2.2 Transfer of water to MPPS

It is proposed to transfer up to 2.6 ML/day of water from the SCSS Water Transfer System at SCSS to MPPS for treatment and reuse. This water is currently discharged through LDP001. This will generally reduce the volume of water discharged through LDP001 and provide spare capacity to discharge water from LDP001 under non-routine water management conditions.

Water transferred to MPPS will be temporarily stored within Pond D at MPPS prior to treatment within MPPS's brine concentrators. Permeate from the water treatment process will be transferred to MPPS's cooling water system with brine used to condition ash prior to emplacement within MPPS's ash emplacement areas.

The temporary storage of water within Pond D, treatment of water within MPPS's brine concentrators, transfer of permeate to MPPS's cooling water system and management of brine will require a modification the development consent for SWTP (SSD-7592).

This aspect of the proposed modification is subject to the successful conclusion of ongoing commercial discussions between Springvale Coal and EnergyAustralia.

### 1.2.3 Receipt of water from Angus Place Colliery

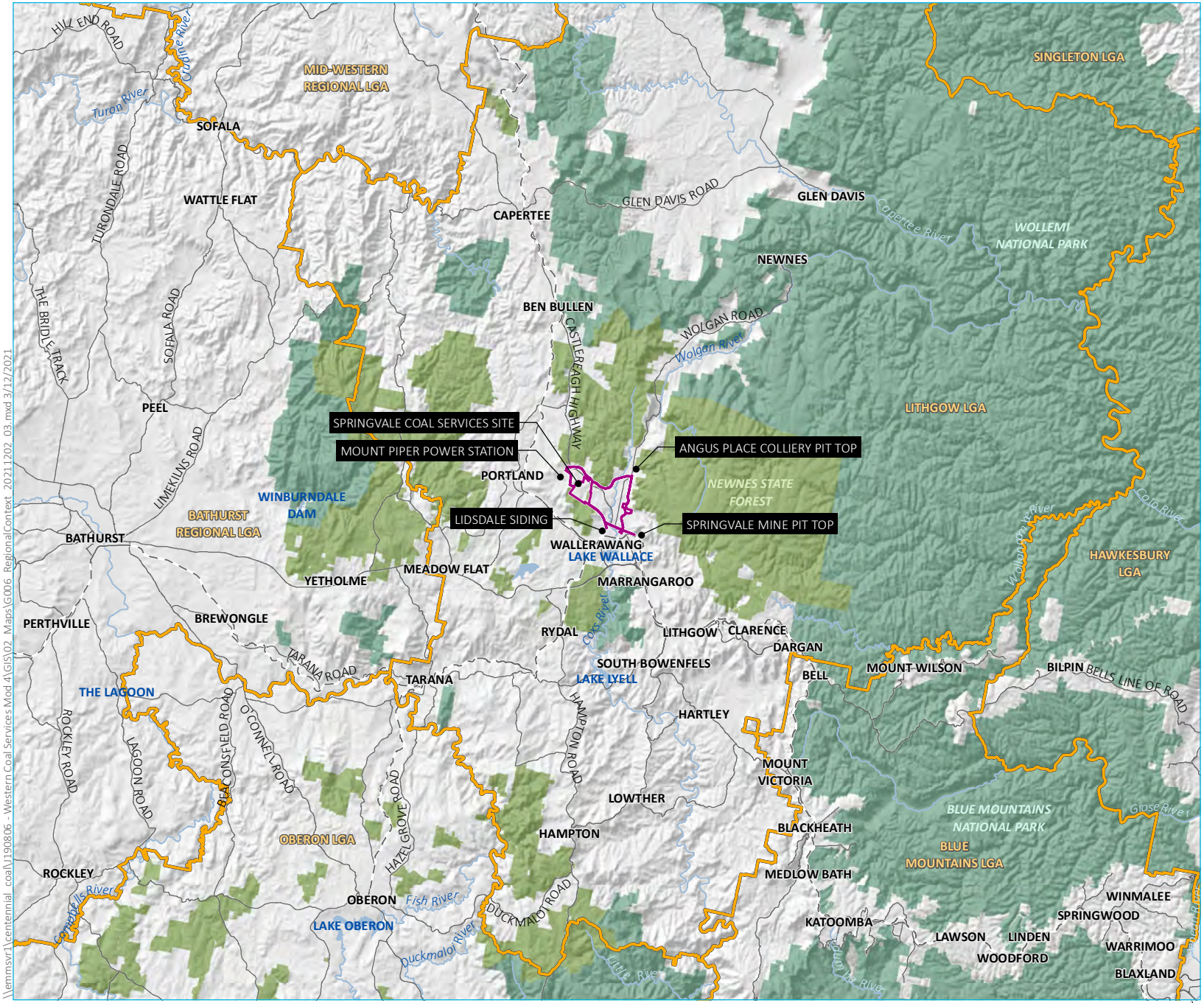
Water from Angus Place Colliery is of a higher quality than water currently used on-site at SCSS. The receipt of water from Angus Place Colliery and its use in coal handling and preparation activities at SCSS is expected to improve the quality of water managed within the reject emplacement area (REA) and discharged from LDP001 as this water will be blended with water currently used on-site.

A separate modification to Angus Place Colliery's development consent (MP 06_0021) will be prepared to authorise the transfer of water from the Angus Place Water Transfer System to SCSS.

### 1.2.4 Redesign of SCSS's water management system

The proposed modification to SSD-5579 includes redesign of SCSS's water management system, including construction of:

- a dewatering pipeline from the TT03 sump to the SCSS water management system;
- Huon Diversion Pond;
- two dirty water ponds (DWP-A and DWP-B); and
- installation of associated pumping, pipeline, and drainage channels.



KEY

- Project application area (SSD-5579)
- Rail line
- Major road
- River
- Named waterbody
- NPWS reserve
- State forest
- Local government area

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2021); Centennial Coal (2021); DFSI (2017); GA (2011); ASGC (2006)

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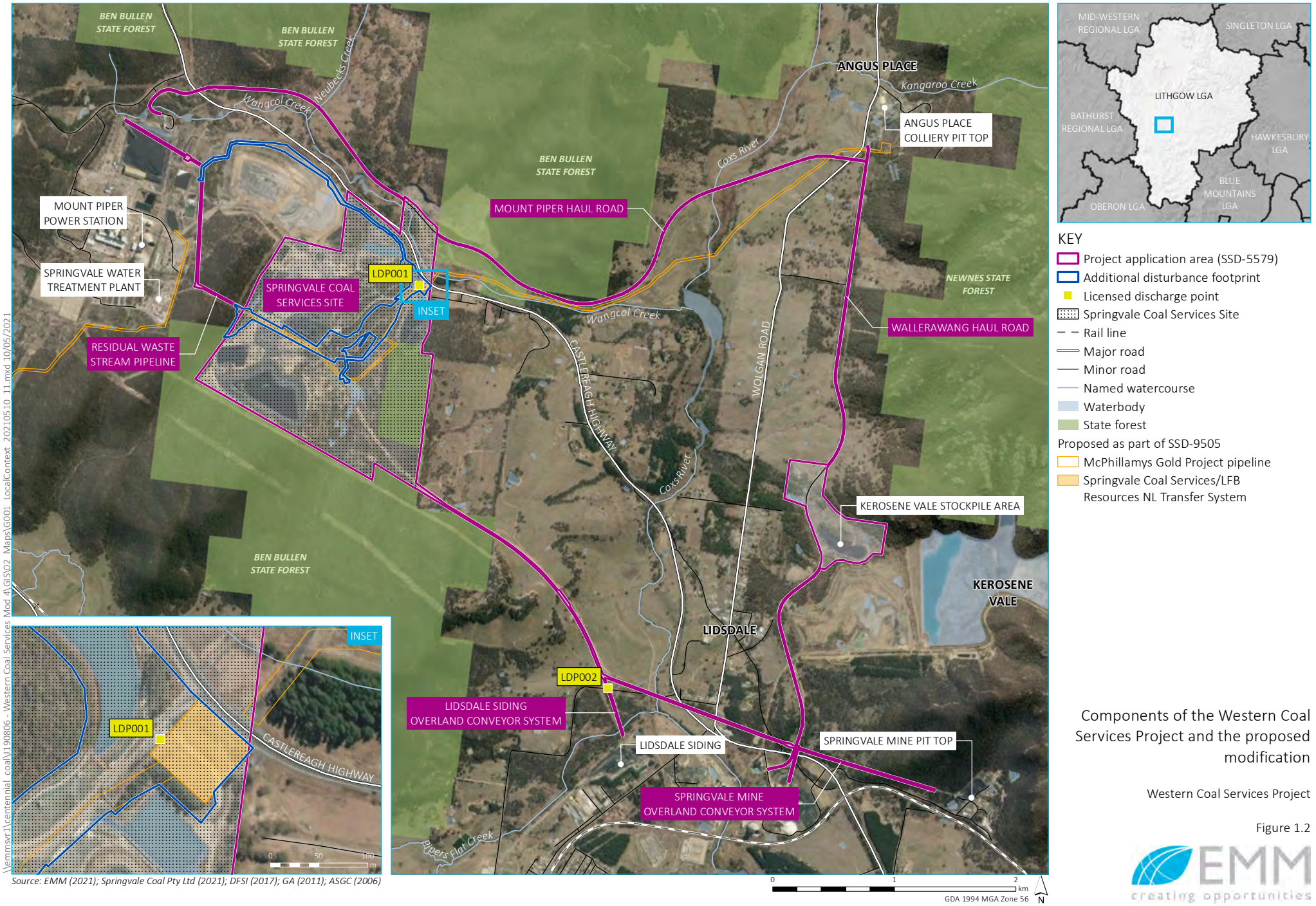
# Regional context

Western Coal Services Project
Aboriginal Cultural Heritage Assessment
Figure 1.1

EMM creating opportunities

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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)*

Components of the Western Coal Services Project and the proposed modification

Western Coal Services Project

Figure 1.2

EMM creating opportunities

## 1.3 Project Area

The current Project Area comprises the MOD 4 impact assessment area which encompasses portions of SCSS and Mount Piper Power Station (MPPS), along the Castlereagh Highway, Blackmans Flat NSW. This is between Portland and Lidsdale in the Lithgow LGA (**Figure 1.3**). This Aboriginal Cultural Heritage Impact Assessment (ACHIA) specifically relates to the Project Area shown as the MOD 4 impact assessment area in **Figure 1.3** and does not consider the archaeological potential outside of the area.

## 1.4 Project Description

The project comprises the proposed modification described in Section 1.2. The upgrade of the onsite water management system at SCSS will involve ground disturbance.

## 1.5 Information and Privacy

### 1.5.1 Restricted Information

No restricted information is provided in this Aboriginal Cultural Heritage Impact Assessment (ACHIA).

### 1.5.2 Confidentiality

No confidential information is included in this ACHIA. However, it is noted that details relating to the locations of registered Aboriginal heritage sites within and near the Project Area that may be considered confidential information by Registered Aboriginal Parties (RAPs) are included.

### 1.5.3 Copyright

The ACHIA was prepared by RPS Australia East Pty Ltd for Springvale Coal.

a. Copyrighting of drawings, reports, specifications calculations and other documents provided by RPS. Australia East Pty Ltd in connection with the provision of the Services will remain the property of RPS Australia East Pty Ltd.

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## 1.6 Authorship and Acknowledgements

This ACHIA has been prepared by RPS Graduate Heritage Consultant/Archaeologist, Kate Morris (BA/ BSc (Hons)). GIS mapping was undertaken by RPS Senior Draftsperson, Natalie Wood. This document was reviewed and approved by RPS Senior Heritage Consultant/Archaeologist Ben Slack (BA Arch).

This report acknowledges the Traditional Owners and Elders, past, present and future, on whose land this project is located.

## Legend

- MOD 4 Impact Assessment Area
- First MOD 4 Impact Assessment Area
- Cadastre
- Roads and Tracks
- Drainage

WANGGOL CREEK

NEUBECKS CREEK

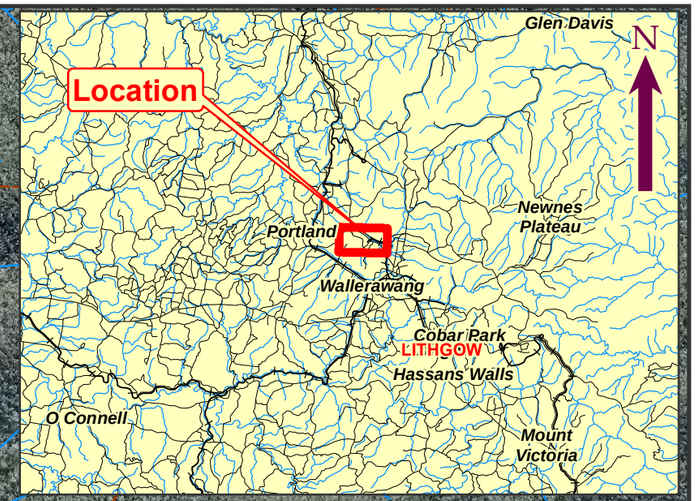
BLACKMANS FLAT

NOON STREET

CASTLEREAGH HIGHWAY

VIEW STREET

KARAWATHA DRIVE




200 100 0 200 400 600 800 1,000 m

SCALE: 1: 12,000 AT A3 SIZE

TITLE : FIGURE 1.3: PROJECT AREA (MOD4 IMPACT ASSESSMENT AREA)

LOCATION : WESTERN COAL SERVICES

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **8/07/2021**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): C A3 (Natalie.Wood)

PATH: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\Arcgis Map Documents\Arch\148221 Figure 1 Location C A3 20210708.mxd

CLIENT: **CENTENNIAL**

JOB REF: **PR148221**

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MAKING COMPLEX EASY

# 2 LEGISLATIVE CONTEXT

The following overview of the statutory framework is provided solely for information purposes for the client, it should not be interpreted as legal advice. The following overview of the statutory framework is relevant to the proposed modification and should not be reinterpreted or applied to other projects.

## 2.1 National Parks and Wildlife Act 1974

Aboriginal cultural heritage (objects and places) in NSW are protected by the *National Parks and Wildlife Act 1974* which is overseen by the DPIE (formerly DECCW & OEH). In some cases, Aboriginal heritage may also be protected under the *Heritage Act 1977*, also overseen by DPIE (formerly the Heritage Branch of the Department of Planning). The *Environmental Planning and Assessment Act 1979*, overseen by the DPIE, and other environmental planning instruments trigger the requirement for the investigation and assessment of Aboriginal cultural heritage as part of the development approval process.

The *National Parks and Wildlife Act 1974* (NPW Act) is the principal Act providing protection for Aboriginal cultural heritage (objects and places) in NSW. It provides protection for Aboriginal cultural heritage irrespective of the level of archaeological or cultural heritage significance or land tenure. DPIE is responsible for the administration of the NPW Act. The NPW Act provides protection for Aboriginal cultural heritage in NSW. Section 86 of the NPW Act states:

- "A person must not harm or desecrate an object that the person knows is an Aboriginal object"
- "A person must not harm an Aboriginal object"
- "A person must not harm or desecrate an Aboriginal place"

Under the NPW Act, it is an offence to harm an Aboriginal object or place. Harming an Aboriginal object or place may result in a fine of up to $550,000 for an individual and imprisonment for two years; and in the case of a corporation, a fine of up to $1.1 million. The fine for a strict liability offence (s86 [2]) is up to $110,000 for an individual and $220,000 for a corporation.

Harm under the NPW Act is defined as any act that: destroys defaces or damages the object; moves the object from the land on which it has been situated; causes or permits the object to be harmed. However, it is a defence from prosecution if the proponent can demonstrate 1) that harm was authorised under Section 90 of the NPW Act, or 2) that the proponent exercised due diligence in respect to Aboriginal cultural heritage. The due diligence defence states that if a person or company has exercised due diligence, liability from prosecution under the NPW Act will be removed or mitigated if it later transpires that an Aboriginal object was harmed. If an Aboriginal object is identified during the proposed activity, all activity within that area must cease and DPIE must be notified (DECCW 2010). The due diligence defence does not authorise continuing harm.

### 2.1.1 Notification of Aboriginal Objects

Under Section 89A of the NPW Act, the proponent must report all Aboriginal objects and places to the Director General of the DPIE within a reasonable time, unless already recorded on the Aboriginal Heritage Information Management System (AHIMS). Fines of $11,000 for an individual and $22,000 for a corporation may apply for each object not reported.

## 2.2 National Parks and Wildlife Regulation 2019

The National Parks and Wildlife Regulation 2019 (NPW Regulation) provides a framework for undertaking activities and exercising due diligence in respect to Aboriginal heritage.

## 2.3 Due Diligence and Codes of Practice

The aims of a due diligence assessment are to:

- assist in avoiding unintended harm to Aboriginal objects;
- provide certainty to land managers and developers about appropriate measures for them to take;
- encourages a precautionary approach;
- provides a defence against prosecution if the process is followed; and
- results in more effective conservation outcomes for Aboriginal cultural heritage.

One of the benefits of the due diligence provisions are that they provide a simplified process of investigating the Aboriginal archaeological context of an area to determine if an Aboriginal Heritage Impact Permit (AHIP) is required. Under s80A of the NPW Regulation a number of due diligence codes are recognised. This report has been written to meet the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (2010) ("Due Diligence Code").

### 2.3.1 Due Diligence Code of Practice for the Protection of Aboriginal Objects New South Wales (DECCW 2010)

This publication sets out a minimum benchmark for acceptable due diligence investigations to be followed.

The purpose of the code is set out reasonable and practical steps in order to:

1. identify whether or not Aboriginal objects (and places) are, or are likely to be, present in an area;
2. determine whether or not their activities are likely to harm Aboriginal objects (if present); and
3. determine whether further Aboriginal consultation is required for site salvage under the Centennial Western Region Aboriginal Cultural Heritage Management Plan (DECCW 2010:2).

Investigations under the Due Diligence Code include the following:

- A search of the AHIMS database to identify if there are previously recorded Aboriginal objects or places in the Project Area;
- Identification of landscape features including, land within 200 metres of water, dune systems, ridgetops, headlands, land immediately above or below cliff faces and/or rock shelters/caves;
- Desktop assessment including a review of previous archaeological and heritage studies and any other relevant material;
- Visual inspection of the Project Area to identify if there are Aboriginal objects present; and
- Assessment as to whether an AHIP is required.

This report has complied with the requirements of the Due Diligence Code listed above.

### 2.3.2 NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects (Minerals Council 2010)

The fundamental requirements of the Minerals Due Diligence Code (Minerals Council 2010) are the same as the Due Diligence Code (DECCW 2010). Although the requirements are the same, the Minerals Due Diligence Code also suggests that Aboriginal consultation be considered (although not a formal requirement) (Minerals Council 2010:7) and that "company personnel should be trained in cultural heritage in case Aboriginal objects are discovered during field activities" (Minerals Council 2010). The Minerals Due Diligence Code also provides examples of common activities which are undertaken in relation to mining and how they can be managed in accordance with the due diligence codes and the relevant legislation (Minerals Council 2010:20-22).

# 3 ABORIGINAL COMMUNITY CONSULTATION

It is acknowledged that Aboriginal people should be involved in the Aboriginal heritage planning process and are the primary source of information about the value of their heritage. Aboriginal community consultation is regarded as an integral part of the process of investigating and assessing Aboriginal cultural heritage (OEH 2010).

## 3.1 Aboriginal Cultural Heritage Consultation Requirements

Aboriginal community consultation has been undertaken for this ACHIA which has followed the Consultation Requirements (DECCW, 2010b) and been conducted in accordance with the Centennial Western Region ACHMP.

The Consultation Requirements outline a four stage Aboriginal consultation process and mandate specific timeframes for each stage. The four stages are summarised below. All the consultation documentation for each stage is included in **Appendix C**.

### 3.1.1 Stage 1 – Notification of project and registration of interest

Stage 1 requires that Aboriginal people who hold cultural information are identified, notified and invited to register an expression of interest in the assessment. This identification process should draw on reasonable sources of information including: the relevant DPIE Environment Protection and Regulation Group regional office, the relevant LALC(s), the Register of Aboriginal Owners, the Native Title Tribunal, Native Title Services Corporation, local council(s) and the relevant Local Land Services, as well as placing an advertisement in a local newspaper circulating in the general location of the activity. Aboriginal organisations and/or individuals identified should be notified of the activity and invited to register an expression of interest for Aboriginal consultation.

### 3.1.2 Stage 2- Presentation of information about the proposed project

The aim of stage 2 is to provide registered Aboriginal parties identified during stage 1 information about the scope of the proposal and the proposed heritage assessment process.

### 3.1.3 Stage 3- Gathering information about cultural significance

Stage 3 provides the opportunity for registered Aboriginal stakeholders to recommend culturally appropriate research methodologies for the cultural heritage assessment. At this stage registered stakeholders are invited to provide input to determine the cultural significance of Aboriginal objects and/or places within the Project Area. In turn they are also given the opportunity to have an input into the development of any cultural heritage management options.

### 3.1.4 Stage 4- Review of draft cultural heritage assessment report

The final stage of the Consultation Requirements requires all registered Aboriginal stakeholders to be provided with a copy of the draft ACHAR and given 28 days in which to review the document. This stage provides Aboriginal stakeholders with an opportunity to review the ACHAR prior to its submission with the AHIP application. Further cultural information may be gathered at this stage and all comments received are then incorporated into the final report.

## 3.2 Consultation

Springvale Coal has previously undertaken consultation with the local Aboriginal community and is thus consulting with their established Representative Aboriginal Parties (RAPs) for the proposed modification (**Appendix C**). This ACHIA has been prepared in consultation with the existing RAPs for Springvale Coal. The initial field survey was undertaken on 3 December 2020 by RPS Senior Heritage Consultant Ben Slack and the RAPS listed in **Table 1**. Patsy Wolfenden attended the site visit on 9 December 2020 as she was unable to attend the inspection on 3 December.

**Table 1 RAPs who attended the 2020 field survey**

| Organisation | Representative |
|---|---|
| Wellington Valley Wiradjuri Aboriginal Corporation | Bradley Bliss |
| Bathurst Local Aboriginal Land Council | Donald Morgan |
| Warrabinga | Tyron Pennell |
| Mingaan | Patsy Wolfenden |

A second field survey was undertaken on 25 May 2021 by RPS Graduate Heritage Consultant Kate Morris and the RAPS listed in **Table 2.** This survey targeted additional impact areas identified following the initial surveys completed in December 2020.

**Table 2 RAPs who attended the 2021 field survey**

| Organisation | Representative |
|---|---|
| Wellington Valley Wiradjuri Aboriginal Corporation | Bradley Bliss |
| Bathurst Local Aboriginal Land Council | Donald Morgan |
| Warrabinga | Tyron Pennell |
| Mingaan | Yamandirra Newton |

# 4 ENVIRONMENTAL CONTEXT

An understanding of environmental context is important for the predictive modelling of Aboriginal sites, as well as for their interpretation. The local environment provided natural resources for Aboriginal people, such as stone (for manufacturing stone tools), food and medicines, and wood and bark (for implements such as shields, spears, canoes, bowls, and shelters, amongst others), as well as areas for camping and other activities. The nature of Aboriginal occupation and resource procurement is related to the local environment and it therefore needs to be considered as part of the cultural heritage assessment process.

## 4.1 Geology and Soils

The Project Area is predominately located on Triassic and Permian sediments. Surrounding parent materials include the Illawarra Coal Measures and the Berry Formation. Horizontally bedded shale, sandstone, siltstone, mudstone, claystone, limestone, coal, torbanite and conglomerate are the main rock types.

The Narrabeen group is also close to the Project Area and is characterised by sandstone, interbedded sandstone, siltstone, and claystone. The Quaternary deposits are characterised by undifferentiated alluvial deposits, sand, clay, and gravel.

The Project Area sits on predominately disturbed terrain but is surrounded by three soils landscapes: the Lithgow, Cullen Bullen, and Wollangambe soil landscapes.

**Lithgow soil landscape**

The Lithgow soil landscape is subject to moderate gull erosion and occasional sheet erosion. The topsoil layer li1 is a dull yellowish brown sandy loam at 0-11cm, topsoil layer li2 is a dark reddish brown clay loam at 0-10cm, and layer li3 is a bleached fine sandy clay loam (King 1993). The subsoil is angular blocky medium clay that varies from a reddish brown to a white with grey mottles at 30-60 cm. Soils are moderately deep to deep with depths greater than 170cm (King 1993). Limitations include hard-setting topsoils, high run-on, the mine subsidence, and localised high potential aluminium toxicity.

**Cullen Bullen soil landscape**

This soil landscape is subject to moderate gully erosion along some drainage depressions and severe sheet and rill erosion on steep, isolated slopes. The topsoil layer cb1 is a dark reddish brown sandy clay loam at 0-21cm, and topsoil layer cb2 is a bleached fine sandy clay loam at 21-50cm. Subsoil, layer cb3, is a bright brown moderately pedal clay at 50-110cm (King 1993). Soils are shallow to moderately (<100cm) (King 1993). Limitations include hard-setting topsoils, high water erosion hazard, rock outcrop, and localised high foundation hazard.

**Wollangambe soil landscape**

This soil landscape is subject to severe rill and sheet erosion. The topsoil layer wo1 is a dark brown single-grained loamy sand at 0-7cm, and topsoil and subsoil layer wo2 is a red clayey sand at 7-70cm. Topsoil and subsoil, layer wo3, is a bright yellowish brown clayey sand at 15-60cm (King 1993). Subsoil layer wo4 is a pedal light grey clay at 20-50cm. Soils are shallow to moderately (<100cm) (King 1993). Limitations include hard-setting topsoils, high water erosion hazard, rock outcrop, and localised high foundation hazard.

**Disturbed Terrain**

While these soil landscapes surround the Project Area, it sits predominately on disturbed terrain, the soil of which has either been removed, buried or greatly disturbed (King 1993). Original vegetation has usually been completely cleared and landfill materials include a variety of soils, rocks, building and waste materials. The area has been previously cleared for mining/quarrying and the installation of infrastructure and services.

## 4.2 Topography and Hydrology

The topography of the land surrounding the Project Area consists of flat to gently inclined rises on broad (>300m) valley floors away from major drainage lines. It also includes broad rolling low hills and rises, rounded crests and moderately to steeply inclined side slopes (King 1993). Local relief varies between <25m - <100m, slope gradients vary between <10-35%, elevation is between 550-1000m and localised rock outcrop is present as small rock benches and low scarps (King 1993). The Project Area itself is varied in terms of topography as most areas of landfill and rehabilitation is levelled; however, many quarries have irregular steep sides (King 1993).

To the north of the Project Area are Neubecks and Wangcol Creeks. Neubecks Creek is a tributary of Wangcol Creek which is a second order tributary of Coxs River. To the south is Piper's Flat Creek. Both semi-permanent and permanent water sources surround the Project Area. The riverine resources contained within the Coxs River would have provided major marine resources for Aboriginal people including a vast variety of fish species. Access to fresh water is a major determinant of where Aboriginal people camped for periods of time. Coxs River is also one of two corridors that were used by Aboriginal people to cross the Blue Mountains.

## 4.3 Flora and Fauna

The purpose of this section is to provide an indication of the types of flora and fauna resources which were likely to have been available to Aboriginal people in the past. However, it does not replace more detailed studies undertaken for the Project Area.

Past Aboriginal people are likely to have encountered open-woodland and forest. Common tree species include scribbly gum (*Eucalyptus rossii*), snow gum (*E. pauciflora ssp. pauciflora*), brittle gum (E. mannifera ssp. mannifera), broad-leaved peppermint (E. dives), red stringy bark (*E. macrorhyncha*), black wattle (*Acacia decurrens*), black ash (*E. sieberi*), narrow leaved stringy bark (*E. oblonga ssp. oblonga*), red bloodwood (*E. gummifera*), blue mountain ash (*Eucalyptus oreades*), broad leaved peppermint (*E. dives*), grey gum (*E. punctata*), Sydney peppermint (*E. piperita*), and narrow-leaved peppermint (*E. radiata*). A wide variety of shrubs are found in conjunction with such trees (King 1993) (Keith 2006).

Typical animals which may have been harvested by Aboriginal people include kangaroos, wallabies, sugar gliders, possums, echidnas, a variety of lizards and snakes, birds, as well as rats and mice. The bones of such animals have been recovered from Aboriginal sites, although the hides, bones and teeth of some of the larger mammals may have been used for Aboriginal clothing, tools, ornamentation, or other implements.

This flora and fauna are indicative of rich food and material sources that would have provided a favourable area for Aboriginal occupation. The diversity of flora and fauna species may have provided seasonal food resources for small Aboriginal groups or communities moving throughout the region.

## 4.4 Summary

An overview of the environmental context of the area with regard to its relevance to heritage items is an important part of an ACHIA. The purpose of reviewing the relevant environmental and heritage information is to assist in identifying whether Aboriginal or historic sites or places may be present within the Project Area.

An overview of the environmental context of the Project Area indicates that there are several factors that would have made it initially conducive for occupation by Aboriginal people and later for settlement by Europeans.

The area has a good supply of fresh water that would have provided permanent sources for Aboriginal occupation. This would also have resulted in a diversity of flora and fauna to provide food resources for local inhabitants.

# 5 ARCHAEOLOGICAL CONTEXT

## 5.1 Aboriginal Heritage Information Management System (AHIMS)

The purpose of reviewing the relevant heritage information is to assist in identifying whether Aboriginal objects or places are present, or likely to be present within the Project Area. It also assists in defining areas of archaeological potential.

An initial AHIMS search was undertaken on 11 November 2020, which revealed 57 Aboriginal sites within the searched coordinates in a radius of five kilometres around the Project Area. Of these 57, 12 are invalid sites (Table 3) that have been confirmed as not a site on the AHIMS database, leaving 45 valid sites within the search parameters.

An extensive AHIMS search was undertaken on 11 November 2020 (ID: 549109) encompassing Easting: 222097 - 227090, Northings: 6302482 – 6307462. This extensive search also identified 57 sites in total, with 45 valid sites (Table 4 and 5) within the search parameters, one of which is located within the Project Area (Figure 2).

**Table 3 Invalid AHIMS sites within the searched coordinates**

| AHIMS# | Site Name | Site Type | Status | Eastings | Northings |
|---|---|---|---|---|---|
| 45-6-2354 | Lamberts Creek 7 | Open Camp Site | Destroyed | 225530 | 6303350 |
| 45-6-2355 | Lamberts Creek 6 | Open Camp Site | Destroyed | 225480 | 6303070 |
| 45-1-2581 | BP-OS-1 | Artefact site (number unspecified) | Partially Destroyed | 224391 | 6306376 |
| 45-1-2754 | Neubecks Creek Open Site PAD 6 | PAD | Partially Destroyed | 225164 | 6305870 |
| 45-1-2755 | Neubecks Creek Open Site PAD 7 | PAD | Partially Destroyed | 225338 | 6306253 |
| 45-1-2752 | Neubecks Creek IF-8 with PAD | PAD | Partially Destroyed | 225257 | 6306096 |
| 45-1-0216 | Neubecks Creek 2 | Open Camp Site | Partially Destroyed | 225594 | 6305876 |
| 45-1-0217 | Neubeck Creek 1 | Open Camp Site | Destroyed | 224774 | 6306112 |
| 45-1-0238 | Mount Piper | Axe Grinding Groove,Shelter with Art,Shelter with Deposit | Valid | 222590 | 6302870 |
| 45-1-0243 | S12 Springvale Colliery | Open Camp Site | Destroyed | 224970 | 6303900 |
| 45-1-0244 | S13 Springvale Colliery | Open Camp Site | Destroyed | 224750 | 6304040 |
| 45-1-0203 | S6 Blackmans Flat | Open Camp Site | Destroyed | 225180 | 6303220 |

**Table 4 Summary of valid AHIMS sites within the searched coordinates**

| Site Type | Quantity | % |
|---|---|---|
| Open campsite | 20 | 44 |
| Isolated find | 14 | 32 |
| Artefact site (number unspecified) | 2 | 4 |
| Artefact scatter | 1 | 2 |
| Stone Arrangement | 1 | 2 |
| PAD | 5 | 12 |
| Shelter with deposit and axe grinding groove | 1 | 2 |
| Scarred tree | 1 | 2 |
| **TOTAL** | **45** | **100%** |

Source: AHIMS 11 November 2020, Search eastings: 222097 - 227090, northings: 6302482 – 6307462 and RPS 2018

**Table 5 Valid AHIMS sites within the searched coordinates**

| AHIMS# | Site Name | Site Type | Status | Eastings | Northings |
|---|---|---|---|---|---|
| 45-1-2582 | BP-IF-1 | Artefact site (number unspecified) | Valid | 225130 | 6305840 |
| 45-1-2547 | IV-OS-1 | Open Camp Site | Valid | 222014 | 6304060 |
| 45-1-2548 | IV-IF-2 | Isolated Find | Valid | 222850 | 6303590 |
| 45-1-2549 | IV-OS-3 | Open Camp Site | Valid | 222790 | 6303230 |
| 45-1-2551 | IV-OS-5 | Open Camp Site | Valid | 222790 | 6303490 |
| 45-1-2552 | IV-OS-4 | Open Camp Site | Valid | 222810 | 6303400 |
| 45-1-2553 | IV-OS-6 | Open Camp Site | Valid | 223670 | 6302970 |
| 45-1-2554 | IV-IF-1 | Isolated Find | Valid | 222135 | 6304060 |
| 45-1-2587 | WC1A | Isolated Find | Valid | 225991 | 6305123 |
| 41-1-0239 | NC-OS2 | PAD | Partially Destroyed | 226217 | 6306703 |
| 45-1-2588 | NC-OS1 with PAD | PAD | Valid | 225556 | 6305650 |
| 45-1-2589 | NC-OS3 | PAD | Valid | 226273 | 6306444 |
| 45-1-2590 | NC-OS4 | PAD | Partially Destroyed | 225959 | 6306703 |
| 45-1-2591 | NC-IF1 | PAD | Valid | 225851 | 6306185 |
| 45-1-0045 | Ben Bullen Stone Arrangement;Ben Bullen State Forest | Stone Arrangement | Valid | 226800 | 6305600 |
| 45-1-2753 | Neubecks Creek Open Site 5 | Isolated Find | Valid | 225938 | 6305155 |
| 45-1-2720 | CS SU4-A5 | Isolated Find | Valid | 225945 | 6303776 |
| 45-1-2721 | CS SU4-A4 | Isolated Find | Valid | 225953 | 6303887 |
| 45-1-2722 | CS SU4-A3 | Isolated Find | Valid | 225879 | 6303777 |
| 45-1-2723 | CS SU4-A2 | Isolated Find | Valid | 225959 | 6303943 |
| 45-1-2724 | CS SU4-A1 | Isolated Find | Valid | 225946 | 6303882 |
| 45-1-2725 | CS SU3-A1 | Isolated Find | Valid | 226166 | 6303832 |
| 45-1-2749 | Neubecks Creek Isolated Find 2 | Isolated Find | Valid | 225787 | 6305480 |
| 45-1-2750 | Neubecks Creek Isolated Find 3 | Isolated Find | Valid | 225963 | 6306832 |
| 45-1-2751 | Neubecks Creek Isolated Find 4 | Isolated Find | Valid | 226044 | 6306350 |
| 45-1-0066 | Pipers Flat;Ivanhoe Colliery | Open Camp Site | Valid | 222760 | 6303710 |
| 45-1-0067 | Pipers Flat Ivanhoe Colliery | Open Camp Site | Valid | 222700 | 6303780 |
| 45-1-0068 | Avondale | Open Camp Site | Valid | 222150 | 6305000 |
| 45-1-0207 | S8 Blackmans Flat | Open Camp Site | Valid | 226520 | 6303050 |
| 45-1-0208 | S5 Blackmans Flat | Open Camp Site | Valid | 225550 | 6303050 |
| 45-1-0209 | S4 Wallerawang; | Open Camp Site | Valid | 226300 | 6302550 |
| 45-1-0210 | S3 Wallerawang; | Open Camp Site | Valid | 226600 | 6302350 |
| 45-1-0215 | Lamberts Ck 5 Mt Piper | Open Camp Site | Valid | 225300 | 6302480 |
| 45-1-0218 | 57 - Blackmans Flat | Open Camp Site | Valid | 224400 | 6303650 |
| 45-1-0234 | Western main 2 | Open Camp Site | Valid | 226020 | 6304680 |
| 45-1-0236 | Western main 1; same as 45-1-0241 | Open Camp Site | Valid | 226060 | 6304580 |

| AHIMS# | Site Name | Site Type | Status | Eastings | Northings |
|---|---|---|---|---|---|
| 45-1-0242 | Western main 3, same as 45-1-0235 | Open Camp Site | Valid | 225630 | 6304830 |
| 45-1-0019 | Irondale | Axe Grinding Groove,Shelter with Deposit | Valid | 225500 | 6302750 |
| 45-1-2550 | IV-OS-2 | Open Camp Site | Valid | 222130 | 6303520 |
| 45-1-2601 | SVW-OS1 with PAD | Artefact scatter | Valid | 225796 | 6303196 |
| 45-1-2602 | WCU1 | Isolated Find | Valid | 223989 | 6303882 |
| 45-1-0235 | Western main 3; same as 45-1-0242 | Open Camp Site | Valid | 225630 | 6304830 |
| 45-1-0241 | Western main 1, same as 45-1-0236 | Open Camp Site | Valid | 226060 | 6304580 |
| 45-1-2795 | BF JN 1 IF - Blackmans Flat IF | Artefact site (number unspecified) | Valid | 225191 | 6304132 |
| 19-5-0218 | PF3 | Scarred tree | Valid | 223371 | 6302484 |

Source: AHIMS 11 November 2020, Search eastings: 222097 - 227090, northings: 6302482 – 6307462

Two previously recorded Aboriginal objects or places are present within the Project Area (AHIMS 45-1-2975 and 45-1-0244); however, one is invalid and has destroyed status (45-1-0244). The next nearest previously registered valid AHIMS sites are in an approximately 500 metre radius of the Project Area. These sites are AHIMS 45-1-0218, 45-1-0208, 45-1-2601, 45-1-2722, 45-1-2720, 45-1-2724, 45-1-2725, 45-1-2721, 45-1-2723, 45-1-0241, 45-1-0236, and 45-1-0234 (Figure 2).

AHIMS sites 45-1-0218, 45-1-0208, 45-1-2601, 45-1-2722, 45-1-2720, 45-1-2724, 45-1-2725, 45-1-2721, and 45-1-2723 are all to the south of the Project Area. AHIMS sites 45-1-0241, 45-1-0236, and 45-1-0234 are to the north.

It is important to note that the AHIMS register only contains information on Aboriginal sites for which site cards have been submitted, and the presence/absence of recorded Aboriginal sites on the AHIMS register does not preclude other sites from being present.

## 5.2 Literature Review

A review of previous studies undertaken in the area, including archaeological surveys and excavations, is used to establish a better understanding of the archaeological potential of the Project Area.

**RPS, 2019. Aboriginal Cultural Heritage Due Diligence Assessment – Springvale Coal**

RPS was engaged by Centennial to undertake an Aboriginal Heritage Due Diligence at Blackmans Flat for Springvale Coal (RPS 2019). The purple hashed area depicted on Figure 2 was inspected on foot on 21 January 2019 by RPS Heritage Consultant Ben Slack. Much of the area had been subject to coal stockpiling and was therefore heavily disturbed. No mature trees were located within the area and exposed ground surfaces were inspected for evidence of Aboriginal objects or PADs. The results of the AHIMS search and the visual inspection indicated no identified Aboriginal objects in the area inspected.

**RPS, 2018. Aboriginal Heritage Due Diligence Letter Report, Western Coal Services (Centennial), Blackmans Flat, NSW.**

RPS was engaged by Springvale Coal to provide an Aboriginal Heritage Due Diligence Letter Report for a proposed water management structure at Blackmans Flat (RPS 2018). The AHIMS search revealed that no registered Aboriginal sites or objects within or near the orange hashed area depicted on Figure 2. The orange hashed area depicted on Figure 2 was inspected on foot on 7 February 2018 by Western Coal Services Environmental and Community Co-ordinator, Neil Thompson, Aboriginal Stakeholders, Bradley Bliss from Wellington Valley Wiradjuri Corporation, Chris Halls from Gundungurra Aboriginal Heritage Association, and RPS Archaeologist, Jo Nelson. No registered sites were located during that pedestrian survey.

**RPS, 2018. Western Coal Services: AHIMS Site Duplications.**

In 2018, RPS investigated AHIMS site duplications for Springvale Coal (RPS 2018). An updated AHIMS search was conducted on 22 January 2018 in order to identify site duplications and confirm valid and invalid sites. A total of six sites at three locations were identified as being duplicates. AHIMS sites 45-1-0241 and 45-1-0242 have been amended on the AHIMS database as duplicates of 45-1-0236 and 45-1-0235 respectively. A total of 13 sites have been deleted, destroyed or partially destroyed.

**RPS, 2017. Updated Revision of the Status of AHIMS Sites Within 30 Metres Of Proposed Springvale Water Treatment And Pipeline Project, Springvale Coal.**

In 2017, RPS revised the status of AHIMS sites in close proximity to a project at Blackmans Flat for Springvale Coal (RPS 2017). Previously registered AHIMS 45-1-0243, AHIMS 45-1-0244 and AHIMS 45-6-2354 were found to be destroyed and no longer valid.

**RPS 2017 Aboriginal Heritage Due Diligence Assessment: Blackmans Flat, NSW**

RPS was engaged by Springvale Coal to prepare an Aboriginal Heritage Due Diligence Assessment at Blackmans Flat for a Reject Emplacement Area (REA) (RPS 2017). An AHIMS search was undertaken on 12 May 2017 that revealed 75 previously recorded Aboriginal sites. No previously registered sites were located within the orange shaded area depicted on Figure 2. The orange shaded area depicted on Figure 2 was inspected on foot on 18 May 2017 by RPS Cultural Heritage Consultant Ben Slack together with RPS Ecologist Joe May. Much of the orange shaded area depicted on Figure 2 had been subject to coal stockpiling and was heavily disturbed. The visual inspection focused on areas of vegetation which appeared undisturbed and were to be subject to impacts from the expanding REA. Mature trees were inspected for evidence of cultural modification and exposed ground surfaces were inspected for evidence of Aboriginal objects or potential archaeological deposits (PADs). No Aboriginal objects or places were identified during the pedestrian survey.

## 5.3 Gap Analysis

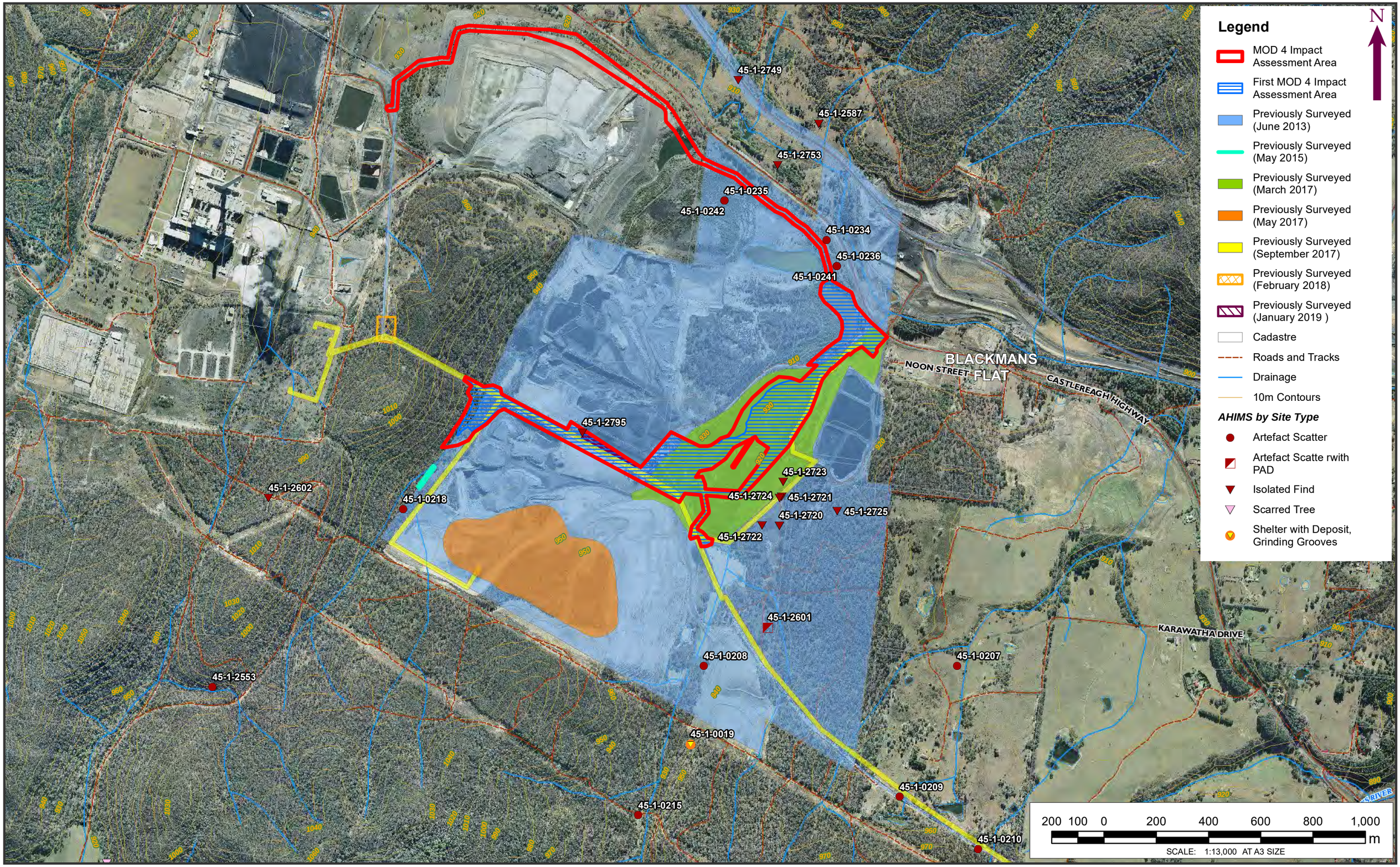
A significant number of previous surveys have occurred within the SCSS boundary (**Figure 2**). Due to this, a gap analysis was undertaken in order to identify areas that had not been subject to visual inspections or contained a higher probability of identifying Aboriginal sites such as creek lines.

The gap analysis identified a small section on the western boundary of SCSS which had not undergone recent surveys and contained a less disturbed environment and therefore required a visual inspection.

## 5.4 Summary of the Aboriginal Heritage Context

The review of the archaeological context of Blackmans Flat specifically, at SCSS, shows little to no evidence of artefactual material or sites, despite known sites being present in the wider area. The environmental context suggests the area may have been used for occupation and transiently for hunting or travel with access to water and floral and faunal resources. However, this specific area is highly disturbed and many of the sites have been destroyed.

The wider area has been impacted by European land use, which historically both commercially utilised and cleared the surrounding vegetation and for industrial, agricultural, residential and commercial purposes.




TITLE : FIGURE 2: AREAS PREVIOUSLY SURVEYED

LOCATION : WESTERN COAL SERVICES

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **8/07/2021**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\Arcgis Map Documents\Arch\148221 Figure 2 Previously Surveyed B A3 20210708.mxd

CLIENT: **CENTENNIAL**
JOB REF: **PR148221**

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# 6 ABORIGINAL HERITAGE SURVEY AND FIELD RESULTS

## 6.1 Survey Methodology

The Project Area underwent a targeted survey in accordance with the requirements set out in the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (OEH 2010). The initial field survey was undertaken on 3rd December 2020 with RAPs listed in **Table 1**. The second survey was undertaken on 25th May 2021 with RAPs listed in **Table 2.** Survey tracks are shown in Figure 3.

Prior to undertaking the surveys, a pre work meeting was undertaken with RPS archaeologists, Centennial personnel and RAPs in order to identify areas which would require archaeological survey. The survey targeted areas not previously subject to a visual inspection.

## 6.2 Survey and Field Results 2020

The survey was undertaken in an open forest environment intersected by dirt tracks (Plate 1). Vegetation comprised juvenile trees and low lying shrubs with surface visibility extremely high within dirt road and generally good within the vegetated areas; a small quantity of leaf litter hindered the visibility slightly (Plate 2). Material observed comprised significant quantities of quartz fragments and sandstone with some ironstone. The entire area has undergone some form of disturbance, this included vehicles moving along the dirt roads, erosion, and vegetation clearing.

Three small quartz flakes were observed in an exposed area adjacent to the dirt track (Plate 3 and 4). These were not in situ and have likely eroded from the nearby disturbed areas and moved down slope. Due to the location of the artefacts, during the visual inspection a barrier was put in place to ensure no damage occurred to the sites (Plate 5).

**Plate 1: View north-west**

**Plate 2: View south-west**

**Plate 3: Quartz artefacts**

**Plate 4: Context shot of site location**

**Plate 5: Fencing erected around the site**

### 6.2.1 Summary of Aboriginal Sites Identified During 2020 Survey

One new Aboriginal site was identified during the survey which comprised three quartz flakes in a disturbed context. The site has been registered on the AHIMS database (AHIMS 45-1-2823) and has also been fenced off to ensure no damage. Considering the location of the site and the nearby erosion and disturbances, sub-surface potential is considered to be low. Prior to works commencing the site should be salvaged under the protocols set out in the Centennial Western Region ACHMP, specifically section 6.4.1 of the management plan impact assessment.

## 6.3 Survey and Field Results 2021

The survey comprised small sections of land that were not previously inspected due to a change in the MOD4 boundaries in the south, west and north (Figure 3). In the south, in close proximity to AHIMS 45-1-2823 recorded in the initial 2020 survey, an artefact scatter and isolated find were identified. The isolated find was located in an open forest environment and the artefact scatter comprised artefacts located on and adjacent to the main dirt track.

Vegetation comprised juvenile trees, low lying shrubs with low surface visibility due to thick grass (Plate 6). In the south, visibility increased with small exposures revealing light brown compact silt, quartzite, quartz and sandstone (Plate 7). The entire area has undergone some form of disturbance, this includes vehicles moving along the dirt roads, erosion, and vegetation clearing.

**Plate 6: Low visibility in the south**

**Plate 7: Exposures revealing quartzite, quartz and sandstone**

IF1, the isolated find, comprised a quartzite flake (6x4x1cm), and AS1, the artefact scatter, comprised one grey and pink tuff flake-core, two broken quartz flakes, one pink quartz flake, and two pieces of the same broken white chert blade (Plates 8-12). These six artefacts were likely not in situ as most were located on the track and the others were in close proximity (Plate 13). Due to the location of the artefacts, during the visual inspection all locations were marked with spray paint (as shown in Plate 15) and a Centennial employee was called to place a barrier around the marked sites later that day to ensure no damage occurred.

**Plate 8: IF1**

**Plate 9: Tuff flake-core in AS1**

**Plate 10: Two broken quartz flakes in AS1**

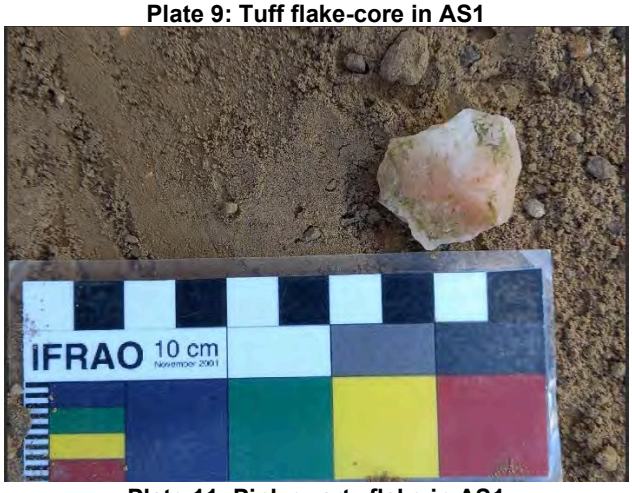


**Plate 11: Pink quartz flake in AS1**

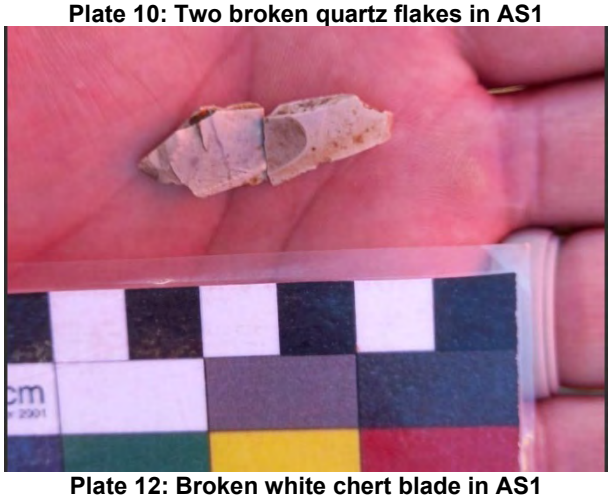

**Plate 12: Broken white chert blade in AS1**

**Plate 13: Dirt track south of AS1**

In the west, on the very edge of the boundary in a rehabilitated area, IF3, a potential isolated find, was located (Plates 14-15). The area had low surface visibility due to mulch in the rehabilitated area and leaf litter, grass, trees and branches in other area (Plate 16). The location was disturbed due to regular maintenance of the revegetation (Plate 17). Quartz, quartzite nodules, shale and imported gravels were noted.

**Plate 14: IF3 potential quartz flake**

**Plate 15: IF3 spray painted for later fencing**

**Plate 16: Low visibility in the west**

**Plate 17: Maintenance of revegetated area**

In the north, IF2, a white chert core isolated find, was identified near a highly disturbed area (Plate 18 and 19). Surface visibility was very high along the northern strip of the MOD4 impact assessment area due to the roadway and constructed drain (Plate 20). In the east of the northern section, surface visibility decreased due to encroaching vegetation. In addition to vehicles, disturbances included the roadway being constructed of redeposited fill, concrete posts, rubber sheets, pipes, a dam, a monitoring bore, tyres, and fencing (Plate 21). Materials were mostly imported gravels, shales, sandstones outcrops, with some quartz and quartzite.

Plate 18: South-west of IF2, very disturbed land

Plate 19: IF2 white chert core

Plate 20: High surface visibility

Plate 21: Monitoring bore, star pickets, pipe

### 6.3.1 Summary of Aboriginal Sites Identified During 2021 Survey

Four new Aboriginal sites were identified during this survey which comprised three isolated finds and one artefact scatter. The sites have been registered on the AHIMS database and have also been fenced off to ensure no damage. Considering the locations of the sites and the nearby erosion and extensive disturbances, sub-surface potential is considered to be low. Prior to works commencing the sites should be salvaged under the protocols set out in the Centennial Western Region ACHMP, specifically section 6.4.1 of the management plan impact assessment.

### 6.3.2 Cultural and Scientific Rankings of Aboriginal Sites

As per section 6.2.2 of the ACHMP Western Region, the sites were assigned cultural and scientific/archaeological ranks. The ranking scale for Cultural Significance comprises High or Extremely High Cultural Significance. The ranking scale for Scientific Significance comprises a point system that assesses five criteria (research potential, rarity, representativeness, integrity and educational potential) by low (1 point), moderate (2 points), and high (3 points) significance. The sum of these points is then combined for an

overall significance ranking (low is 5-7 points, moderate is 8-11 points, and high is 12-15 points) and assessed at a local and regional level.

The cultural rankings for the sites are:

- AHIMS 45-1-2823:  Extremely High Cultural Significance
- AS1: Extremely High Cultural Significance
- IF1: Extremely High Cultural Significance
- IF2: Extremely High Cultural Significance
- IF3: Extremely High Cultural Significance

The scientific/archaeological rankings for the sites are (Table 6):

- AHIMS 45-1-2823:  Low Significance, Low Regional Significance
- AS1: Low Local Significance, Low Regional Significance
- IF1: Low Local Significance, Low Regional Significance
- IF2: Low Local Significance, Low Regional Significance
- IF3: Low Local Significance, Low Regional Significance

**Table 6 Scientific Rankings**

| Site | Scope | Research Potential | Rarity | Representativeness | Integrity | Educational Potential | Local Significance | Regional Significance |
|---|---|---|---|---|---|---|---|---|
| 45-1-2823 | Local | 1 | 1 | 1 | 1 | 1 | Low | Low |
| | Regional | 1 | 1 | 1 | 1 | 1 | Low | Low |
| AS1 | Local | 1 | 1 | 1 | 1 | 1 | Low | Low |
| | Regional | 1 | 1 | 1 | 1 | 1 | Low | Low |
| IF1 | Local | 1 | 1 | 1 | 1 | 1 | Low | Low |
| | Regional | 1 | 1 | 1 | 1 | 1 | Low | Low |
| IF2 | Local | 1 | 1 | 1 | 1 | 1 | Low | Low |
| | Regional | 1 | 1 | 1 | 1 | 1 | Low | Low |
| IF3 | Local | 1 | 1 | 1 | 1 | 1 | Low | Low |
| | Regional | 1 | 1 | 1 | 1 | 1 | Low | Low |

45-1-2582
45-1-2588
45-1-0045
IF2
QUARTZITE2
45-1-2749
45-1-2587
45-1-2753
45-1-0235
45-1-0242
45-1-0234
45-1-0236
45-1-0241
IF3
AS1
QUARTZITE
IF1
45-1-2795
45-1-2602
45-1-0218
45-1-2723
45-1-2724
45-1-2721
45-1-2720
45-1-2725
45-1-2722
45-1-2601
45-1-0208
45-1-2553

N

## Legend

- MOD 4 Impact Assessment Area
- First MOD 4 Impact Assessment Area
- Previously Surveyed (June 2013)
- Previously Surveyed (May 2015)
- Previously Surveyed (March 2017)
- Previously Surveyed (May 2017)
- Previously Surveyed (September 2017)
- Previously Surveyed (February 2018)
- Previously Surveyed (January 2019 )
- Track Log - Survey 1 - 3/12/2020
- Track Log - Survey 2 - 25/05/2021

***AHIMS by Site Type***

- Stone
- Artefact Scatter
- Artefact Scatte rwith PAD
- Artefact Site (Number Unspecified)
- Isolated Find
- PAD

***RPS Recorded Sites***

- Artefact Scatter
- Isolated Find
- Artefacts

200 100 0 200 400 600 800 1,000 m

SCALE 1: 12,000 AT A3 SIZE

TITLE : FIGURE 3: SURVEY RESULTS

LOCATION : WESTERN COAL SERVICES

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **8/07/2021**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\Arcgis Map Documents\Arch\148221 Figure 3 SurveyResults B A3 20210708.mxd

CLIENT: **CENTENNIAL**
JOB REF: **PR148221**

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## 6.4 Previous Impacts

The Project Area has been subject to previous impacts through the development of MPPS and SCSS. The installation of infrastructure and services adjacent to a highway has disturbed a large area of land. Some AHIMS sites have previously been impacted by works and are now destroyed. As such it is considered the Project Area has largely been disturbed.

## 6.5 Proposed Activity

Springvale Coal is seeking to modify aspects of the water management system at SCSS.

The proposed activity will involve the following works:

- Construction and operation of a new water transfer system (to facilitate the transfer of up to 15.6 ML/day of water from the SCSS to the proposed McPhillamys Gold Project).
- Transfer of up to 2.6 ML/day of water from SCSS to MPPS (for treatment and reuse within MPPS's cooling water system).
- Receipt of raw water from Angus Place Water Transfer System (for use in the coal handling and preparation plant at SCSS).
- Redesign of the on-site water management system at SCSS (to facilitate the transfer of land from Springvale Coal back to EnergyAustralia.
- Additional surface disturbance to facilitate proposed modifications to SCSS's water management system.

## 6.6 Impact Assessment

As AHIMS 45-1-2823 (artefact scatter), IF1, IF2, IF3 and AS1 sit within the Project Area, it is probable that the Aboriginal objects will be impacted during the proposed works. The impact assessment is summarised in **Table 5**. After discussions on site with the RAPs, it was agreed that these sites be salvaged prior to works commencing. No other previously registered AHIMS sites will be impacted during the proposed works.

**Table 7 Impact Assessment of AHIMS sites within the Project Area**

| Sites within the Project Area | | | |
|---|---|---|---|
| **AHIMS** | **Harm** | **Degree** | **Consequence** |
| 45-1-2823 | Direct | Complete | Complete loss of value |
| IF1 (45-1-2848) | Direct | Complete | Complete loss of value |
| IF2 (45-1-2847) | Direct | Complete | Complete loss of value |
| IF3 (45-1-2846) | Direct | Complete | Complete loss of value |
| AS1 (45-1-2845) | Direct | Complete | Complete loss of value |

# 7 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions have been drawn from the available environmental, cultural, and archaeological information for the Project Area as well as the results of the archaeological survey conducted for this assessment.

During the site inspections, five new sites were located, including:

- AHIMS 45-1-2823, which comprises three quartz flakes;
- AS1 (45-1-2845), which comprises one grey and pink tuff flake-core, two broken quartz flakes, one pink quartz flake and two pieces of the same broken white chert blade;
- IF1 (45-1-2848), which comprises a quartzite flake;
- IF2 (45-1-2847), which comprises a chert core; and
- IF3 (45-1-2846), which comprises a potential quartz flake.

The cultural rankings for all sites are Extremely High Cultural Significance. The scientific/archaeological rankings for all sites are Low Local Significance, Low Regional Significance.

The location of the sites are within the proposed development works (the MOD4 impact assessment area depicted in Figures 1.3 and 2) and should be salvaged under the Centennial Western Region ACHMP, together with the RAPs. No other sites were identified during the survey. Considering the significant disturbance in the Project Area, it is considered that sub-surface archaeological potential is low.

### Recommendation 1 Salvage of identified sites

The newly identified AHIMS sites (45-1-2823, IF1, IF2, IF3 and AS1) should be salvaged under the Centennial Western Region ACHMP prior to works commencing. This would be undertaken under section 6.4.1 of the ACHMP. Prior to this occurring, the sites are to be added to the ACHMP.

### Recommendation 2 Recording Keeping

This Aboriginal Cultural Heritage Impact Assessment (ACHIA) must be kept by Springvale Coal so that it can be presented, if needed, as a defence from prosecution under Section 86(2) of the *National Parks and Wildlife Act 1974*.

### Recommendation 3: Unexpected finds procedure, Aboriginal object/s

If unrecorded Aboriginal object/s are identified in the Project Area (MOD4 impact assessment area) during works, all works in the immediate area must cease and the area cordoned off. The area is to be managed in accordance with the procedures outlined in *Centennial's Western Region ACHMP*.

### Recommendation 4: Unexpected finds procedure, historic

If, during the course of development works, suspected historic cultural heritage material is uncovered, work should cease in that area immediately. Protocols under the *Historic Heritage Management Plan – Western Region* are to be followed and works may recommence only when an appropriate and approved management strategy is implemented.

# 8 REFERENCES

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# Appendix A

## Extensive AHIMS Search

# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref/PO Number : PR148221 WCS

Client Service ID : 549109

| SiteID | SiteName | Datum | Zone | Easting | Northing | Context | Site Status | SiteFeatures | SiteTypes | Reports |
|---|---|---|---|---|---|---|---|---|---|---|
| 45-6-2354 | Lamberts Creek 7 | AGD | 56 | 225530 | 6303350 | Open site | Destroyed | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Ms.Jillian Comber,Ms.Laila Haglund | | | | | **Permits** | 405 | |
| 45-6-2355 | Lamberts Creek 6; | AGD | 56 | 225480 | 6303070 | Open site | Destroyed | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Ms.Laila Haglund,Ms.Jillian Comber | | | | | **Permits** | 405 | |
| 45-1-2581 | BP-OS-1 | AGD | 56 | 224391 | 6306376 | Open site | Partially Destroyed | Artefact : - | | |
| | **Contact** | **Recorders** | Central West Archaeological and Heritage Services Pty Ltd,Mr.Nicholas Harrop | | | | | **Permits** | | |
| 45-1-2582 | BP-IF-1 | AGD | 56 | 225130 | 6305840 | Open site | Valid | Artefact : - | | |
| | **Contact** | **Recorders** | Central West Archaeological and Heritage Services Pty Ltd | | | | | **Permits** | | |
| 45-1-2547 | IV-OS-1 | AGD | 56 | 222014 | 6304060 | Open site | Valid | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Mrs.Robynne Mills | | | | | **Permits** | | |
| 45-1-2548 | IV-IF-2 | AGD | 56 | 222850 | 6303590 | Open site | Valid | Artefact : - | Isolated Find | |
| | **Contact** | **Recorders** | Mrs.Robynne Mills | | | | | **Permits** | | |
| 45-1-2549 | IV-OS-3 | AGD | 56 | 222790 | 6303230 | Open site | Valid | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Mrs.Robynne Mills | | | | | **Permits** | | |
| 45-1-2551 | IV-OS-5 | AGD | 56 | 222790 | 6303490 | Open site | Valid | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Mrs.Robynne Mills | | | | | **Permits** | | |
| 45-1-2552 | IV-OS-4 | AGD | 56 | 222810 | 6303400 | Open site | Valid | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Mrs.Robynne Mills | | | | | **Permits** | | |
| 45-1-2553 | IV-OS-6 | AGD | 56 | 223670 | 6302970 | Open site | Valid | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Mrs.Robynne Mills | | | | | **Permits** | | |
| 45-1-2554 | IV-IF-1 | AGD | 56 | 222135 | 6304060 | Open site | Valid | Artefact : - | Isolated Find | |
| | **Contact** | **Recorders** | Mrs.Robynne Mills | | | | | **Permits** | | |
| 45-1-2587 | WC1A | AGD | 56 | 225991 | 6305123 | Open site | Valid | Artefact : 1 | | 98981 |
| | **Contact** Bathurst LALC | **Recorders** | Mr.John Appleton | | | | | **Permits** | | |
| 41-1-0239 | NC-OS2 | AGD | 56 | 226217 | 6306703 | Open site | Partially Destroyed | Artefact : 10, Potential Archaeological Deposit (PAD) : 1 | | |
| | **Contact** Searle | **Recorders** | OzArk Environmental and Heritage Management,Mr.Nicholas James Harrop | | | | | **Permits** | 2225 | |
| 45-1-2588 | NC-OS1 with PAD | AGD | 56 | 225556 | 6305650 | Open site | Valid | Artefact : 10, Potential Archaeological Deposit (PAD) : 1 | | |
| | **Contact** T Russell | **Recorders** | OzArk Environmental and Heritage Management | | | | | **Permits** | | |

**Report generated by AHIMS Web Service on 11/11/2020 for Rps Australia East Pty Ltd Carrington Team Administrator for the following area at Datum :GDA, Zone : 56, Eastings : 222097 - 227090, Northings : 6302482 - 6307462 with a Buffer of 0 meters. Additional Info : Heritage Impact assessment. Number of Aboriginal sites and Aboriginal objects found is 57**

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

| SiteID | SiteName | Datum | Zone | Easting | Northing | Context | Site Status | SiteFeatures | SiteTypes | Reports |
|---|---|---|---|---|---|---|---|---|---|---|
| 45-1-2589 | NC-OS3 | AGD | 56 | 226273 | 6306444 | Open site | Valid | Artefact : 10, Potential Archaeological Deposit (PAD) : 1 | | |
| | **Contact** T Russell | **Recorders** | OzArk Environmental and Heritage Management | | | | | **Permits** | 2225 | |
| 45-1-2590 | NC-OS4 | AGD | 56 | 225959 | 6306703 | Open site | Partially Destroyed | Artefact : 10, Potential Archaeological Deposit (PAD) : 1 | | |
| | **Contact** T Russell | **Recorders** | OzArk Environmental and Heritage Management,Mr.Nicholas Harrop | | | | | **Permits** | 2225 | |
| 45-1-2591 | NC-IF1 | AGD | 56 | 225851 | 6306185 | Open site | Valid | Artefact : 10, Potential Archaeological Deposit (PAD) : 1 | | |
| | **Contact** T Russell | **Recorders** | OzArk Environmental and Heritage Management | | | | | **Permits** | 2225 | |
| 45-1-0045 | Ben Bullen Stone Arrangement;Ben Bullen State Forest; | AGD | 56 | 226800 | 6305600 | Open site | Valid | Stone Arrangement : - | Stone Arrangement | |
| | **Contact** | **Recorders** | Doctor.Susan Mcintyre-Tamwoy | | | | | **Permits** | | |
| 45-1-2753 | Neubecks Creek Open Site 5 | GDA | 56 | 225938 | 6305155 | Open site | Valid | Artefact : 1 | | |
| | **Contact** | **Recorders** | OzArk Environmental and Heritage Management | | | | | **Permits** | | |
| 45-1-2754 | Neubecks Creek Open Site PAD 6 | GDA | 56 | 225164 | 6305870 | Open site | Partially Destroyed | Artefact : 1, Potential Archaeological Deposit (PAD) : 1 | | |
| | **Contact** | **Recorders** | OzArk Environmental and Heritage Management,Mr.Nicholas James Harrop | | | | | **Permits** | | |
| 45-1-2755 | Neubecks Creek Open Site PAD 7 | GDA | 56 | 225338 | 6306253 | Open site | Partially Destroyed | Artefact : 1, Potential Archaeological Deposit (PAD) : 1 | | |
| | **Contact** | **Recorders** | OzArk Environmental and Heritage Management,Mr.Nicholas James Harrop | | | | | **Permits** | | |
| 45-1-2720 | CS SU4-A5 | GDA | 56 | 225945 | 6303776 | Open site | Valid | Artefact : 1 | | |
| | **Contact** | **Recorders** | Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria | | | | | **Permits** | | |
| 45-1-2721 | CS SU4-A4 | GDA | 56 | 225953 | 6303887 | Open site | Valid | Artefact : 1 | | |
| | **Contact** | **Recorders** | Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria | | | | | **Permits** | | |
| 45-1-2722 | CS SU4-A3 | GDA | 56 | 225879 | 6303777 | Open site | Valid | Artefact : 1 | | |
| | **Contact** | **Recorders** | Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria | | | | | **Permits** | | |
| 45-1-2723 | CS SU4-A2 | GDA | 56 | 225959 | 6303943 | Open site | Valid | Artefact : 1 | | |
| | **Contact** | **Recorders** | Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria | | | | | **Permits** | | |
| 45-1-2724 | CS SU4-A1 | GDA | 56 | 225946 | 6303882 | Open site | Valid | Artefact : 1 | | |
| | **Contact** | **Recorders** | Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria | | | | | **Permits** | | |

**Report generated by AHIMS Web Service on 11/11/2020 for Rps Australia East Pty Ltd Carrington Team Administrator for the following area at Datum :GDA, Zone : 56, Eastings : 222097 - 227090, Northings : 6302482 - 6307462 with a Buffer of 0 meters. Additional Info : Heritage Impact assessment. Number of Aboriginal sites and Aboriginal objects found is 57**

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

| SiteID | SiteName | Datum | Zone | Easting | Northing | Context | Site Status | SiteFeatures | SiteTypes | Reports |
|---|---|---|---|---|---|---|---|---|---|---|
| 45-1-2725 | CS SU3-A1 | GDA | 56 | 226166 | 6303832 | Open site | Valid | Artefact : 1 | | |
| Contact | Recorders | Ms.Cheng-Yen Loo,RPS East Australia Pty Ltd - Echuca Victoria | | | | | | Permits | | |
| 45-1-2749 | Neubecks Creek Isolated Find 2 | GDA | 56 | 225787 | 6305480 | Open site | Valid | Artefact : 1 | | |
| Contact | Recorders | OzArk Environmental and Heritage Management | | | | | | Permits | | |
| 45-1-2750 | Neubecks Creek Isolated Find 3 | GDA | 56 | 225963 | 6306832 | Open site | Valid | Artefact : 1 | | |
| Contact | Recorders | OzArk Environmental and Heritage Management | | | | | | Permits | | |
| 45-1-2751 | Neubecks Creek Isolated Find 4 | GDA | 56 | 226044 | 6306350 | Open site | Valid | Artefact : 1 | | |
| Contact | Recorders | OzArk Environmental and Heritage Management | | | | | | Permits | | |
| 45-1-2752 | Neubecks Creek IF-8 with PAD | GDA | 56 | 225257 | 6306096 | Open site | Partially Destroyed | Artefact : 1, Potential Archaeological Deposit (PAD) : 1 | | |
| Contact | Recorders | OzArk Environmental and Heritage Management,Mr.Nicholas James Harrop | | | | | | Permits | | |
| 45-1-0066 | Pipers Flat;Ivanhoe Colliery; | AGD | 56 | 222760 | 6303710 | Open site | Valid | Artefact : - | Open Camp Site | |
| Contact | Recorders | Ms.Laila Haglund | | | | | | Permits | | |
| 45-1-0067 | Pipers Flat Ivanhoe Colliery | AGD | 56 | 222700 | 6303780 | Open site | Valid | Artefact : - | Open Camp Site | 387 |
| Contact | Recorders | ASRSYS | | | | | | Permits | | |
| 45-1-0068 | Avondale; | AGD | 56 | 222150 | 6305000 | Open site | Valid | Artefact : - | Open Camp Site | |
| Contact | Recorders | Ms.Laila Haglund | | | | | | Permits | | |
| 45-1-0207 | S8;Blackmans Flat; | AGD | 56 | 226520 | 6303050 | Open site | Valid | Artefact : - | Open Camp Site | 2300 |
| Contact | Recorders | Elizabeth Rich,Alice Gorman | | | | | | Permits | | |
| 45-1-0208 | S5;Blackmans Flat; | AGD | 56 | 225550 | 6303050 | Open site | Valid | Artefact : - | Open Camp Site | 2300 |
| Contact | Recorders | Elizabeth Rich | | | | | | Permits | 361 | |
| 45-1-0209 | S4;Wallerawang; | AGD | 56 | 226300 | 6302550 | Open site | Valid | Artefact : - | Open Camp Site | 2300 |
| Contact | Recorders | Elizabeth Rich | | | | | | Permits | | |
| 45-1-0210 | S3;Wallerawang; | AGD | 56 | 226600 | 6302350 | Open site | Valid | Artefact : - | Open Camp Site | 2300 |
| Contact | Recorders | Elizabeth Rich | | | | | | Permits | 472 | |
| 45-1-0215 | Lamberts Ck 5;Mt Piper; | AGD | 56 | 225300 | 6302480 | Open site | Valid | Artefact : - | Open Camp Site | 2294 |
| Contact | Recorders | Helen Brayshaw,Ms.Laila Haglund | | | | | | Permits | | |
| 45-1-0216 | Neubecks Creek 2; | AGD | 56 | 225594 | 6305876 | Open site | Partially Destroyed | Artefact : - | Open Camp Site | |
| Contact | Recorders | Helen Brayshaw,Ms.Laila Haglund,Mr.Nicholas James Harrop | | | | | | Permits | | |
| 45-1-0217 | Neubeck Creek 1; | GDA | 56 | 224774 | 6306112 | Open site | Destroyed | Artefact : - | Open Camp Site | |
| Contact | Recorders | Helen Brayshaw,Ms.Laila Haglund | | | | | | Permits | 2225 | |
| 45-1-0218 | 57 - Blackmans Flat; | AGD | 56 | 224400 | 6303650 | Open site | Valid | Artefact : - | Open Camp Site | |
| Contact | Recorders | Mr.Neville Baker,Elizabeth Rich | | | | | | Permits | | |

**Report generated by AHIMS Web Service on 11/11/2020 for Rps Australia East Pty Ltd Carrington Team Administrator for the following area at Datum :GDA, Zone : 56, Eastings : 222097 - 227090, Northings : 6302482 - 6307462 with a Buffer of 0 meters. Additional Info : Heritage Impact assessment. Number of Aboriginal sites and Aboriginal objects found is 57**

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| SiteID | SiteName | Datum | Zone | Easting | Northing | Context | Site Status | SiteFeatures | SiteTypes | Reports |
|---|---|---|---|---|---|---|---|---|---|---|
| 45-1-0234 | Western main 2; | AGD | 56 | 226020 | 6304680 | Open site | Valid | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Helen Brayshaw | | | | | **Permits** | 427 | |
| 45-1-0236 | Western main 1; same as 45-1-0241 | AGD | 56 | 226060 | 6304580 | Open site | Valid | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Helen Brayshaw | | | | | **Permits** | 428 | |
| 45-1-0238 | Mount Piper; | AGD | 56 | 222590 | 6302870 | Closed site | Valid | Artefact : -, Art (Pigment or Engraved) : -, Grinding Groove : - | Axe Grinding Groove,Shelter with Art,Shelter with Deposit | 2907 |
| | **Contact** | **Recorders** | Helen Brayshaw,Mary Dallas Consulting Archaeologists (MDCA) | | | | | **Permits** | | |
| 45-1-0242 | Western main 3, same as 45-1-0235 | AGD | 56 | 225630 | 6304830 | Open site | Valid | Artefact : - | Open Camp Site | 2501 |
| | **Contact** | **Recorders** | Helen Brayshaw | | | | | **Permits** | | |
| 45-1-0243 | S12;Springvale Colliery; | AGD | 56 | 224970 | 6303900 | Open site | Destroyed | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | ASRSYS | | | | | **Permits** | 467 | |
| 45-1-0244 | S13;Springvale Colliery; | AGD | 56 | 224750 | 6304040 | Open site | Destroyed | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Elizabeth Rich,E Boney | | | | | **Permits** | 467 | |
| 45-1-0203 | S6;Blackmans Flat; | AGD | 56 | 225180 | 6303220 | Open site | Destroyed | Artefact : - | Open Camp Site | 2300 |
| | **Contact** | **Recorders** | S Fields,Elizabeth Rich | | | | | **Permits** | | |
| 45-1-0019 | Irondale; | AGD | 56 | 225500 | 6302750 | Closed site | Valid | Artefact : -, Grinding Groove : - | Axe Grinding Groove,Shelter with Deposit | |
| | **Contact** | **Recorders** | R Miller | | | | | **Permits** | | |
| 45-1-2550 | IV-OS-2 | AGD | 56 | 222130 | 6303520 | Open site | Valid | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Mrs.Robynne Mills | | | | | **Permits** | | |
| 45-1-2601 | SVW-OS1 with PAD | AGD | 56 | 225796 | 6303196 | Open site | Valid | Artefact : 6 | | |
| | **Contact** | **Recorders** | Bathurst LALC,Doctor.Jodie Benton,Mr.Phillip Cameron | | | | | **Permits** | | |
| 45-1-2602 | WCU1 | GDA | 56 | 223989 | 6303882 | Open site | Valid | Artefact : 1 | | |
| | **Contact** Searle | **Recorders** | Navin Officer Heritage Consultants Pty Ltd | | | | | **Permits** | | |
| 45-1-0235 | Western main 3; same as 45-1-0242 | AGD | 56 | 225630 | 6304830 | Open site | Valid | Artefact : - | Open Camp Site | |
| | **Contact** | **Recorders** | Helen Brayshaw | | | | | **Permits** | 428 | |
| 45-1-0241 | Western main 1, same as 45-1-0236 | AGD | 56 | 226060 | 6304580 | Open site | Valid | Artefact : - | Open Camp Site | 2501 |
| | **Contact** | **Recorders** | Helen Brayshaw | | | | | **Permits** | | |
| 45-1-2795 | BF JN 1 IF - Blackmans Flat IF | GDA | 56 | 225191 | 6304132 | Open site | Valid | Artefact : - | | |
| | **Contact** | **Recorders** | RPS Australia East Pty Ltd - Hamilton,Ms.Jo Nelson | | | | | **Permits** | | |
| 19-5-0218 | PF3 | GDA | 56 | 223371 | 6302484 | Open site | Valid | Artefact : -, Modified Tree (Carved or Scarred) : - | | |

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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref/PO Number : PR148221 WCS

Client Service ID : 549109

| SiteID | SiteName | Datum | Zone | Easting | Northing | Context | Site Status | SiteFeatures | SiteTypes | Reports |
|---|---|---|---|---|---|---|---|---|---|---|
| Contact | | Recorders | Navin Officer Heritage Consultants Pty Ltd,Mrs.Nicola Hayes,Onsite Cultural Herita | | | | Permits | | | |

**Report generated by AHIMS Web Service on 11/11/2020 for Rps Australia East Pty Ltd Carrington Team Administrator for the following area at Datum :GDA, Zone : 56, Eastings : 222097 - 227090, Northings : 6302482 - 6307462 with a Buffer of 0 meters. Additional Info : Heritage Impact assessment. Number of Aboriginal sites and Aboriginal objects found is 57**

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# Appendix B

## Site Cards

# Aboriginal Site Recording Form

**AHIMS Registrar**
**PO Box 1967, Hurstville 2220 NSW**

**AHIMS site ID:** 45-1-2823 **Date recorded:** 16-12-2020

## Site Location Information

**Site name:** RPS Artefact Scatter QFlake1

**Easting:** 224843 **Northing:** 6304251 **Coordinates must be in GDA (MGA)**

**Horizontal Accuracy (m):** 10

**Zone:** 56 **Location method:** Non-Differential GPS

## Recorder Information

(The person responsible for the completion and submission of this form)

| Title | Surname | First name |
|---|---|---|
| Ms. | Morris | Kate |

**Organisation:** RPS Australia Asia Pacific

**Address:** Unit 2A, 45 Fitzroy Street, Carrington NSW

**Phone:** 0249404200 **E-mail:** kate.morris@rpsgroup.com.au

## Site Context Information

**Land Form Pattern:** Rolling Hills **Land Use:** Mining

**Land Form Unit:** Slope **Vegetation:** Open Forest

**Distance to Water (m):** 10 **Primary Report:**

**How to get to the site:** Within Western Coal Services boundary, entrance off Castlereagh Highway

**Other site information:**

## Site location map

## Site contents information

**open/closed site:** Open

**Site condition:** Disturbed

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 1. Artefact | 4 | 3 | 3 | | | | |

Description:

4 quartz flakes, artefact scatter

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 2. | | | | | | | |

Description:

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 3. | | | | | | | |

Description:

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 4. | | | | | | | |

Description:

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 5. | | | | | | | |

Description:

Other Site Info:

## Site plan

## Site photographs

Description: 3 quartz flakes

Description: 1 quartz flake

Description: View North-west

Description: Artefact scatter 'QFlake1' site

## Site restrictions

**Do you want to Restrict this site?:**

**Restriction type:** Gender General Location

**Why is this site restricted?:**

## Further information contact

**Title** **Surname** **First name**

**Organisation:**

**Address:**

**Phone:** **E-mail:**

# Aboriginal Site Recording Form

**AHIMS Registrar**
**PO Box 1967, Hurstville 2220 NSW**

**AHIMS site ID:** 45-1-2845 **Date recorded:** 31-08-2021

## Site Location Information

**Site name:** MOD4_AS1_KM

**Easting:** 224843 **Northing:** 6304243 **Coordinates must be in GDA (MGA)**

**Horizontal Accuracy (m):** 10

**Zone:** 56 **Location method:** Phone GPS

## Recorder Information

(The person responsible for the completion and submission of this form)

| Title | Surname | First name |
|---|---|---|
| Ms. | Morris | Kate |

**Organisation:** RPS Australia Asia Pacific

**Address:** Unit 2A, 45 Fitzroy Street, Carrington NSW

**Phone:** 0249404200 **E-mail:** kate.morris@rpsgroup.com.au

## Site Context Information

**Land Form Pattern:** Rolling Hills **Land Use:** Mining

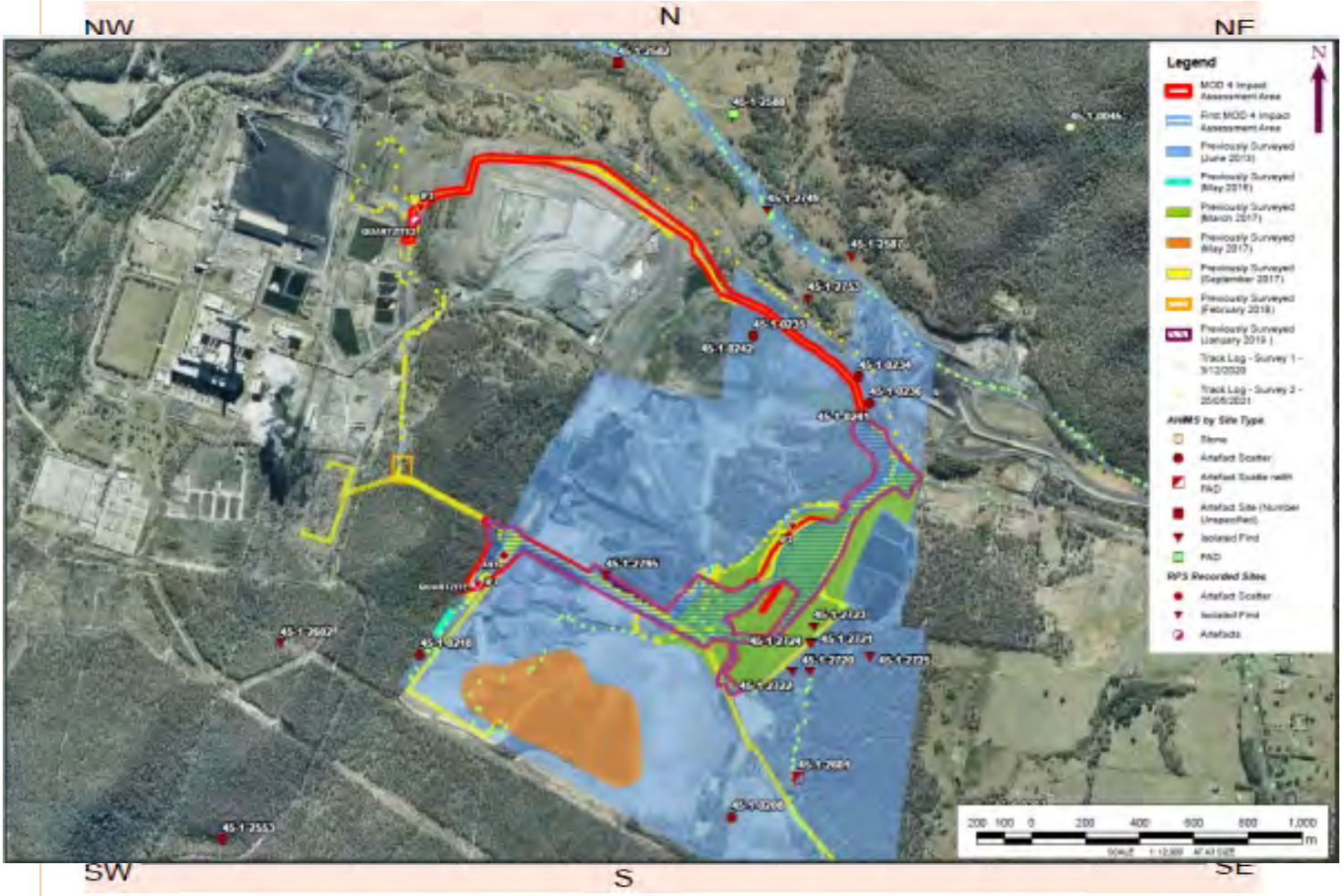
**Land Form Unit:** Slope **Vegetation:** Open Forest

**Distance to Water (m):** 10 **Primary Report:**

**How to get to the site:** Within Western Coal Services boundary, entrance off Castlereagh Highway

**Other site information:** This site is adjacent to AHIMS 45-1-2823 and is likely all one scatter (the same site), however these 6 artefacts were mostly on the roadway edge while 45-1-2823 is located on the grassy wooded area

## Site location map




## Site contents information

**open/closed site:** Open

**Site condition:** Disturbed

| Features: | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Regrowth (cm) | Scar shape | Tree Species |
|---|---|---|---|---|---|---|---|
| 1. Artefact | 6 | 25 | 2 | | | | |

Description:

AS1, the artefact scatter, comprised one grey and pink tuff flake-core, two broken quartz flakes, one pink quartz flake, and two pieces of the same broken white chert blade. These six artefacts were likely not in situ as most were located on the track and the others were in close proximity to it.

| Features: | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Regrowth (cm) | Scar shape | Tree Species |
|---|---|---|---|---|---|---|---|
| 2. | | | | | | | |

Description:

| Features: | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Regrowth (cm) | Scar shape | Tree Species |
|---|---|---|---|---|---|---|---|
| 3. | | | | | | | |

Description:

| Features: | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Regrowth (cm) | Scar shape | Tree Species |
|---|---|---|---|---|---|---|---|
| 4. | | | | | | | |

Description:

| Features: | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Regrowth (cm) | Scar shape | Tree Species |
|---|---|---|---|---|---|---|---|
| 5. | | | | | | | |

Description:

Other Site Info: This site is adjacent to AHIMS 45-1-2823 and is likely all one scatter (the same site), however these 6 artefacts were mostly on the roadway edge while 45-1-2823 is located on the grassy wooded area

## Site plan

## Site photographs

Description: Grey and pink tuff flake-core

Description: Two broken quartz flakes

Description: One pink quartz flake

Description: Two pieces of the same broken white chert blade refitted

## Site restrictions

**Do you want to Restrict this site?:**

**Restriction type:** Gender ☐ General ☐ Location ☐

**Why is this site restricted?:**

## Further information contact

| Title | Surname | First name |
|---|---|---|
| | | |

**Organisation:**

**Address:**

**Phone:** **E-mail:**

# Aboriginal Site Recording Form

**AHIMS Registrar**
**PO Box 1967, Hurstville 2220 NSW**

**AHIMS site ID:** 45-1-2846 **Date recorded:** 31-08-2021

## Site Location Information

**Site name:** MOD4_IF3_KM

**Easting:** 225879 **Northing:** 6304312 **Coordinates must be in GDA (MGA)**

**Horizontal Accuracy (m):** 10

**Zone:** 56 **Location method:** Phone GPS

## Recorder Information

(The person responsible for the completion and submission of this form)

| Title | Surname | First name |
|---|---|---|
| Ms. | Morris | Kate |

**Organisation:** RPS Australia Asia Pacific

**Address:** Unit 2A, 45 Fitzroy Street, Carrington NSW

**Phone:** 0249404200 **E-mail:** kate.morris@rpsgroup.com.au

## Site Context Information

**Land Form Pattern:** Rolling Hills **Land Use:** Mining

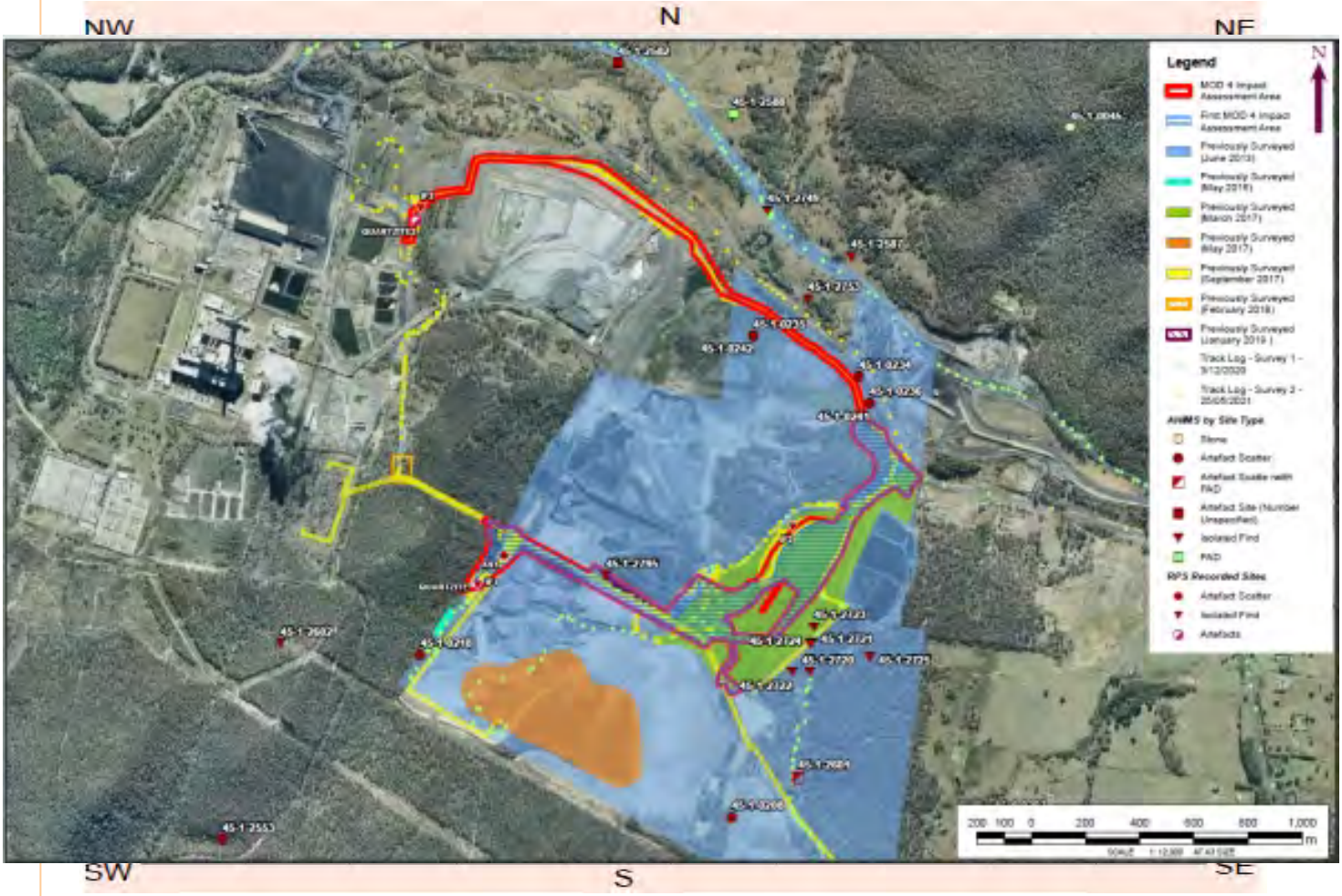
**Land Form Unit:** Slope **Vegetation:** Revegetated

**Distance to Water (m):** 150 **Primary Report:**

**How to get to the site:** Within Western Coal Services Boundary, near the Castlereagh entrance

**Other site information:** IF3 approximately 40m down slope of the dirt track. On a mid slope of an area being re-vegetated with mulch and stakes surrounding the site

## Site location map




## Site contents information

**open/closed site:** Open

**Site condition:** Disturbed

**Features:**

| | | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|---|
| 1. | Artefact | 1 | 1 | 1 | | | | |

Description:

Potential quartz flake, dimensions: 5x3x1.5cm

**Features:**

| | | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|---|
| 2. | | | | | | | | |

Description:

| Features: | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Regrowth (cm) | Scar shape | Tree Species |
|---|---|---|---|---|---|---|---|
| 3. | | | | | | | |

Description:

| Features: | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Regrowth (cm) | Scar shape | Tree Species |
|---|---|---|---|---|---|---|---|
| 4. | | | | | | | |

Description:

| Features: | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Regrowth (cm) | Scar shape | Tree Species |
|---|---|---|---|---|---|---|---|
| 5. | | | | | | | |

Description:

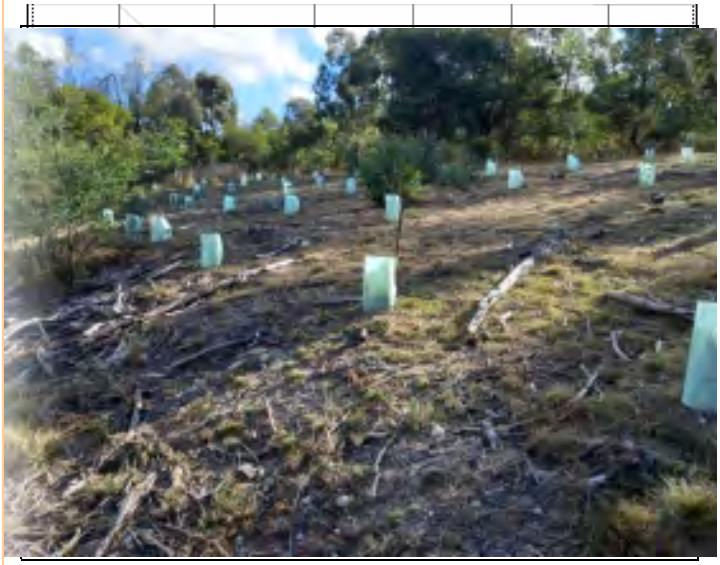
Other Site Info: IF3 approximately 40m down slope of the dirt track. On a mid slope of an area being re-vegetated with mulch and stakes surrounding the site

## Site plan

## Site photographs

Description: Potential quartz flake, IF3

Description: IF3 location marked out with spray paint for Centennial staff to identify for fencing off



Description: Site context - re-vegetated area

Description: Site context - midslope

## Site restrictions

**Do you want to Restrict this site?:**

**Restriction type:** Gender ☐ General ☐ Location ☐

**Why is this site restricted?:**

## Further information contact

**Title** **Surname** **First name**

**Organisation:**

**Address:**

**Phone:** **E-mail:**

# Aboriginal Site Recording Form

**AHIMS Registrar**
**PO Box 1967, Hurstville 2220 NSW**

**AHIMS site ID:** 45-1-2847 **Date recorded:** 31-08-2021

## Site Location Information

**Site name:** MOD4_IF2_KM

**Easting:** 224508 **Northing:** 6305493 **Coordinates must be in GDA (MGA)**

**Horizontal Accuracy (m):** 10

**Zone:** 56 **Location method:** Phone GPS

## Recorder Information

(The person responsible for the completion and submission of this form)

| Title | Surname | First name |
|---|---|---|
| Ms. | Morris | Kate |

**Organisation:** RPS Australia Asia Pacific

**Address:** Unit 2A, 45 Fitzroy Street, Carrington NSW

**Phone:** 0249404200 **E-mail:** kate.morris@rpsgroup.com.au

## Site Context Information

**Land Form Pattern:** Rolling Hills **Land Use:** Mining

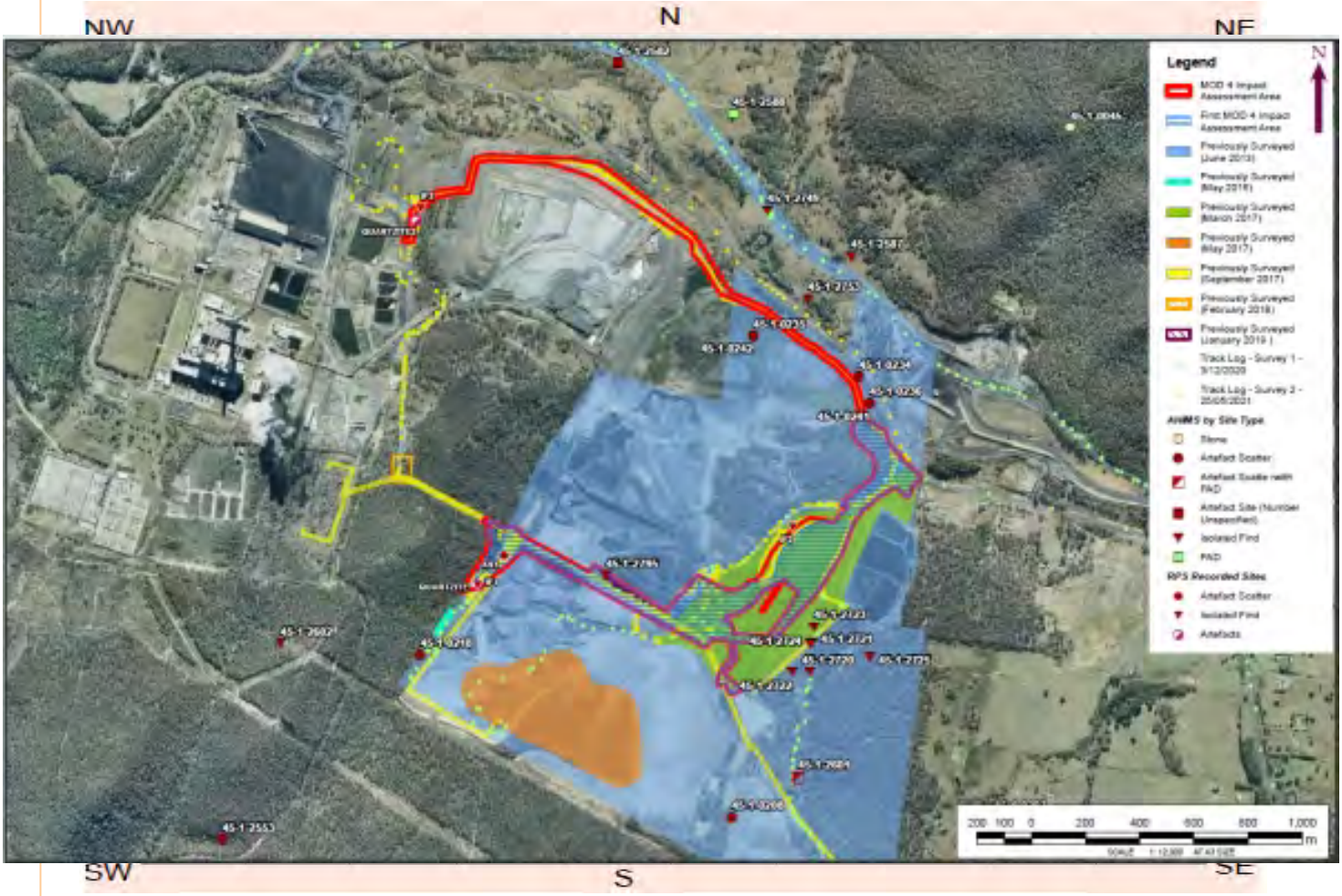
**Land Form Unit:** Slope **Vegetation:** Open Woodland

**Distance to Water (m):** 500 **Primary Report:**

**How to get to the site:** Within the Western Coal Services boundary, off Castlereagh Highway

**Other site information:** The white chert core was located next to a very highly disturbed area with imported gravel, roadway, and machinery. The core is located at the top of a grassy slope overlooking the road (approx 20m to the west)

## Site location map




## Site contents information

**open/closed site:** Open

**Site condition:** Disturbed

**Features:**

| | | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|---|
| 1. | Artefact | 1 | 1 | 1 | | | | |

Description:

White chert core, isolated find

**Features:**

| | | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|---|
| 2. | | | | | | | | |

Description:

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 3. | | | | | | | |

Description:

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 4. | | | | | | | |

Description:

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 5. | | | | | | | |

Description:

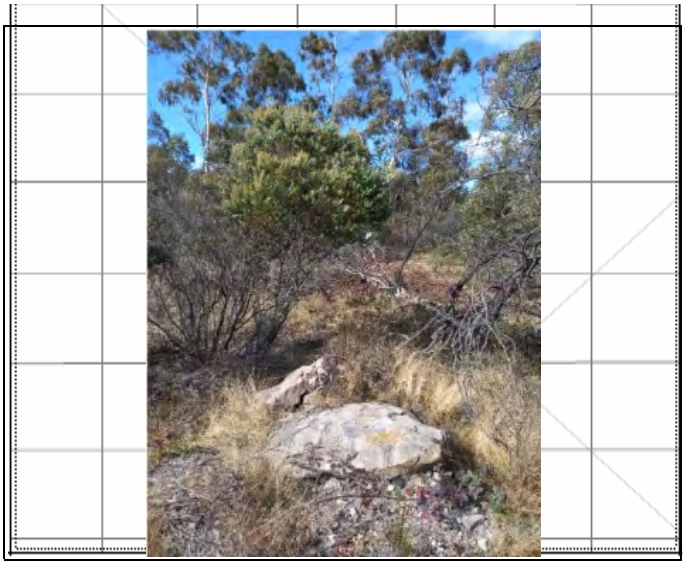
Other Site Info: The white chert core was located next to a very highly disturbed area with imported gravel, roadway, and machinery. The core is located at the top of a grassy slope overlooking the road (approx 20m to the west)

## Site plan

## Site photographs

Description: Isolated find 2, white chert core

Description: Site location



Description: Location of IF1, white chert core

Description: Site context, machinery and roadway in right of image and slope upwards with open woodland in left

## Site restrictions

**Do you want to Restrict this site?:**

**Restriction type:** Gender General Location

**Why is this site restricted?:**

## Further information contact

**Title** **Surname** **First name**

**Organisation:**

**Address:**

**Phone:** **E-mail:**

# Aboriginal Site Recording Form

**AHIMS Registrar**
**PO Box 1967, Hurstville 2220 NSW**

**AHIMS site ID:** 45-1-2848 **Date recorded:** 31-08-2021

## Site Location Information

**Site name:** MOD4_IF1_KM

**Easting:** 224720 **Northing:** 6304103 **Coordinates must be in GDA (MGA)**

**Horizontal Accuracy (m):** 10

**Zone:** 56 **Location method:** Phone GPS

## Recorder Information

(The person responsible for the completion and submission of this form)

| Title | Surname | First name |
|---|---|---|
| Ms. | Morris | Kate |

**Organisation:** RPS Australia Asia Pacific

**Address:** Unit 2A, 45 Fitzroy Street, Carrington NSW

**Phone:** 0249404200 **E-mail:** kate.morris@rpsgroup.com.au

## Site Context Information

**Land Form Pattern:** Rolling Hills **Land Use:** Mining

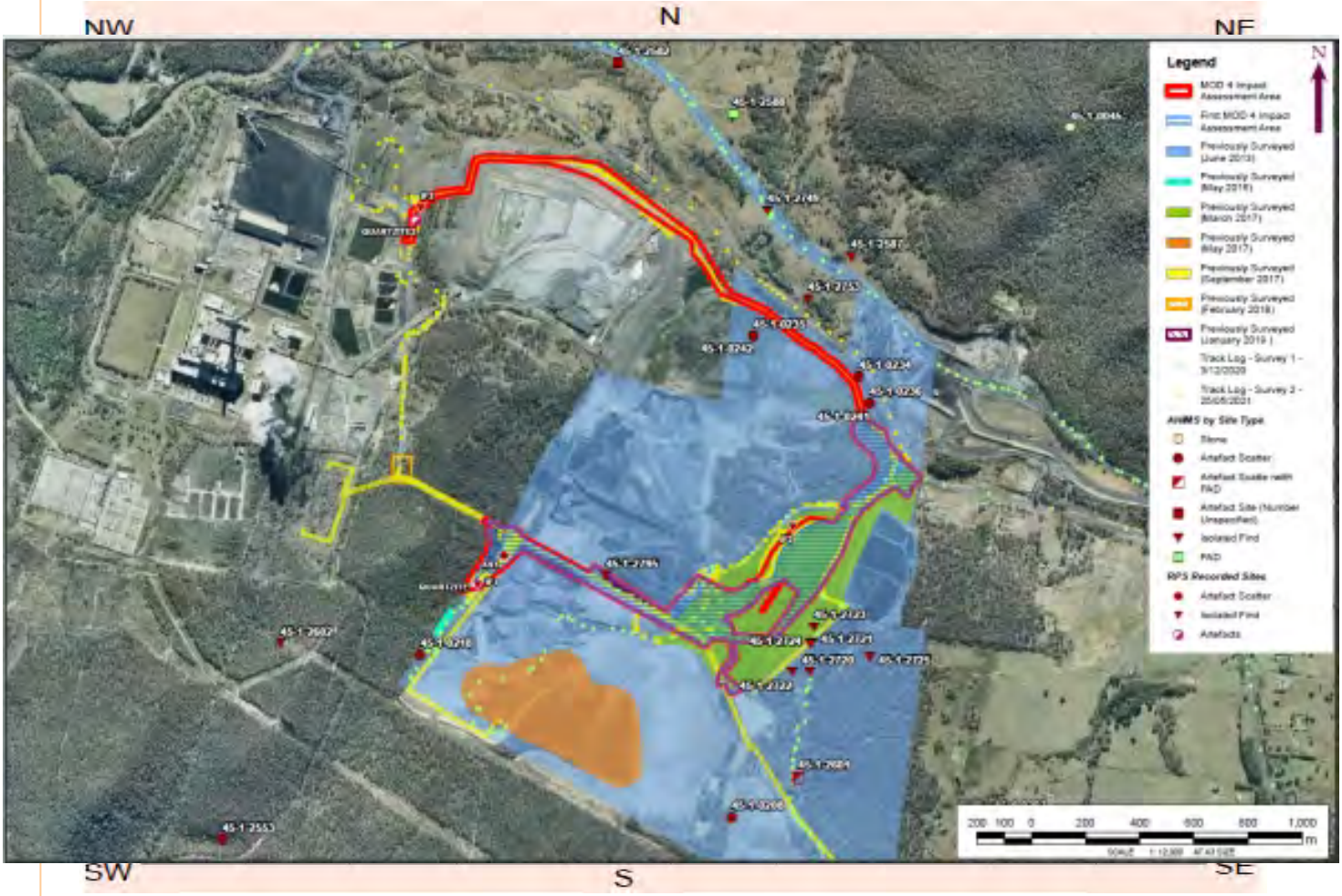
**Land Form Unit:** Slope **Vegetation:** Open Woodland

**Distance to Water (m):** 10 **Primary Report:**

**How to get to the site:** Within Western Coal Services boundary, entrance off Castlereagh Highway

**Other site information:** Located over 20m from an artefact scatter to the north, sitting on the grass between a dirt track and a wooded grassy area with a stream that runs parallel to the track. Dorsal scars present

## Site location map




## Site contents information

**open/closed site:** Open

**Site condition:** Disturbed

**Features:**

| | | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|---|
| 1. | Artefact | 1 | 1 | 1 | | | | |

Description:

Grey quartzite flake, dimensions: 6x4x1cm

**Features:**

| | | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|---|
| 2. | | | | | | | | |

Description:

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 3. | | | | | | | |

Description:

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 4. | | | | | | | |

Description:

**Features:**

| | Number of features | Length of feature(s) extent (m) | Width of feature (s) extent (m) | Scarred Trees: Scar Depth (cm) | Scarred Trees: Regrowth (cm) | Scarred Trees: Scar shape | Scarred Trees: Tree Species |
|---|---|---|---|---|---|---|---|
| 5. | | | | | | | |

Description:

Other Site Info: Located over 20m from an artefact scatter to the north, sitting on the grass between a dirt track and a wooded grassy area with a stream that runs parallel to the track. Dorsal scars present

## Site plan

## Site photographs

Description: Isolated Find 1, Quartzite flake ventral surface

Description: Isolated Find 1, Quartzite flake dorsal surface

Description: IF1, Grey quartzite flake

Description: Site context of IF1

## Site restrictions

**Do you want to Restrict this site?:**

**Restriction type:** Gender ☐ General ☐ Location ☐

**Why is this site restricted?:**

## Further information contact

**Title** **Surname** **First name**

**Organisation:**

**Address:**

**Phone:** **E-mail:**

# Appendix C
# Consultation Documents

7 May 2020

To whom it may concern,

**RE: Western Coal Services - Modification to Water Management System**

We wrote to you in November 2020 regarding works proposed at Centennial's Springvale Coal Services Site (SCSS) which included an invitation to attend a site heritage survey on Thursday 3 December 2020. As part of the project, Springvale Coal is seeking to modify aspects of the water management system at the Springvale Coal Services Site (SCSS) which will involve surface disturbance activities to facilitate the proposed upgrades.

Since the initial survey was completed, further design work has been undertaken with additional surface disturbance proposed in order to facilitate the modification. Part of these disturbance areas are situated on land owned by EnergyAustralia at the Mount Piper Power Station. Figure 1 illustrates the new disturbance areas which are in purple excluding the purple areas within the red boundary as these areas were surveyed previously in December 2020.

As a registered Aboriginal party, we would like to invite your organisation to attend a heritage survey of the new disturbance areas at the SCSS. This survey will be coordinated by heritage consultants from RPS Australia East Pty Ltd and is scheduled for Tuesday 25 May 2021.

Should you wish to provide a representative to participate in this heritage survey, could you please provide your representative's details to me via email iain.hornshaw@centennialcoal.com.au by 5pm Thursday 20 May 2021.

For those participating in the heritage survey the following will apply:

- In relation to COVID-19
    - Please do not attend if you are feeling unwell.
    - Social distancing is to be maintained.
    - On arrival you will have your temperate taken and asked a number of questions in relation to COVID-19. Whilst on site all participants must adhere to the COVID-19 procedures that are in place to maintain safety.
    - You must complete the attached Mt Piper COVID-19 Response Form (Attachment 1).
- Personal protection equipment
    - Participants must wear long pants and long sleeves with high visibility (or a high-vis vest over the jacket).

**Centennial Springvale Pty Limited**
ABN 64 052 096 812
**Springvale Coal Pty Limited**
ABN 39 052 096 769

PO Box 198
Wallerawang NSW 2845
T. +61 02 6350 1600
E: info@centennialcoal.com.au
www.centennialcoal.com.au

- Steel toe capped shoes, safety glasses and a hard hats are required.
- Each individual is responsible for their own food and water.

- Standard Payment Terms and Conditions
  - Flat rate of $1,000 per group per day.
  - Travel costs to be reimbursed at the current ATO rate.
  - Invoices are to be submitted within 30 days of the date of the inspection.

Representatives participating in the inspection are requested to meet in the carpark at the Springvale Coal Services Site located off the Castlereagh Highway, Blackmans Flat (refer Figure 2).

For any further information I can be contacted either by phone (02) 4935 8901 or email iain.hornshaw@centennialcoal.com.au.

Yours sincerely

**Iain Hornshaw**
Approvals Manager

**Figure 1 – Proposed disturbance areas requiring survey (purple excluding areas within the red boundary).**

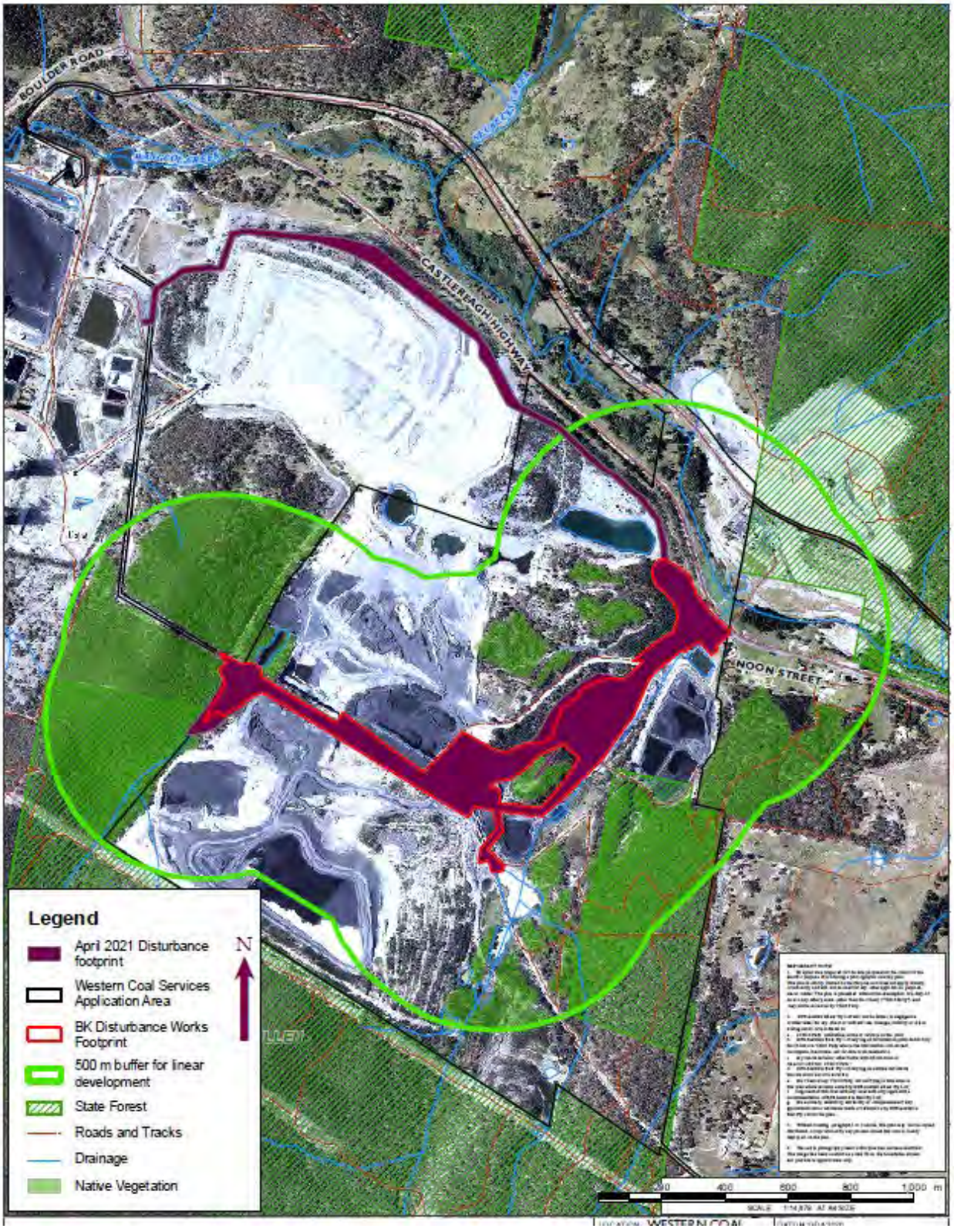


**Figure 2 – Map and directions to Springvale Coal Services Site**

**Attachment 1 - EnergyAustralia Mt Piper COVID-19 Response Form**

EnergyAustralia

Mt Piper Power Station - Daily Prestart Wellness Questionnaire

Date: _____ Section / Individual name: _____

If the responses to any of these questions draw attention to a person's health or infection and contact status, then ask them to please remain separate and notify the safety team. Forward this form to the safety team only if the results require safety team attention.

eansw.ohs@energyaustralia.com.au

Are you/anyone feeling unwell today ? (If not well, stay home) Yes / No
If an underlying (diagnosed) non transmissible condition also has these symptoms, has there been a change in the symptom recently ? Yes / No

| Is anyone experiencing respiratory, cold or flu like symptoms such as: | Yes | No |
|---|---|---|
| Shortness of breath | | |
| Cough | | |
| Sore/scratchy throat; | | |
| Fever | | |
| Fatigue | | |
| Have you taken pain relief in the last 24 hours e.g. Aspirin, Paracetamol, Ibuprofen (Important, as these can mask COVID symptoms). | | |

**Contact with Potential COVID carriers.**

| | Yes | No |
|---|---|---|
| Have you/anyone been recently in a NSW, or interstate "hot spot" that requires monitoring of symptoms, or a COVID test. https://www.nsw.gov.au/covid-19/latest-news-and-updates | | |
| Have you/anyone been in contact with anyone that is suspected of having COVID 19, or has been tested for COVID 19 and is awaiting results of testing ? | | |
| Have you/anyone been in contact with a person that has travelled from overseas or interstate in the past fortnight, and not undertaken quarantine ? | | |

Follow current site protocols for management of infection

- EnergyAustralia advice is that if you are not well, or have experienced a change in already understood symptoms, you should stay at home.
- Social distancing, make sure you keep a safe distance (> 1.5 metres) between people, observe signage.
- Wash your hands and face with soap and water for 20 sec and use hand sanitiser.
- Clean shared surfaces and tools before and after use
- Cough and sneeze into your sleeve
- If potential COVID symptoms appear during the course of the day, initiate the protocols for a person becoming ill at work. (Objective Reference A1663462).

WELLINGTON VALLEY WIRADJURI
ABORIGINAL CORPORATION

P.O. Box 1583
Orange NSW 2800
ABN: 77 548 143 187
ICN: 7398
WVWAC@hotmail.com

16 August 2021

James Wearne
Centennial Coal

**Re: Aboriginal Heritage Impact Assessment, Western Coal Services MOD4, Springvale Coal Services Site. Dated 23 July 2021.**

Dear James,

Wellington Valley Wiradjuri Aboriginal Corporation (WVWAC) would like to thank you for your invitation to provide a response for This Aboriginal Cultural Heritage issue relevant to obligations to protect our Heritage within our Traditional Lands. Wellington Valley Wiradjuri represent the fourteen traditional families with identified apical ancestry pre European occupation with our known Traditional Lands. We know our culture, country and continue with our association with our traditional lands (Ngurangbang).

WVWAC object to any other non-traditional aboriginal organizations or people taking part in site surveys, consultation and assessments within our defined Traditional Lands. These non-traditional people and groups are outsiders under Traditional Lore and have no right to advise on or to be present during consultation or site visits as they do not possess the specific traditional knowledge in relation to these lands or sites. These participants may be indigenous and may live locally within the region however, this still does not give them the right to disregard Traditional Lore and values.

Wellington Valley Wiradjuri Aboriginal Corporation (WVWAC) have through consultation with other Traditional Elders and Traditional Community with cultural knowledge have the following comments and or recommendations:

- WVWAC Elders, Members, Directors and Field Officers have reviewed the Aboriginal Heritage Impact Assessment, Western Coal Services MOD4, Springvale Coal Services Site. Dated 23 July 2021, WVWAC Agree to the findings and Recommendations of this Report.

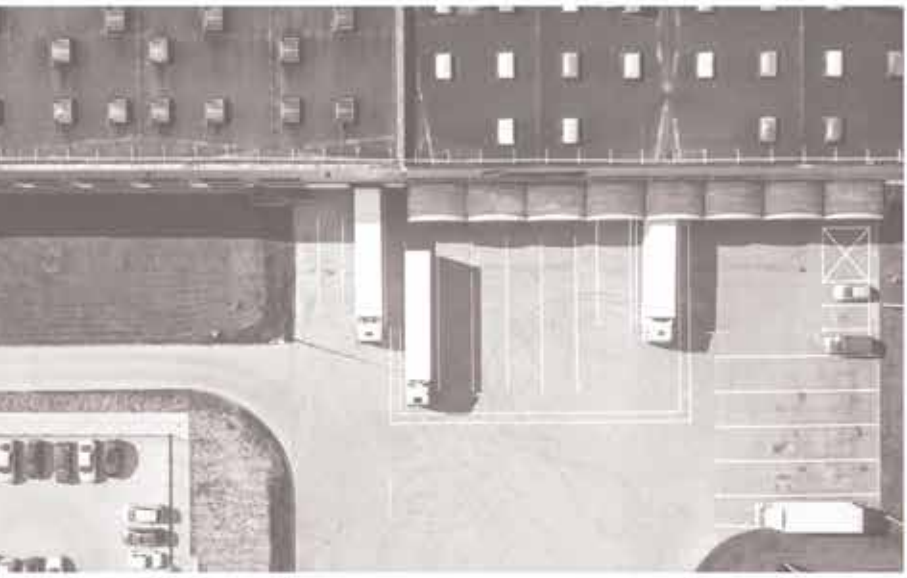
WVWAC look forward to further participating in the above project, sharing our knowledge of county and to ensure our Heritage is protected. We trust our response meets your requirements. Please contact WVWAC Directors should you require our assistance to address any Aboriginal issues to support your future plans.

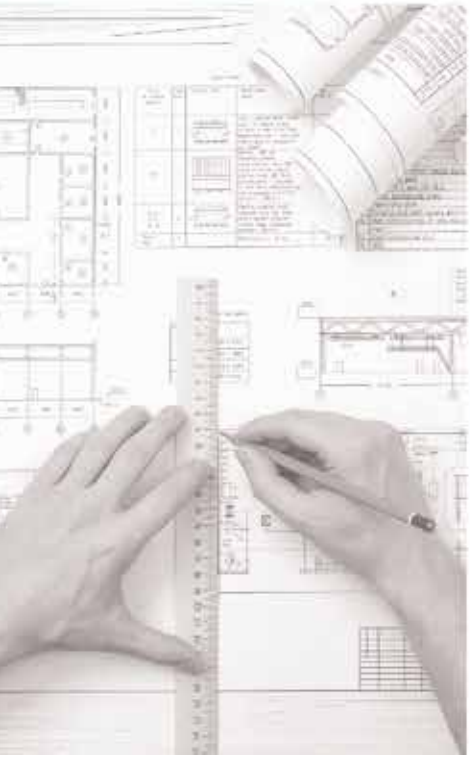
Regards,

Bradley R. Bliss J.P.
WVWAC CEO and Contact Officer
Gallanggabang Aboriginal Corporation Director
Senior Aboriginal Cultural Heritage Field Officer
Senior Aboriginal Cultural Mentor and Educator
Traditional Owner Clan Descendant
Mobile: 0427321016

# Appendix E

## Biodiversity development assessment report





# WESTERN COAL SERVICES: MOD 4

## Biodiversity Development Assessment Report

148221
V1
26 November 2021

rpsgroup.com

| Document status | | | | | |
|---|---|---|---|---|---|
| **Version** | **Purpose of document** | **Authored by** | **Reviewed by** | **Approved by** | **Review date** |
| V0 | Client review | Hayden Beck | Mark Aitkens | Mark Aitkens | 3/11/2021 |
| V1 | Final following client review | Hayden Beck | Mark Aitkens | Mark Aitkens | 26/11/2021 |

**This BDAR has been certified by:**

Dr Hayden Beck (Accredited BAM Assessor – BAAS19000) 26 November 2021

This report was prepared by RPS within the terms of RPS' engagement with its client and in direct response to a scope of services. This report is supplied for the sole and specific purpose for use by RPS' client. The report does not account for any changes relating the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report. RPS does not accept any responsibility or liability for loss whatsoever to any third party caused by, related to or arising out of any use or reliance on the report.

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# Contents

**Stage 1 Biodiversity Assessment** ..... **1**

**1 INTRODUCTION TO STAGE 1 – BIODIVERSITY ASSESSMENT** ..... **2**
1.1 Project Description ..... 2
1.1.1 Proposed Modification Elements ..... 3
1.2 Project Area Particulars ..... 3
1.3 Sources of information used in assessment ..... 4
1.4 Identification of assessment method applied ..... 4
1.5 Staff Qualifications ..... 4
1.6 Definitions ..... 5

**2 LANDSCAPE CONTEXT** ..... **8**
2.1 IBRA Bioregions and subregions ..... 8
2.2 NSW Landscape regions ..... 8
2.3 Area ..... 8
2.4 Native vegetation ..... 8
2.5 Cleared Areas ..... 8
2.6 Rivers and Streams ..... 8
2.7 Wetlands ..... 9
2.8 Connectivity Features ..... 9
2.9 Areas of Geological Significance and Soil Hazard Features ..... 9
2.10 Areas of Outstanding Biodiversity Value ..... 9
2.11 Project Area Context Components ..... 9
2.11.1 Method of BAM assessment ..... 9
2.11.2 Percentage of Native Vegetation Cover ..... 9

**3 NATIVE VEGETATION, TECS AND VEGETATION INTEGRITY** ..... **14**
3.1 Native Plant Species ..... 14
3.2 High Threat Weeds ..... 14
3.3 Patch size ..... 14
3.4 Plant Community Type (PCT) ..... 14
3.4.1 Method of assessing PCTs ..... 14
3.4.2 PCTs identified within the Project Area ..... 16
3.4.3 Patch size ..... 31
3.4.4 Vegetation Integrity Score ..... 31

**4 THREATENED SPECIES** ..... **32**
4.1 Fauna habitat assessment ..... 32
4.2 Ecosystem credit species ..... 32
4.2.1 Additions ..... 34
4.2.2 Exclusions ..... 34
4.3 Species Credit Species ..... 34
4.3.1 Candidate Species Excluded ..... 38
4.3.2 Species Polygons ..... 41
4.4 Potential prescribed biodiversity Impacts ..... 44
4.4.1 Water quality, water bodies and hydrological processes ..... 44
4.4.2 Vehicle strikes ..... 44
4.4.3 Habitat connectivity ..... 45

**Stage 2 Impact Assessment** ..... **49**

**5 AVOID AND MINIMISE IMPACTS** ..... **50**
5.1 Avoiding and Minimising Impacts on Native Vegetation and Habitat ..... 50
5.2 Avoiding and Minimising Prescribed Biodiversity Impacts ..... 50
5.2.1 Water quality, water bodies and hydrological processes ..... 50

5.2.2 Vehicle strikes ..... 50

**6 ASSESSMENT OF IMPACTS ..... 51**
6.1 Direct Impacts ..... 51
6.1.1 Impacts to Native Vegetation ..... 51
6.1.2 Loss of species credit species habitat or individuals ..... 51
6.2 Indirect Impacts ..... 51

**7 MITIGATION AND MANAGEMENT OF IMPACTS ..... 53**

**8 SERIOUS AND IRREVERSIBLE IMPACTS (SAII) ..... 57**
8.1 Current status of TEC ..... 57
8.1.1 Current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal) ..... 57
8.2 Impacts from the proposal on the TEC at risk of an SAII ..... 57
8.2.1 Impact on the geographic extent of the TEC ..... 57
8.2.2 Extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes ..... 58

**9 REQUIREMENT TO OFFSET ..... 60**
9.1 Ecosystem credits ..... 60
9.1.1 Offset liability overall Project ..... 60
9.1.2 Offset liability by Proposed Modification Element ..... 61
9.1.3 Impacts not requiring offset (or assessment) ..... 62
9.2 Species credits ..... 62
9.2.1 Offset liability overall ..... 62
9.2.2 Offset liability by Proposed Modification Element ..... 62

**10 CONCLUSION ..... 65**

**11 REFERENCES ..... 67**

# Tables

Table 1-1 Land parcels in Project Area ..... 3
Table 2-1 Soil Landscape Units ..... 9
Table 3-1 Definitions of vegetation zones ..... 15
Table 3-2 PCTs present within the Project Area, Proposed Modification Element and Zone allocation[1] ..... 17
Table 3-3 PCT 335 Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion ..... 19
Table 3-4 PCT 731 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion ..... 21
Table 3-5 PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion ..... 22
Table 3-6 Description of Cleared/Disturbed Land ..... 28
Table 3-7 Vegetation Integrity Score ..... 31
Table 4-1 Ecosystem credit species ..... 32
Table 4-2 Candidate Species Credit Species requiring assessment ..... 35
Table 4-3 Candidate species: excluded by survey ..... 38
Table 4-4 Candidate species: removed based on habitat constraint/s ..... 39
Table 4-8 Assessment of impact of vehicle strike on threatened fauna ..... 44
Table 6-1 Direct impacts ..... 51
Table 9-1 Ecosystem credit liability ..... 60
Table 9-2 Ecosystem credit liability: Proposed Modification Element 1 ..... 61

Table 9-3 Ecosystem credit liability: Proposed Modification Element 2 ..... 61
Table 9-4 Ecosystem credit liability: Proposed Modification Element 3 ..... 61
Table 9-5 Ecosystem credit liability: Proposed Modification Element 4 ..... 62
Table 9-6 Species credit liability ..... 62
Table 10-1 Ecosystem credit liability ..... 65
Table 10-2 Species credit liability ..... 66

## Plates

Plate 3-1 Zone 1: Poor condition PCT 335 – along southern stretch of Project Area, between lower and upper access roads entering WCS ..... 20
Plate 3-2 Zone 1: Poor condition PCT 335 below conveyor adjacent coal washery ..... 20
Plate 3-3 Zone 2: Moderate condition PCT 731 ..... 21
Plate 3-4 Zone 3: Moderate condition PCT 1191 – western extent adjacent to Ben Bullen SF ..... 23
Plate 3-5 Zone 4: Rehabilitation PCT 1191 – midway along western arm of Project Area ..... 23
Plate 3-6 Zone 4: Rehabilitation PCT 1191 – WCS adjacent access road ..... 24
Plate 3-7 Zone 4: Rehabilitation PCT 1191 – EA Land downslope of ash dam ..... 24
Plate 3-8 Zone 4: Rehabilitation PCT 1191 – EA Land toward MPPS ..... 25
Plate 3-9 Zone 5: Regrowth PCT 1191 – toward southwestern extent of Project Area ..... 25
Plate 3-10 Zone 6: Poor condition (canopy only) PCT 1191 – near front gate of WCS ..... 26
Plate 3-11 Zone 6: Poor condition (canopy only) PCT 1191 – near WCS site office ..... 26
Plate 3-12 Zone 6: Poor condition (groundcover only) PCT 1191 – adjacent to Castlereagh Highway ..... 27
Plate 3-13 Zone 6: Poor condition (groundcover only) PCT 1191 – adjacent to Castlereagh Highway ..... 27
Plate 3-14 Cleared/Disturbed land within Project Area – access road along southern extent of Project Area ..... 28
Plate 3-15 Cleared/Disturbed land within Project Area – EA land access track adjacent to ash dam ..... 29
Plate 3-16 Cleared/Disturbed land within Project Area – EA land access track adjacent to ash dam ..... 29
Plate 3-17 Cleared/Disturbed land within Project Area – EA land toward MPPS ..... 30
Plate 3-18 Cleared/Disturbed land within Project Area – WCS access toward western arm of Project Area ..... 30

## Figures

Figure 1-1 Location of Project Area ..... 6
Figure 1-2 Project components ..... 7
Figure 2-1 Project Area Context and Landscape Features ..... 10
Figure 2-2 Native vegetation within Assessment Area ..... 11
Figure 2-3 Geological nature of Project Area ..... 12
Figure 2-4 Soil landscape of Project Area ..... 13
Figure 3-1 Vegetation zones ..... 18
Figure 4-1 Species polygons: *Eucalyptus aggregata* (Black Gum) ..... 42
Figure 4-2 Species polygons: *Paralucia spinifera* (Bathurst Copper Butterfly) ..... 43
Figure 4-3 Habitat connectivity between the subject land and assessment area (broad spatial extent) ..... 47
Figure 4-4 Habitat connectivity between the subject land and assessment area (fine spatial extent) ..... 48
Figure 8-1 CEEC at risk of an SAII within the Project Area ..... 59
Figure 9-1 Impacts requiring offset ..... 63
Figure 9-2 Impacts not requiring offset/ assessment ..... 64

# Appendices

Appendix A Biodiversity Investigation Report
Appendix B Biodiversity Credit Report
Appendix C Variation rules

# STAGE 1
# BIODIVERSITY ASSESSMENT

# 1 INTRODUCTION TO STAGE 1 – BIODIVERSITY ASSESSMENT

RPS Australia East Pty (RPS) has been engaged by Western Coal Services Pty Limited (WCS; operated by Springvale Coal Pty Limited) to undertake a Biodiversity Development Assessment Report (BDAR) for the upgrade of the onsite water management system, as part of Modification 4 (MOD 4) to State Significant Development (SSD) 5579 under Section 4.55(2) of the *Environmental Planning and Assessment* Act 1979 (EP&A Act) (herein referred to as the 'Project').

WCS was granted consent SSD 5579 on 4 April 2014 by the Planning Assessment Commission, as delegate for the then Minister of Planning and Infrastructure. SSD 5579 provides consent for the construction and operation of infrastructure to facilitate the receipt, handling and processing of coal from Springvale Mine (SSD 5594), Angus Place Colliery (SSD 06_0021) and other Centennial operations in addition to the transportation of this coal to local power stations or the Lidsdale Rail Siding (PA 08_0223).

As the Project is a modification to an SSD, application of the Biodiversity Assessment Methodology (BAM) is mandatory (State of NSW 2020) where there is a greater impact on biodiversity. This BDAR is based on the application of the BAM, as required under the *Biodiversity Conservation Act* 2016 (BC Act). This BDAR addresses Stage 1 (Biodiversity Assessment) and Stage 2 (Impact Assessment) of the BAM.

In addition to this BDAR, the attached Biodiversity Investigation Report (BIR; **Appendix A**) describes the methods and results of investigations undertaken to support the assessment of impacts on biodiversity listed under the BC Act associated with the Project. The BIR supports the BDAR by providing comprehensive details of the survey method, efforts and results, and so is referred to throughout this BDAR. It also provides photographic evidence to support the allocation of Plant Community Types (PCTs). The BIR also addresses the assessment requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) and relevant State Environmental Planning Policies (SEPPs).

## 1.1 Project Description

Springvale Coal proposes to modify SSD 5579 to allow:

- Construction and operation of the Springvale Coal Services Site (SCSS) Water Transfer System;
- Transfer of up to 15.6 ML/day of water from the SCSS Water Transfer System to the proposed Springvale Coal Services/ LFB Resources NL transfer system;
- Transfer of up to 2.6 ML/day of water from SCSS to Mt Piper Power Station (MPPS) for treatment and reuse within the MPPS cooling water system;
- Receipt of raw water from Angus Place Water Transfer System for use in the coal handling and preparation plant at SCSS;
- Redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia (EA);
- Increase of the capacity of the Washery Dam at SCSS; and
- Administrative changes to Condition 45 of Schedule 3 of SSD 5579 to align with amendments to the *Mining Act* 1992.

The primary objectives of the water management system at SCSS are to:

- Provide a secure water supply for coal washing, washdown and dust suppression (including haul roads and coal stockpiles); and
- Control the quantity and quality of water discharged into Wangcol Creek via LDP001.

The key components of WCS and the proposed modification are shown on **Figure 1-1** and **Figure 1-2**. The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the Project Area. This will include impact to some native vegetation.

The following terms are used in this document:

- **Project** – Modification to WCS SSD-5579 for the upgrade of the onsite water management system;
- **Project Area** – Footprint of the Project. This is the area within which disturbance activities are required for the proposed modification (also referred to as the construction envelope in the Modification Report);
- **Subject Land** – Land Parcels the Project is located;
- **Assessment Area** – Land within a 500 m buffer from the outer extent of the Project Area (~576.3 ha; note that this is a linear development); and
- **Local Area** – Land within 10 km$^2$ of the Project Area.

### 1.1.1 Proposed Modification Elements

The Project is divided into the following four Proposed Modification Elements:

- Dirty Water Pond (DWP) - A and clean water diversion;
- Regis and EnergyAustralia (EA) water transfer systems;
- DWP - B; and
- Angus Place water offtake and transfer system.

The division of the Proposed Modification Elements is shown in **Figure 1-2.**

## 1.2 Project Area Particulars

**Locality:** Blackmans Flat NSW

**LGA:** Lithgow City Council (LCC)

**Lot/DP:** A list of land parcels in the Project Area is presented in **Table 1-1**.

**Project Area:** Footprint of the Project Area is approximately 29.97 ha (~15.18 ha of native vegetation). The location of the Project Area is shown in **Figure 1-1**.

**Boundaries:** The Project Area is bounded by Mt Piper Power Station (EnergyAustralia; EA) to the west, Ben Bullen State Forest to the south, agricultural properties to the east and the Castlereagh Highway to the north (agricultural properties and Ben Bullet SF occurs north of the Castlereagh Highway).

**Zoning:** Under the provisions of the Lithgow Local Environment Plan 2014 (LEP), the Project Area is zoned as RU1 Primary Production and SP2 Electricity Generating Works.

**Current Land Use:** The land is currently used for existing WCS and EA operations.

**Topography:** Project Area is in an area with considerable topographical variation, ranging from ~902 to ~950 m ASL.

The location of the Project Area and Local Area is shown in **Table 1-1**.

**Table 1-1 Land parcels in Project Area**

| Lot | DP | Control |
|---|---|---|
| 1 | 702619 | FREEHOLD |
| 2 | 126483 | FREEHOLD |
| 5 | 804929 | FREEHOLD |
| 1 | 1127043 | FREEHOLD |
| 137 | 1188105 | FREEHOLD |
| 4 | 1151441 | FREEHOLD |
| 357 | 751651 | FREEHOLD |

| Lot | DP | Control |
|---|---|---|
| 13 | 751651 | FREEHOLD |
| 8 | 804929 | FREEHOLD |
| 67 | 751636 | FREEHOLD |
| 502 | 825541 | NSW GOVERNMENT |
| 101 | 1240974 | FREEHOLD |
| 9 | 804929 | FREEHOLD |
| 2 | 1256036 | FREEHOLD |
| 1 | 88503 | FREEHOLD |
| 102 | 1240974 | FREEHOLD |
| 1 | 702619 | FREEHOLD |

## 1.3 Sources of information used in assessment

Sources of information used in this assessment include:

- Proposal layers and concept designs provided by Centennial;
- Department of Agriculture, Water and Environment (DAWE) Australian Government's Species Profiles and Threats (SPRAT) database (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl) (DAWE 2021a);
- DAWEs EPBC Act Protected Matters Search Tool (http://www.environment.gov.au/epbc/protected-matters-search-tool; DAWE 2021b);
- Department of Planning, Industry and Environment (DPIE) Threatened Species Profiles (http://www.environment.nsw.gov.au/threatenedspeciesapp/; DPIE 2021a);
- DPIE NSW Bionet Threatened Biodiversity Profile Data Collection (DPIE 2021b);
- Interim Biogeographical Regionalisation for Australia (IBRA) and IBRA sub-regions (http://www.environment.gov.au/land/nrs/science/ibra);
- DPIEs profiles of threatened species, populations and ecological communities;
- DPIEs VIS Mapping (http://www.environment.nsw.gov.au/research/VISmap.htm);
- NSW Biodiversity Values Map (https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap; Accessed November 2021); and
- Biodiversity Assessment Method Order 2020 (State of NSW 2020).

## 1.4 Identification of assessment method applied

A Biodiversity Development Assessment Report (BDAR) is required as the Project is a modification application for an SSD project that will increase the impact on biodiversity values.

## 1.5 Staff Qualifications

This report was written and certified by Dr Hayden Beck (Accredited BAM Assessor – BAAS1900). It was reviewed and issued for approval by Mark Aitkens (Accredited BAM Assessor - BAAS17034). Surveys were undertaken by Hayden Beck, Tara Boreham, Shelomi Doyle, Shawn Ryan, Zach Cotter, Rhys Corrigan and Jess Graham.

## 1.6 Definitions

Terms and definitions adopted in this report are listed in **Table 1-2**.

**Table 1-2 Terms and definitions**

| Term | Definition |
|---|---|
| BAM | Biodiversity Assessment Method |
| BDAR | Biodiversity Development Assessment Report |
| BOS | Biodiversity Offset Scheme |
| Buffer Area | Land within 500 m of Project Area[1] |
| CEEC | Critically Endangered Ecological Community |
| DWP | Dirty Water Pond |
| EA | EnergyAustralia |
| EEC | Endangered Ecological Community |
| HTW | High Threat Weed |
| LCC | Lithgow City Council |
| LGA | Local Government Area |
| Local Area | Land within 10 km radius of the Project Area |
| MOD 4 | Modification 4 to SSD 5579 |
| MPPS | Mount Piper Power Station |
| Project | Modification 4 to Western Coal Services SSD-5579 |
| Project Area | Area within which disturbance activities are required for the proposed modification (i.e. covers all four proposed modification elements). Same as “construction envelope” in the Modification Report. |
| Proposal Modification Element | The four elements composing the Project:<br>DWP-A and clean water diversion<br>Regis and EnergyAustralia water transfer systems<br>DWP-B<br>Angus Place water offtake and transfer system |
| WCS | Western Coal Services |
| SAII | Serious and Irreversible Impact |
| SCSS | Springvale Coal Services Site |
| Subject Land | Land Parcels where Project is located |
| SSD | State Significant Development |
| SF | State Forest |
| TECs | Threatened Ecological Community |
| VIS | BioNet Vegetation Classification System |

1. A 500 m buffer is applied since the Project is linear development.

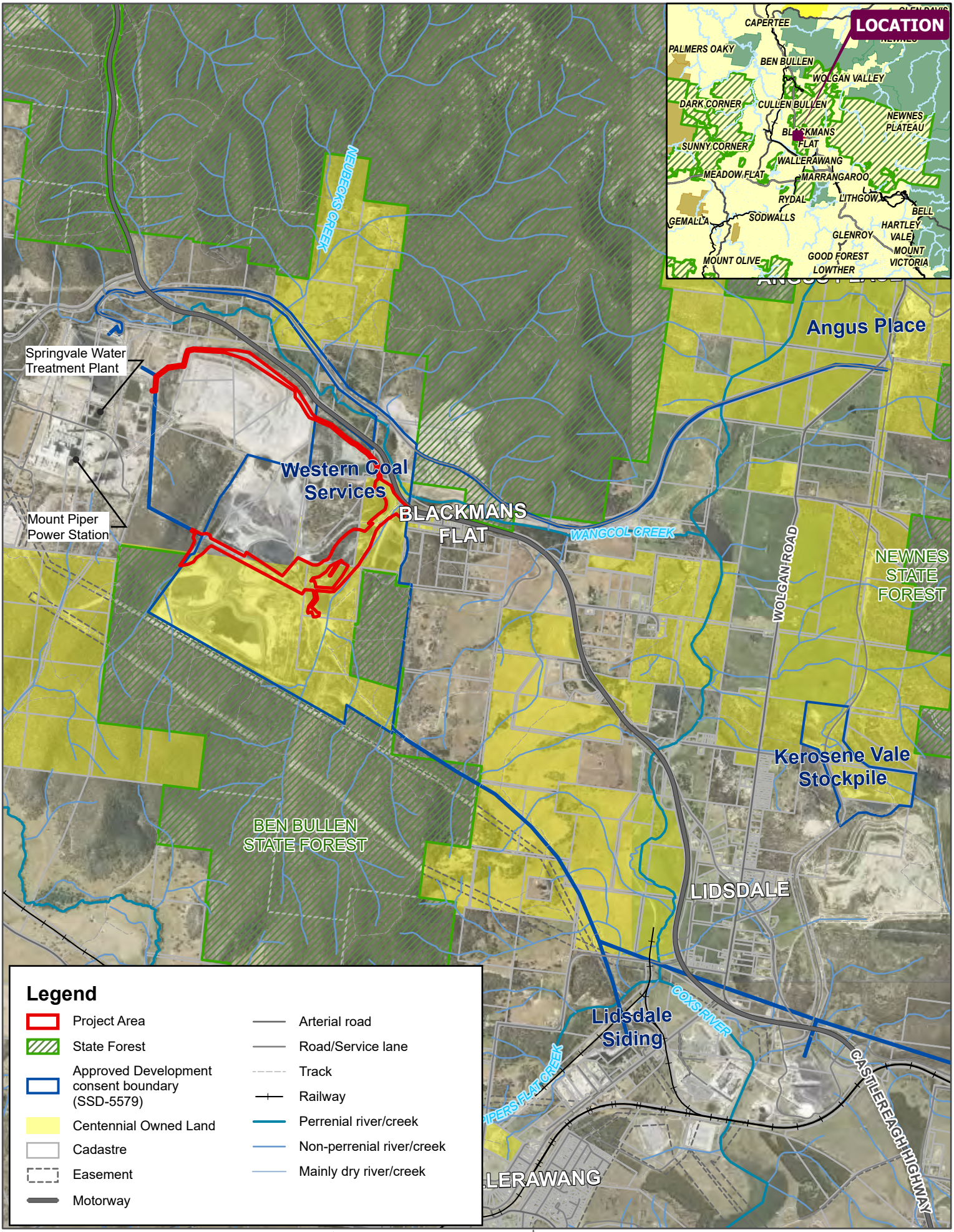


**FIGURE 1-1**
**LOCATION OF PROJECT AREA**

VERSION: **A**

DATE EXPORTED: 2/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 0.25 0.5 0.75 1 Km

N

SCALE 1:35,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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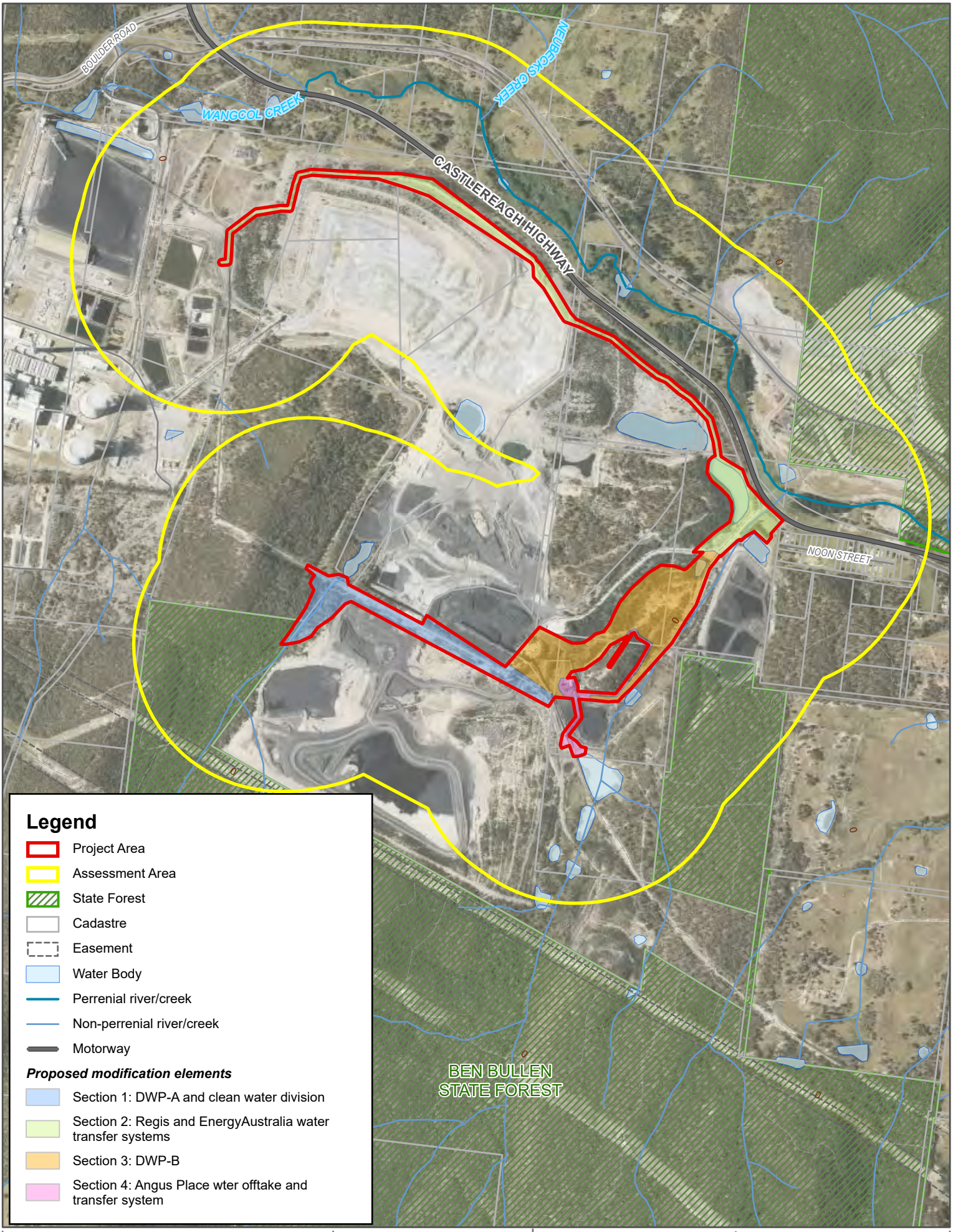


**FIGURE 1-2**
**PROJECT COMPONENTS**

VERSION: **A**

DATE EXPORTED: 3/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 100 200 300 400 500 m

N

SCALE 1:16,010 AT A4 SIZE
SPATIAL REFERENCE: GDA 1994 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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# 2 LANDSCAPE CONTEXT

## 2.1 IBRA Bioregions and subregions

The Project Area is located just within the South Eastern Highlands Interim Biogeographic Regionalisation for Australia (IBRA) region and Capertee Uplands subregion. The extent of these bioregional units is displayed in **Figure 2-1**.

## 2.2 NSW Landscape regions

The Project is to occur on Capertee Plateau Mitchell Landscape (NPWS 2003; **Figure 2-1**).

## 2.3 Area

The Project Area footprint is ~29.97 ha. Approximately 15.55 ha of native vegetation will be removed for the Project [note that ~ 1.19 ha of this is below the Vegetation Integrity Score (VIS) threshold for offsetting, as per Section 9.2.1 of BAM].

## 2.4 Native vegetation

Approximately 200.18 ha of vegetation occurs within the 500 m Buffer (~34.7%). Native vegetation within this Buffer Area is shown in **Figure 2-2**.

Vegetation mapping and inspection of recent aerial photography indicates a large amount of vegetation clearing within the locality, resulting in several patches of non-continuous native vegetation; much of these large patches of vegetation belong to Ben Bullen SF (**Figure 2-2**).

## 2.5 Cleared Areas

Approximately 65.3% (376.12 of 576.30 ha) of the Assessment Area is cleared (**Figure 2-2**). Past clearing of native vegetation has occurred due to:

- WCS operations (including stockpiles, access tracks and water management ponds);
- Public roads (including Castlereagh Highway);
- Haul roads;
- Unsealed access tracks;
- Clearing by past forestry;
- Livestock farming;
- Rural housing; and
- Transmission line easements.

## 2.6 Rivers and Streams

First, second, third and fourth order tributaries of Wangcol Creek are located within or downslope of the Assessment Area, which discharge into Coxs River (**Figure 2-1**). The ephemeral nature of these creeks is reflected in small flows during wet periods and cease to flow during drought periods. Several small water treatment dams have been constructed along these drainage lines, which alter flow conditions to allow treatment. Wangcol Creek and Coxs River are mapped as Key Fish Habitats by DPI (2007).

## 2.7 Wetlands

There are no wetlands within the Project Area. However, there are several constructed water detention ponds within the Project Area. These are mine-related infrastructure and offer limited habitat value to wetland-associated fauna.

## 2.8 Connectivity Features

Vegetation mapping and inspection of recent aerial photography indicates vegetation clearing within the locality has fragmented the landscape. Nevertheless, vegetation at the Project Area has tentative connections to a large and continuous native vegetation, including several conservation areas. Greatest connectivity occurs to the south-western extent of the Project Area, as vegetation here is connected to Ben Bullen State Forest. For mobile fauna, there is partial connectivity of bushland remnant in the Project Area to a vast tract of vegetation in the east, which includes Newnes SF, as well as Gardens of Stone, Wollemi and Yengo National Parks. Habitat connectivity of the Project Area is further detailed in **Section 4.4.3**.

## 2.9 Areas of Geological Significance and Soil Hazard Features

There are no significant geological features, such as cliffs or caves within or adjacent to the Project Area. Geological features and Soil Landscape Units present within the Project Area are provided in **Figure 2-3**, **Figure 2-4** and detailed in **Table 2-1** (King 1992).

**Table 2-1 Soil Landscape Units**

| Soil Landscape | Formative Process | Composition | Hazards |
|---|---|---|---|
| Disturbed Terrain | Colluvial-alluvial | Not assessed | Not assessed |
| Lithgow | Residual landscape | Moderately deep to deep (>170 cm), Solods/yellow Solodic Soils on lower slopes and in areas of poor drainage (i.e. relevant to Project Area) | Hardsetting topsoils, high run-on, localised Mine Subsidence District, localised rock fall hazard, localised high potential aluminium toxicity |
| Cullen Bullen | Erosional Landscape | Moderately deep to deep (50 – 150 cm) yellow Solodic Soils and Yellow Podzolic Soils on lower slopes near and along narrow (<20 m) drainage lines. | Hardsetting topsoils, high water erosion hazard, localised mine subsidence district, high run-on, rock outcrop, localised rock fall hazard and localised high foundation hazard. |

## 2.10 Areas of Outstanding Biodiversity Value

No areas of outstanding Biodiversity Value are known to occur within the Project Area.

## 2.11 Project Area Context Components

### 2.11.1 Method of BAM assessment

A Development Assessment Case for a Major Development was applied within the BAM calculator (BAM-C).

### 2.11.2 Percentage of Native Vegetation Cover

The overall vegetation cover within the Assessment Area was determined using aerial photographs and local vegetation mapping (i.e. DEC 2016). The percentage of native vegetation cover within the Assessment Area was calculated to constitute ~34.7% (**Figure 2-2**).

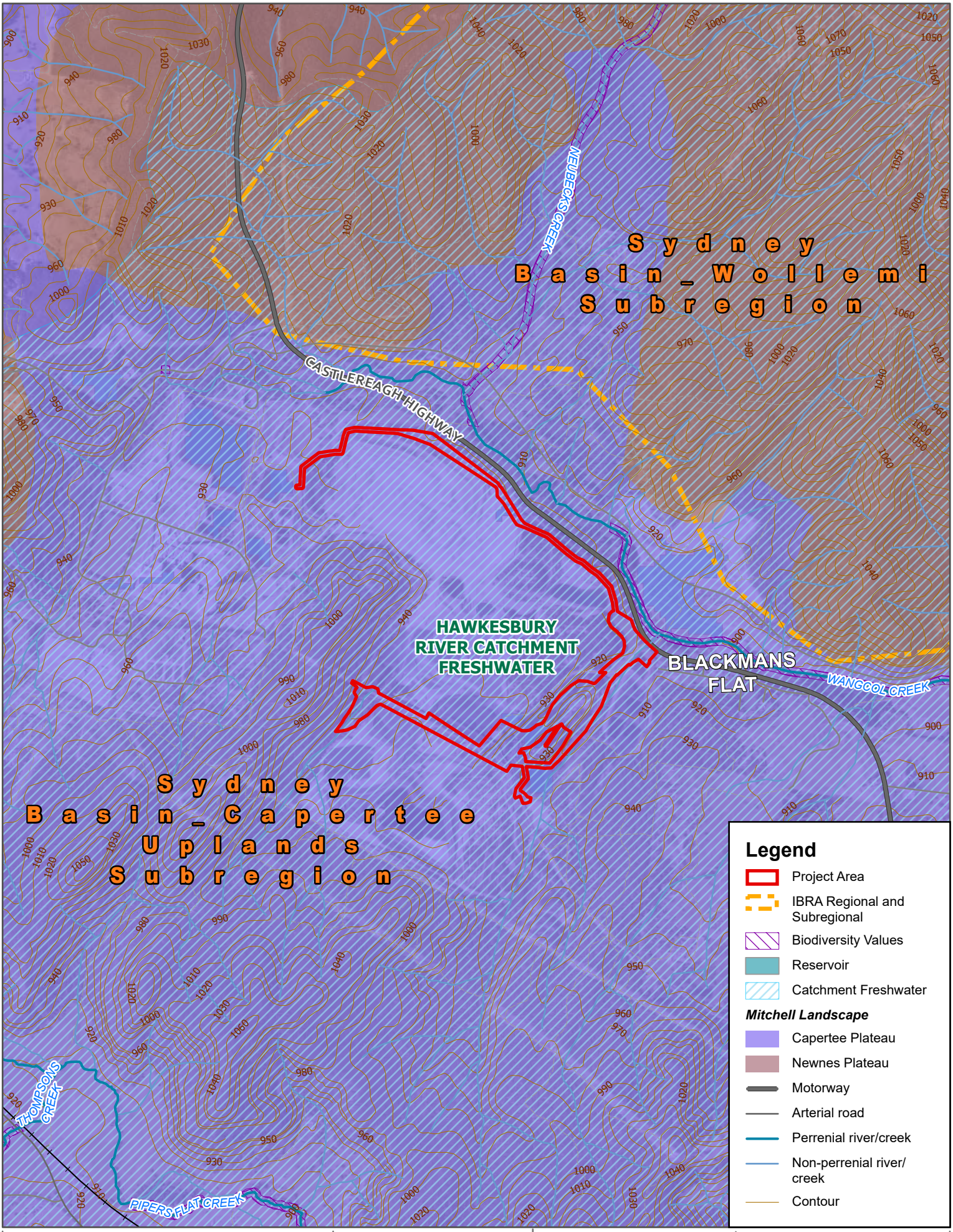


**FIGURE 2-1**
**PROJECT AREA CONTEXT AND LANDSCAPE FEATURES**

VERSION: **A**

DATE EXPORTED: 2/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 0.25 0.5 0.75 K

N

SCALE 1:25,000 AT A4 SIZE
SPATIAL REFERENCE: GDA 1994 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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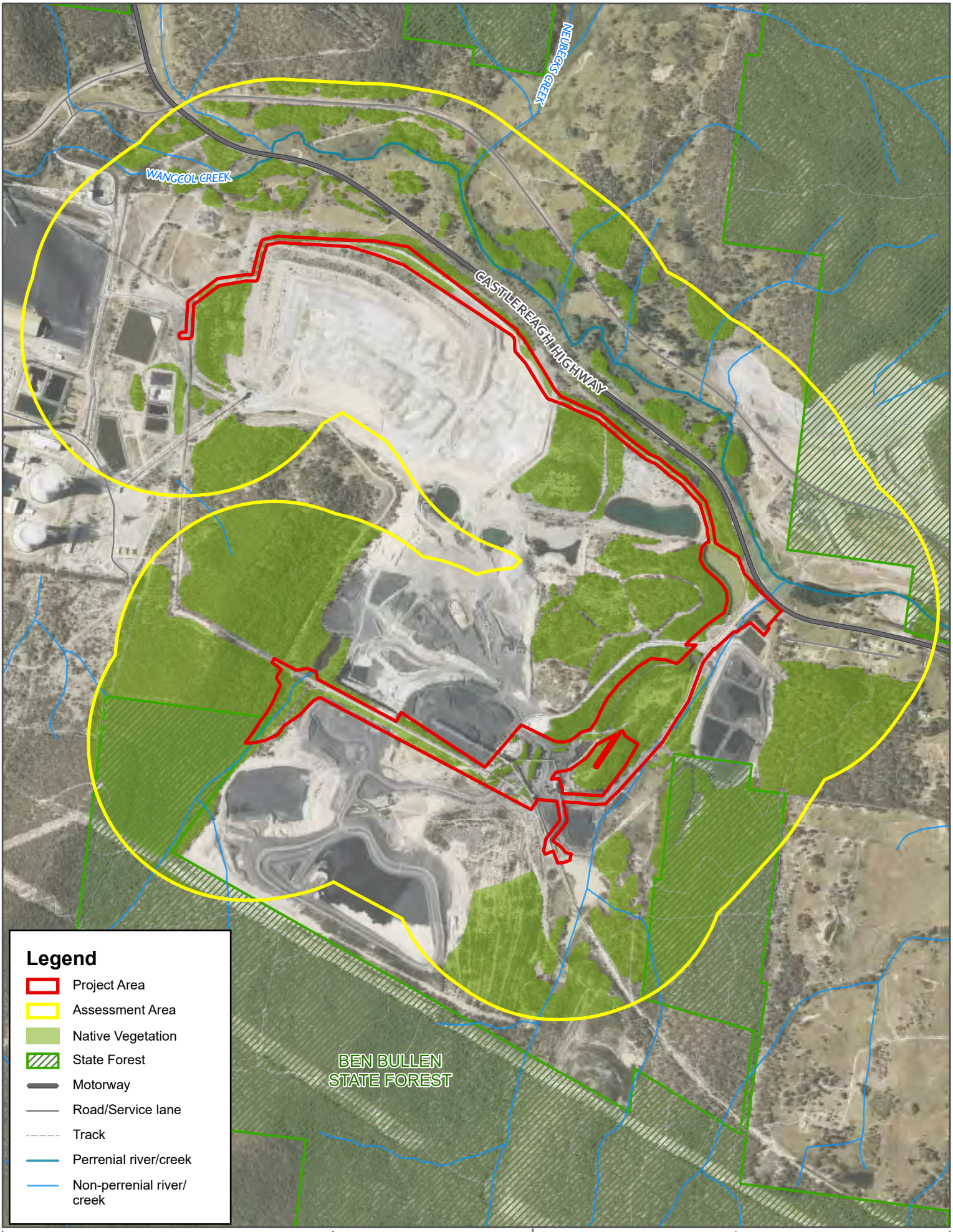


**FIGURE 2-2**
**NATIVE VEGETATION WITHIN ASSESSMENT AREA**

VERSION: **A**

DATE EXPORTED: 5/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 100 200 300 400 500 m

N

SCALE 1:15,000 AT A4 SIZE
SPATIAL REFERENCE: GDA 1994 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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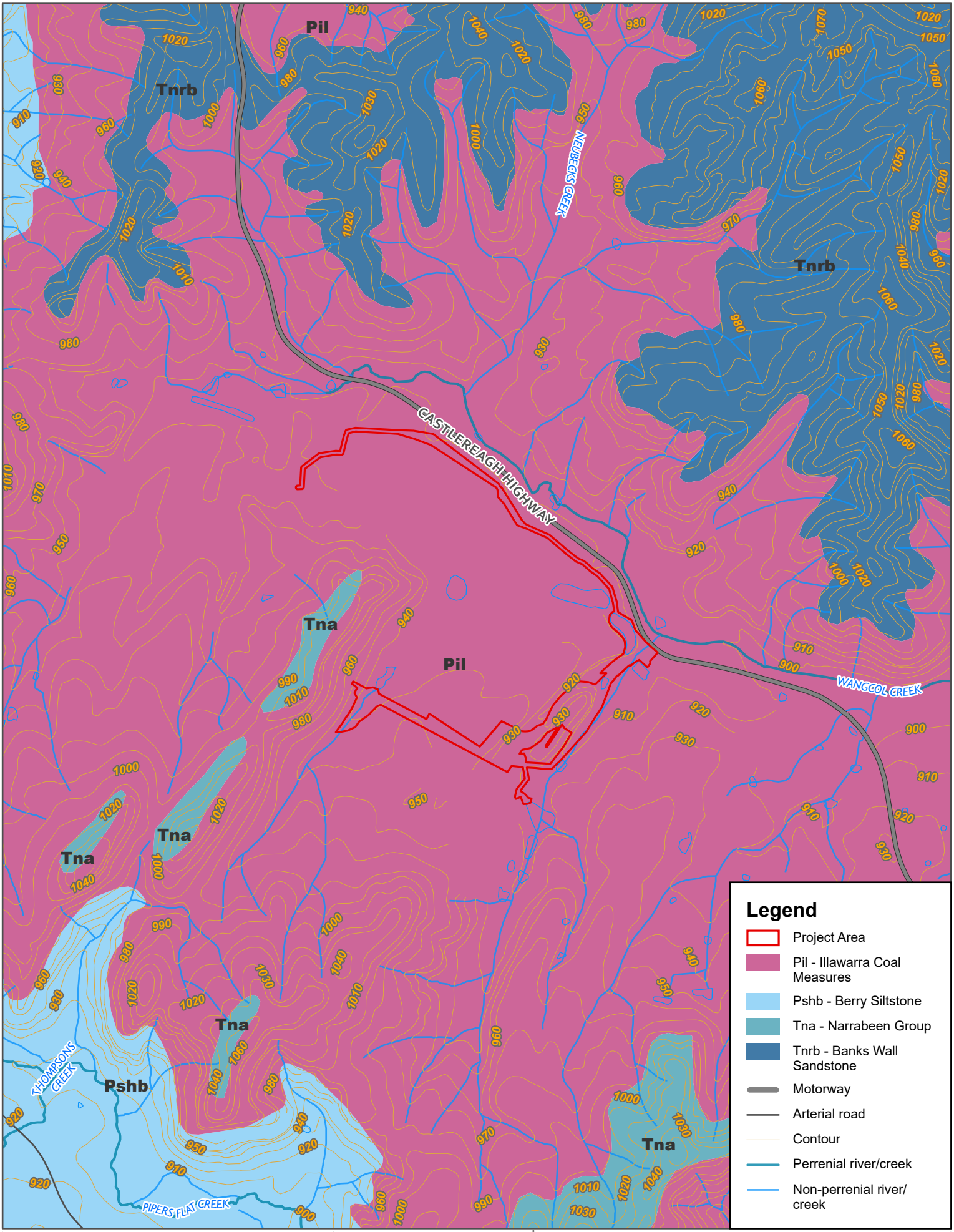


**FIGURE 2-3**
**GEOLOGICAL NATURE OF PROJECT AREA**

VERSION: **A**

DATE EXPORTED: 2/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 0.25 0.5 0.75 K

N

SCALE 1:25,000 AT A4 SIZE
SPATIAL REFERENCE: GDA 1994 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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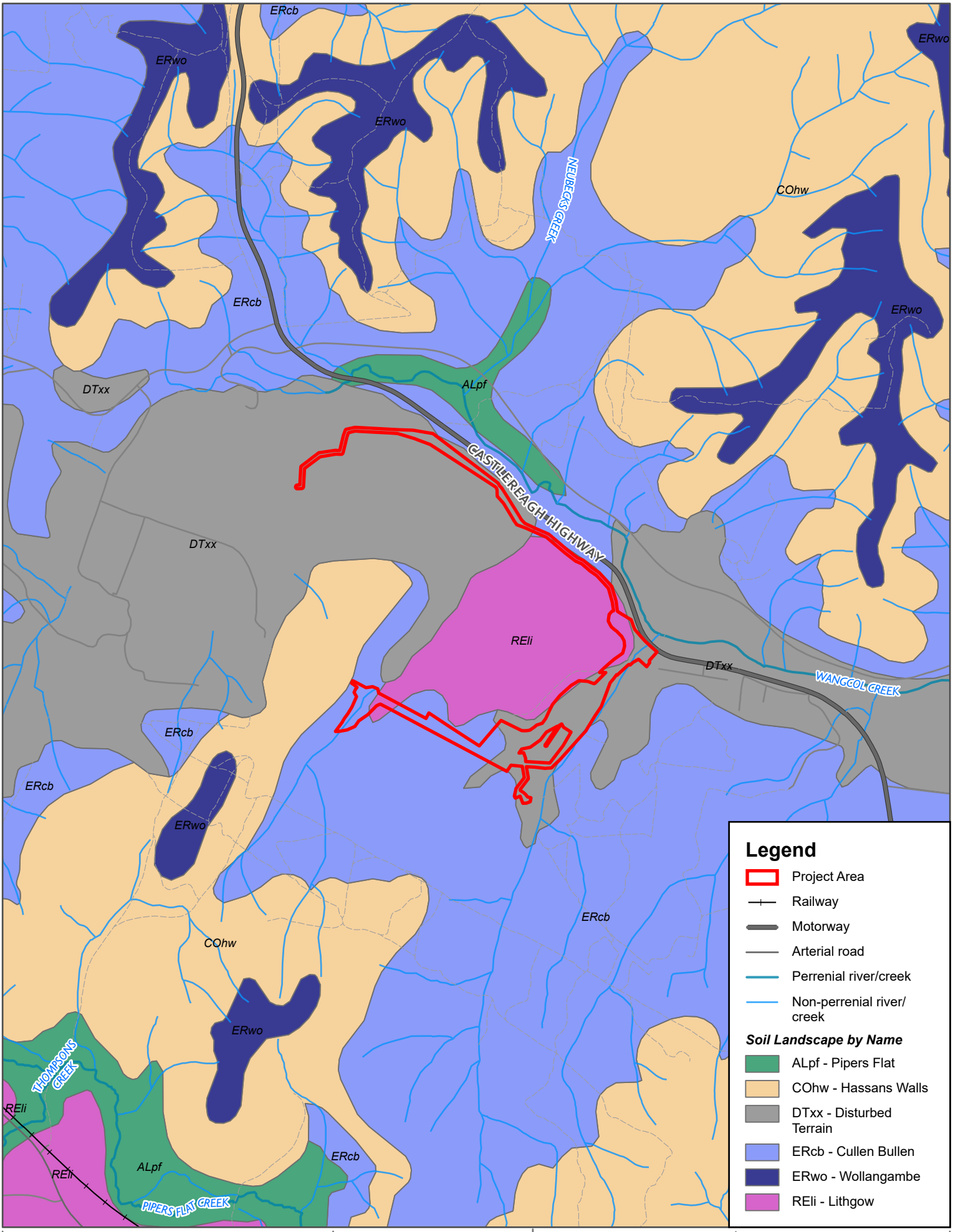


**FIGURE 2-4**
**SOIL LANDSCAPE OF PROJECT AREA**

VERSION: **A**

DATE EXPORTED: 3/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 0.25 0.5 0.75 K

N

SCALE 1:25,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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# 3 NATIVE VEGETATION, TECS AND VEGETATION INTEGRITY

## 3.1 Native Plant Species

In total, 181 flora species were detected within the BAM plots: 150 native and 31 weed species. For a full list of species see **Appendix A**.

## 3.2 High Threat Weeds

Thirty-one weed species were detected in the BAM plots. Of these, the High Threat Weeds (HTW; listed under the BAM) were:

- *Hypericum perforatum* (St. Johns Wort);
- *Paspalum dilatatum* (Paspalum); and
- *Rosa rubiginosa* (Sweet Briar).

## 3.3 Patch size

The native vegetation to be cleared is not part of a continuous patch, with tentative connections nearby Cullen Bullen State Forest. In accordance with the BAM, patch size area was assigned as a class, being <5ha, 5–24 ha, 25–100 ha or ≥ 100. This determines the allocation of patch size with ≥100 ha.

## 3.4 Plant Community Type (PCT)

Below is a summary of the vegetation communities assigned within the Project Area. For further information, including survey methods, photographs and datasheets, please refer to the BIR (**Appendix A**).

### 3.4.1 Method of assessing PCTs

#### 3.4.1.1 Review of Existing Information

Vegetation of the Western Blue Mountains including the Capertee, Coxs and Jenolan-Gurnang Areas by DEC (2006) was used as the baseline dataset to inform allocation of vegetation communities throughout the Project Area. As DEC (2006) applied Mapping Units (MUs) to characterise vegetation communities, comparative Biometric Vegetation Types [BVTs; equivalent to Plant Community Types (PCTs)] were assigned where possible as per Centennial's Western Region Biodiversity Offset Strategy (WRBOS; RPS 2019). This offset strategy included 24 MUs across four properties in the Western Blue Mountains region, where most vegetation communities relevant to the Project Area were encountered. The conversions undertaken, from MUs to BVTs (equivalent to PCTs), were reviewed and accepted by NSW DPI in 2019 during the establishment of these offset sites. DPIE's Vegetation Information System (VIS) was also consulted to best inform selection of the best fitting PCT.

#### 3.4.1.2 Ground-truthing of vegetation mapping

Rapid Data Points (RDPs) were used to assist vegetation classification and refine the boundaries and distribution of PCTs. Flora data collected by RDPs is provided in **Appendix A**.

Data collected within 20 m of each RDP include:

- Dominant canopy species;
- Main associated species;
- Vegetation condition;
- Landscape position;

- Characteristic mid-storey species;
- Characteristic groundcover species; and
- Other diagnostic features.

Data collected during RDPs and inferences made as per **Appendix A** were used to refine the vegetation map using Geographic Information System (GIS; ArcGIS™). MU/PCTs were identified primarily upon diagnostic canopy species, as defined by DEC (2006).

**Table 3-1 Definitions of vegetation zones**

| Vegetation Condition Class | Definition |
|---|---|
| Good | Vegetation community generally resembles pre-European levels of condition, structure and overall integrity. Vegetation is resilient to weed invasion due to dominance of native species within the ground, shrub and canopy layers. |
| Moderate | Native canopy present. The understorey is dominated by natives (>50 % native cover). Vegetation condition is below benchmark value but above that defined for poor condition. |
| Derived | Native vegetation in a structurally modified state, exemplified by an unnatural dominance of species in a non-characteristic strata combined with the absence of characteristic species in the dominant strata (e.g. native grasslands derived from grassy woodlands, native shrublands derived from dry sclerophyll forests). |
| Poor | Native canopy largely absent. Understorey dominated by exotic species (i.e. > 50% exotic cover). Native shrub layer has largely been replaced by weeds. |
| Distrubed/cleared | These areas have:<br>a vegetation integrity score <15 where the PCT is representative of an endangered or critically endangered ecological community, or<br>a vegetation zone has a vegetation integrity score <17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or<br>a vegetation zone has a vegetation integrity score <20 where the PCT is not representative of a TEC or associated with threatened species habitat.<br>Based on the vegetation integrity score for this vegetation group, assessment of native vegetation is not required beyond Section 5.4 of the BAM (State of NSW 2020). |

### 3.4.1.3 Floristic Survey

Seventeen flora plots were carried out in accordance with the BAM to assess the composition, structure and function components of vegetation integrity (**Appendix A**). BAM plots were situated to represent the vegetation to be cleared within each zone.

The following attributes were measured in each plot:

- One standard 20 x 20 m plot (400 $m^2$), to assess the composition and structure attributes, including trees, shrubs, grasses, forbs, ferns and other growth forms;
- One standard 20 x 50 m plot (1000 $m^2$) to assess the function attributes: number of large trees (i.e. > 50 cm DBH), stem size class, tree regeneration, length of fallen logs, high threat exotic vegetation cover and hollow-bearing trees; and
- Five 1 $m^2$ sub-plots to assess average litter cover for the plots.

### 3.4.2 PCTs identified within the Project Area

Remnant vegetation in the Project Area was consistent with the following PCTs:

- PCT 335 - Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion;
- PCT 731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion; and
- PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion.

Much of the Project Area was in a highly modified state, with many areas impacted by approved earthworks operations associated with the WCS and MPPS operations. That is, in these disturbed areas, the vegetation present resulted from past rehabilitation efforts and/or degrees of natural regrowth. To objectively assign this naturally regrowing and actively rehabilitated vegetation patches to a suitable PCT, a multivariate analysis analysing floristic assessable composition (i.e. cluster analysis) was undertaken(see **Appendix A**). The result of the multivariate analysis indicated that these patches of regrowth/rehabilitated vegetation patches grouped best with PCT 1191.

Landscape position and proximity to adjacent remnant vegetation communities was also consistent with the above groupings.

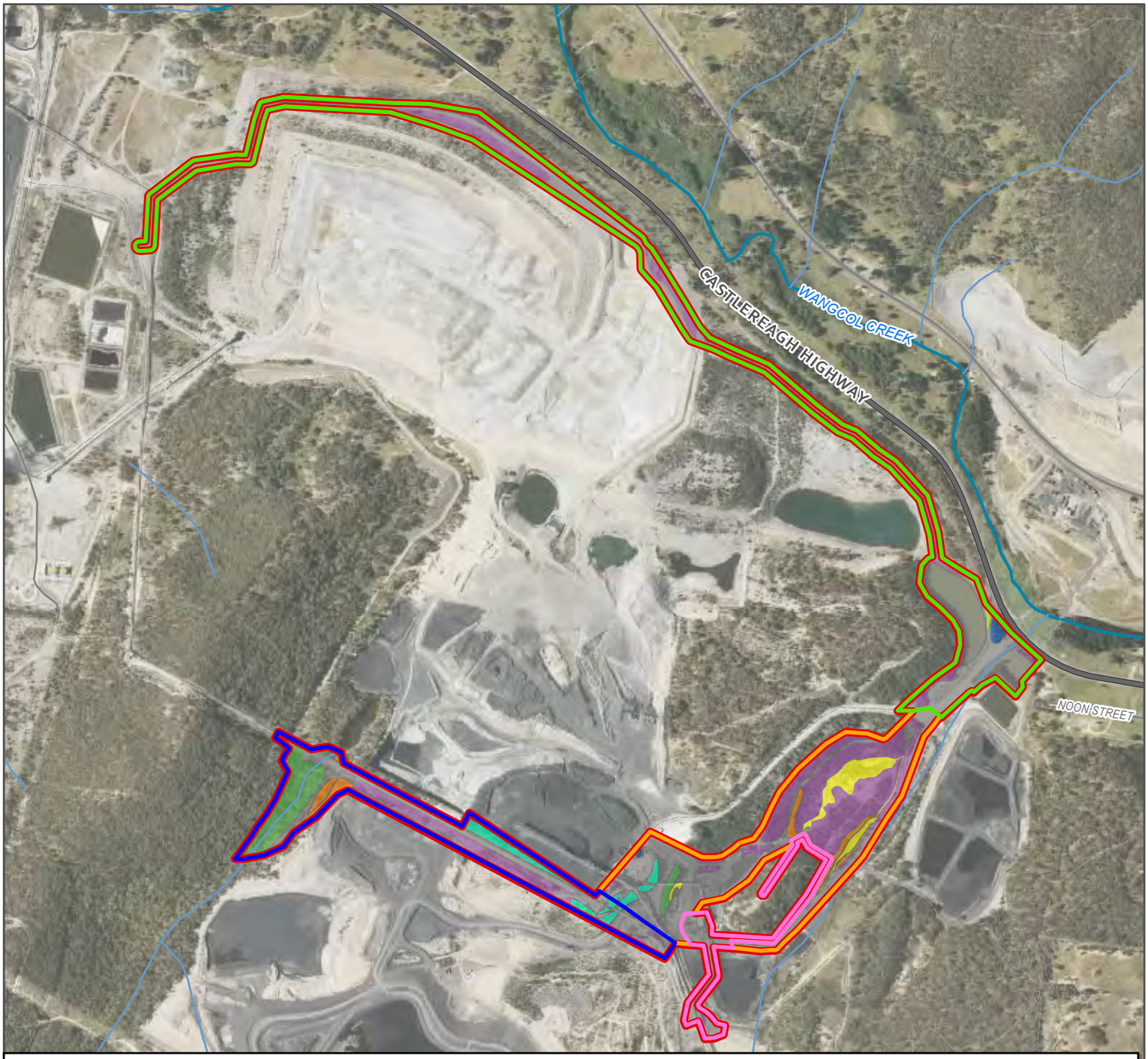
Justification of the allocation of these PCTs is provided in **Table 3-5** to **Table 3-6** below, and within the BIR (**Appendix A**). **Figure 3-1** of the BIR indicates the location of this vegetation, and the plots used to assess vegetation integrity. **Table 3-2** below summarises the extent of these PCTs within the Project Area, and the corresponding vegetation zones allocated.

Further information including a description of PCTs in the Project Area and justification for its selection, is shown in **Table 3-3** to **Table** 3-6.

**Table 3-2 PCTs present within the Project Area, Proposed Modification Element and Zone allocation[1]**

| Zone | PCT | Condition | Total Area (ha) | Section 1: DWP-A and clean water diversion | Section 2: Regis and EA water transfer systems | Section 3: DWP-B | Section 4: Angus Place water offtake and transfer system | No. BAM plots required | No. BAM plots undertaken |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 335 - Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion | Poor | 0.93 | - | - | 0.93 | - | 1 | 1 |
| 2 | 731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion | Moderate | 0.94 | 0.66 | - | 0.22 | 0.06 | 1 | 2 |
| 3 | 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | Moderate | 1.85 | 1.63 | 0.04 | 0.18 | - | 1 | 2 |
| 4 | 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | Rehabilitation | 10.00 | 1.31 | 3.93 | 4.61 | 0.16 | 4 | 7 |
| 5 | 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | Regrowth | 1.16 | 0.50 | - | 0.42 | 0.24 | 1 | 2 |
| 6 | 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | Poor (Canopy only) | 0.19 | - | 0.16 | 0.03 | - | 1 | 1 |
| 7 | 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | Poor (Understorey only) | 0.11 | - | 0.11 | - | - | 1 | 1 |
| 8 | Disturbed land/ Non-native vegetation | - | 14.78 | 2.72 | 6.23 | 4.66 | 1.17 | - | - |

1. Area values rounded up to 2 decimal places.




## Legend

- Project Area

***Proposed modification elements***

- Section 1: DWP-A and clean water division
- Section 2: Regis and EnergyAustralia water transfer systems
- Section 3: DWP-B
- Section 4: Angus Place wter offtake and transfer system

***Vegetation Zones : PCT - Condition***

- 1 : 335 Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion - Poor
- 2 : 731 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion - Moderate
- 3 : 1191 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Moderate
- 4 : 1191 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Rehabilitation
- 5 : 1191 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Regrowth
- 6 : 1191 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Poor (Canopy only)
- 7 : 1191 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Poor (understorey only)
- 8 : Disturbed land/ Non-native vegetation

**FIGURE 3-1**
**VEGETATION ZONES**

VERSION: **B**

DATE EXPORTED: 26/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 100 200 300 400 m

N

SCALE 1:12,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

**IMPORTANT NOTE**
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.
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g. the accuracy, reliability, suitability or completeness of any approximations or estimates made or referred to by RPS Australia East Pty Ltd in this plan.

Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\Arcgis Map Documents\Eco\BDAR Figures\148221 BDAR Figures.aprx

**Table 3-3 PCT 335 Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion**

| PCT 335 Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion | |
|---|---|
| Description: | Tall tussock grassland to mid-high sedgeland to rushland or reedland dominated by tussock snow grass *Poa labillardierei var. labillardierei*, sedges including *Carex appressa*, rushes such as *Juncus homalocaulis* and *Juncus fockei*. In wetter areas a taller layer of water plants including the Common Reed (*Phragmites australis*) and bulrush (*Typha domingensis*) may be present. Occurs on silty or peaty clay loam with high levels of organic material on alluviums derived from a range of substrates along watercourse where sediment has accumulated to form valley flats or where springs may feed valley soaks in the Upper Slopes sub-region of the NSW SW Slopes Bioregion and adjoining parts of the South Eastern Highlands Bioregion. |
| Zone/s: | Zone 1: Poor Condition |
| BAM Plot/s; RDP Number: | BAM Plot 13; RDP 7 |
| Diagnostic upper stratum species: | None |
| Diagnostic middle stratum species: | *Typha spp.* (Plot 13) |
| Diagnostic ground stratum species: | Although diagnostic rush species *Juncus spp.* were absent, four species of Juncus spp. were present and dominated the flora assemblage. Grasses *Cynodon dactylon, Microlaena stipoides var. stipoides* and *Aristida ramosa var. ramosa* were observed nearby the plot. |
| Justification: | Highly modified flora assemblage owing to pollution and past earthworks, with vegetation community dominated by *Typha spp*. and *Juncus spp*. Description of PCT 335 landscape position and formation fits: rushland in South Eastern Bioregion Highlands Bioregion, silty alluvium material and location within a valley spring/soak area where flow was impeded. Given searches of *Typha spp*. as a key diagnostic species in BioNet Vegetation Information System (VIS; DPIE 2021c) in South Eastern Bioregion Highlands Bioregion yielded 12 potential matches. Only PCT 335 was consistent with the class of vegetation (Inland Floodplain Swamps), whilst the others were either Coastal swamps, Montane Bogs and Fens (no peats, humic clay loams present or diagnostic species) or Montane Lakes (vegetation in this zone is clearly not grouped with these communities). |
| Classification: | There are currently no TECs associated with this PCT. |
| Condition: | Moderate/Poor: Highly disturbed and modified vegetation zone resulting from expression of groundwater. Water quality appeared poor, likely owing to origin of waters from upslope (i.e. ash dam and water management systems at SCSS). Past earthworks apparent throughout zone. |
| Estimate of percent cleared value of dominant PCT: | 83% |

**Plate 3-1 Zone 1: Poor condition PCT 335 – along southern stretch of Project Area, between lower and upper access roads entering WCS**

**Plate 3-2 Zone 1: Poor condition PCT 335 below conveyor adjacent coal washery**

**Table 3-4 PCT 731 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion**

| PCT 731 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion | |
|---|---|
| Description: | Open forest with a sparse shrub layer and grassy groundcover. Occurs on undulating hills between 550 and 1100 m from the western Blue Mountains to near Braidwood. |
| Zone/s | Zone 2: Moderate condition |
| BAM Plot/s: | 6 and 7 |
| Diagnostic upper stratum species: | *Eucalyptus dives* (Plot 7); *Eucalyptus macrorhyncha* (Plots 6 and 7); *Eucalyptus mannifera* (Plot 6 and 7) |
| Diagnostic middle stratum species: | *Melichrus urceolatus* (observed adjacent Plot 6) |
| Diagnostic ground stratum species: | *Gonocarpus tetragynus* (Plot 6); *Hibbertia obtusifolia* (Plots 6 and 7); *Hypericum gramineum* (Plot 6) |
| Justification: | Search for the diagnostic canopy species within BioNet VIS (2021c) yielded only nine potential matches occurring in the South Eastern Bioregion Highlands Bioregion. Of these only two were consistent with the vegetation formation (i.e. Grassy Woodland): PCT 731 and PCT 1330. However, PCT 1330 did not fit due to a lack of Yellow Box and Blakely's Red Gum. Hence PCT 731 was the best fit. The landscape position was also consistent with the description for PCT 731, being located on undulating hills between at 902 to 950 m ASL in western Blue Mountains. |
| Classification: | There are currently no TECs associated with this PCT. |
| Condition: | Zone 2 Moderate: Remnant vegetation patches impacted by edge effects and disturbance associated with operations at WCS. However, ground cover dominated by native species with a moderately mature canopy. |
| Estimate of percent cleared value of dominant PCT: | 80% |

**Plate 3-3 Zone 2: Moderate condition PCT 731**

**Table 3-5 PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion**

| PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | |
|---|---|
| Description: | Occurs on frost-hollow flats and footslopes in undulating tableland areas between 600 and 1100m. |
| Zone/s | Zone 3: Moderate; Zone 4: Rehabilitation; Zone 5: Regrowth; Zone 6 Poor (Canopy only); Zone 7 Poor (Understory only) |
| BAM Plot/ RDP Number: | Zone 3: Plots 1 and 15, Zone 4: Plots 2, 3, 8, 9, 10, 11, 12, Zone 5: Plots 4, 5 and 14, Zone 6: Plot 16; Zone 7: Plot 17, RDPs 1, 2, 6, 10 |
| Diagnostic upper stratum species: | Snow Gum (*Eucalyptus pauciflora*: Plots 1, 5, 10, 11 and 14); *Eucalyptus rubida* (Plot 1); *Eucalyptus stellulata* (Black Sally: Plot 16); *Eucalyptus viminalis (*Ribbon Gum; Plots 1, 4, 5 and 15); *Eucalyptus bridgesiana* (Apple Box; Plot 16); *Eucalyptus aggregata* (Black Gum; located adjacent Plot 14; See **Appendix A**) |
| Diagnostic middle stratum species: | Silver Wattle (*Acacia dealbata*: Plots 1, 2 and 16) |
| Diagnostic ground stratum species: | *Gonocarpus tetragynus* (Poverty Raspwort; Plots 1, 2, 3, 4, 5, 8, 11 and 15); *Hydrocotyle laxiflora* (Stinking Pennywort; Plot 1 and 15); *Hypericum gramineum* (Small St John's Wort; Plots 4, 8, 15 and 17); *Microlaena stipoides var. stipoides* (Weeping Grass; Plots 1, 2, 3, 4, 5, 8, 15, 16 and 17); *Themeda triandra* (Plots 1, 3, 8, 14, 15 and 17). |
| Justification: | Floristic composition of Zone 3 was used to guide PCT selection. This Zone had all strata intact. Consistently dominant species from these strata were selected as diagnostic species: *Eucalyptus viminalis* (Ribbon Gum), *Eucalyptus pauciflora* (White Sally), *Eucalyptus rubida*, *Acacia dealbata* (Silver Wattle) and *Poa sieberiana* (Snow Grass). BioNet VIS (DPIE 2021c) yielded four potential PCTs with all diagnostic species in SE Highlands IBRA Bioregion. Only three of these had the correct Vegetation Formation (i.e. Grassy Woodland); PCTs 650, 1190 and 1191. However, PCT 650 is not located nearby the Project Area (i.e. Delegate to Shoalhaven, NSW). PCT 1190 was ruled out as this community occurs south of ACT ranges. As such, PCT 1191 was considered the best fit. The landscape position of the site was also consistent with this vegetation community; located at the footslopes and in the flats of a broad valley. Subtle compositional differences were also noted throughout the site, coinciding with topographic variation; *E. viminalis* dominated more elevated areas (i.e. Zones 3 and 4), whilst *E. bridgesiana* (Apple Box) and *E. aggregata* (Black Gum) occurred more toward the valley flats/ frost hollows (i.e. Zone 6). Elevation of the Project Area was also consistent with the PCT description: 902 to 950 m ASL. |
| Classification: | Commensurate Critically Endangered Ecological Community (CEEC) - *Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions (Equivalent).* |
| Condition: | Zone 3: Moderate: Vegetation is impacted by edge effects associated with easements, stockpiles, water treatment dams etc. Remnant diagnostic eucalypts and shrubs were present. The mid and ground storey had a low weed presence.<br>Zone 4: Rehabilitation: Planted vegetation with some natural recruitment of vegetation occurring. A multivariate analysis (see **Appendix A**) revealed zone most closely resembles PCT 1191, rather than PCT 731. Weedy with rehabilitation native species common throughout zone including *Acacia rubida* (Red-stemmed Wattle), *Acacia parramattensis* (Parramatta Wattle) and *Cassina sifton* (Sifton Bush).<br>Zone 5: Regrowth: Eucalyptus recruitment naturally occurring from adjacent areas (primarily *E. viminalis*). Understory also more native than Zone 4: Rehabilitation.<br>Zone 6: Poor (canopy only): Understory and midstory removed with a managed understory (routine mowing) with exotic grasses dominant (e.g. Kikuyu).<br>Zone 7: Poor (understory only): No canopy present with scarce shrubs and primarily exotic grasses. Acacia dealbata present, indicative of PCT. BAM plot undertaken indicated a VIS score < 15 (for CEEC), and hence vegetation is below the threshold for offset requirements (as per Section 9.2.1 of BAM 2020). |
| Estimate of percent cleared value of dominant PCT: | 95% |

**Plate 3-4 Zone 3: Moderate condition PCT 1191 – western extent adjacent to Ben Bullen SF**

**Plate 3-5 Zone 4: Rehabilitation PCT 1191 – midway along western arm of Project Area**

**Plate 3-6 Zone 4: Rehabilitation PCT 1191 – WCS adjacent access road**

**Plate 3-7 Zone 4: Rehabilitation PCT 1191 – EA Land downslope of ash dam**

**Plate 3-8 Zone 4: Rehabilitation PCT 1191 – EA Land toward MPPS**

**Plate 3-9 Zone 5: Regrowth PCT 1191 – toward southwestern extent of Project Area**

**Plate 3-10 Zone 6: Poor condition (canopy only) PCT 1191 – near front gate of WCS**

**Plate 3-11 Zone 6: Poor condition (canopy only) PCT 1191 – near WCS site office**

**Plate 3-12 Zone 6: Poor condition (groundcover only) PCT 1191 – adjacent to Castlereagh Highway**

**Plate 3-13 Zone 6: Poor condition (groundcover only) PCT 1191 – adjacent to Castlereagh Highway**

**Table 3-6 Description of Cleared/Disturbed Land**

| Cleared/ Disturbed Land | |
|---|---|
| Description: | Non-native vegetation and disturbed land associated with historic impacts associated with the WCS and MPPS operations. Land uses leading to disturbance include earth works associated with construction of roads, access tracks, plant (e.g. coal washery), stockpiles, equipment and machine laydown areas, conveyor belts, buildings etc. |
| BAM Plot/ RDP Number: | NA |
| Diagnostic upper stratum species: | NA |
| Diagnostic middle stratum species: | NA |
| Diagnostic ground stratum species: | NA |
| Justification: | Highly modified by WCS and MPPS operations and past land use. Native species largely lacking, with vegetation dominated by exotic species. |
| Classification: | There are currently no TECs associated with this area. |
| Condition: | Cleared/Disturbed |
| Estimate of percent cleared value of dominant PCT: | NA |

**Plate 3-14 Cleared/Disturbed land within Project Area – access road along southern extent of Project Area**

**Plate 3-15 Cleared/Disturbed land within Project Area – EA land access track adjacent to ash dam**

**Plate 3-16 Cleared/Disturbed land within Project Area – EA land access track adjacent to ash dam**

**Plate 3-17 Cleared/Disturbed land within Project Area – EA land toward MPPS**

**Plate 3-18 Cleared/Disturbed land within Project Area – WCS access toward western arm of Project Area**

### 3.4.3 Patch size

Patch sizes were assigned to vegetation zones within the Project Area using ArcGIS to select boundaries depicted in the existing mapping for the Project Area by DEC (2016), with reference to RDPs (strategically located across the Project Area) and aerial imagery.

In accordance with the BAM, patch size area was assigned to each vegetation zone as a class, being < 5ha, 5–24 ha, 25–100 ha or ≥ 100 ha. The patch size for all zones was > 100 ha. That is, vegetation had no gap of less than 100 m from the next area of native vegetation (in accordance with Section 4.3.2 of BAM 2020).

### 3.4.4 Vegetation Integrity Score

The Vegetation Integrity Score as calculated by the BAM-C (Version 45; last updated 10/06/21) is provided in **Table 3-7**.

**Table 3-7 Vegetation Integrity Score**

| Zone | PCT/Condition | Composition condition score | Structure condition score | Function condition score | Current vegetation integrity score |
|---|---|---|---|---|---|
| 1 | PCT 335 Poor | 50.9 | 4.3 | - | 14.9 |
| 2 | PCT 731 Moderate | 72.8 | 73.3 | 65 | 70.3 |
| 3 | PCT 1191 Moderate | 90.8 | 82.3 | 57.2 | 75.3 |
| 4 | PCT 1191 Rehabilitation | 42.3 | 30.4 | 31.1 | 34.2 |
| 5 | PCT 1191 Regrowth | 72.8 | 46.3 | 40.1 | 51.3 |
| 6 | PCT 1191 Poor (Canopy only) | 27.6 | 35.7 | 65.9 | 40.2 |
| 7 | PCT 1191 Poor (Understory only) | 29.2 | 2.1 | 0.4 | 3.0 |
| 8 | Disturbed/ non-native vegetation/ water | - | - | - | - |

# 4 THREATENED SPECIES

## 4.1 Fauna habitat assessment

The habitat assessment aims to inform the assessment of ecosystem credit species predicted to occur within the Project Area and to assist in developing a list of Candidate species requiring further assessment (in accordance with Section 6.2 of the BAM and Section 6.4 of BAM respectively). A habitat-based fauna assessment was undertaken by identifying the following fauna habitat features:

- Habitat trees (including large hollow-bearing trees);
- Degraded aquatic habitat (owing to poor water quality);
- Flowering shrubs and feed tree species, including winter flowering species; and
- Tributaries of Wangcol Creek.

The results of this fauna habitat assessment are further detailed in the BIR (**Appendix A**).

## 4.2 Ecosystem credit species

Ecosystem credit species assigned by the BAM-C as being associated with the PCTs present within the Project Area are presented in **Table 4-1**.

**Table 4-1 Ecosystem credit species**

| Species<br>Common name | Associated PCT/s | Sensitivity to gain class | BC Act listing | EPBC Act listing |
|---|---|---|---|---|
| *Anthochaera phrygia*<br>Regent Honeyeater (Foraging) | 731; 1191 | High Sensitivity to Potential Gain | Critically Endangered | Critically Endangered |
| *Artamus cyanopterus cyanopterus*<br>Dusky Woodswallow | 335; 731; 1191 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Callocephalon fimbriatum*<br>Gang-gang Cockatoo (Foraging) | 731; 1191 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Chthonicola sagittata*<br>Speckled Warbler | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Circus assimilis*<br>Spotted Harrier | 335; 1191 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Climacteris picumnus victoriae*<br>Brown Treecreeper (eastern subspecies) | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Daphoenositta chrysoptera*<br>Varied Sittella | 731; 1191 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Dasyurus maculatus*<br>Spotted-tailed Quoll | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Endangered |
| *Falco subniger*<br>Black Falcon | 335 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Falsistrellus tasmaniensis*<br>Eastern False Pipistrelle | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Glossopsitta pusilla*<br>Little Lorikeet | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Haliaeetus leucogaster*<br>White-bellied Sea-Eagle | 335; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |

| Species<br>Common name | Associated PCT/s | Sensitivity to gain class | BC Act listing | EPBC Act listing |
|---|---|---|---|---|
| (Foraging) | | | | |
| *Hieraaetus morphnoides*<br>Little Eagle<br>(Foraging) | 335; 731; 1191 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Lophoictinia isura*<br>Square-tailed Kite<br>(Foraging) | 731 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Melanodryas cucullata cucullata*<br>Hooded Robin (south-eastern form) | 731; 1191 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Melithreptus gularis gularis*<br>Black-chinned Honeyeater (eastern subspecies) | 731 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Miniopterus orianae oceanensis*<br>Large Bent-winged Bat<br>(Foraging) | 1093; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Neophema pulchella*<br>Turquoise Parrot | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Ninox connivens*<br>Barking Owl<br>(Foraging) | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Ninox strenua*<br>Powerful Owl<br>(Foraging) | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Petaurus australis*<br>Yellow-bellied Glider | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Petroica boodang*<br>Scarlet Robin | 731; 1191 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Petroica phoenicea*<br>Flame Robin | 731; 1191 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Phascolarctos cinereus*<br>Koala<br>(Foraging) | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Vulnerable |
| *Pteropus poliocephalus*<br>Grey-headed Flying-fox<br>(Foraging) | 731 | High Sensitivity to Potential Gain | Vulnerable | Vulnerable |
| *Saccolaimus flaviventris*<br>Yellow-bellied Sheathtail-bat | 731 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Scoteanax rueppellii*<br>Greater Broad-nosed Bat | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Stagonopleura guttata*<br>Diamond Firetail | 731; 1191 | Moderate Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Tyto novaehollandiae*<br>Masked Owl<br>(Foraging) | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |
| *Varanus rosenbergi*<br>Rosenberg's Goanna | 731; 1191 | High Sensitivity to Potential Gain | Vulnerable | Not Listed |

Of the Ecosystem Credit species, the following were detected within or nearby the Project Area:

- Brown Treecreeper [(eastern subspecies) *Climacteris picumnus*; BC Act: Vulnerable; EPBC Act: Not Listed); Foraging only];
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only);
- Gang Gang Cockatoo (*Callocephalon fimbriatum*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only); and
- Large-eared Pied Bat (*Chalinolobus dwyeri*; BC Act: Vulnerable; EPBC Act: Vulnerable; Foraging only);
- Little Eagle (*Hieraaetus morphnoides*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only);
- Scarlet Robin (*Petroica boodang*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only); and
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only).

### 4.2.1 Additions

The suite of threatened species likely to occur on or use the Project Area according to Steps 1 and 2 in BAM Section 5.2, to be assessed for Species credits, are provided in **Table 4-2**.

*Acacia bynoeana* (Bynoe's Wattle), *Acacia meiantha* and *Eucalyptus cannonii* (Capertee Stringybark) were added as Species Credit Species due to their potential to occur within the Project Area (**Appendix A**). That is, these species are known to associate with PCT 1093, which is very similar in floristic composition and landscape position as PCT 731. As such, PCT 731 were considered potential habitat for this species and accounted for during threatened flora surveys.

### 4.2.2 Exclusions

The following ecosystem credit species were excluded from assessment based on habitat constraints or geographic limitations.

- *Calyptorhynchus lathami* (Glossy Black-Cockatoo) was excluded since there was no *Allocasuarina* or *Casuarina* species within the Project Area;
- *Ephippiorhynchus asiaticus* (Black-necked Stork) was excluded since there was no suitable wetland present. PCT 335 was in poor condition owing to water quality, with little pooled water offering foraging resources (see **Appendix A**);
- *Grantiella picta* (Painted Honeyeater) was excluded since mistletoes were not present at a density of greater than five mistletoes per hectare within PCT 731 in the Project Area; and
- *Petaurus australis* (Yellow-bellied Glider) was excluded from Zones 4, 5, 6 and 7 due to a lack of large hollows (i.e. >25 cm diameter).

## 4.3 Species Credit Species

Of the Candidate Species, the following Species Credit Species were found or assumed present within the Project Area:

- *Eucalyptus aggregata* (Black Gum; BC Act: Vulnerable; EPBC Act: Vulnerable; 32 individuals in Project Area); and
- *Paralucia spinifera* (Bathurst Copper Butterfly; BC Act: Endangered; EPBC Act: Vulnerable; approximately 0.24 ha of potential habitat in Project Area).

Species polygons for *Eucalyptus aggregata* (Black Gum) and *Paralucia spinifera* (Bathurst Copper Butterfly) are provided in **Figure 4-1** and **Figure 4-2**.

**Table 4-2 Candidate Species Credit Species requiring assessment**

| Species Credit Species | BC Act | EPBC Act | Habitat components and geographic restrictions | Sensitivity to gain class | Habitat components on Project Area | Include or excluded | Reason for inclusion or exclusion |
|---|---|---|---|---|---|---|---|
| *Acacia bynoeana*[1] Bynoe's Wattle | Endangered | Vulnerable | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Acacia meiantha*[1] | Endangered | Endangered | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Anthochaera phrygia* Regent Honeyeater (Breeding) | Critically Endangered | Critically Endangered | As per mapped areas | High Sensitivity to Potential Gain | No | Exclude | Project Area not within mapped breeding habitat |
| *Callocephalon fimbriatum* Gang-gang Cockatoo (Breeding) | Vulnerable | Not Listed | Hollow bearing trees<br>Eucalypt tree species with hollows greater than 9 cm diameter | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Calyptorhynchus lathami* Glossy Black-Cockatoo (Breeding) | Vulnerable | Not Listed | Hollow bearing trees<br>Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Cercartetus nanus* Eastern Pygmy-possum | Vulnerable | Not Listed | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Chalinolobus dwyeri* Large-eared Pied Bat | Vulnerable | Vulnerable | Cliffs<br>Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels | Very High Sensitivity to Potential Gain | No | Exclude | No suitable breeding habitat present. See Appendix A. |
| *Eucalyptus aggregata* Black Gum | Vulnerable | Vulnerable | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Eucalyptus cannonii*[1] Capertee Stringybark | Vulnerable | Not Listed | - | Moderate Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Eucalyptus pulverulenta* Silver-leafed Gum | Vulnerable | Vulnerable | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Haliaeetus leucogaster* White-bellied Sea-Eagle | Vulnerable | Not Listed | Living or dead mature trees within suitable vegetation within 1km of a | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |

| Species Credit Species | BC Act | EPBC Act | Habitat components and geographic restrictions | Sensitivity to gain class | Habitat components on Project Area | Include or excluded | Reason for inclusion or exclusion |
|---|---|---|---|---|---|---|---|
| (Breeding) | | | rivers, lakes, large dams or creeks, wetlands and coastlines | | | | |
| *Heleioporus australiacus* Giant Burrowing Frog | Vulnerable | Vulnerable | - | Moderate Sensitivity to Potential Gain | No | Exclude | Species vagrant to IBRA subregion |
| *Hieraaetus morphnoides* Little Eagle (Breeding) | Vulnerable | Not Listed | Nest trees - live (occasionally dead) large old trees within vegetation) | Moderate Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Leucochrysum albicans var. tricolor* Hoary Sunray | Not Listed | Endangered | - | Moderate Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Litoria booroolongensis* Booroolong Frog | Endangered | Endangered | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Lophoictinia isura* Square-tailed Kite (Breeding) | Vulnerable | Not Listed | Nest trees | Moderate Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Miniopterus orianae oceanensis* Large Bent-winged Bat (Breeding) | Vulnerable | Not Listed | Caves<br>Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave<br>" observation type code "E nest-roost<br>" with numbers of individuals >500 | Very High Sensitivity to Potential Gain | No | Exclude | No suitable breeding habitat present. See Appendix A. |
| *Ninox connivens* Barking Owl (Breeding) | Vulnerable | Not Listed | Hollow bearing trees<br>Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Ninox strenua* Powerful Owl (Breeding) | Vulnerable | Not Listed | Hollow bearing trees<br>Living or dead trees with hollow greater than 20cm diameter | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |

| Species Credit Species | BC Act | EPBC Act | Habitat components and geographic restrictions | Sensitivity to gain class | Habitat components on Project Area | Include or excluded | Reason for inclusion or exclusion |
|---|---|---|---|---|---|---|---|
| *Paralucia spinifera* Purple Copper Butterfly, Bathurst Copper Butterfly | Endangered | Vulnerable | *Bursaria spinosa* or within 40m of *Bursaria spinosa* | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Petaurus norfolcensis* Squirrel Glider | Vulnerable | Not Listed | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Petrogale penicillata* Brush-tailed Rock-wallaby | Endangered | Vulnerable | Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines | Very High Sensitivity to Potential Gain | No | Exclude | No land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines. See **Appendix A**. |
| *Phascogale tapoatafa* Brush-tailed Phascogale | Vulnerable | Not Listed | - | High Sensitivity to Potential Gain | Yes | Exclude | Species vagrant to IBRA subregion |
| *Phascolarctos cinereus* Koala (Breeding) | Vulnerable | Vulnerable | Areas identified via survey as important habitat | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Prasophyllum petilum* Tarengo Leek Orchid | Endangered | Endangered | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Pteropus poliocephalus* Grey-headed Flying-fox (Breeding) | Vulnerable | Vulnerable | Breeding camps | High Sensitivity to Potential Gain | No | Exclude | No breeding camps. See Appendix A. |
| *Swainsona sericea* Silky Swainson-pea | Vulnerable | Not Listed | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Thesium australe* Austral Toadflax | Vulnerable | Vulnerable | - | Moderate Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Tyto novaehollandiae* Masked Owl (Breeding) | Vulnerable | Not Listed | Hollow bearing trees<br>Living or dead trees with hollows greater than 20cm diameter | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |
| *Veronica blakelyi* | Vulnerable | Not Listed | - | High Sensitivity to Potential Gain | Yes | Include | Potential habitat present |

1. Species added due to potential for suitable habitat (associated with PCT 1093, which is similar as PCT 731).

### 4.3.1 Candidate Species Excluded

#### 4.3.1.1 Exclusions based on survey

Candidate Species excluded based on survey are listed in **Table 4-3**. More details regarding survey effort and habitat assessment are provided in **Appendix A**.

**Table 4-3 Candidate species: excluded by survey**

| Species<br>Common name | BC Act | Justification for removal |
|---|---|---|
| *Acacia bynoeana*<br>Bynoe's Wattle | Endangered | Threatened plant survey (TPS) within potential associated PCT 731 undertaken in April, June/July, October and November 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Acacia meiantha* | Endangered | TPS within potential associated PCT 731 undertaken in June and October 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Callocephalon fimbriatum*<br>Gang-gang Cockatoo | Vulnerable | Bird survey undertaken in parallel with TPS within PCTs 731 and 1191 in October 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Calyptorhynchus lathami*<br>Glossy Black-Cockatoo | Vulnerable | Hollow-nesting bird survey undertaken in parallel with TPS within PCT 731 and 1191 in June and August 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Cercartetus nanus*<br>Eastern Pygmy-possum | Vulnerable | Spotlighting survey in PCTs 731 and 1191 undertaken in October 2021 (consistent with BAM-C prescribed survey timing). Nest boxes were also established for 28 days over October/November 2021, designed specifically to encourage *C. nanus* occupancy. Species deemed absent. |
| *Eucalyptus aggregata*<br>Black Gum | Vulnerable | TPS within potential associated PCT 731 and 1191 undertaken in January, April, June, October and November 2021 (consistent with BAM-C prescribed survey timing). |
| *Eucalyptus cannonii*<br>Capertee Stringybark | Vulnerable | TPS within potential associated PCT 731 undertaken in April, June and October 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Eucalyptus pulverulenta*<br>Silver-leafed Gum | Vulnerable | TPS within potential associated PCT 731 undertaken in April, June and October 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Haliaeetus leucogaster*<br>White-bellied Sea-Eagle | Vulnerable | Bird survey undertaken in parallel with TPS within PCT 1191 in October and November 2021 (consistent with BAM-C prescribed survey timing). PCT 335 had no suitable nesting trees. Species deemed absent. |
| *Hieraaetus morphnoides*<br>Little Eagle | Vulnerable | Bird survey undertaken in parallel with TPS within PCTs 731 and 1191 in October 2021 (consistent with BAM-C prescribed survey timing). PCT 335 had no suitable nesting trees. Species deemed absent. |
| *Lophoictinia isura*<br>Square-tailed Kite | Vulnerable | Bird survey undertaken in parallel with TPS within PCT 731 in January, October and November 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Ninox connivens*<br>Barking Owl | Vulnerable | Nocturnal bird survey (stag watching and spotlighting) undertaken in PCTs 731 and 1191 in June/July and October 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Ninox strenua*<br>Powerful Owl | Vulnerable | Nocturnal bird survey (stag watching and spotlighting) undertaken in PCTs 731 and 1191 in June/July 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Petaurus norfolcensis*<br>Squirrel Glider | Vulnerable | Camera trapping (from June to August) and spotlighting in June 2021 were undertaken in potential associated PCT 731 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Phascogale tapoatafa*<br>Brush-tailed Phascogale | Vulnerable | Camera trapping (from June to August) and spotlighting in June 2021 were undertaken in potential associated PCT 731 (consistent with BAM-C prescribed survey timing). Note that this species is considered a vagrant to the |

| Species<br>Common name | BC Act | Justification for removal |
|---|---|---|
| | | Project Area since it has not been detected within the Capertee Uplands IBRA subregion (DPIE 2021a). Species deemed absent. |
| *Phascolarctos cinereus*<br>Koala | Vulnerable | Camera trapping (from June to August 2021) and spotlighting in June/July and October 2021 were undertaken in potential associated PCT 731 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Prasophyllum petilum*<br>Tarengo Leek Orchid | Endangered | Survey of potential associated PCT 1191 undertaken in October and November 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Swainsona sericea*<br>Silky Swainson-pea | Vulnerable | Survey of potential associated PCT 1191 undertaken in October and November 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Thesium australe*<br>Austral Toadflax | Vulnerable | Survey of potential associated PCT 1191 undertaken in November 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Tyto novaehollandiae*<br>Masked Owl | Vulnerable | Nocturnal bird survey (stag watching and spotlighting) undertaken in PCTs 731 and 1191 in June 2021 (consistent with BAM-C prescribed survey timing). Species deemed absent. |
| *Veronica blakelyi* | Vulnerable | Species was surveyed for out of season. Surveys were undertaken on four occasions (April, June, October and November 2021) within the associated PCT 731. No plants were found consistent with the growth morphology of this species (or more broadly any *Veronica spp*.). Surveys were also extended to PCT 1191, where this species may also occur based on the habitat description in PlantNET (National Herbarium of NSW 2021). As this species is discernible out of flowering period, being a perennial species and not cryptic (individuals grow to 50 cm high), it is considered that this survey effort was representative and adequate to deem it absent from the Project Area. Species deemed absent. |

#### 4.3.1.2 Exclusions based on habitat constraints

Candidate Species excluded based on habitat constraints are listed in **Table 4-4**.

**Table 4-4 Candidate species: removed based on habitat constraint/s**

| Species<br>Common name | BC Act | Habitat constraint | Justification for removal |
|---|---|---|---|
| *Anthochaera phrygia*<br>Regent Honeyeater | Critically Endangered | As per mapped areas | Project Area is outside the mapped breeding area for this species. |
| *Chalinolobus dwyeri*<br>Large-eared Pied Bat | Vulnerable | Cliffs<br>Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels | Project Area may be considered foraging habitat given there are potential breeding habitat within 2 km and this species has been previously detected within the WCS site. However, the Project Area and surrounding 100 m lacks caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding. Hence, this species is to be considered an Ecosystem Credit species only. See **Appendix A**. |
| *Miniopterus orianae oceanensis*<br>Large Bent-winged Bat<br>(Breeding) | Vulnerable | Caves<br>Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave<br>"observation type code" E nest-roost | Project Area may be considered foraging habitat given there are potential breeding habitat within 2 km and this species has been previously detected within the WCS site. However, the Project Area and surrounding 100 m lacks caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding. Hence, this species is to be considered an Ecosystem Credit species only. See **Appendix A**. |

| Species Common name | BC Act | Habitat constraint | Justification for removal |
|---|---|---|---|
| | | "with numbers of individuals >500 | |
| *Petrogale penicillata* Brush-tailed Rock-wallaby | Endangered | Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines | Project area is more than 1 km from suitable rocky habitat. Note that suitable habitat was identified approximately 2 km from the Project Area along cliff lines in Newnes SF. However, fencing along the Castlereagh Highway perimeter of WCS and EA land presents a significant connectivity barrier that would likely preclude it from WCS, even if that rock habitat was used by this species. |
| *Pteropus poliocephalus* Grey-headed Flying-fox (Breeding) | Vulnerable | Breeding camps | PCT 731 is located immediately adjacent to WCS operations. Historically, no breeding roost has been observed, as confirmed by WCS site managers. Moreover, no camp was observed during October or November 2021, when breeding camps establish. |

#### 4.3.1.3 Exclusions based on degraded habitat

Candidate Species excluded based on degraded habitat are listed in **Table 4-5**. Nevertheless, herpetofauna surveys were undertaken in aquatic habitat within the Project Area, with these species failing to be detected (**Appendix A**).

**Table 4-5 Candidate species: removed based on degraded habitat**

| Species Common name | BC Act | Justification for removal |
|---|---|---|
| *Heleioporus australiacus* Giant Burrowing Frog | Vulnerable | Aquatic and riparian habitat within the Project Area was highly modified and degraded. All but one waterbody was man-made; constructed for the purpose of water treatment. The only natural creek was at the western extent of the Project Area, toward Ben Bullen SF. However, even this tributary is highly degraded with poor water quality, with flow terminating at an adjacent coal stockpile site (dying riparian vegetation was indicative of the poor condition). See Section 4.4 of **Appendix A** for further details and photographic evidence. Nevertheless, an aural-visual survey of these areas in October (prescribed survey period by BAM-C) yielded no detections. Species deemed absent. |
| *Litoria booroolongensis* Booroolong Frog | Endangered | Aquatic and riparian habitat within the Project Area was highly modified and degraded. All but one waterbody was man-made; constructed for the purpose of water treatment. The only natural creek was at the western extent of the Project Area, toward Ben Bullen SF. However, even this tributary is highly degraded with poor water quality, with flow terminating at an adjacent coal stockpile site (dying riparian vegetation was indicative of the poor condition). This species depends upon cobble-stone and other rock structures typically adjacent to flowing streams (DPIE 2021a); such habitat is absent. See Section 4.4 of **Appendix A** for further details and photographic evidence. Nevertheless, an aural-visual survey of these areas in October (prescribed survey period by BAM-C) yielded no detections. Species deemed absent. |

#### 4.3.1.4 Exclusions based on vagrancy

Candidate Species excluded based on vagrancy to the IBRA subregion are listed in **Table 4-6**.

**Table 4-6 Candidate species: removed based on degraded habitat**

| Species<br>Common name | BC Act | Justification for removal |
|---|---|---|
| *Heleioporus australiacus*<br>Giant Burrowing Frog | Vulnerable | To date, there are no records of *Heleioporus australiacus* (Giant Burrowing Frog) within the Capertee Uplands IBRA subregion (DPIE 2021a). |
| *Phascogale tapoatafa*<br>Brush-tailed Phascogale | Vulnerable | To date, there are no records of *Phascogale tapoatafa* (Brush-tailed Phascogale) within the Capertee Uplands IBRA subregion (DPIE 2021a). |

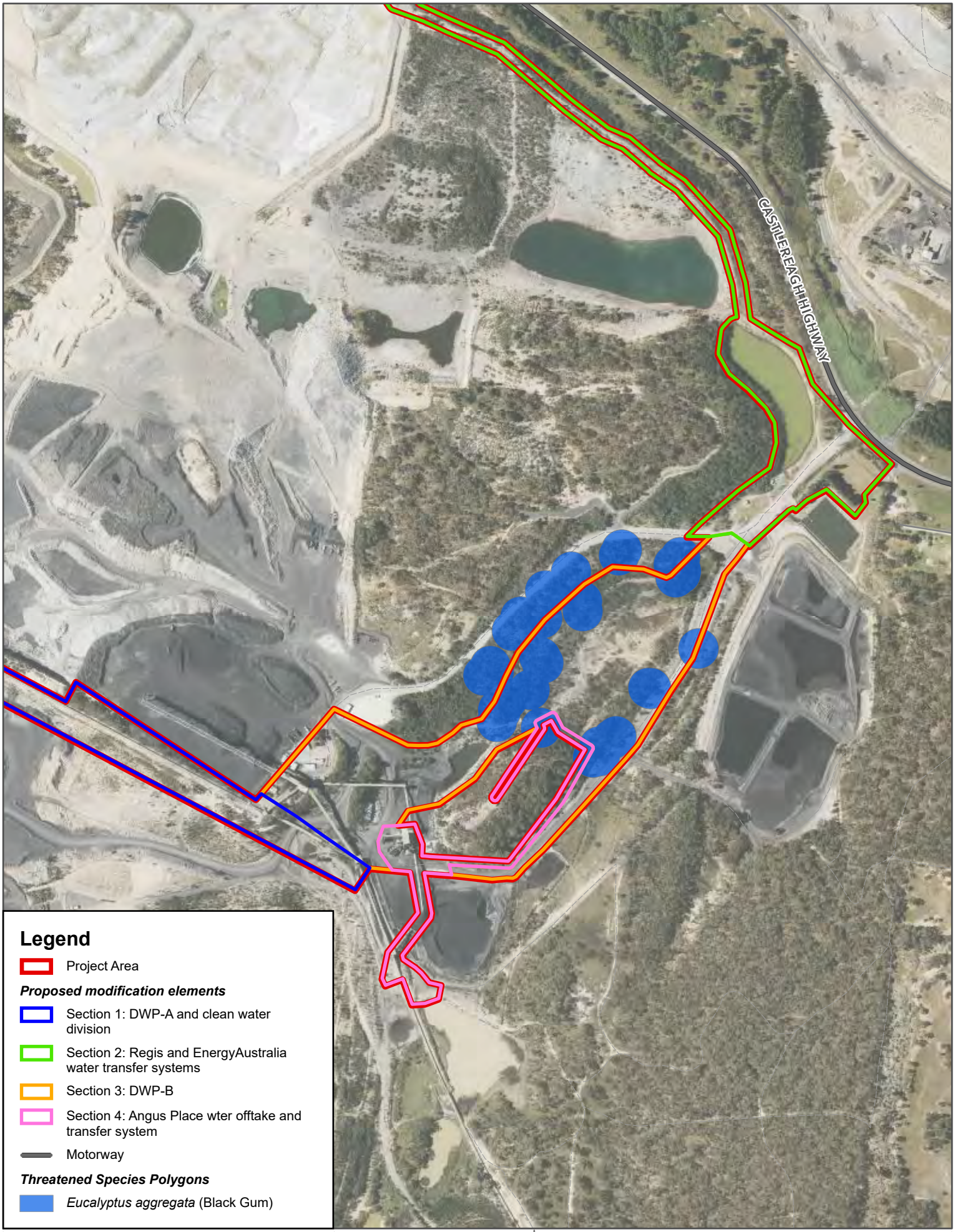
### 4.3.2 Species Polygons

Species polygons for Species Credit Species either detected or assumed to be present are listed in **Table 4-7**.

**Table 4-7 Summary of species credit species detected or assumed to be present within the Project Area**

| Species credit species | Biodiversity risk weighting | Survey Timing | Assumed to occur/ survey/ expert report | Habitat constraints measured | Unit | Detected in Project Area? | Detected in Predicted Impact Area? | Species polygon | Figure |
|---|---|---|---|---|---|---|---|---|---|
| *Eucalyptus aggregata*<br>Black Gum | 2 | January, June, July, October and November 2021 | Survey confirmed presence | - | Count | Yes | Yes | 30 m buffer around GPS marked-up individuals | **Figure 4-1** |
| *Paralucia spinifera*<br>Bathurst Copper Butterfly | 2 | September, October and December | Assumed to occur | *Bursaria spinosa* or within 40 m of *Bursaria spinosa* | Area | No[1] | No | 40m buffer around GPS marked-up *Bursaria spinosa subsp. lasiophylla* | **Figure 4-2** |

1. Species assumed present due to lack of sufficient survey effort. Survey to be undertaken in December 2021 to confirm presence/absence.




## Legend

- Project Area

***Proposed modification elements***

- Section 1: DWP-A and clean water division
- Section 2: Regis and EnergyAustralia water transfer systems
- Section 3: DWP-B
- Section 4: Angus Place wter offtake and transfer system
- Motorway

***Threatened Species Polygons***

- *Eucalyptus aggregata* (Black Gum)

**FIGURE 4-1**
**SPECIES POLYGONS : EUCALYPTUS AGGREGATA (BLACK GUM)**

VERSION: **B**

DATE EXPORTED: 26/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 50 100 150 200 250 m

N

SCALE 1:7,000 AT A4 SIZE
SPATIAL REFERENCE: GDA 1994 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

**IMPORTANT NOTE**
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.

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b. RPS Australia East Pty Ltd relying on information provided to it by the Client or a Third Party where the information is incorrect, incomplete, inaccurate, out-of-date or unreasonable;
c. any inaccuracies or other faults with information or data sourced from a Third Party;
d. RPS Australia East Pty Ltd relying on surface indicators that are incorrect or inaccurate;
e. the Client or any Third Party not verifying information in this plan where recommended by RPS Australia East Pty Ltd;
f. lodgement of this plan with any local authority against the recommendation of RPS Australia East Pty Ltd;
g. the accuracy, reliability, suitability or completeness of any approximations or estimates made or referred to by RPS Australia East Pty Ltd in this plan.

Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\Arcgis Map Documents\Eco\BDAR Figures\148221 BDAR Figures.aprx

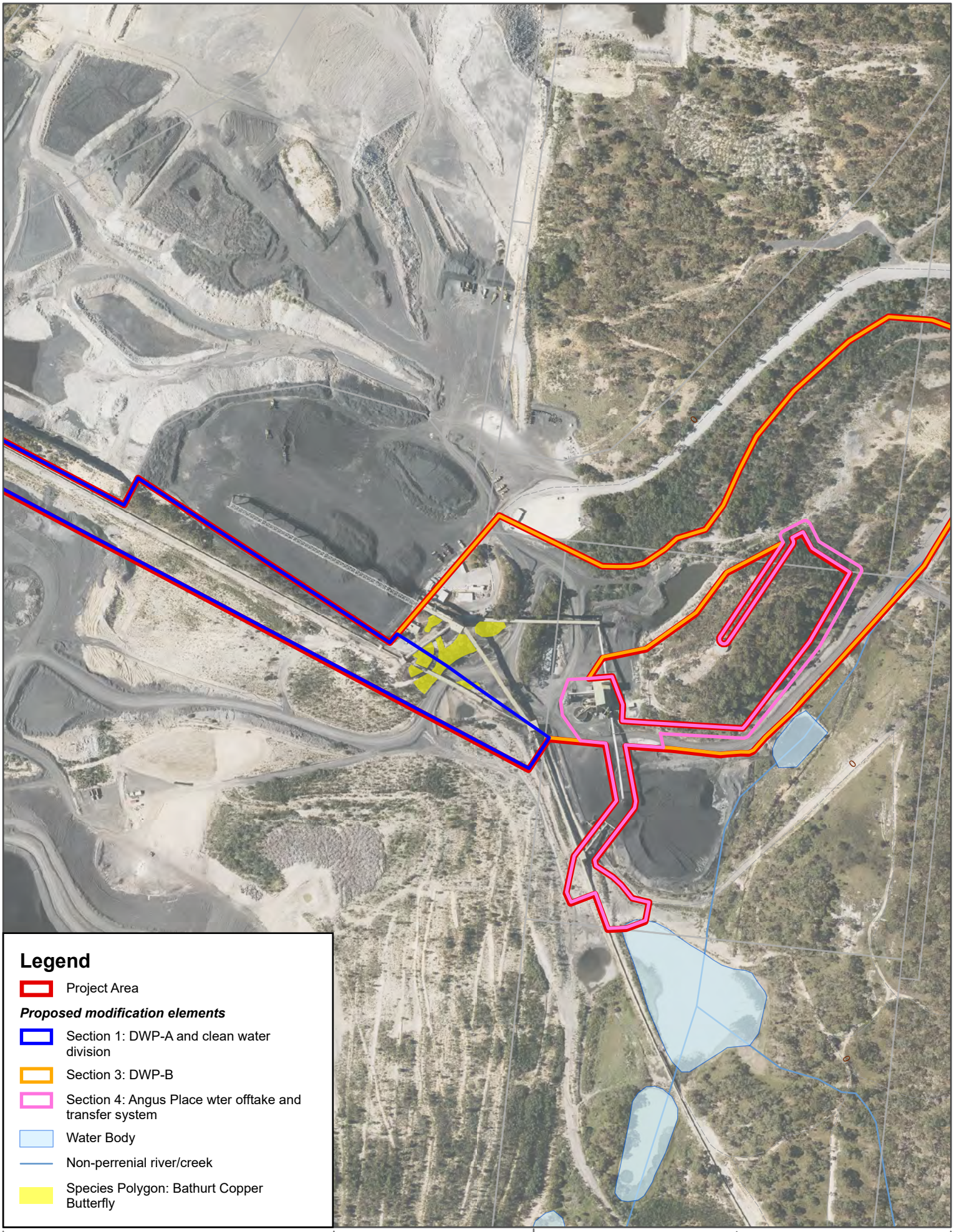


**FIGURE 4-2**
**SPECIES POLYGON: BATHURST COPPER BUTTERFLY**

VERSION: **A**

DATE EXPORTED: 26/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 50 100 150 m

N

SCALE 1:5,000 AT A4 SIZE
SPATIAL REFERENCE: GDA 1994 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

**IMPORTANT NOTE**
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.

2. RPS Australia East Pty Ltd will not be liable (in negligence or otherwise) for any direct or indirect loss, damage, liability or claim arising out of or incidental to:
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b. RPS Australia East Pty Ltd relying on information provided to it by the Client or a Third Party where the information is incorrect, incomplete, inaccurate, out-of-date or unreasonable;
c. any inaccuracies or other faults with information or data sourced from a Third Party;
d. RPS Australia East Pty Ltd relying on surface indicators that are incorrect or inaccurate;
e. the Client or any Third Party not verifying information in this plan where recommended by RPS Australia East Pty Ltd;
f. lodgement of this plan with any local authority against the recommendation of RPS Australia East Pty Ltd;
g. the accuracy, reliability, suitability or completeness of any approximations or estimates made or referred to by RPS Australia East Pty Ltd in this plan.

Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\Arcgis Map Documents\Eco\BDAR Figures\148221 BDAR Figures.aprx

## 4.4 Potential prescribed biodiversity Impacts

Prescribed impacts are the impacts on biodiversity values which are not related to, or are in addition to, native vegetation clearing and habitat loss (Section 6.7 of the BAM). Based on the Candidate species, potential prescribed biodiversity impacts on threatened species identified within the Project Area are:

- Water quality, water bodies and hydrological processes; and
- Vehicle strikes.

The potential occurrence of these potential prescribed impacts is detailed in **Sections 4.4.1** to **4.4.2** below.

In addition, Habitat connectivity is also a potential prescribed biodiversity impact, given the fragmented nature of the Assessment Area. This matter is explored in **Section 4.4.3** below.

### 4.4.1 Water quality, water bodies and hydrological processes

The Project will avoid directly impacting any natural water bodies or hydrological processes. However, there is potential impacts on water quality from the Project during the construction phase; when earthworks may expose and destabilise soil. Surface runoff carrying construction materials (e.g. excavated soil) may flow into Wangcol Creek. Although habitat was identified as degraded to support threatened aquatic species (e.g. frogs), water quality may impact those occurring downstream. For instance, threatened frogs such as *Litoria booroolongensis* (Booroolong Frog) and *Heleioporus australiacus* (Giant Burrowing Frog) may occur downstream. These species depend upon water of a suitable quality and quantity, supplied from such tributaries, to support their resource requirements, including breeding habitat.

Although there is some potential for water quality impacts to occur during construction, it is considered that sediment erosion control measures (as prescribed in **Section 7**) would sufficiently reduce the risk and potential severity of these impacts, should they occur. Moreover, the extent of earthworks required is considered relatively minor.

Construction of hard surfaces may also affect groundwater if it precludes water absorption. Nevertheless, it is not expected that the Project will significantly change the water balance within these tributaries as areas of hard substrate to be constructed is an incremental increase to that already present.

On balance, it is considered that the Project will benefit the broader aquatic environment through transferring mine water for re-use, rather than released into the environment.

### 4.4.2 Vehicle strikes

Vehicles will require frequent access to the site primarily during the construction phase during daytime only, which may pose a risk to some threatened species. The risk of vehicle strike on threatened species is assessed in **Table 4-8**. It was considered that, based on the increase in traffic movements pertaining to daytime and during construction phase only (as well as highly infrequent maintenance work), the risk of vehicle strike on threatened fauna is considered low.

**Table 4-8 Assessment of impact of vehicle strike on threatened fauna**

| Species | Likelihood of strike | Predicted impacts |
|---|---|---|
| *Callocephalon fimbriatum*<br>Gang-gang Cockatoo | Low – species generally flies near canopy. | Unlikely to be struck by vehicles |
| *Calyptorhynchus lathami*<br>Glossy Black-Cockatoo | Low – species generally flies near canopy. | Unlikely to be struck by vehicles |
| *Cercartetus nanus*<br>Eastern Pygmy-possum | Low – species is nocturnal. | Unlikely to be struck by vehicles |
| *Chalinolobus dwyeri*<br>Large-eared Pied Bat | Low – species is nocturnal and generally flies near canopy. | Unlikely to be struck by vehicles |
| *Haliaeetus leucogaster*<br>White-bellied Sea-Eagle | Low – species generally flies near canopy. | Unlikely to be struck by vehicles |

| Species | Likelihood of strike | Predicted impacts |
|---|---|---|
| *Heleioporus australiacus* Giant Burrowing Frog | Low – species is nocturnal. | Unlikely to be struck by vehicles |
| *Hieraaetus morphnoides* Little Eagle | Low – species generally flies near canopy. | Unlikely to be struck by vehicles |
| *Litoria booroolongensis* Booroolong Frog | Low – species is most active at night and typically occurs in riparian areas. | Unlikely to be struck by vehicles |
| *Lophoictinia isura* Square-tailed Kite | Low – species generally flies near canopy. | Unlikely to be struck by vehicles |
| *Miniopterus orianae oceanensis* Large Bent-winged Bat | Low – species is nocturnal. | Unlikely to be struck by vehicles |
| *Ninox connivens* Barking Owl | Low – species is nocturnal. | Unlikely to be struck by vehicles |
| *Ninox strenua* Powerful Owl | Low – species is nocturnal. | Unlikely to be struck by vehicles |
| *Petaurus norfolcensis* Squirrel Glider | Low – species is nocturnal. | Unlikely to be struck by vehicles |
| *Petrogale penicillata* Brush-tailed Rock-wallaby | Low – species is nocturnal. | Unlikely to be struck by vehicles |
| *Phascolarctos cinereus* Koala | Low – species is nocturnal. | Unlikely to be struck by vehicles |
| *Pteropus poliocephalus* Grey-headed Flying-fox | Low – species is nocturnal. | Unlikely to be struck by vehicles |
| *Tyto novaehollandiae* Masked Owl | Low – species is nocturnal. | Unlikely to be struck by vehicles |

### 4.4.3 Habitat connectivity

The Project Area offers low value for movement of threatened fauna between areas of important habitat. On either side of the Project Area, Ben Bullen SF provides important habitat areas for several mobile threatened fauna species, including *Cercartetus nanus* (Eastern Pygmy-possum); *Petaurus norfolcensis* (Squirrel Glider); *Petrogale penicillata* (Brush-tailed Rock-wallaby*)*; *Phascogale tapoatafa* (Brush-tailed Phascogale) and *Phascolarctos cinereus* (Koala). It is likely, at least for some of these species, movement between habitat in the State Forest extents to the north and south of the Project Area is required to support their foraging and reproduction, and hence support the ongoing viability of local populations of these species (**Figure 4-3**).

Although there is some ability for birds and potentially some highly mobile mammals to move through the Project Area to access habitat in Ben Bullen SF, access to vegetation within WCS/MPPS premises is historically limited by perimeter security fencing, whilst much of the mature vegetation is cleared within the Project Area, with large gaps between remnant vegetation pockets presenting a much riskier movement option, with many of these consisting of commonly used access roads that support WCS operations. **Figure 4-4** displays the extent of mature vegetation (displayed to depict habitat important for glider movements) through the Project Area, which is proxy for the provision of shelter and movement nodes. As indicated, this potential corridor is risky, given the distances between vegetation patches (e.g. 97.7 to 1,976 m between patches of mature vegetation within the Project Area) combined with exposure to anthropogenic disturbance along that route (i.e. light and noise associated with the 24 hr operation of WCS). As such, movement between key habitat areas is likely to be safer and less energetically taxing by use of corridors immediately north and south of the WCS/MPPS sites, as shown in **Figure 4-3**.

A literature review for thresholds of corridor connectivity found little general rules on habitat connectivity requirements for the arboreal mammals listed above. Nevertheless, for dietary specialist such as the aforementioned arboreal mammals, with an intolerance to urban disturbance, a relatively large home-range with continuous canopy cover is generally required to afford access to sufficient food resources without too much energy cost and predation risk (Isacc et al. 2014). As such, the large gaps between movement nodes within the Project Area present a considerable obstacle for movement. Using the Squirrel Glider as a model

species, gaps of >25 m may present a barrier for Squirrel Glider movement throughout the Project Area, with greatest tree height of approximately 15 m [i.e. glide distance = (15 m x 1.8) -2 as per LMCC 2015]. As there are four existing gaps of >90 m throughout the Project Area, even when assessing movement through the WCS portion of the Project Area, it is considered that the Project Area is unlikely to currently support reliable movement of at least Squirrel Gliders between patches of habitat in the Ben Bullen SF, to the north and south.

Hence, although the Project would impact a highly fragmented and risky movement option for some highly mobile threatened species, the well vegetated corridors north and south of WCS and MPPS provide safer and less energetically demanding movement options between key habitat within Ben Bullen SF. As such, removal of the largely disturbed extent of native vegetation by the Project is unlikely to disconnect habitat for threatened fauna populations in the local area. As such, the need to avoid and mitigate this prescribed impact is considered unnecessary.

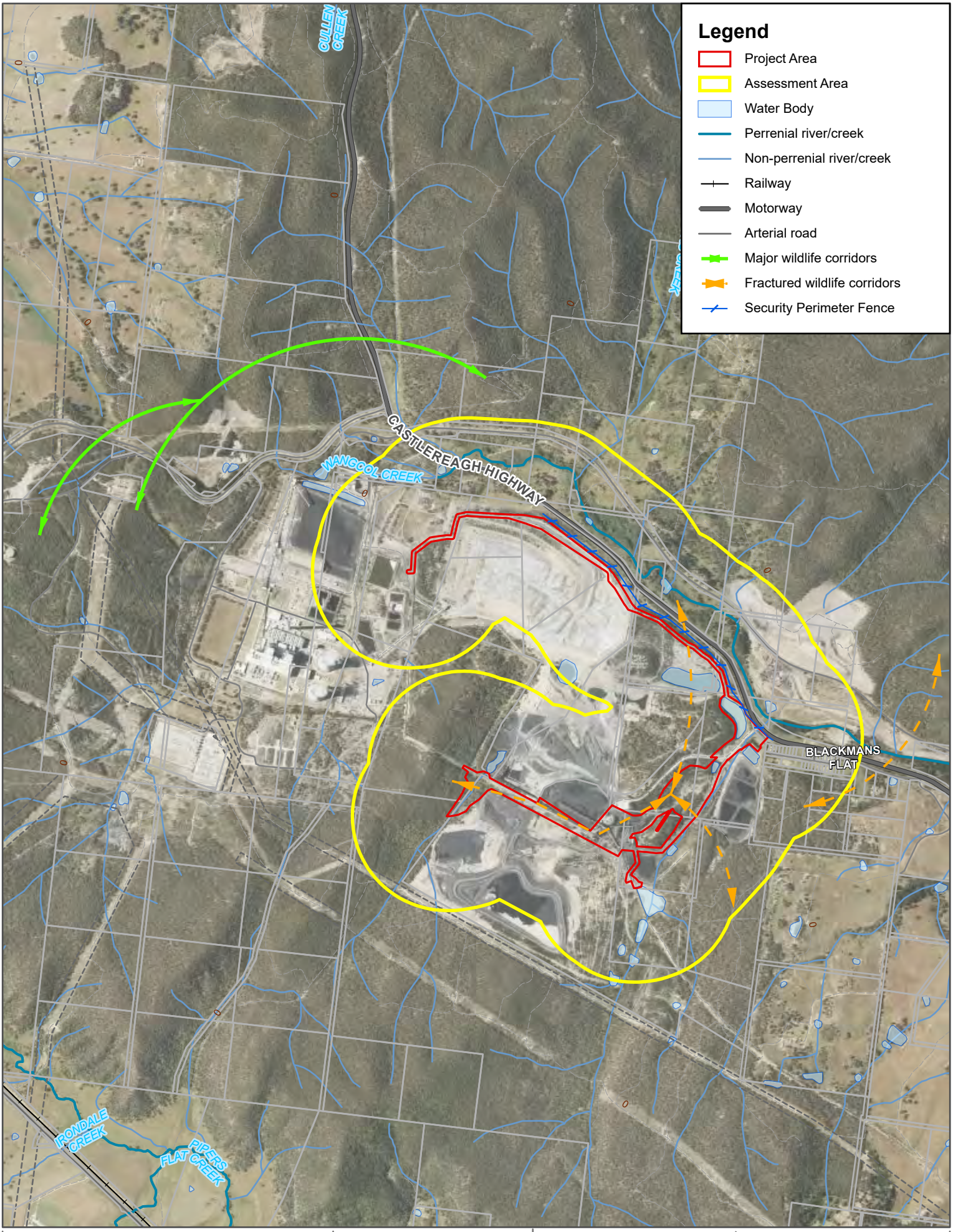


**FIGURE 4-3**
**HABITAT CONNECTIVITY BETWEEN THE SUBJECT LAND AND ASSESSMENT AREA (BROAD SPATIAL EXTENT)**

VERSION: **A**

DATE EXPORTED: 26/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0.25 0 0.25 0.5 Km

N

SCALE 1:25,000 AT A4 SIZE
SPATIAL REFERENCE: GDA 1994 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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**FIGURE 4-4**
**HABITAT CONNECTIVITY BETWEEN THE SUBJECT LAND AND ASSESSMENT AREA (FINE SPATIAL EXTENT)**

VERSION: **A**

DATE EXPORTED: 26/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 100 200 300 m

N

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA 1994 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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# STAGE 2
# IMPACT ASSESSMENT

# 5 AVOID AND MINIMISE IMPACTS

## 5.1 Avoiding and Minimising Impacts on Native Vegetation and Habitat

Centennial have reduced Project impacts on biodiversity values by restricting the installation of the pipeline and associated infrastructure to pre-disturbed areas wherever possible. This involved redesigning the path of the pipeline to avoid impacting *Eucalyptus aggregata* (Black Gum; BC Act: Vulnerable) where possible; the one threatened flora species recorded within the Project Area.

Centennial has prioritised the use of existing access roads to facilitate construction and operation of the Project wherever possible. This allowed the impact on biodiversity values to be isolated to a limited extent of disturbed bushland (i.e. ~15.18 ha), with impacts confined primarily to patches that were in a poor condition or rehabilitated areas. Apart from Zone 3 (moderate condition PCT 1191), vegetation to be impacted by the Project is of a largely depauperate condition, as this vegetation is currently subject to edge effects. Past disturbance associated with plant activities at both WCS and MPPS has largely degraded the species richness and habitat function of vegetation within the Project Area.

## 5.2 Avoiding and Minimising Prescribed Biodiversity Impacts

The BC Regulation (clause 6.1) identifies actions that are prescribed as impacts to be assessed under the Biodiversity Offsets Scheme. **Sections 5.2.1** to **5.2.2** detail how impacts to potential Prescribed Biodiversity Impacts were avoided or minimised. Mitigation measures to further reduce the potential to impact these Prescribed Biodiversity Impacts are provided in **Section 7**.

### 5.2.1 Water quality, water bodies and hydrological processes

To minimise any potential water quality issues arising from earthworks, such as sedimentation, sediment and erosion controls will be implemented during construction. Following construction, any disturbed areas will be stabilised to ensure that there are no ongoing risks to water quality that may result from erosion. Water quality risks may also arise from chemical and oil spills from construction equipment. In the case of a chemical or oil spill, spill containment and clean-up protocols will be followed to minimise potential for these substances from contaminating nearby waterways. Mitigation actions to reduce risks of water contamination arising from construction are detailed in **Section 7**. Through use of appropriate mitigation measures to minimise risks of runoff contamination, the Project is unlikely to impact the persistence of the suite of threatened species that may use downstream habitat.

### 5.2.2 Vehicle strikes

Risk of vehicle strike will be reduced during construction by ensuring all construction activities are undertaken during the day. To further mitigate risks of strikes on native fauna, vehicle speed limits are to be strictly enforced during both construction and operation. Inductions to all personnel during construction and operation will also be undertaken to ensure drivers are aware of the potential for animal vehicle strike, and the hours where risk is greatest (i.e. dawn and dusk). These requirements are provided in **Section 7**.

# 6 ASSESSMENT OF IMPACTS

## 6.1 Direct Impacts

### 6.1.1 Impacts to Native Vegetation

The direct impacts to native vegetation are summarised in **Table 6-1**.

**Table 6-1 Direct impacts**

| Zone | Area (ha) | Current VIS | Future VIS |
|---|---|---|---|
| 1: PCT 335 Poor | 0.93 | 14.9 | 0 |
| 2: PCT 731 Moderate | 0.94 | 70.3 | 0 |
| 3: PCT 1191 Moderate | 1.85 | 75.3 | 0 |
| 4: PCT 1191 Rehabilitation | 10.00 | 34.2 | 0 |
| 5: PCT 1191 Regrowth | 1.16 | 51.3 | 0 |
| 6: PCT 1191 Poor (Canopy only) | 0.19 | 40.2 | 0 |
| 7: PCT 1191 Poor (Understory only) | 0.11 | 3 | 0 |
| 8: Disturbed/ non-native vegetation/ water | 14.78 | - | - |
| **Total** | **29.97** | **-** | **-** |

### 6.1.2 Loss of species credit species habitat or individuals

Species credit liability associated with the loss of potential habitat for Species Credit Species either detected or assumed to be present are summarised in **Table 6-2**.

**Table 6-2 Impacts to Species Credit Species**

| Species | Associated zone | Individuals/ Area |
|---|---|---|
| *Eucalyptus aggregata*<br>Black Gum | PCT 1191 Rehabilitation<br>PCT 1191 Regrowth | 32 Individuals |
| *Paralucia spinifera*<br>Bathurst Copper Butterfly | PCT 731 Moderate<br>PCT 1191 Rehabilitation | 0.24 ha |

## 6.2 Indirect Impacts

Indirect impacts that need to be considered are listed in Section 8.2 of BAM. Those that are relevant to the Project are:

- Inadvertent impacts on adjacent habitat or vegetation;
- Reduced viability of adjacent habitat due to edge effects;
- Reduced viability of adjacent habitat due to noise, dust or light spill; and
- Transport of weeds and pathogens from the site to adjacent vegetation; and
- Disturbance to specialist foraging habitat (e.g. high flowering shrub density within rehabilitation areas may provide important foraging habitat for nectivorous birds and mammals, such as the Squirrel Glider).

Given the nature of the Project, the following impacts were considered not applicable either given the nature of the Project or the installation of suitable mitigation measures to reduce risk:

- Increased risk of starvation or exposure, and loss of shade or shelter;

- Loss of breeding habitat;
- Trampling of threatened flora species;
- Inhibition of nitrogen fixation and increased soil salinity;
- Fertiliser drift;
- Rubbish dumping;
- Wood collection;
- Increase in predatory species;
- Increase in pest animal populations;
- Change in fire regimes; and
- Disturbance to specialist breeding habitat.

**Table 7-1** identifies the type, frequency, duration and consequence of the indirect impacts that may occur due to applicable indirect impacts. **Table 7-1** also details mitigation measures to be employed to reduce potential impacts of these indirect impacts on biodiversity, in accordance with Section 9.1.4.2 of BAM.

# 7 MITIGATION AND MANAGEMENT OF IMPACTS

Measures to mitigate or manage impacts to biodiversity values are detailed in **Table 7-1**.

**Table 7-1 Mitigation measures to avoid and minimise impacts on native vegetation and habitat**

| Potential Impact | Mitigation measure | Proposed management measure | Timing | Frequency | Responsibility | Risk of failure | Risk and consequence of residual impacts |
|---|---|---|---|---|---|---|---|
| **Impacts on fauna and their habitat** | | | | | | | |
| Direct impact to fauna | Fauna protection protocols | Pre-clearance surveys by qualified ecologist prior to tree removal; and<br>Apply procedures to safely fell habitat trees and release areas for any rescued fauna. | Construction | One-off | Centennial / contractor | Medium | Some individuals may die/injured if not detected |
| Direct impact to fauna habitat | Retain other habitat attributes | Hollow logs and rock habitat within the clearance areas will be retained and carefully placed into the adjacent bushland. | Construction | One-off | Centennial / contractor | Low | Some fauna may be injured/die through loss of shelter resources |
| **Indirect impacts on native vegetation and habitat** | | | | | | | |
| Inadvertent impacts on adjacent habitat or vegetation (including adjacent *Eucalyptus aggregata*)<br>Reduced viability of adjacent habitat due to edge effects | Protect adjacent habitat or vegetation | Boundaries for vegetation removal clearly established prior to clearing using tape by a qualified ecologist;<br>All vehicles and equipment accessing site must use established access sites only; and<br>Restrict load/equipment set down areas to well within the designated impact area. | Construction | One-off | Centennial / contractor | Low | Some adjacent vegetation or habitat may be damaged |
| Reduced viability of adjacent habitat due to noise, dust or light spill | Minimise noise and light spill | Avoid night work; and<br>Take measures to reduce noise (e.g. use of noise barriers). | Construction | One-off | Centennial / contractor | Low | Minor impacts of noise on fauna during day only |
| | Dust management | Monitoring of dust generated during earthworks, suspending work if more than negligible amounts of dust is blown into adjacent bushland and use of water carts. | Construction | Ongoing | Centennial / contractor | Low | None |

| Potential Impact | Mitigation measure | Proposed management measure | Timing | Frequency | Responsibility | Risk of failure | Risk and consequence of residual impacts |
|---|---|---|---|---|---|---|---|
| Transport of weeds and pathogens from the site to adjacent vegetation | Weed and pathogen management | Good hygiene practices are to be used to reduce the risk of spreading weeds and pathogens, including ensuring that all machinery, materials and personnel are clean of any weed seed prior to entering the site;<br>Priority Weeds listed under *Biosecurity Act* (2015) to be actively managed on site to limit the spread of weeds into the adjacent forested areas; and<br>Weeds removed from the subject site are to be disposed of appropriately at an approved waste facility; and<br>Occurrences of pathogens (e.g. Myrtle Rust and Phytophthora) will be reported, treated and monitored. | Construction | Infrequent | Centennial / contractor | Medium | Introduction and spread of invasive species that may outcompete or exclude native fauna; and<br>Reduction of habitat quality in adjacent bushland. |
| Change in fire regimes | Fire response measures | Fire extinguishers accessible on site. | Construction | Infrequent | Centennial / contractor | Low | Uncontrolled burn |
| Rubbish dumping | Rubbish management | All waste generated during construction is to be collected and deposited offsite at a suitable waste facility. | Construction | One-off | Centennial / contractor | Low | None |
| Disturbance to specialist foraging habitat (e.g. Gliders) | Minimise disturbance to local Glider foraging patterns | Time clearing of rehabilitated areas where possible (e.g. areas of high shrub food resources) to avoid critical life cycle events, such as breeding or nursing. | Construction | One-off | Centennial / contractor | Medium | Rapid loss of food resources for Squirrel Glider may impact reproductive success of local Squirrel Glider population. |
| All relevant indirect impacts | Staff training and site briefing to educate contractors on biodiversity management measures | Contractors are made aware of biodiversity management measures through site induction and toolbox talks; and<br>Contractors Construction Environmental Management Plan (CEMP) to include all biodiversity management measures. | Pre-construction and Construction | Ongoing | Centennial / contractor | Low | Impacts to adjacent bushland and waterways |

| Potential Impact | Mitigation measure | Proposed management measure | Timing | Frequency | Responsibility | Risk of failure | Risk and consequence of residual impacts |
|---|---|---|---|---|---|---|---|
| **Prescribed biodiversity impacts** | | | | | | | |
| Water quality, water bodies and hydrological processes | Sediment and erosion controls | Erosion and sediment control measures are to be implemented and maintained to prevent sediment moving offsite, and sediment laden water entering any watercourse;<br>Erosion controls are to be regularly inspected for their functionality and cleared if required, especially after rainfall;<br>Excavated material should be stockpiled well away from areas where native vegetation is to be retained and waterways; and<br>Work areas stabilised progressively during works. | Construction | One-off | Centennial / contractor | Low | Sedimentation of downstream aquatic habitats |
| | Maintain upper catchment hydrology (maintain ephemerality) | Erosion and sediment controls designed to prevent permanent or semi-permanent ponding of water | Construction | One-off | Centennial / contractor | Low | Impacts on water quality to flora and fauna |
| | Prevent water pollution | No release of dirty water into drainage lines/waterways;<br>All fuel/chemicals are to be stored in either self-bunded containers or in a bunded facility;<br>An emergency spill kit is always to be kept on sites where equipment is being used;<br>An emergency spill response plan developed; and<br>Regular inspection of equipment and vehicles for fuel or oil leaks. | Construction | Infrequent | Centennial / contractor | Low | Water pollution impacting downstream ecosystems |
| Vehicle strike | Avoid vehicle strike | Vehicles will adhere to a 40 km/hr speed limit.<br>Site inductions are to include risks associated with vehicle strike. | Construction and operation | Ongoing | Centennial / contractor | Medium | Fauna strike by vehicle |

| Potential Impact | Mitigation measure | Proposed management measure | Timing | Frequency | Responsibility | Risk of failure | Risk and consequence of residual impacts |
|---|---|---|---|---|---|---|---|
| | | Strict adherence to construction and operational periods (i.e. daylight hours). | | | | | |

# 8 SERIOUS AND IRREVERSIBLE IMPACTS (SAII)

No SAII species were found or assumed to occur in the Project Area. However, the Project has potential to impact a TEC at risk of an SAII: Werriwa Cool Temperate Grassy Woodland CEEC.

Based on Section 9.1.1 of the BAM 2020, the BDAR is to provide further information regarding the assessment of SAIIs. This assessment is provided below. The extent of the CEEC at risk of an SAII within the Project Area is shown in **Figure 8-1**. The action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII are presented in **Section 5**.

## 8.1 Current status of TEC

### 8.1.1 Current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)

1. Evidence of reduction in geographic distribution

NSW Threatened Species Scientific Committee concludes that between 4–10% of the pre-1750 distribution of Werriwa Tablelands Cool Temperate Grassy Woodland remains (DPIE 2019).

2. Extent of reduction in ecological function for the TEC

Remnants of Werriwa Tablelands Cool Temperate Grassy Woodland are poorly represented in the formal reserve network and unreserved remnants are subject to the threat of vegetation clearing. Remnants are typically small, fragmented and are thus susceptible to attrition through clearing for routine land management practices (DPIE 2019).

3. Evidence of restricted geographic distribution

The extent of occurrence of Werriwa Tablelands Cool Temperate Grassy Woodland is 6,285 km$^2$ based on a minimum convex polygon enclosing known occurrences of the community (DPIE 2019).

4. Extent of evidence that the TEC is unlikely to respond to management

The success of management depends upon the extent of degradation, current practices and management actions undertaken. The likelihood of response to management depends on altering land-use practices. For instance, simple actions such as temporarily removing stock from a paddock or avoiding mowing during the flowering and seeding period of native species, will encourage trees, grasses and wildflowers to regenerate (GBWCMN 2010). The control or eradication of weed species can facilitate the successful reproduction of native plants or animals. Retention of fallen timber provides habitat for reptiles and ground feeding birds.

## 8.2 Impacts from the proposal on the TEC at risk of an SAII

### 8.2.1 Impact on the geographic extent of the TEC

The Project Area is located well north of the mapped extent of this TEC (Bathurst Tablelands Region represents the most northern reported extent; DPIE 2019). However, floristic similarities suggest PCT 1191 within the Project Area is consistent with this TEC. The condition of this vegetation is highly variable, ranging from moderate to poor. Based on vegetation integrity, impacts to intact and regrowth PCT 1191 (i.e. Zones 3 and 5) represent the greatest potential impact, however the extent of these zones combined is relatively small (i.e. ~3.01 ha). Including regrowth and rehabilitated areas, the potential impact to this TEC is ~13.38 ha, which is considered ~0.002% of the known extent of this TEC [i.e. 6,285 km$^2$ as per NSW Threatened Species Scientific Committee (2019)]. Note that, for the relatively intact and regrowth vegetation (i.e. Zones 3 and 5), loss of this vegetation would constitute ~0.0005% of the known extent of this TEC.

### 8.2.2 Extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes

Vegetation in the Project Area is highly disturbed and fragmented due to past land practices associated with WCS and MPPS. Much of the vegetation to be impacted is rehabilitated vegetation, offering little ecological function (i.e. no mature trees) and several naturalised species not consistent with this TEC. Due to the past disturbance and relatively minor extent of intact TEC (i.e. Zone 5; ~1.85 ha), it is not expected that impacts associated with the Project would have more than a negligible impact on biotic processes and or further environmental degradation.

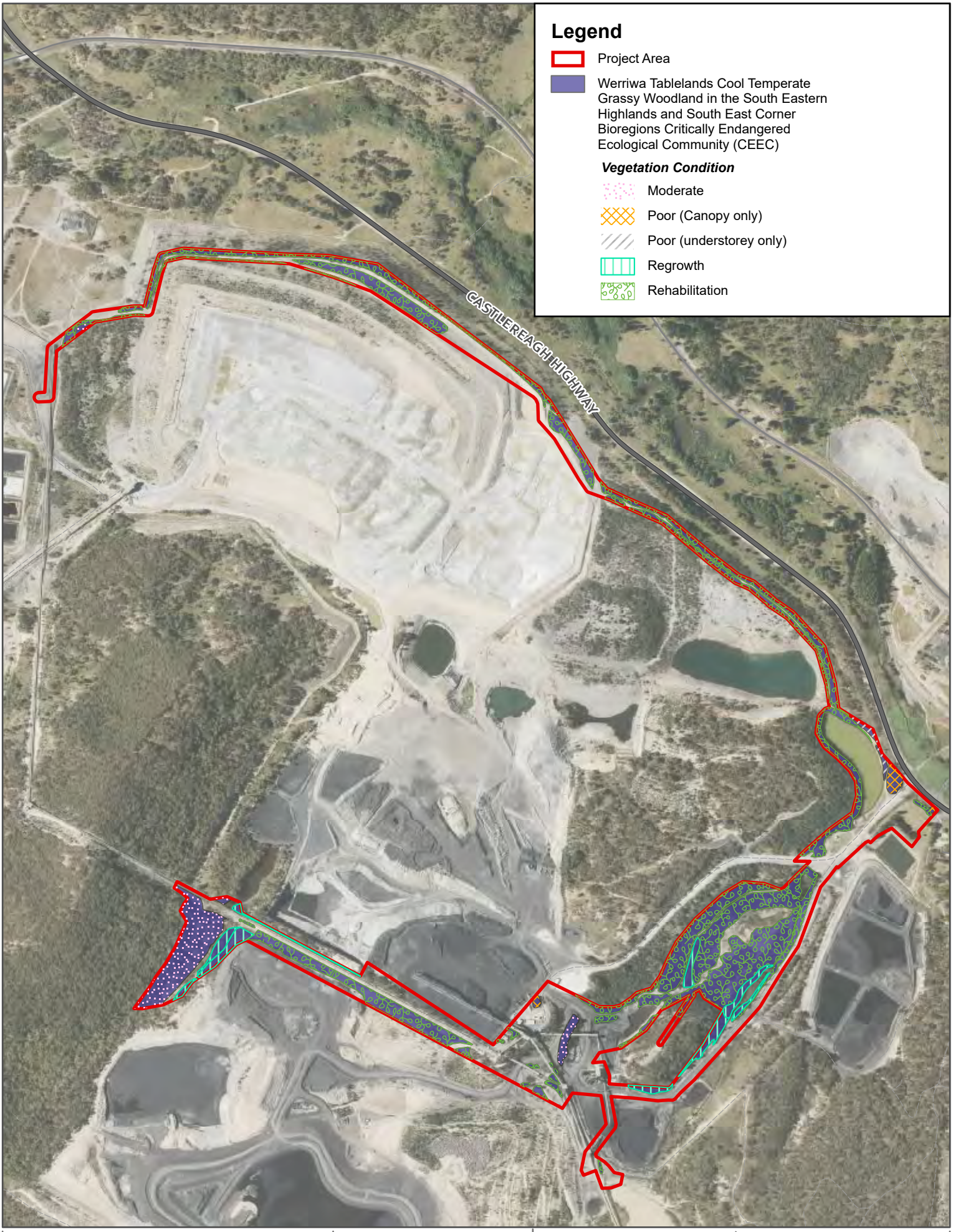


**FIGURE 8-1**
**CEEC AT RISK OF AN SAII WITHIN THE PROJECT AREA**

VERSION: **B**

DATE EXPORTED: 26/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 100 200 300 m

N

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\Arcgis Map Documents\Eco\BDAR Figures\148221 BDAR Figures.aprx

# 9 REQUIREMENT TO OFFSET

The offset liability for the Project is to be delivered prior to the commencement of each Proposed Modification Element. That is, the Ecosystem and Species Credits liability for each of the four Proposed Modification Elements would be satisfied prior to commencement of that individual element. As well as the overall offset liability for the Project, the Ecosystem and Species Credit liability for the Project has been presented for each of the Proposed Modification Elements. The Proposed Modification Elements for which offsetting is to be staged are:

- DWP-A and clean water diversion;
- Regis and EnergyAustralia water transfer systems;
- DWP-B; and
- Angus Place water offtake and transfer system.

The Biodiversity Credit Report for the overall Project is provided in **Appendix B**. Locations of impacts requiring offset and areas not requiring assessment are provided in **Figure 9-1** and **Figure 9-2**, respectively.

## 9.1 Ecosystem credits

### 9.1.1 Offset liability overall Project

Ecosystem credits required to offset impacts are presented in **Table 9-1**.

**Table 9-1 Ecosystem credit liability**

| BAM-C Condition Class | PCT/Condition | Vegetation integrity loss | Area (ha) | Species sensitivity to gain class | Biodiversity risk weighting | Potential SAII | No. ecosystem credits |
|---|---|---|---|---|---|---|---|
| Zone1_PCT335_Pr | PCT 335 Poor | 14.9 | 0.93 | High | 2 | No | 0 |
| Zone2_PCT731_Mod | PCT 731 Moderate | 70.3 | 0.94 | High | 2 | No | 33 |
| Zone3_PCT1191_Mod | PCT 1191 Moderate | 75.3 | 1.85 | High | 2.5 | Yes | 87 |
| Zone4_PCT1191_Rehab | PCT 1191 Rehabilitation | 34.2 | 10.00 | High | 2.5 | Yes | 214 |
| Zone5_PCT1191_Regr | PCT 1191 Regrowth | 51.3 | 1.16 | High | 2.5 | Yes | 37 |
| Zone6_PCT1191_PrCan | PCT 1191 Poor (Canopy only) | 40.2 | 0.19 | High | 2.5 | Yes | 5 |
| Zone7_PCT1191_PrUnd | PCT 1191 Poor (Understory only) | 3 | 0.11 | High | 2.5 | No | 0 |

## 9.1.2 Offset liability by Proposed Modification Element

### 9.1.2.1 Proposed Modification Element 1: DWP-A and clean water diversion

**Table 9-2 Ecosystem credit liability: Proposed Modification Element 1**

| BAM-C Condition Class | PCT/Condition | Vegetation integrity loss | Area (ha) | Species sensitivity to gain class | Biodiversity risk weighting | Potential SAII | No. ecosystem credits |
|---|---|---|---|---|---|---|---|
| Zone2_PCT731_Mod | PCT 731 Moderate | 70.3 | 0.66 | High | 2 | No | 23 |
| Zone3_PCT1191_Mod | PCT 1191 Moderate | 75.3 | 1.63 | High | 2.5 | Yes | 77 |
| Zone4_PCT1191_Rehab | PCT 1191 Rehabilitation | 34.2 | 1.31 | High | 2.5 | Yes | 28 |
| Zone5_PCT1191_Regr | PCT 1191 Regrowth | 51.3 | 0.50 | High | 2.5 | Yes | 16 |

### 9.1.2.2 Proposed Modification Element 2: Regis and EnergyAustralia water transfer systems

**Table 9-3 Ecosystem credit liability: Proposed Modification Element 2**

| BAM-C Condition Class | PCT/Condition | Vegetation integrity loss | Area (ha) | Species sensitivity to gain class | Biodiversity risk weighting | Potential SAII | No. ecosystem credits |
|---|---|---|---|---|---|---|---|
| Zone3_PCT1191_Mod | PCT 1191 Moderate | 75.3 | 0.04 | High | 2.5 | Yes | 2 |
| Zone4_PCT1191_Rehab | PCT 1191 Rehabilitation | 34.2 | 3.93 | High | 2.5 | Yes | 84 |
| Zone6_PCT1191_PrCan | PCT 1191 Poor (Canopy only) | 40.2 | 0.16 | High | 2.5 | Yes | 4 |
| Zone7_PCT1191_PrUnd | PCT 1191 Poor (Understory only) | 3.0 | 0.11 | High | 2.5 | No | 0 |

### 9.1.2.3 Proposed Modification Element 3: DWP-B

**Table 9-4 Ecosystem credit liability: Proposed Modification Element 3**

| BAM-C Condition Class | PCT/Condition | Vegetation integrity loss | Area (ha) | Species sensitivity to gain class | Biodiversity risk weighting | Potential SAII | No. ecosystem credits |
|---|---|---|---|---|---|---|---|
| Zone1_PCT335_Pr | PCT 335 Poor | 14.9 | 0.93 | High | 2 | No | 0 |
| Zone2_PCT731_Mod | PCT 731 Moderate | 70.3 | 0.22 | High | 2 | No | 8 |
| Zone3_PCT1191_Mod | PCT 1191 Moderate | 75.3 | 0.18 | High | 2.5 | Yes | 8 |
| Zone4_PCT1191_Rehab | PCT 1191 Rehabilitation | 34.2 | 4.61 | High | 2.5 | Yes | 99 |
| Zone5_PCT1191_Regr | PCT 1191 Regrowth | 51.3 | 0.42 | High | 2.5 | Yes | 13 |
| Zone6_PCT1191_PrCan | PCT 1191 Poor (Canopy only) | 40.2 | 0.03 | High | 2.5 | Yes | 1 |

#### 9.1.2.4 Proposed Modification Element 4: Angus Place water offtake and transfer system

**Table 9-5 Ecosystem credit liability: Proposed Modification Element 4**

| BAM-C Condition Class | PCT/Condition | Vegetation integrity loss | Area (ha) | Species sensitivity to gain class (for BRW) | Biodiversity risk weighting | Potential SAII | No. ecosystem credits |
|---|---|---|---|---|---|---|---|
| Zone2_PCT731_Mod | PCT 731 Moderate | 70.3 | 0.06 | High | 2 | No | 2 |
| Zone4_PCT1191_Rehab | PCT 1191 Rehabilitation | 34.2 | 0.16 | High | 2.5 | Yes | 3 |
| Zone5_PCT1191_Regr | PCT 1191 Regrowth | 51.3 | 0.24 | High | 2.5 | Yes | 8 |

### 9.1.3 Impacts not requiring offset (or assessment)

The assessment of non-vegetated lands located within the Project area is ~14.41 ha (**Figure 9-2**). Additionally, as the VIS for Zones 1 and 7 was under the thresholds for offsetting (as per Section 9.2.1 of BAM 2020), no offsets are required for these zones. No further assessment (or offsetting provisions) is required for these areas as there is no loss of native vegetation (as defined by BAM), associated habitat or any prescribed impacts.

## 9.2 Species credits

### 9.2.1 Offset liability overall

Species credits required to offset the Project are presented in **Table 9-6**.

**Table 9-6 Species credit liability**

| Species | Vegetation Zones | Area / Count | Biodiversity risk weighting | Potential SAII | No. species credits |
|---|---|---|---|---|---|
| *Eucalyptus aggregata* Black Gum | Zone4_PCT1191_Rehab | Count | 2 | No | 48 |
| | Zone5_PCT1191_Regr | Count | 2 | No | 16 |
| *Paralucia spinifera* Bathurst Copper Butterfly | Zone2_PCT731_Mod | Area | 2 | No | 7 |
| | Zone4_PCT1191_Rehab | Area | 2 | No | 1 |

### 9.2.2 Offset liability by Proposed Modification Element

Thirty one *E. aggregata* (Black Gum) are to be impacted occur within Proposed Modification Element 3: DWP-B; the offset liability is 62 Species credits. One *E. aggregata* (Black Gum) will be impacted within Proposed Modification Element 4: Angus Place water offtake and transfer system; the offset liability is 2 Species credits.

0.09 ha of potential *P. spinifera* (Bathurst Copper Butterfly) habitat would be impacted by Proposed Modification Elements Section 1: DWP-A and clean water division (3 Species credits). 0.15 ha of potential *P. spinifera* (Bathurst Copper Butterfly) habitat would be impacted by 3: DWP-B (5 Species credits).

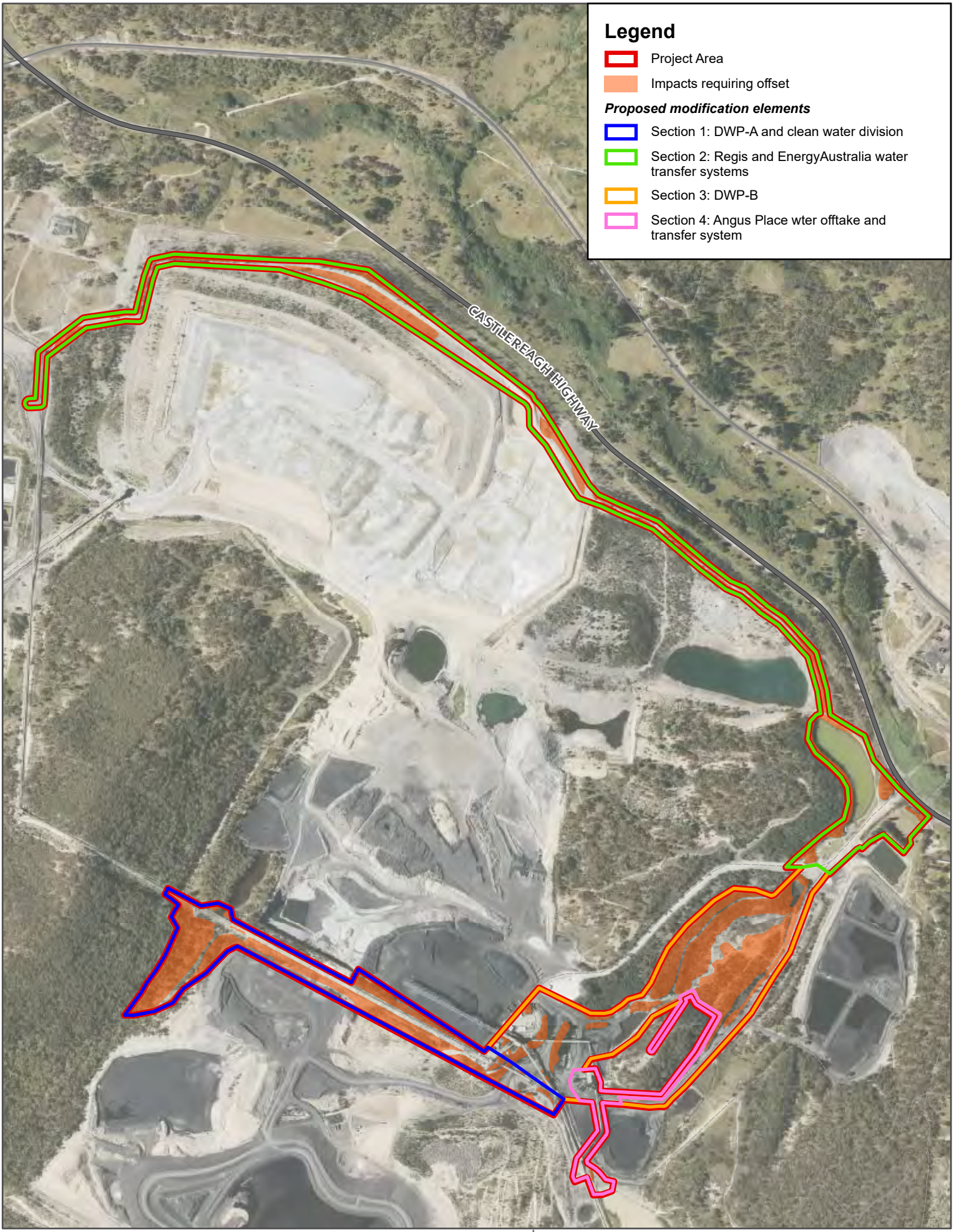


**FIGURE 9-1**
**IMPACTS REQUIRING OFFSET**

VERSION: **A**

DATE EXPORTED: 5/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 100 200 300 m

N

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

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Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\Arcgis Map Documents\Eco\BDAR Figures\148221 BDAR Figures.aprx

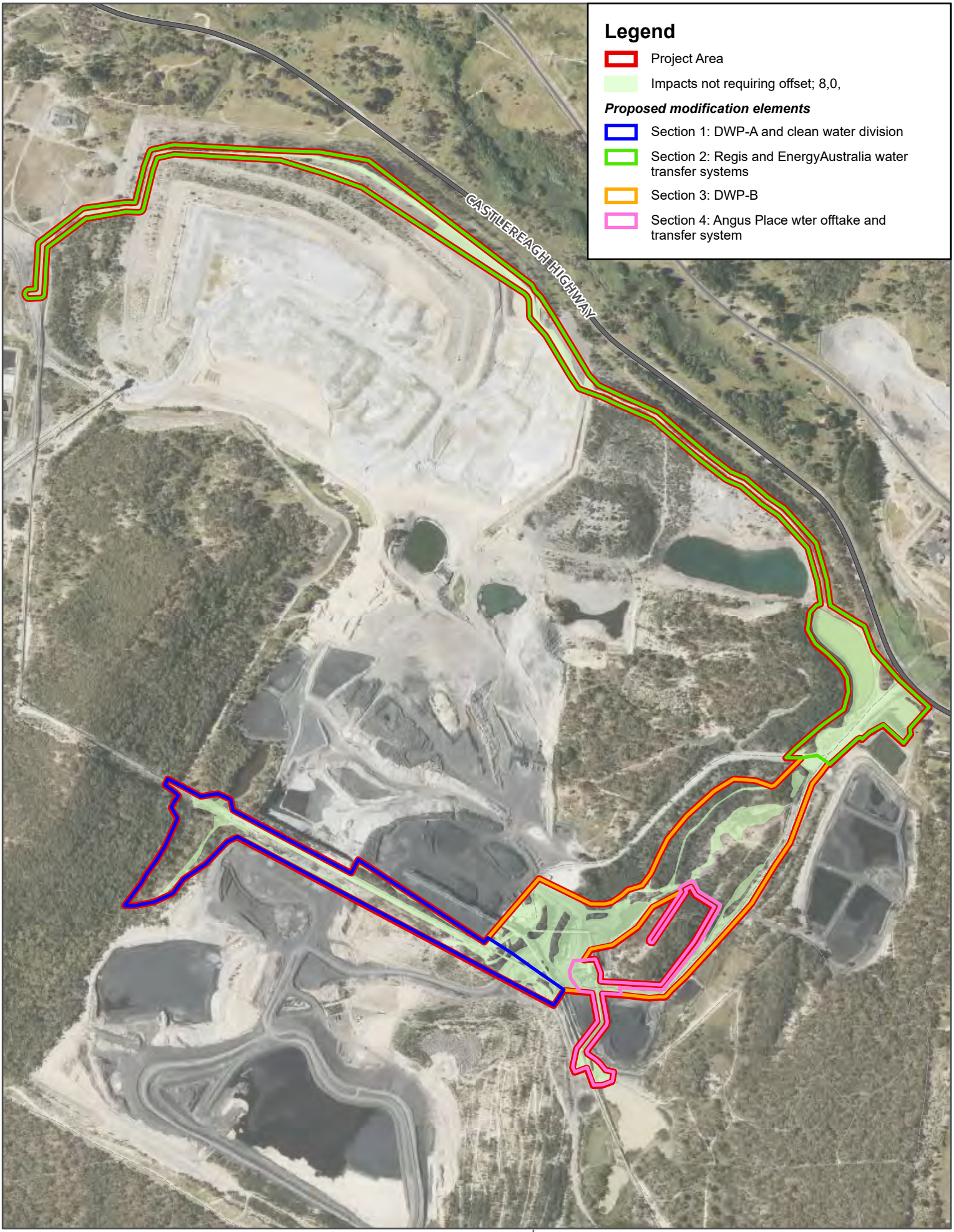


**FIGURE 9-2**
**IMPACTS NOT REQUIRING OFFSET / ASSESSMENT**

VERSION: **A**

DATE EXPORTED: 5/11/2021.

TECHNICIAN: **Natalie.Wood**

LOCATION:
**Western Coal Services - MOD4**

DATA SOURCES
Centennial, RPS, Flown Jan 2017

0 100 200 300 m

N

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**

PROJECT: **PR148221**

PURPOSE: **BDAR**

**IMPORTANT NOTE**
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.
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c. any inaccuracies or other faults with information or data sourced from a Third Party;
d. RPS Australia East Pty Ltd relying on surface indicators that are incorrect or inaccurate;
e. the Client or any Third Party not verifying information in this plan where recommended by RPS Australia East Pty Ltd;
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Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\Arcgis Map Documents\Eco\BDAR Figures\148221 BDAR Figures.aprx

# 10 CONCLUSION

RPS was engaged by Springvale Coal to prepare this BDAR for the proposed upgrade of the onsite water management system at SCSS, as part of MOD 4 to SSD 5579. This report was prepared to assess the impacts of the project on biodiversity values to meet the requirements of BAM.

This BDAR addresses Stage 1 (Biodiversity Assessment) and Stage 2 (Impact Assessment) of the BAM.

In accordance with the objectives of the Biodiversity Offset Scheme (BOS), the Project was designed to avoid and minimise impacts on biodiversity values by pertaining impacts to pre-disturbed areas wherever possible, as well as avoiding threatened species and their habitat, where possible. Mitigation measures proposed for the Project to reduce indirect impacts are presented in **Section 7**.

Maps have been provided in compliance with BAM, including the layout of the Proposed Modification Elements in relation to biodiversity values, including impacts requiring/not requiring offsets.

The overall Ecosystem Credits required for the Project are:

- 33 Ecosystem credits for PCT 731 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion; and
- 343 Ecosystem credits for PCT 1191 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion.

The overall Species Credits required for the Project are:

- 64 Species Credits for *Eucalyptus aggregata* (Black Gum); and
- 8 Species Credits for *Paralucia spinifera* (Bathurst Copper Butterfly).

Ecosystem and Species Credit liability relevant to each Proposed Modification Element will be satisfied prior to commencement of construction for that element. The offset liability for each Proposed Modification Element is summarised in **Table 10-1** and **Table 10-2**.

**Table 10-1 Ecosystem credit liability**

| PCT | Project Modification Element | No. ecosystem credits |
|---|---|---|
| PCT 731 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion | DWP – A and clean water diversion | 23 |
| | DWP-B | 8 |
| | Angus Place water offtake and transfer system | 2 |
| | **Total** | **33** |
| PCT 1191 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | DWP – A and clean water diversion | 121 |
| | Regis and EnergyAustralia (EA) water transfer systems | 90 |
| | DWP-B | 121 |
| | Angus Place water offtake and transfer system | 11 |
| | **Total** | **343** |

**Table 10-2 Species credit liability**

| Species Credit Species | Project Modification Element | No. species credits |
|---|---|---|
| *Eucalyptus aggregata* Black Gum | DWP-B | 62 |
| | Angus Place water offtake and transfer system | 2 |
| | **Total** | **64** |
| *Paralucia spinifera* (Bathurst Copper Butterfly) | DWP – A and clean water diversion | 3 |
| | DWP-B | 5 |
| | **Total** | **8** |

These credit requirements will be satisfied in accordance with the NSW Biodiversity Offset Scheme through retiring credits under the Biodiversity Offset Scheme, based on like-for-like rules where possible. Payments into the Biodiversity Conservation Fund may be made where suitable credits are not available. Variation rules for credit requirements are provided in **Appendix C**.

Note that surveys for *Paralucia spinifera* (Bathurst Copper Butterfly) will be undertaken in December 2021 to confirm presence/ absence. Should this survey fail to detect this species, an offset requirement for this species would be considered unnecessary.

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# Appendix A
## Biodiversity Investigation Report

# WESTERN COAL SERVICES: MOD 4

## Biodiversity Investigation Report

148221
V2
26 November 2021

rpsgroup.com

REPORT

## Document status

| Version | Purpose of document | Authored by | Reviewed by | Approved by | Review date |
|---|---|---|---|---|---|
| V1 | Client Review | Hayden Beck | Mark Aitkens | Mark Aitkens | 5 November 2021 |
| V2 | Final following client review | Hayden Beck | Mark Aitkens | Mark Aitkens | 26 November 2021 |

## Approval for issue

Mark Aitkens 26 November 2021

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# Contents


**1 INTRODUCTION ..... 1**
1.1 The Project ..... 1
1.2 Project Area Particulars ..... 2
1.3 Purpose of this BIR ..... 4
1.4 Scope of Works ..... 4

**2 STAFF QUALIFICATIONS AND INVOLVEMENT ..... 5**
2.1 Regulatory Context ..... 5
2.2 Staff involvement ..... 6
2.3 Qualifications ..... 6

**3 METHODOLOGY ..... 7**
3.1 Desktop Assessment ..... 7
3.1.1 Databases ..... 7
3.1.2 Spatial Datasets ..... 7
3.1.3 Literature ..... 7
3.1.4 Likelihood of Occurrence ..... 8
3.2 Flora Surveys ..... 9
3.2.1 Vegetation Mapping ..... 9
3.2.2 BAM Plots ..... 10
3.2.3 Quality Control ..... 10
3.2.4 Targeted Flora Surveys ..... 15
3.3 Fauna Surveys ..... 20
3.3.1 Camera trap surveys ..... 20
3.3.2 Elliot trap surveys ..... 20
3.3.3 Nest box surveys ..... 20
3.3.4 Nocturnal Mammal and Bird Stag watch/ spotlighting ..... 21
3.3.5 Herpetofauna ..... 21
3.3.6 Identification of diurnal bird nest trees/ Grey-headed Flying-fox roosts ..... 22
3.3.7 Secondary Indications and Incidental Observations ..... 22
3.3.8 Habitat Survey ..... 22
3.4 Survey Dates and Weather Conditions ..... 39
3.5 Limitations ..... 40
3.5.1 Property access ..... 40
3.5.2 Safety ..... 40
3.5.3 Seasonality ..... 40
3.5.4 Data Availability and Accuracy ..... 40

**4 RESULTS ..... 42**
4.1 Desktop Assessment ..... 42
4.1.1 Database Interrogation – Species ..... 42
4.1.2 Literature Review ..... 43
4.1.3 Spatial Datasets ..... 43
4.1.4 Candidate Species Survey Matrix – BAM Calculator ..... 44
4.1.5 Species ruled out ..... 45
4.1.6 Survey sufficiency ..... 46
4.2 Vegetation Cover ..... 46
4.2.1 Plant Community Types (PCTs) ..... 46
4.3 Flora Surveys ..... 54
4.3.1 Threatened Flora ..... 54
4.3.2 Weeds ..... 55
4.4 Fauna Surveys ..... 57
4.4.1 Targeted Herpetofauna Census ..... 57

4.4.2 Habitat Survey ....60

**5 IMPACT ASSESSMENT ....64**
5.1 NSW State Groundwater Dependant Ecosystems ....64
5.2 Environmental Protection and Biodiversity Conservation Act 1999 ....66
5.2.1 EPBC Act Listed Migratory Species ....66
5.2.2 EPBC Act Listed Threatened Species ....66
5.2.3 Threatened Ecological Communities ....67

**6 CONCLUSIONS AND RECOMMENDATIONS ....68**
6.1 State Requirements (BC Act) ....68
6.2 Commonwealth Requirements (EPBC Act) ....69

**7 REFERENCES ....70**
Assessment of Significance for Vulnerable Species ....143
Assessment of Significance for Endangered Species ....147

## Tables

Table 1-1 Land parcels in Project Area ....2
Table 2-1 Relevant Legislation, Policy and Guidelines ....5
Table 3-1 Likelihood of Occurrence criteria ....8
Table 3-3 Application of BCD's targeted flora survey guidelines ....16
Table 3-4 Application of BCD's targeted fauna survey guidelines to surveys for large daytime birds ....24
Table 3-5 Application of BCD's targeted fauna survey guidelines to surveys for nocturnal birds ....26
Table 3-6 Application of BCD's targeted fauna survey guidelines to surveys for mammals ....27
Table 3-7 Application of BCD's targeted fauna survey guidelines to surveys for insects ....30
Table 3-8 Weather conditions during survey period[1] ....39
Table 4-1 Threatened and or migratory species with 'Moderate' or greater likelihood of occurring ....42
Table 4-2 Previously detected threatened species ....43
Table 4-3 Candidate species list and survey timing for PCT 335; 731 and 1191 ....44
Table 4-4 PCTs and condition classes within the Project Area ....46
Table 4-5 HTWs detected within the Project Area and their management requirements ....55
Table 5-1 Migratory birds listed under EPBC Act ....66

## Plates

Plate 3-1 Pygmy Possum nest box installed in Project Area ....21
Plate 4-1 Zone 1: PCT 335 (Poor Condition) along central section of Project Area on WCS land ....47
Plate 4-2 Zone 2: PCT 731 (Moderate Condition) between coal stockpiles and conveyor on WCS land ....48
Plate 4-3 Zone 3: PCT 1191 (Moderate Condition) far western extent of Project Area, adjacent Ben Bullen SF on WCS land ....49
Plate 4-4 Zone 4: PCT 1191 Rehabilitation along central section of Project Area on WCS land ....50
Plate 4-5 Zone 5: PCT 1191 Regrowth toward western arm of Project Area on WCS land ....50
Plate 4-6 Zone 6: PCT 1191 Poor (Canopy Only) near WCS front gate ....51
Plate 4-7 Zone 7: PCT 1191 Poor (Groundcover only) adjacent Castlereagh Highway ....51
Plate 4-8 Zone 8: Cleared/ Disturbed land adjacent MPPS ....52
Plate 4-9 Zone 8: Cleared/ Disturbed land on MPPS ash dam wall ....53
Plate 4-10 Zone 8: Cleared/ Disturbed land on MPPS ash dam wall (note weed management) ....53
Plate 4-11 *Eucalyptus aggregata* planted as part of past rehabilitation effort ....54
Plate 4-12 Krefft's Glider detected by Camera Trap ....59
Plate 4-13 Krefft's Glider detected by Camera Trap ....59

Plate 4-14 Examples of disturbed/modified rock substrate within the Project Area ....62
Plate 4-15 Examples of disturbed/modified aquatic habitat in the Project Area....63
Plate 4-16 Patch of *Bursaria spinosa subsp. lasiophylla*....63

## Figures

Figure 1-1 Project Area Location....3
Figure 3-1 Plot locations and vegetation communities....14
Figure 3-2 Target Flora Searches for *Acacia bynoeana* (Bynoe's Wattle); *Acacia meiantha*; *Eucalyptus aggregata*; *Eucalyptus cannonii* (Capertee Stringybark); *Eucalyptus pulverulenta* (Silver-leafed Gum); *Leocochrysum albicans var. tricolor* (Hoary Sunray); and *Veronica blakelyi*....18
Figure 3-3 Target Flora Searches for *Eucalyptus aggregata* (Black Gum); *Prasophyllum petilum* (Tarengo Leek Orchid); *Swainsona sericea* (Silky Swainson-pea); and *Thesium australe* (Austral Toadflax)....19
Figure 3-4 Fauna survey effort: *Callocephalon fimbriatum* (Gang-gang Cockatoo); *Calyptorhynchus lathami* (Glossy Black-Cockatoo); *Lophoictinia isura* (Square-tailed Kite)....31
Figure 3-5 Fauna survey effort: *Haliaeetus leucogaster* (White-bellied Sea-Eagle)....32
Figure 3-6 Fauna survey effort: *Hieraaetus morphnoides* (Little Eagle)....33
Figure 3-7 Fauna survey effort: *Ninox connivens* (Barking Owl); *Ninox strenua* (Powerful Owl); *Tyto novaehollandiae* (Masked Owl)....34
Figure 3-8 Fauna survey effort: *Cercartetus nanus* (Eastern Pygmy-possum); *Petauroides volans* (Greater Glider); *Phascolarctos cinereus* (Koala)....35
Figure 3-9 Fauna survey effort: *Petaurus norfolcensis* (Squirrel Glider); *Petrogale penicillata* (Brush-tailed Rock-wallaby); *Pteropus poliocephalus* (Grey-headed Flying-fox)....36
Figure 3-10 Fauna survey effort: *Paralucia spinifera* (Bathurst Copper Butterfly)....37
Figure 3-11 Fauna survey effort: *Heleioporus australiacus* (Giant Burrowing Frog); *Litoria booroolongensis* (Booroolong Frog)....38
Figure 4-1 Threatened flora recorded....56
Figure 4-2 Threatened fauna recorded....58
Figure 4-3 Hollow-bearing trees recorded....61
Figure 5-1 Groundwater Dependent Ecosystems (BOM 2021b)....65

## Appendices

Appendix A Staff Qualifications
Appendix B EPBC Act Protected Matters Search
Appendix C Likelihood of Occurrence
Appendix D Flora List
Appendix E Cluster analysis
Appendix F BAM Plot Photographs
Appendix G BAM Plot Datasheets
Appendix H Fauna List
Appendix I EPBC Act: Assessment of Significance

# 1 INTRODUCTION

RPS Australia East Pty Ltd (RPS) was engaged by Western Coal Services Pty Limited (WCS; operated by Springvale Coal Pty Limited) to undertake a Biodiversity Investigation Report (BIR) to consider the proposed modification of aspects of water management at Springvale Coal Services Site (SCSS), as part of Modification 4 (MOD 4) to State Significant Development (SSD) 5579 under Section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (herein referred to as the 'Project'). The proposed modification will result in an increase to the disturbance footprint within, and extent of, the project application area approved under SSD 5579.

This BIR presents the biodiversity investigation methods and results for the Project Area. This BIR informs Stage 1 of the overarching Biodiversity Development Assessment Report (BDAR); a mandatory requirement for Major Projects under the NSW *Biodiversity Conservation Act 2016* (BC Act). The BIR also assesses matters not addressed in the BDAR, including the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and relevant State Environmental Planning Policies (SEPPs).

Flora and fauna surveys performed within the Project Area were undertaken with reference to the Biodiversity Assessment Method Order 2020 (BAM; State of NSW 2020).

The following terms are used in this document:

- **Project** – Modification to WCS SSD-5579 to upgrade the onsite water management system;
- **Project Area** – Footprint to be impacted by the Project;
- **Assessment Area** – Land within a 500 m buffer from the outer extent of the Project Area (noting that the Project is a linear development); and
- **Local Area** – Land within 10 $km^2$ of the Project Area.

## 1.1 The Project

Springvale Coal proposes to modify SSD-5579 to allow:

- Construction and operation of the SCSS Water Transfer System;
- Transfer of up to 15.6 ML/day of water from the SCSS Water Transfer System to the proposed Springvale Coal Services/ LFB Resources NL transfer system;
- Transfer of up to 2.6 ML/day of water from SCSS to Mt Piper Power Station (MPPS) for treatment and reuse within the Mount Piper Power Station (MPPS) cooling water system;
- Receipt of raw water from Angus Place Water Transfer System for use in the coal handling and preparation plant at SCSS;
- Redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia (EA);
- Increase of the capacity of the Washery Dam at SCSS; and
- Administrative changes to Condition 45 of Schedule 3 of SSD 5579 to align with amendments to the *Mining Act* 1992.

The primary objectives of the water management system at SCSS are to:

- Provide a secure water supply for coal washing, washdown and dust suppression (including haul roads and coal stockpiles); and
- Control the quantity and quality of water discharged into Wangcol Creek via LDP001 (Licenced Discharge Point 1).

The key components of SCSS and the proposed modification are shown on **Figure 1-1**. The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the Project Area. This will include impact to some native vegetation.

## 1.2 Project Area Particulars

**Locality:** Blackmans Flat NSW

**LGA:** Lithgow City Council (LCC)

**Lot/DP:** A list of land parcels in the Project Area is presented in **Table 1-1**.

**Project Area:** Footprint of the Project Area is approximately ~29.97 ha. The location of the Project Area is shown in **Figure 1-1**.

**Boundaries:** The Project Area is bounded by Mount Piper Power Station (operated by EnergyAustralia; EA) to the west, Ben Bullen State Forest to the south, agricultural properties to the east and the Castlereagh Highway to the north (agricultural properties and Ben Bullet SF occurs north of the Castlereagh Highway).

**Zoning:** Under the provisions of the Lithgow Local Environment Plan 2014 (LEP), the Project Area is zoned as RU1 Primary Production and SP2 Electricity Generating Works.

**Current Land Use:** The land is currently used for existing SCSS and EA operations.

**Topography:** Project Area is in an area with considerable topographical variation, ranging from ~902 to ~950 m ASL.

The location of the Project Area and Local Area is shown in **Figure 1-1**.

**Table 1-1 Land parcels in Project Area**

| Lot | DP | Control |
|---|---|---|
| 1 | 702619 | FREEHOLD |
| 2 | 126483 | FREEHOLD |
| 5 | 804929 | FREEHOLD |
| 1 | 1127043 | FREEHOLD |
| 137 | 1188105 | FREEHOLD |
| 4 | 1151441 | FREEHOLD |
| 357 | 751651 | FREEHOLD |
| 13 | 751651 | FREEHOLD |
| 8 | 804929 | FREEHOLD |
| 67 | 751636 | FREEHOLD |
| 502 | 825541 | NSW GOVERNMENT |
| 101 | 1240974 | FREEHOLD |
| 9 | 804929 | FREEHOLD |
| 2 | 1256036 | FREEHOLD |
| 1 | 88503 | FREEHOLD |
| 102 | 1240974 | FREEHOLD |
| 1 | 702619 | FREEHOLD |

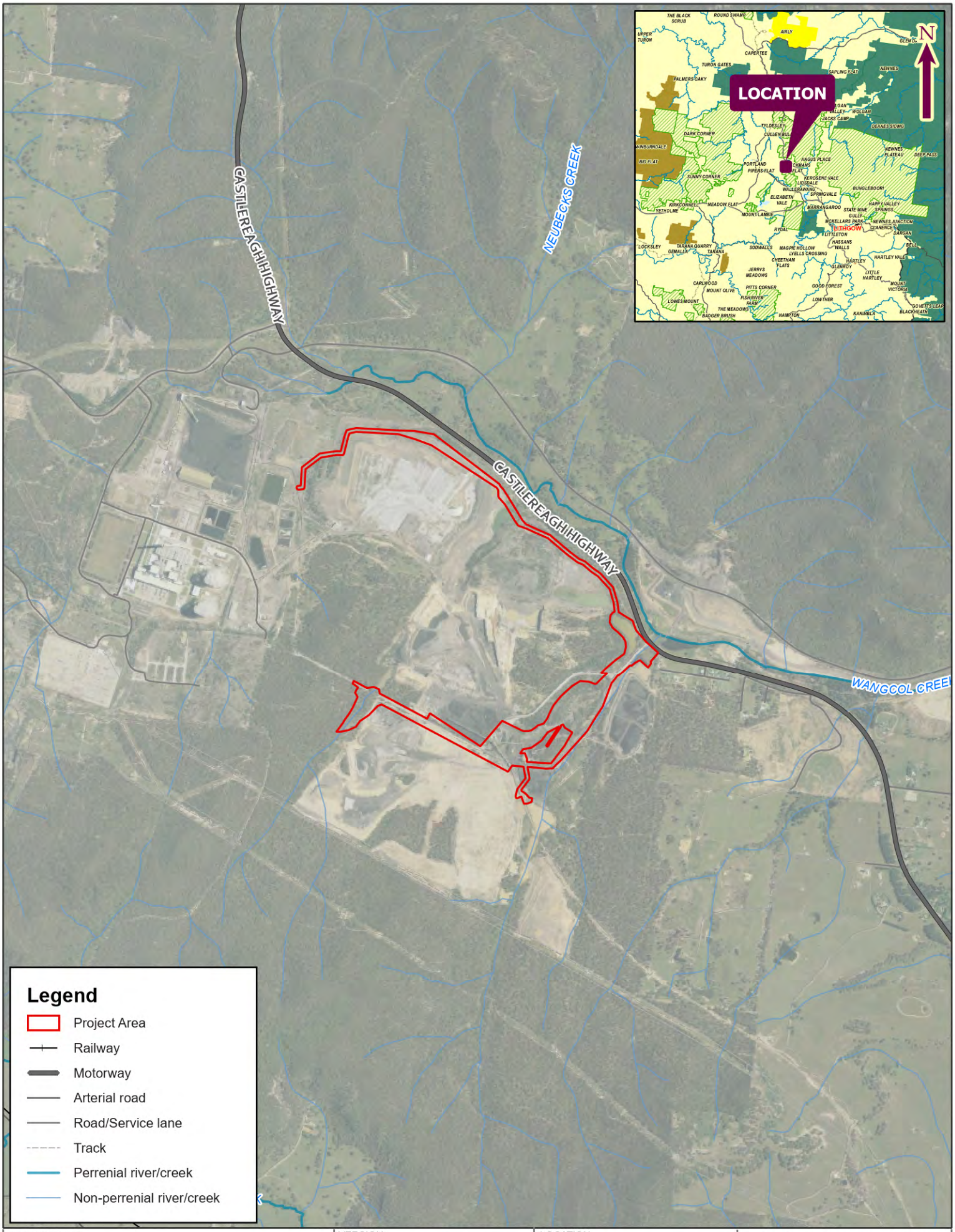


**FIGURE 1-1**
**PROJECT AREA LOCATION**

VERSION:
**A**
DATE EXPORTED:
**16/08/2021 10:01 AM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

0 100 200 300 400 500 600 700 800 m

DATA SOURCES
Centennial, RPS, © Department of Finance, Services & Innovation 2018

SCALE 1:25,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

**IMPORTANT NOTE**
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.
2. RPS Australia East Pty Ltd will not be liable (in negligence or otherwise) for any direct or indirect loss, damage, liability or claim arising out of or incidental to:
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## 1.3 Purpose of this BIR

The purpose of this BIR is to describe the biodiversity values of the Project Area as a basis for assessing the impacts of the Project on biodiversity matters as required under the BC Act and EPBC Act. Section 1.7 of the EP&A Act requires application of the BC Act and, where a significant impact on biodiversity is identified, mandatorily involves the preparation of a BDAR. This BIR focused on threatened biodiversity listed under the BC Act and EPBC Act, to allow for the preparation of:

- A BDAR (Section 7.7 of the BC Act); and
- An assessment for MNES listed under the EPBC Act in accordance with the *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (DoE 2013).

The BIR has evaluated the likelihood of occurrence and incidence of threatened biodiversity (i.e. threatened species, populations, ecological communities) listed under the BC Act and/or EPBC Act using methods and guidance specified in the Biodiversity Assessment Method (BAM) and Project brief. This BIR provides information used in the assessment of impact to relevant MNES listed under the EPBC Act. MNES relevant to this report are those listed under Sections 178, 181, 183 and 209 (threatened species, ecological communities, threatening processes and migratory species), as amended on 14/12/2020.

The following documents and guidelines have been considered when preparing this BIR:

- Threatened Species Assessment Guidelines (DECC 2007a);
- NSW State Groundwater Dependent Ecosystem Policy (DLWC 2002);
- Risk Assessment Guidelines for Groundwater Dependent Ecosystems (DPI 2012);
- Biodiversity Assessment Method 2020 Operational Manual – Stage 1 (DPIE 2020X);
- State Environmental Planning Policy (Koala Habitat Protection) 2020; and
- *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (DoE 2013).

## 1.4 Scope of Works

The scope of this BIR is to:

- Identify vascular plant species occurring within the Project Area, including threatened species listed under the BC Act or EPBC Act;
- Identify and map the extent of vegetation communities and Plant Community Types (PCTs) within the Project Area, including any threatened ecological communities (TECs) listed under the BC Act and/or EPBC Act;
- Identify any fauna species, including threatened and migratory species, and populations or their habitats, which occur within the Project Area and are known in the Local Area (i.e. 10 $km^2$ from the Project Area);
- Report datasets necessary for performing computations in the online BAM Calculator (BAM-C);
- Assess the likely impact of the Project on threatened biodiversity listed under the EPBC Act that are relevant to the Project; and
- Consider relevance of local environmental legislation, including relevant SEPPs.

Information presented in this BIR is to be used to inform the preparation of the corresponding BDAR for the Project.

# 2 STAFF QUALIFICATIONS AND INVOLVEMENT

## 2.1 Regulatory Context

The current proposal is a modification under Section 4.55(2) of the EP&A Act to an existing State Significant Development (SSD) consent SSD-5579 for WCS, which was granted on 4 April 2014. As the Project is a modification to an SSD, the BAM is mandatory.

The regulatory context that defines the assessment framework for the Project is outlined in **Table 2-1**.

**Table 2-1 Relevant Legislation, Policy and Guidelines**

| Legislation, Policy and Guidelines | Jurisdiction | Comment |
|---|---|---|
| *Environment Protection and Biodiversity Conservation Act* 1999 | Commonwealth | Provides lists of MNES such as threatened species and ecological communities (Section 18 and 18A). Outlines circumstances where a Proponent is required to refer a proposed action for assessment under the EPBC Act (i.e. Section 68). |
| *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* | Commonwealth | These Significant impact guidelines provide overarching guidance on determining whether an action is likely to have a significant impact on a MNES. Consideration of survey methods for specific MNES required where potential impacts are identified. |
| *Biodiversity Conservation Act* 2016 | NSW | Provides lists of species, populations and ecological communities with a legal threatened status in NSW. Introduces the Biodiversity Offsets Scheme (BOS) and Biodiversity Assessment Method (BAM). |
| *Biosecurity Act* 2015 | NSW | Prescribes the statutory requirements for managing pests, diseases, weeds and contaminants in NSW. Applies to construction activities and occupation of the Project Area. |
| *Environmental Planning and Assessment Act* 1979 | NSW | This Act has effect subject to the provisions of Part 7 of the Biodiversity Conservation Act 2016 and Part 7A of the Fisheries Management Act 1994 that relate to the operation of this Act in connection with the terrestrial and aquatic environment. Biodiversity impact assessments in terrestrial settings to be performed in accordance with BAM and BOS. |
| *National Parks and Wildlife Act* 1974 | NSW | Requires consideration of any impacts on the conservation reserve network. |
| State Environmental Planning Policy (Koala Habitat Protection) 2020 | NSW | State Environmental Planning Policy (Koala Habitat Protection) 2020 applies to LCC LGA, which includes the Project Area. SEPP (Koala Protection) 2020 repeals and replaces the State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2019. The Koala Habitat Protection SEPP is closely aligned with the previous SEPP 44 – Koala Habitat Protection (SEPP 44). with similar definitions of 'potential' and 'core' koala habitat. Note that this SEPP does not apply to SSDs and so has not been addressed here. |

## 2.2 Staff involvement

The preparation of this BIR and associated BDAR was managed by Ms Shelomi Doyle (Accredited BAM Assessor – BAAS 20032) and Dr Hayden Beck (Accredited BAM Assessor – BAAS 19000). The document was reviewed by Mr Mark Aitkens (Accredited BAM Assessor BAAS 17034). The BDAR was endorsed by Dr Hayden Beck (Accredited BAM Assessor – BAAS 19000).

## 2.3 Qualifications

Academic qualifications and professional experience of key RPS staff involved in the documentation are provided in **Appendix A**.

# 3 METHODOLOGY

Investigation methods, including desktop information sources and survey methods, are detailed in the following sections.

## 3.1 Desktop Assessment

### 3.1.1 Databases

Relevant information was reviewed to gain an understanding of the biodiversity values occurring or potentially occurring within the Project Area. Information sources reviewed within the Local Area were:

- BAM Calculator candidate species output (BAM-C; accessed April 2021);
- Flora and Fauna records contained in the Department of Planning, Industry and Environment (DPIE 2021a) Atlas of NSW Wildlife (accessed April 2021); and
- Flora and Fauna records contained in the Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search tool (DAWE 2021a; accessed April 2021; **Appendix B**).

A preliminary 'likelihood of occurrence' assessment (LoO) was produced from this information to provide a framework for determining investigation methods necessary for performing adequate site investigations.

### 3.1.2 Spatial Datasets

Desktop analysis of vegetation communities included a review of:

- Vegetation of the Western Blue Mountains including the Capertee, Coxs and Jenolan-Gurnang Areas (DEC 2006);
- Mitchell Landscapes (NPWS 2003a);
- IBRA Region and subregion mapping (IBRA7); and
- Recent aerial imagery of the Project Area.

### 3.1.3 Literature

Previous reports that considered the occurrence of threatened species or ecological communities within the Project Area and or Locality were reviewed. These information sources included:

- RPS (2010) Angus Place Pipeline Due Diligence Survey. Report prepared for Centennial Coal Pty Ltd;
- RPS (2014a) Flora and Fauna Assessment for Angus Place Mine Extension Project;
- RPS (2014b) Flora and Fauna report for Springvale Major Extension. Report prepared for Centennial Coal Pty Ltd; and
- RPS (2019) Wolgan Road North Lot 56 BioBanking Agreement Report. Report prepared for Centennial Coal Pty Ltd.

Commercially available aerial imagery, regional mapping and literature was also explored to identify areas of potential biodiversity value in the Project Area. Information sources included:

- Aerial Photograph Interpretation (API) to prepare vegetation mapping for the Project Area (per- and post-fire);
- The Vegetation of the Western Blue Mountains including the Capertee, Coxs, Jenolan and Gurnang Areas. Volume 1: Technical report (DEC 2006);
- DLWC (2002) NSW State Groundwater Dependent Ecosystem Policy;
- Eamus D. (2009) Identifying groundwater dependent ecosystems, A guide for land and water managers. Australian Government – Land and Water Australia;

- A review of Geographic Information System (GIS) data including (but not limited to) aerial photography, topographic maps and Soil Landscapes; and
- Collective knowledge gained from extensive work in the area.

### 3.1.4 Likelihood of Occurrence

A list of threatened species, populations and ecological communities (collectively referred to hereafter as 'threatened biodiversity') identified as potentially occurring in the Project Area was compiled through a Likelihood of Occurrence Analysis (LoOA; **Appendix C**). A preliminary LoOA was performed prior to field surveys to guide investigation methods and effort. This was subsequently refined following the completion of field survey. Criteria used to assess likelihood of species occurring is provided in **Table 3-1**.

**Table 3-1 Likelihood of Occurrence criteria**

| Likelihood | Description |
|---|---|
| **None** | Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the Study Area. The Study Area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2 km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| **Low** | Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The Study Area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2 km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. |
| **Moderate** | Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the Study Area. The Study Area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. |
| **High** | Habitat values within the Study Area are generally consistent with descriptions provided in the BCD TSPD. Habitat is likely to be located within the known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are unlikely to adversely influence the capacity of the species to occupy the habitat. Pre-existing and active KTPs are unlikely to be substantially influencing species incidence and/ or habitat occupancy. |
| **Known** | Species observed and habitat values within the Study Area are generally consistent with descriptions provided in the BCD TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Habitat occupancy is likely to be associated with important life cycle processes; however, the reliance on this habitat would depend on additional factors (e.g. size and extent of local population, effect of KTPs). |

Note: Candidate Species may only be dismissed from requiring survey when:

- presence is assumed;
- an expert report is prepared; or
- more appropriate local data is gained.

## 3.2 Flora Surveys

Flora surveys were conducted in accordance with the BAM, with the aim to identify the vegetation communities and quantify their integrity within the Project Area. Species detected are summarised in **Appendix D**.

### 3.2.1 Vegetation Mapping

Vegetation of the Western Blue Mountains including the Capertee, Coxs and Jenolan-Gurnang Areas by DEC (2006) was used as the baseline dataset to inform allocation of vegetation communities throughout the Project Area. As DEC (2006) applied Mapping Units (MUs) to characterise vegetation communities, comparative Biometric Vegetation Types [BVTs; equivalent to Plant Community Types (PCTs)] were assigned where possible as per Centennial's Western Region Biodiversity Offset Strategy (WRBOS; RPS 2019). This offset strategy included 24 MUs across four properties in the Western Blue Mountains region, where most vegetation communities relevant to the Project Area were encountered. The conversions undertaken, from MUs to BVTs (equivalent to PCTs), were reviewed and accepted by NSW DPI in 2019 during the establishment of these offset sites. **Table 3-2** displays the conversions of MUs to PCTs relevant to the Project area, as aligned with Centennial's WRBOS. Also marked in this table are MUs relevant to the Project Area that were not included in the WRBOS. In this case, DPIE's Vegetation Information System (VIS) was used to best inform the best fitting PCT.

#### 3.2.1.1 Ground-truthing of vegetation mapping

Rapid Data Points (RDPs) were used to assist vegetation classification and refine the boundaries and distribution of PCTs, as well as the extent of bushfire impact. Flora data collected during RDPs is provided in **Appendix D**.

Data collected within 20 m of each RDP include:

- Dominant canopy species;
- Main associated species;
- Vegetation condition;
- Landscape position;
- Characteristic mid-storey species;
- Characteristic groundcover species; and
- Other diagnostic features.

Updated vegetation mapping (including derivation of vegetation zones) was then used to inform the minimum number of plots, as required by BAM 2020.

#### 3.2.1.2 Allocation of rehabilitated/regrowth vegetation to PCTs

Large extents of the vegetation within the Project Area were either planted and or naturally rehabilitating. As such, floristic data was used to allocate these vegetation zones to PCTs. Following undertaking BAM Plots, as outlined in **Section 3.2.2** below, a Cluster Analysis of plant species abundance data was used to guide allocation of rehabilitation/regrowth to PCTs.

A species dissimilarity matrix was created in PRIMER™ based on square root transformed species abundance data for BAM plots. A Cluster Analysis was then performed in PRIMER™ and visualised on an nMDS to identify clusters of 20 and 40% similarity (note that higher similarity values failed to distinguish any further grouping, so were not included here). These groups were then used to identify the similarity of rehabilitation/ regrowth plots to allocate to a suitable PCT, and hence designation of vegetation zones within the BDAR and for insertion in the BAM-C.

**Appendix E** shows the iterative process to firstly visualise floristic similarities, then the final allocation of PCTs based on the Cluster Analysis result. Specifically, **Figures A1** and **A2** show the cluster analysis of BAM plots prior to allocation of rehabilitation/regrowth vegetation to PCTs, respectively.

### 3.2.2 BAM Plots

Seventeen BAM plots were performed within the Project Area, measuring the composition, structure and functional components of the vegetation cover (**Figure 3-1**). The BAM plots were placed locations that best represented the vegetation zone being assessed.

Each plots included:

- One standard 20 x 20 m plot, to assess the composition and structure attributes, including trees, shrubs, grasses, forbs, ferns and other growth forms;
- One standard 20 x 50 m plot (1000 $m^2$) to assess the function attributes: number of large trees [i.e. > 50 cm Diameter at breast height (DBH)], stem size class, tree regeneration, length of fallen logs, high threat exotic vegetation cover and hollow-bearing trees; and
- Five 1 $m^2$ sub-plots to assess average litter cover for the plots.

The methods for collecting data from within a BAM plot are described in State of NSW (2020).

### 3.2.3 Quality Control

To ensure the floristic data collected were reliable, all BAM plots were undertaken by two ecologists with an in-depth understanding of native vegetation within the Project Area. Where there was uncertainty identifying a species, a specimen (i.e. leaves, buds, fruit and or flowers) was collected and later identified using relevant guides and keys (including PlantNET; National Herbarium of NSW, 2020). In cases where further resolution was required, samples were sent to the National Herbarium of NSW for identification.

When estimating vegetation cover and abundance, these variables were independently assessed by the two observers. If a disparity occurred, the observers discussed the value in question until an agreement was reached in an effort to control observer bias.

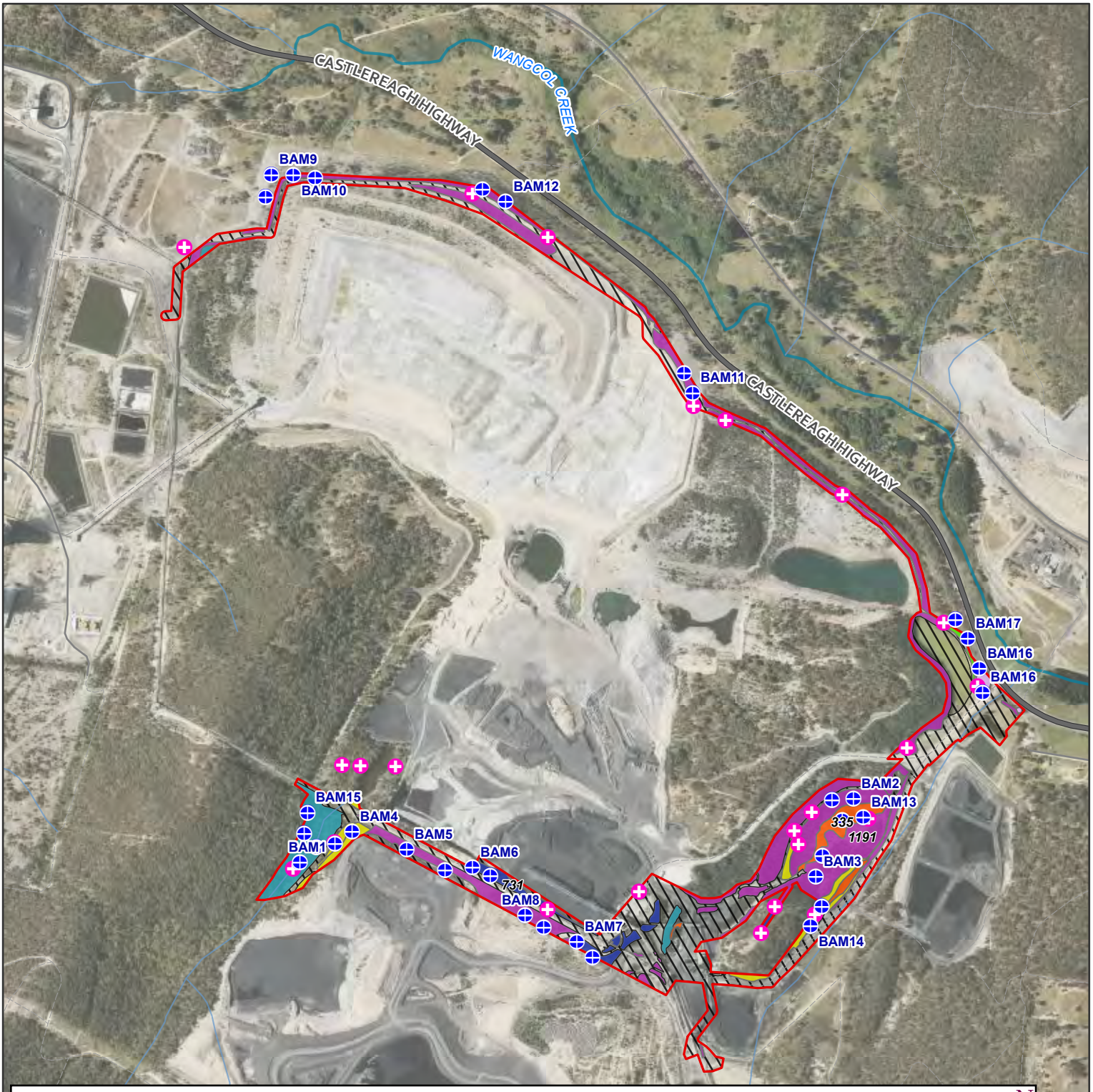
As a further quality control measure, RPS senior staff conducted training sessions and routinely checked floristic, cover and abundance data collected within BAM plots for accuracy. All data electronically entered are also subject to internal quality control audits.

**Table 3-2 Conversion of Mapping Units (DEC 2006) to Plant Community Types**

| Map Units (MU) (DEC 2006) | Map Unit Description | Vegetation Formation | BVT | BVT Description | PCT |
|---|---|---|---|---|---|
| MU 3[1] | Hillslope Talus Mountain Gum - Brown Stringybark - Grey Gum - Broad-leaved Hickory Moist Forest | Dry Sclerophyll Forests (Shrubby/grass subformation) | HN568 | Red Box - Grey Gum - stringybark woodland on talus slopes of the western Blue Mountains, Sydney Basin Bioregion | 1088 |
| MU 7 | Newnes Plateau Narrow-Leaved Peppermint – Mountain Gum – Brown Stringybark Layered Forest | Dry Sclerophyll Forests (Shrubby subformation) | HN559 (previously HN558) | Narrow-leaved Peppermint - Silvertop Ash - Mountain Grey Gum shrubby open forest of the upper Blue Mountains, Sydney Basin Bioregion | 967 |
| MU 8 | Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest | Dry Sclerophyll Forests (Shrubby subformation) | HN599 (previously HN558) | Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin<br>(Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands) | 1247 |
| MU 11 | Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest | Grassy Woodlands | HN572 | Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands | 1100 |
| MU13 | Tableland Gully Ribbon Gum - Blackwood - Apple Box Forest | Grassy Woodlands | HN501 | Apple Box - Broad-leaved Peppermint dry open forest of the South Eastern Highlands Bioregion<br>(Previously: Apple Box - Broad-leaved Peppermint dry open forest of the Abercrombie-Tarlo area, South Eastern Highlands) | 649 |
| MU 14 | Tableland Mountain Gum - Snow Gum - Daviesia Montane Open Forest | Grassy Woodlands | HN572 | Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands | 1100 |
| MU 15 | Tableland Hollows Black Gum - Black Sally Open Forest | Grassy Woodlands | HN504 | Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands, South Eastern Highlands | 677 |
| MU 20 | Capertee Rough-barked Apple - Redgum - Yellow Box Grassy Woodlands (EEC) | Grassy Woodlands | HN506 | Blakely's Red Gum - Yellow Box - Rough-barked Apple grassy woodland of the Capertee Valley, Sydney Basin Bioregion | 703 |
| MU 21 | Capertee - Wolgan Slopes Red Box - Grey Gum - Stringybark Grassy Open Forest | Dry Sclerophyll Forests (Shrubby subformation) | HN534 | Grey Gum - Narrow-leaved Stringybark - Inland Scribbly Gum shrubby open forest of the western Capertee Valley, Sydney Basin | 1088 |
| MU 26 | Newnes Plateau Narrow-Leaved Peppermint – Silvertop Ash Layered Open Forest | Dry Sclerophyll Forests (Shrubby subformation) | HN600 | Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin | 1248 |

| Map Units (MU) (DEC 2006) | Map Unit Description | Vegetation Formation | BVT | BVT Description | PCT |
|---|---|---|---|---|---|
| MU 26a | Newnes Plateau Narrow-Leaved Peppermint – Silvertop Ash Layered Open Forest (Gentle Depressions) | Dry Sclerophyll Forests (Shrubby subformation) | HN600 | Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin | 1248 |
| MU 28 | Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland | Dry Sclerophyll Forests (Shrubby subformation) | HN600 (originally HN599) | Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin (Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin) | 1248 |
| MU 29 | Sandstone Slopes Sydney Peppermint Shrubby Forest | Dry Sclerophyll Forests (Shrubby subformation) | HN600 (originally HN599) | Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin (Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin) | 1248 |
| MU 30 | Exposed Blue Mountains Sydney Peppermint - Silver-top Ash Shrubby Woodland | Dry Sclerophyll Forests (Shrubby subformation) | HN600 | Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin | 1248 |
| MU32 | Tableland Hills Scribbly Gum - Narrow-leaved Stringybark Shrubby Open Forest | Dry Sclerophyll Forests (Shrubby subformation) | HN570 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands | 1093 |
| MU 33 | Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest | Grassy Woodlands | HN514 | Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands | 731 |
| MU 35 | Tableland Gully Mountain Gum - Broad-leaved Peppermint Grassy Forest | Wet Sclerophyll Forests (Grassy subformation) | HN590 | Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands | 1197 |
| MU 37 | Coxs Permian Red Stringybark - Brittle Gum Woodland | Dry Sclerophyll Forests (Shrubby subformation) | HN570 | Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland | 1093 |
| MU 38 | Capertee Grey Gum - Narrow-leaved Stringybark - Scribbly Gum - Callitris - Ironbark Shrubby Open Forest | Dry Sclerophyll Forests (Shrubby subformation) | HN534 | Grey Gum - Narrow-leaved Stringybark - Inland Scribbly Gum shrubby open forest of the western Capertee Valley, Sydney Basin | 863 |
| MU 42 | Capertee Hills White Box - Tumbledown Redgum - Ironbark - Callitris Shrubby Woodland | Dry Sclerophyll Forests (Shrubby subformation) | HN544 | Inland Scribbly Gum - Grey Gum - Narrow-leaved Ironbark shrubby open forest on hills of western Capertee Valley, Sydney Basin | 889 |

| Map Units (MU) (DEC 2006) | Map Unit Description | Vegetation Formation | BVT | BVT Description | PCT |
|---|---|---|---|---|---|
| MU 43 | Pagoda Rock Sparse Shrubland | Heathlands | HN508 | Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin | 708 |
| MU 44 | Sandstone Plateaux Tee Tree – Dwarf Sheoak – *Banksia* Rocky Heath | Heathlands | HN508 | Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin | 708 |
| MU 45 | Newnes Plateau Tea Tree - Banksia - Mallee Heath | Heathlands | HN508 | Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin | 708 |
| MU 46[1] | Newnes Plateau Dwarf Sheoak – Banksia Heath | Heathlands | HN508 | Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin | 708 |
| MU 50[1] | Newnes Plateau Shrub Swamp | Freshwater Wetlands | HN633 | Baeckea linifolia - Grevillea acanthifolia subsp. acanthifolia shrub/sedge swamp on sandstone, Sydney Basin Bioregion | 657 |
| MU 51[1] | Newnes Plateau Hanging Swamp | Freshwater Wetlands | HN633 | Baeckea linifolia - Grevillea acanthifolia subsp. acanthifolia shrub/sedge swamp on sandstone, Sydney Basin Bioregion | 657 |
| MU 53 | Mountain Hollow Grassy Fen | Freshwater Wetlands | HN602 | Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands Bioregion | 1256 |
| MU 54 | Capertee – Wolgan Riparian Rough-Barked Apple – River Oak Open Forest | Forested Wetlands | HN574 | River Oak open forest of major streams, Sydney Basin and South East Corner Bioregion | 1105 |




Legend

Project Area

***Vegetation Communities by PCT***

335 - Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion - Poor (Zone 1)

731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion - Moderate (Zone 2)

1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Moderate (Zone 3)

1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Rehabilitation (Zone 4)

1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Regrowth (Zone 5)

1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Poor (Canopy only) (Zone 6)

1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion - Poor (understorey only) (Zone 7)

Disturbed land/ Non native vegetation (Zone 8)

RDP Locations

BAM Plots

N

**FIGURE 3-1**
**PLOT LOCATIONS AND VEGETATION COMMUNITIES**

VERSION:
**A**
DATE EXPORTED:
**24/11/2021 11:54 AM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 400 m

SCALE 1:12,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

**IMPORTANT NOTE**
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.

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### 3.2.4 Targeted Flora Surveys

Targeted flora searches were conducted with the aim of locating threatened flora species identified as Candidate Species. Targeted searches were conducted across the targeted survey area by teams of two Ecologists, using parallel transects. Surveys were performed with reference to the methods, timing and effort provided by DPIE (2020b).

Note that the GPS tracks displayed are representative of the effort and subject to spatial inaccuracy due to tree canopy interference/ satellite connectivity and device limitations. Steep and rocky terrain, dense blackberry thickets, fallen trees and construction/plant activities constrained spacing of parallel transects in some locations. All efforts were made to achieve this targeted survey spacing, however safety of staff is a priority for RPS and no unnecessary risks were taken. Where surveys deviated from the targeted spacing due to safety concerns, these unsafe areas were observed from a distance, as per DPIE (2020). The locations and timing of the targeted flora searches are shown on **Figure 3-2** for *Acacia bynoeana* (Bynoe's Wattle); *Acacia meiantha*; *Eucalyptus cannonii* (Capertee Stringybark); *Eucalyptus pulverulenta* (Silver-leafed Gum); *Leocochrysum albicans var. tricolor* (Hoary Sunray); and *Veronica blakelyi;* and **Figure 3-3** for *Eucalyptus aggregata* (Black Gum); *Prasophyllum petilum* (Tarengo Leek Orchid); *Swainsona sericea* (Silky Swainson-pea); and *Thesium australe* (Austral Toadflax).

**Table 3-3** demonstrates how the targeted flora survey meets BCD's targeted flora survey guidelines (DPIE 2020).

#### 3.2.4.1 Multi-species survey

Multi-species surveys were undertaken. In any survey effort, no more than five species in the same stratum were searched for simultaneously, given the maximum target species surveyed for in the same stratum (i.e. herbs and forbs) was five.

**Table 3-3 Application of BCD's targeted flora survey guidelines**

| Species (Common name) | BC Act | EPBC Act | Associated PCT/s within Project Area | Total area of suitable habitat in Project Area (ha) | Survey months (as per BAM-C) | Dates of targeted survey | Targeted transect spacing[1,2] | Any additional survey requirements (TBDC) | Notes regarding vegetation condition | Survey guideline met (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|
| *Acacia bynoeana*[3] Bynoe's Wattle | E | V | 731[1] | | All year | 28 – 29 Apr 2021; 18-21 Oct 2021; 15 – 16 Nov 2021 | 5-10 m (shrub in open vegetation) | Use reference population to identify vegetative state, which will assist in positive identification during survey. | No prolonged drought or an extreme stochastic disturbance event. Surveyed throughout year to ensure survey was undertaken at suitable vegetative state for detection. | Y |
| *Acacia meiantha*[3] | E | E | 731[1] | | Jul - Oct | 18-21 Oct 2021 | 5-10 m (shrub in open vegetation) | Surveyed any time of the year however it flowers profusely during September and October and easily identified during this time. | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Eucalyptus aggregata* Black Gum | V | V | 1191 | | All year | 28 – 29 Apr 2021; 18-21 Oct 2021; 15 – 16 Nov 2021 | 5-10 m (Tree in mostly open vegetation) | - | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Eucalyptus cannonii*[3] Capertee Stringybark | V | - | 731[1] | | All year | 28 – 29 Apr 2021; 18-21 Oct 2021; 15 – 16 Nov 2021 | 5-10 m (Tree in open vegetation) | Use buds to identify. Flowering is sporadic and unreliable and taxonomic key identification requires buds. Survey multiple times throughout the year if buds are not present during a previous survey. | No prolonged drought or an extreme stochastic disturbance event. Surveyed throughout year to ensure survey was undertaken at suitable vegetative state for detection. | Y |
| *Eucalyptus pulverulenta* Silver-leafed Gum | V | V | 731 | | All year | 28 – 29 Apr 2021; 18-21 Oct 2021; 15 – 16 Nov 2021 | 5-10 m (Tree in open vegetation) | - | No prolonged drought or an extreme stochastic disturbance event. | Y |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Leocochrysum albicans var. tricolor*[3] Hoary Sunray | - | E | 731[1] | Sep - Apr | 28 – 29 Apr 2021; 15 – 16 Nov 2021 | 5-10 m (Herb/Forb in open vegetation) | - | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Prasophyllum petilum* Tarengo Leek Orchid | E | E | 1191 | Sep - Dec | 18-21 Oct 2021; 15 – 16 Nov 2021 | 5-10 m (Herb/Forb in open vegetation) | Survey Hunter populations in Sep - Oct, populations north of Queanbeyan in Oct, and south of Quenabeyan in Nov - Dec (Timing may vary depending on season). | No prolonged drought or an extreme stochastic disturbance event.<br>October survey effort satisfied additional TBDC requirements given locality. | Y |
| *Swainsona sericea* Silky Swainson-pea | V | - | 1191 | Sep - Nov | 18-21 Oct 2021; 15 – 16 Nov 2021 | 5-10 m (Herb/Forb in mostly open vegetation) | Survey months differ based on location. Survey Oct - Nov on Monaro. Survey Sep - Oct in the Riverina. | No prolonged drought or an extreme stochastic disturbance event.<br>October and November survey efforts satisfied additional TBDC requirements given locality. | Y |
| *Thesium australe* Austral Toadflax | V | V | 1191 | Nov - Feb | 15 – 16 Nov 2021 | 5-10 m (Herb/Forb in mostly open vegetation) | Species can be easily overlooked when understorey height exceeds 30cm. When this is the case close inspection surveys (searching between grass tussocks) may be necessary to conclusively determine absence of this species. | No prolonged drought or an extreme stochastic disturbance event.<br>Survey effort was amplified in grassy areas (particularly in presence of *Themeda triandra*, a known associate/host). | Y |
| *Veronica blakelyi*[4] | V | - | 731 | Dec - Feb | 28 – 29 Apr 2021; 18-21 Oct 2021; 15 – 16 Nov 2021 | 5-10 m (Herb/Forb in open vegetation) | Use flowers to identify, as easily confused with Veronica perfoliata. Typically flowers over summer but will sporadically flower at other times of the year. | No prolonged drought or an extreme stochastic disturbance event. | Y |

1. Steep and rocky terrain and blackberry thickets along riparian areas constrained spacing of parallel transects in some locations. All efforts were made to achieve this targeted survey spacing, however safety of staff is a priority for RPS and no unnecessary risks were taken. Where surveys deviated from the targeted spacing due to safety concerns, these unsafe areas were observed from a distance, as per DPIE (2020). 2. The majority of the Project Area was primarily woodland/low open woodland/open shrubland according to https://www.anbg.gov.au/cpbr/herbarium/collecting/vegetation-types.html 3. Species was not listed as a Candidate Species given the PCTs present. However, as they were even known to associate with similar vegetation communities (i.e. stringybark/scribbly Gum communities), or have been found locally in past studies, they were added. 4. Veronica blakelyi is easily distinguishable, even in the absence of flowers. The leaf morphology is clearly different between *V. blaklyii* and *V. perfoliata*, so that it was considered that the survey effort was representative, even if undertaken outside of peak flowering period

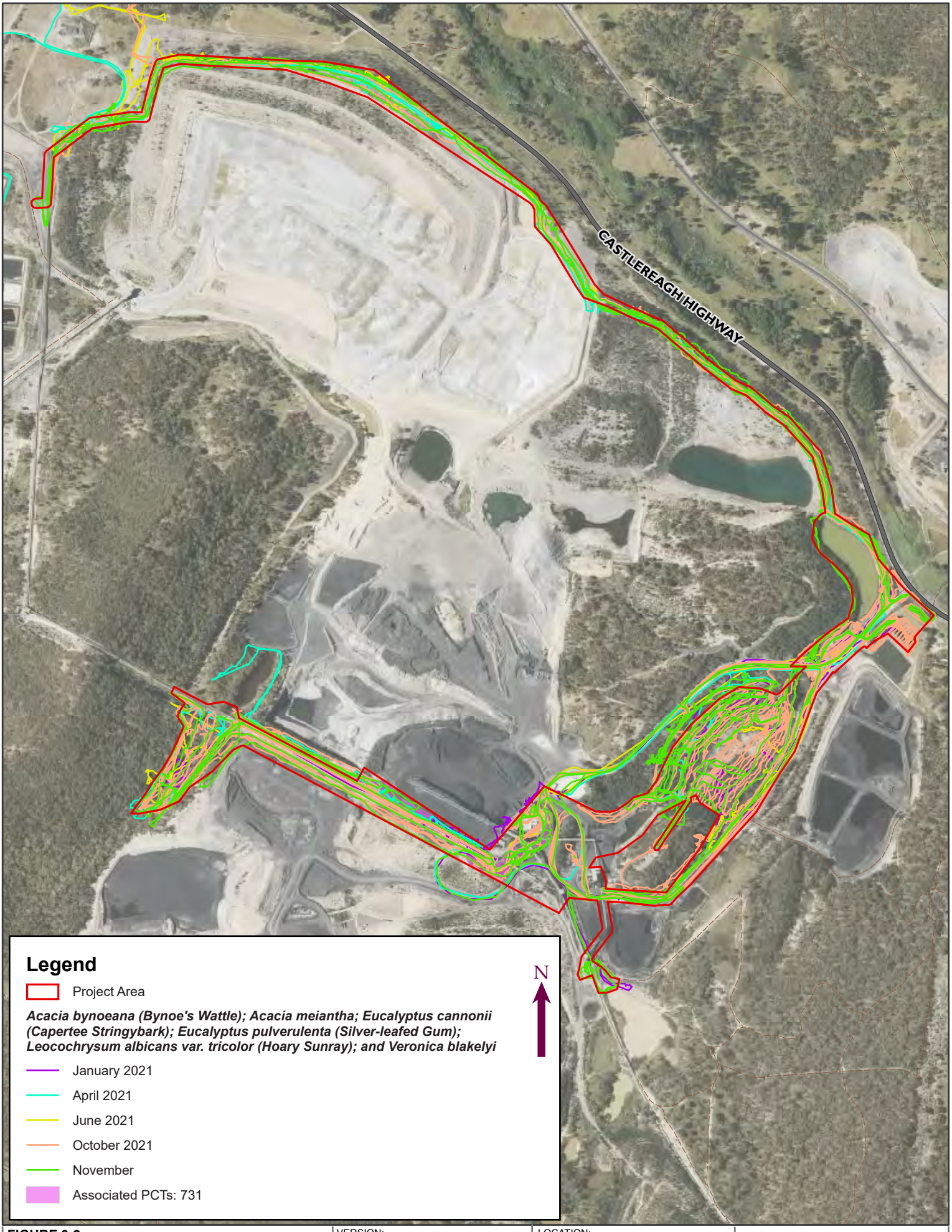


**FIGURE 3-2:**
**TARGET FLORA SEARCHES: ACACIA BYNOEANA (BYNOE'S WATTLE); ACACIA MEIANTHA; EUCALYPTUS CANNONII (CAPERTEE STRINGYBARK); EUCALYPTUS PULVERULENTA (SILVER-LEAFED GUM); LEOCOCHRYSUM ALBICANS VAR. TRICOLOR (HOARY SUNRAY); AND VERONICA BLAKELYI**

VERSION:
**C**
DATE EXPORTED:
**26/11/2021 11:14 AM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

**IMPORTANT NOTE**
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b. RPS Australia East Pty Ltd relying on information provided to it by the Client or a Third Party where the information is incorrect, incomplete, inaccurate, out-of-date or unreasonable;
c. any inaccuracies or other faults with information or data sourced from a Third Party;
d. RPS Australia East Pty Ltd relying on surface indicators that are incorrect or inaccurate;
e. the Client or any Third Party not verifying information in this plan where recommended by RPS Australia East Pty Ltd;
f. lodgement of this plan with any local authority against the recommendation of RPS Australia East Pty Ltd;
g. the accuracy, reliability, suitability or completeness of any approximations or estimates made or referred to by RPS Australia East Pty Ltd in this plan.

Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\148221_WCS_MOD4\148221_WCS_MOD4_B.aprx

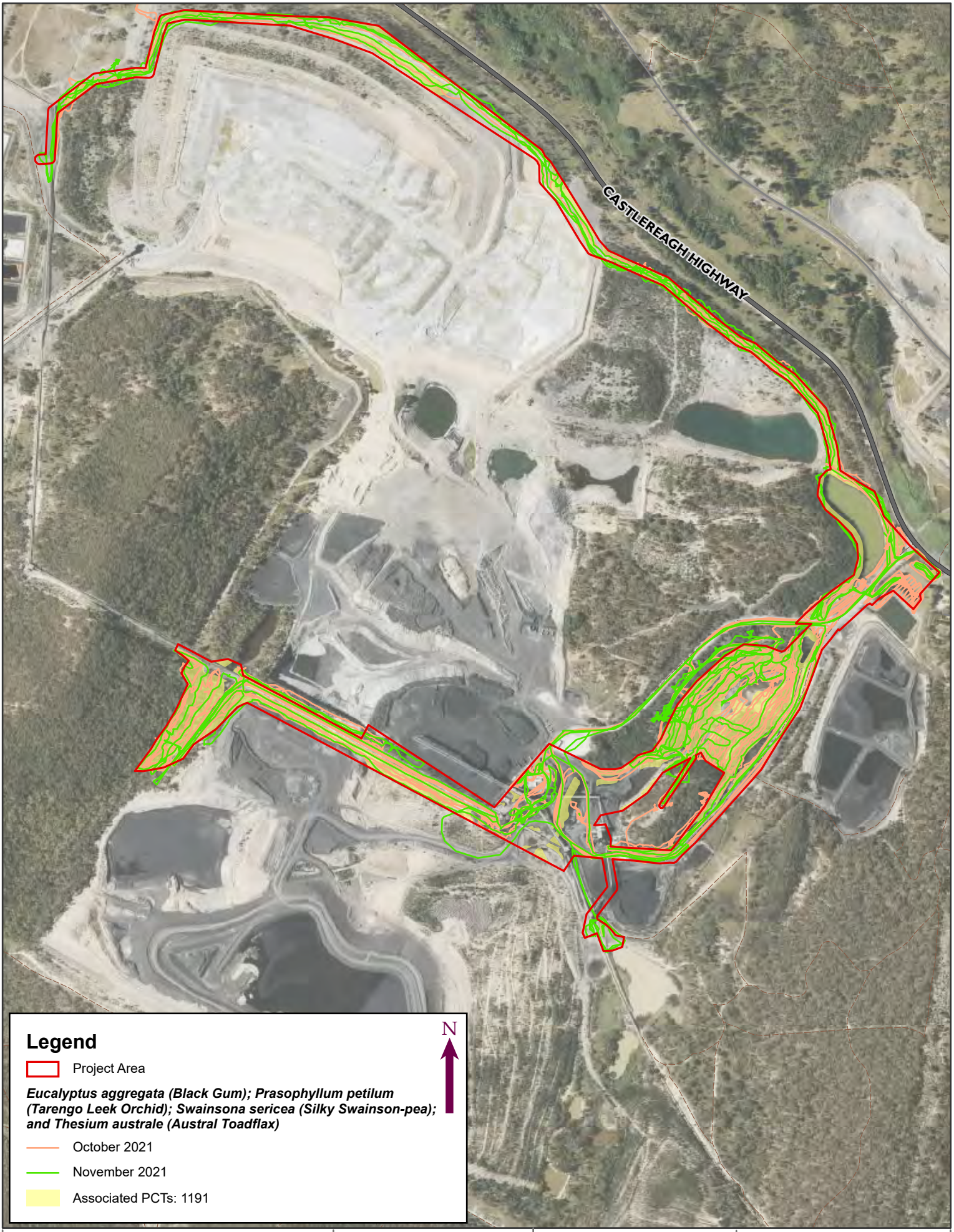


**FIGURE 3-3:**
**TARGET FLORA SEARCHES: EUCALYPTUS AGGREGATA (BLACK GUM); PRASOPHYLLUM PETILUM (TARENGO LEEK ORCHID); SWAINSONA SERICEA (SILKY SWAINSON-PEA); AND THESIUM AUSTRALE (AUSTRAL TOADFLAX)**

VERSION:
**B**
DATE EXPORTED:
**26/11/2021 9:18 AM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

**IMPORTANT NOTE**
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.

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d. RPS Australia East Pty Ltd relying on surface indicators that are incorrect or inaccurate;
e. the Client or any Third Party not verifying information in this plan where recommended by RPS Australia East Pty Ltd;
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g. the accuracy, reliability, suitability or completeness of any approximations or estimates made or referred to by RPS Australia East Pty Ltd in this plan.

Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\148221_WCS_MOD4\148221_WCS_MOD4_B.aprx

## 3.3 Fauna Surveys

Field survey methods, timing and effort used in this investigation reflected the results obtained from the desktop assessment (i.e. identification of threatened fauna species listed under the BC Act and/or EPBC Act that may occur within the refined survey Project Area) and initial BAM Credit Calculator entry output.

Survey techniques performed in this investigation are outlined below. Survey locations for targeted threatened fauna (where surveys address guideline requirements), as grouped by species with the same habitat associations (i.e. associated PCTs within Project Area, are shown in **Figure 3-4** to **Figure** 3-11. **Table 3-3 to Table 3-6** demonstrate how the targeted fauna survey, grouped by guild, meets BCD's targeted fauna survey guidelines (where available) for species deemed to be surveyed for adequately (i.e. candidate species not assumed present or discounted through an expert report). A summary of adequacy of survey effort, in terms of spatial and temporal representativeness against DPIE guidelines, is also provided in **Section 4.3.1.1** of the BDAR.

### 3.3.1 Camera trap surveys

**Candidate Species Targeted: *Petaurus norfolcensis* (Squirrel Glider), *Cercartetus nanus* (Eastern Pygmy-possum); *Phascogale tapoatafa* (Brush-tailed Phascogale); *Petrogale penicillata* (Brush-tailed Rock-wallaby); *Phascolarctos cinereus* (Koala); *Petauroides volans* (Greater Glider)**

Terrestrial camera traps were located at ground level to sample for ground-dwelling mammals, including small-medium mammals such as wallabies, dasyurids (e.g. Antechinus and Dunnarts), rodents (e.g. rats and mice) and bandicoots. These camera traps were baited with a rolled oats mixture. Thirty-one camera traps were set for 53 days, for a total of 1643 camera trap days.

### 3.3.2 Elliot trap surveys

**Candidate Species Targeted: *Petaurus norfolcensis* (Squirrel Glider), *Cercartetus nanus* (Eastern Pygmy-possum); *Phascogale tapoatafa* (Brush-tailed Phascogale); *Petauroides volans* (Greater Glider)**

Arboreal trapping was undertaken using tree mounted Elliott B size traps. Traps were mounted on brackets set at approximately 3 m in height on trees with a diameter at breast height (DBH) greater than 30 cm. Traps were baited with rolled oats, peanut butter and honey mixture, and the tree trunks were sprayed liberally with a brown sugar and water mix each day in the late afternoon. Traps were checked early the following morning. Forty traps were set for four nights, for a total of 160 trapping nights.

### 3.3.3 Nest box surveys

**Candidate Species Targeted: *Cercartetus nanus* (Eastern Pygmy-possum)**

Nest boxes were interspersed through the Project Area and installed for over four weeks to encourage occupancy by Eastern Pygmy-possum (a method shown to reliably survey this species; Harris and Goldingay 2005). Nest boxes were designed to target Pygmy possums by providing a 15 mm entrance hold into a sealed PVC tube (with plastic mesh provided inside for grip; **Plate 3-1**). Traps were mounted on trees using cable ties set at approximately 1 to 2 m in height (as per Harris and Goldingay 2005). Traps were checked for occupancy at the end of the month period, with Pygmy Possum use detected by evidence of use (i.e. nesting material and lack of scats). Ten traps were set for a total of 28 nights, for a total of 280 trapping nights.

**Plate 3-1 Pygmy Possum nest box installed in Project Area**

### 3.3.4 Nocturnal Mammal and Bird Stag watch/ spotlighting

**Candidate Species Targeted: *Petaurus norfolcensis* (Squirrel Glider), *Cercartetus nanus* (Eastern Pygmy-possum); *Phascogale tapoatafa* (Brush-tailed Phascogale); *Petrogale penicillata* (Brush-tailed Rock-wallaby); *Phascolarctos cinereus* (Koala); *Petauroides volans* (Greater Glider); *Ninox connivens* (Barking Owl); *Ninox strenua* (Powerful Owl); *Tyto novaehollandiae* (Masked Owl)**

Spotlighting was undertaken using a 75-watt hand-held spotlight and head torch whilst walking across the refined survey Project Area, targeting areas of appropriate habitat. Three evenings of spotlight survey effort were undertaken. Each spotlighting survey commenced with a stag watch for suitable habitat for owls and medium/large arboreal mammals. Spotlighting was then undertaken throughout the Project Area, except for within EA land due to COVID restrictions (see **Section 0**). Nevertheless, no HBTs (i.e. potential nest/roost trees) were within the Project Area in the EA land (see **Section 4.4.2.1**).

### 3.3.5 Herpetofauna

**Candidate Species Targeted: *Heleioporus australiacus* (Giant Burrowing Frog); *Litoria booroolongensis* (Booroolong Frog)**

Despite the unsuitability of waterways within the Project Area to support threatened frogs (see **Section 4.4.2.4**), four nights of herpetofauna surveys were undertaken in October 2021 (**Figure 3-11**). This method occurred from sundown into the evening, whereby potential habitats for target species were visited for at least 30 minutes. During this time, aural-visual surveys were undertaken by spotlight.

### 3.3.6 Identification of diurnal bird nest trees/ Grey-headed Flying-fox roosts

**Candidate Species Targeted: *Callocephalon fimbriatum* (Gang-gang Cockatoo); *Calyptorhynchus lathami* (Glossy Black-Cockatoo); *Haliaeetus leucogaster* (White-bellied Sea-Eagle); *Hieraaetus morphnoides* (Little Eagle); *Lophoictinia isura* (Square-tailed Kite)**

Coinciding with threatened flora survey transects (**Section 3.2.4**) and habitat tree surveys (**Section 3.3.7.1**), surveys were undertaken to detect nesting of threatened diurnal birds. During this survey effort, any nests and or utilised hollows were observed from ground-level on foot to identify nesting activity.

### 3.3.7 Secondary Indications and Incidental Observations

Opportunistic sightings of secondary indications (scratches, scats, diggings, tracks etc.) of resident fauna were noted. Such indicators included:

- Distinctive scats left by mammals;
- Scratch marks made by various types of arboreal animals;
- Nests made by various guilds of birds;
- Feeding scars on Eucalyptus trees made by Gliders;
- Whitewash, regurgitation pellets and prey remains from Owls;
- Aural recognition of bird and frog calls;
- Skeletal material of vertebrate fauna; and
- Chewed Allocasuarina cones - indicative of feeding by Glossy Black-cockatoo (*Calyptorhynchus lathami*).

### 3.3.8 Habitat Survey

Habitat surveys were undertaken to assess the condition and value of habitat across the Project Area. Significant fauna habitat features, including hollow-bearing trees, hollow logs and termite nests, were identified and noted. The assessment also considered the potential value of the Project Area (and surrounds) for all major guilds of native flora and fauna.

Habitat assessments for threatened species, known to occur or likely to occur in the locality, were undertaken to identify any specific habitat requirements for threatened fauna species within the Project Area. Habitat parameters taken into consideration included: home range, feeding, roosting, breeding, movement patterns and corridor requirements. Factors considered include topography, soil, light and hydrology.

#### 3.3.8.1 Habitat tree survey

Targeted hollow-bearing tree surveys were undertaken to identify the presence of potential habitat for hollow-associated threatened fauna habitat within or the Project Area. That is, all hollow-bearing trees within 100 m of the Project Areas was marked by GPS. To allow identification of the potential habitat provided to threatened fauna, the characteristics of the hollows were also noted, including the number and size of the hollows.

#### 3.3.8.2 Rocky habitat survey

Targeted surveys were undertaken to identify the presence of potential habitat for rock-associated threatened fauna habitat within or nearby the Project Area (e.g. Broad-headed Snake). To allow identification of the potential habitat provided to threatened fauna, the characteristics of rocky habitat were also noted (including level of disturbance, whether it was natural/artificial, size of rocks and type of formation).

#### 3.3.8.3 Cave survey

The Project Area and adjacent areas were searched for any caves (if any) that may provide suitable roosting habitat for cave-associated microbats [e.g. *Chalinolobus dwyeri* (Large-eared Pied Bat) or *Miniopterus orianae oceanensis* (Large Bent-winged Bat)].

#### 3.3.8.4 Aquatic habitat survey

The Project Area and adjacent areas were searched for suitable waterbodies that may provide habitat for threatened frogs. The ephemeral/permanent nature and size of the water body, as well as any relevant habitat structure (e.g. riparian vegetation, boulder/cobble type and extent etc). Notes were also made regarding the water quality, given the proximity to coal loading and processing plant and stockpiles.

#### 3.3.8.5 Bathurst Copper Butterfly habitat

In conjunction with threatened flora surveys, searches for *Bursaria spinosa subsp. lasiophylla* were undertaken to appreciate the potential for Bathurst Copper Butterfly habitat occurring within or nearby the Project Area. Particular attention was applied during the October 2021 survey (18 October 2021) within the one area where *Bursaria spinosa subsp. lasiophylla* were found (approximately 47 individuals).

**Table 3-4 Application of BCD's targeted fauna survey guidelines to surveys for large daytime birds**

| Species Common name | BC Act | EPBC Act | Associated PCT/s within Project Area | Habitat constraints or requirements | Total area of suitable habitat in Project Area (ha) | Survey months (as per BAM-C) | Dates of targeted survey | Application of guidelines used and requirements | Any additional survey requirements | Notes regarding factors influencing survey | Survey guideline met (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Callocephalon fimbriatum* Gang-gang Cockatoo | V | - | 731; 1191 | - | | Oct - Jan | 18-21 Oct 2021; 15 - 16 Nov 2021 | No BAM guidelines available. Signs of breeding searched for during two threatened flora survey efforts during breeding season. Diurnal bird surveys also undertaken during breeding season (October 2021). | Assessors should look for SIGNS OF BREEDING on site as follows; (a) lone adult males identified during the breeding season (October to January); or (b) an occupied nest. | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Calyptorhynchus lathami* Glossy Black-Cockatoo | V | - | 731; 1191 | Presence of Allocasuarina and casuarina species | | Jan - Sep | 28 – 29 Apr 2021; 7 – 9 Jun 2021 | No BAM guidelines available. Signs of breeding searched for during one threatened flora survey effort and habitat tree mark-up during breeding season. | Assessors should look for SIGNS OF BREEDING on site as follows; (a) begging birds of any age or sex; or (b) lone adult males identified during the breeding season (April to August); or (c) an occupied nest. | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Haliaeetus leucogaster* White-bellied Sea-Eagle | V | - | 335; 1191 | Waterbodies; Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines | | Jul - Dec | 7 – 9 Jun 2021; 18-21 Oct 2021; 15 - 16 Nov 2021 | No BAM guidelines available. Signs of breeding searched for during two threatened flora survey efforts and habitat tree mark-up during breeding season. | Breeding habitat is live large old trees within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines AND the presence of a large stick nest within tree canopy. | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Hieraaetus morphnoides* | V | - | 335; 731; 1191 | Nest trees - live (occasionally | | Aug - Oct | 18-21 Oct 2021 | No BAM guidelines available. | Breeding habitat is live (occasionally dead) large old trees | No prolonged drought or an extreme | Y |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Little Eagle | | | | dead) large old trees within vegetation | | | Signs of breeding searched for during one threatened flora survey effort. Diurnal bird surveys also undertaken during breeding season (October 2021). | within suitable vegetation AND the presence of a male and female; or female with nesting material; or an individual on a large stick nest in the top half of the tree canopy. | stochastic disturbance event. | |
| *Lophoictinia isura* Square-tailed Kite | V | - | 731; 1191 | Nest trees | Sep - Jan | 18-21 Oct 2021; 15 - 16 Nov 2021 | No BAM guidelines available. Signs of breeding searched for during two threatened flora during breeding season. Diurnal bird surveys also undertaken during breeding season (October 2021). | Breeding habitat is live large old trees within suitable vegetation AND the presence of a male and female; or female with nesting material; or an individual on a large stick nest in the top half of the tree canopy. | No prolonged drought or an extreme stochastic disturbance event. | Y |

**Table 3-5 Application of BCD's targeted fauna survey guidelines to surveys for nocturnal birds**

| Species Common name | BC Act | EPBC Act | Associated PCT/s within Project Area | Habitat constraints or requirements | Total area of suitable habitat in Project Area (ha) | Survey months (as per BAM-C) | Dates of targeted survey | Name of guidelines used and requirements | Any additional survey requirements | Notes regarding factors influencing survey | Survey guideline met (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Ninox connivens* Barking Owl | V | - | 731; 1191 | Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. | | May - Nov | 29 Jun – 1 July; 18 - Oct 21 2021 | No BAM guidelines available. Spotlight surveys / Stag watches undertaken at suitable hollow-bearing trees (7 nights). | Look for SIGNS OF BREEDING on site as follows; suitable habitat AND (a) presence of male and female OR (b) calling to each other (duetting) OR (c) find nest. | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Ninox strenua* Powerful Owl | V | - | 731; 1191 | Living or dead trees with hollow greater than 20 cm diameter. | | May - Aug | 29 Jun – 1 July 2021 | No BAM guidelines available. Spotlight surveys / Stag watches undertaken at suitable hollow-bearing trees (3 nights). | 1. Look for SIGNS OF BREEDING on site as follows; suitable habitat AND (a) presence of male and female OR (b) calling to each other (duetting) OR (c) find nest. Note that this species does not respond as well to call-play-back and could require stagwatching and other evidence of nesting | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Tyto novaehollandiae* Masked Owl | V | - | 731; 1191 | Living or dead trees with hollows greater than 20 cm diameter. | | May - Aug | 29 Jun – 1 July 2021 | No BAM guidelines available. Spotlight surveys / Stag watches undertaken at suitable hollow-bearing trees (3 nights). | - | No prolonged drought or an extreme stochastic disturbance event. | Y |

**Table 3-6 Application of BCD's targeted fauna survey guidelines to surveys for mammals**

| Species Common name | BC Act | EPBC Act | Associated PCT/s within Project Area | Habitat constraints or requirements | Total area of suitable habitat in Project Area (ha) | Survey months (as per BAM-C) | Dates of targeted survey | Name of guidelines used and requirements | Any additional survey requirements | Notes regarding factors influencing survey | Survey guideline met (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Cercartetus nanus* Eastern Pygmy-possum | V | - | 731; 1191 | - | | Oct - Mar | 18 Oct – 16 Nov 2021 | No BAM guidelines available. Nest boxes were interspersed through the Project Area and installed for over four weeks to encourage occupancy by Eastern Pygmy-possum (a method shown to reliably survey this species; Harris and Goldingay 2005). Elliot trapping across 4 nights (28 nights installed).. Thirty-one camera traps were set for 53 days, for a total of 1643 camera trap days. | - | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Petauroides volans*[1] Greater Glider | - | V | -731; 1191 | Hollow-bearing trees | | All year | 29 Jun – 1 July; 18 - Oct 21 2021 | No BAM guidelines available. Commonwealth guidelines followed with Spotlighting undertaken across seven nights. Elliot trapping across 4 nights (28 nights installed) Thirty-one camera traps were set for 53 days, for a total of | - | No prolonged drought or an extreme stochastic disturbance event. | Y |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1643 camera trap days. | | | |
| *Petaurus norfolcensis* Squirrel Glider | V | - | 731 | - | All year | 29 Jun – 1 July; 18 - Oct 21 2021 | No BAM guidelines available. Spotlighting undertaken across seven nights. Elliot trapping across 4 nights (28 nights installed).. Thirty-one camera traps were set for 53 days, for a total of 1643 camera trap days. | Survey year round but sites with bipinnate acacia, autumn winter flowering trees and shrubs such as *Eucalyptus robusta* and *Banksia sp* (integrifolia etc) should be subject to a more retracted survey period of between March-August. Relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely-connected (i.e. no more than 50 m apart). | No prolonged drought or an extreme stochastic disturbance event. Primary food source was planted Acacia with phyllodes within rehabilitation area (as evidenced by considerable Klefft's Glider detections). | Y |
| *Petrogale penicillata* Brush-tailed Rock-wallaby | V | V | 731 | Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines | All year | 29 Jun – 1 July; 18 - Oct 21 2021 | No BAM guidelines available. Spotlighting undertaken across seven nights. | Systematic feacal pellet surveys and time lapse cameras should be considered as appropriate methods of survey. | No prolonged drought or an extreme stochastic disturbance event. No suitable shelter sites present. Significant barriers to dispersal occur within the Project Area (security perimeter fencing and highway). | Y |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Phascolarctos cinereus*<br>Koala | V | V | 731; 1191 | - | All year | 29 Jun – 1 July; 18 - Oct 21 2021 | No BAM survey guideline for mammals.<br>DoE (2014) survey guideline followed with daytime searches for direct and indirect (scats and scratches) made during threatened plant surveys, undertaking spotlighting surveys (7 nights) and camera trapping (Thirty-one camera traps were set for 53 days, for a total of 1643 camera trap days). | 'Important' habitat (however this is not a mapped important habitat area) is defined by the density of koalas and quality of habitat determined by on-site survey | No prolonged drought or an extreme stochastic disturbance event. | Y |
| *Pteropus poliocephalus*<br>Grey-headed Flying-fox | V | V | 731 | - | Oct - Dec | 18-21 Oct 2021; 15 - 16 Nov 2021 | No BAM survey guideline for mammals.<br>Commonwealth survey guideline followed with camps searched for during two threatened flora survey efforts (during roosting period; DEWHA 2010). Spotlighting surveys (7 nights) also undertaken during roosting period. | The initial search for camps should encompass any recorded camps and roosting habitat likely to occur on the subject land. | No prolonged drought or an extreme stochastic disturbance event. | Y |

**Table 3-7 Application of BCD's targeted fauna survey guidelines to surveys for insects**

| Species (Common name) | BC Act | EPBC Act | Associated PCT/s within Project Area | Habitat constraints or requirements | Total area of suitable habitat in Project Area (ha) | Survey months (as per BAM-C) | Dates of targeted survey | Name of guidelines used and requirements | Any additional survey requirements | Notes regarding factors influencing survey | Survey guideline met (Y/N) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bathurst Copper Butterfly | E | V | 731; 1191 | Bursaria spinosa or within 40m of Bursaria spinosa | 0.24 ha (40 m buffer off *Bursaria spinosa subsp. lassiophylla*) | Sep – Oct; Dec | 18 Oct 21 | No BAM or Commonwealth survey guidelines for species.<br>TBDC additional requirements followed. | To survey adults requires full sunshine and temperature above 15 degrees, individual adults live for approximately 2 weeks however a site can be active for much longer as adults emerge. The peak flying period will vary between sites likely elevation and aspect play a role, seasonal changes may also influence the timing of the flying season. Larvae are detectable at night in December when they are in the later stages of development and escorted by many attendant ants. | Temperature was >15 degrees (approx.. 20C) during time of survey with no rainfall.<br>No prolonged drought or an extreme stochastic disturbance event. | N – although one survey effort follow-up survey for larvae to be undertaken in December to confirm absence. |

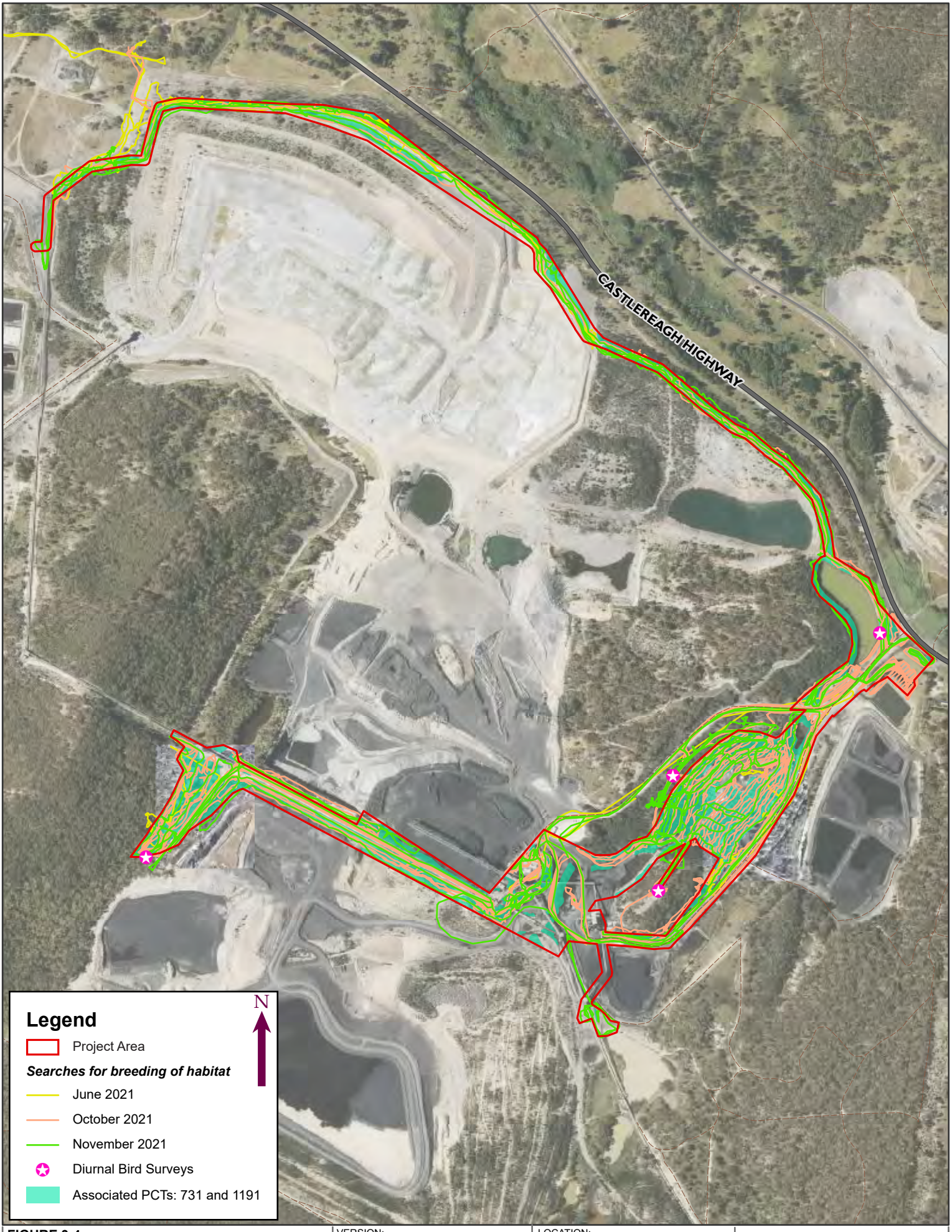


**FIGURE 3-4:**
**FAUNA SURVEY EFFORT: CALLOCEPHALON FIMBRIATUM (GANG-GANG COCKATOO); CALYPTORHYNCHUS LATHAMI (GLOSSY BLACK-COCKATOO); LOPHOICTINIA ISURA (SQUARE-TAILED KITE)**

VERSION:
**B**
DATE EXPORTED:
**26/11/2021 11:53 AM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\148221_WCS_MOD4\148221_WCS_MOD4_B.aprx

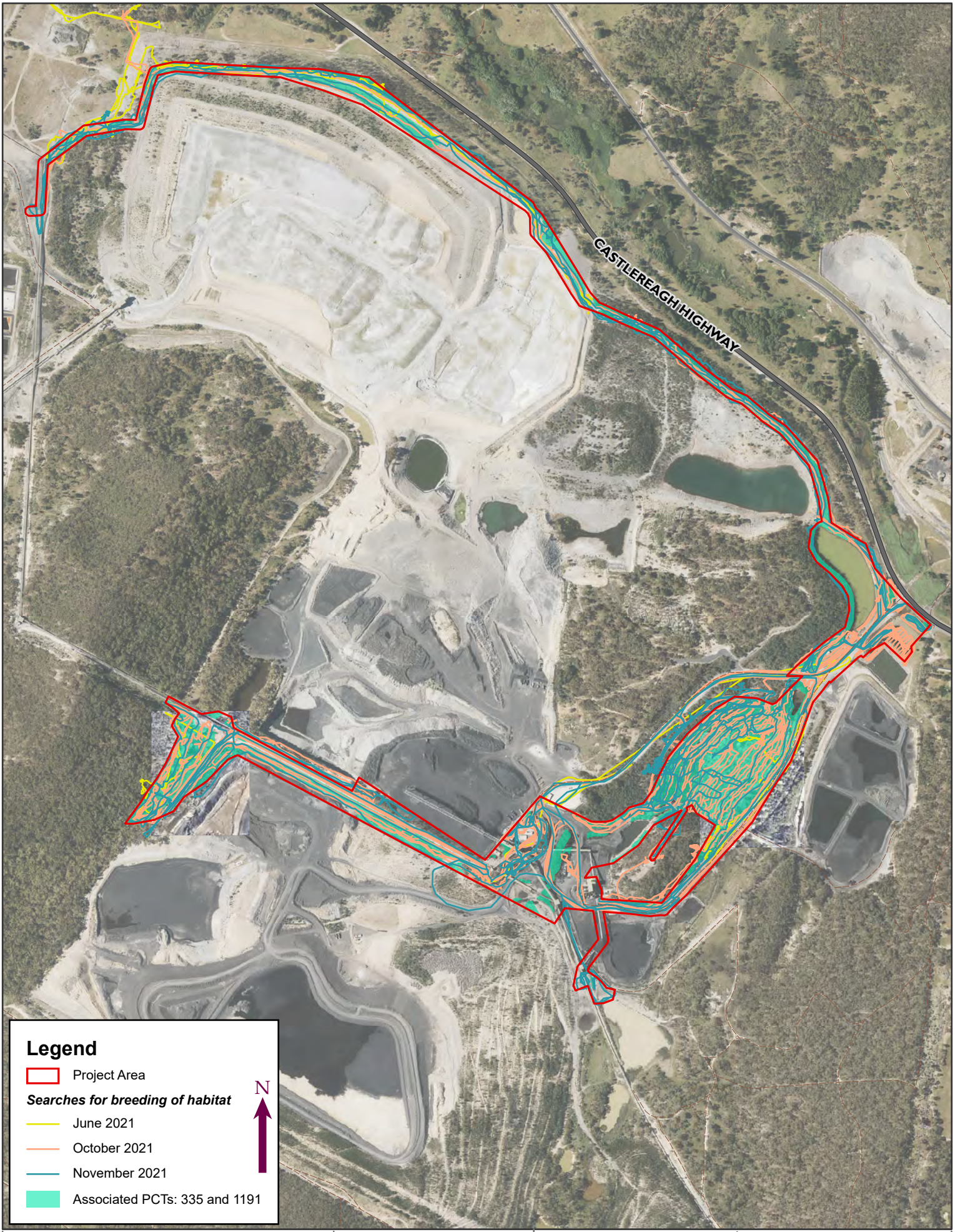


**FIGURE 3-5:**
**FAUNA SURVEY EFFORT: HALIAEETUS LEUCOGASTER (WHITE-BELLIED SEA-EAGLE)**

VERSION:
**B**
DATE EXPORTED:
**26/11/2021 5:24 PM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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**FIGURE 3-6:**
**FAUNA SURVEY EFFORT: HIERAAETUS MORPHNOIDES (LITTLE EAGLE)**

VERSION:
**B**
DATE EXPORTED:
**26/11/2021 11:58 AM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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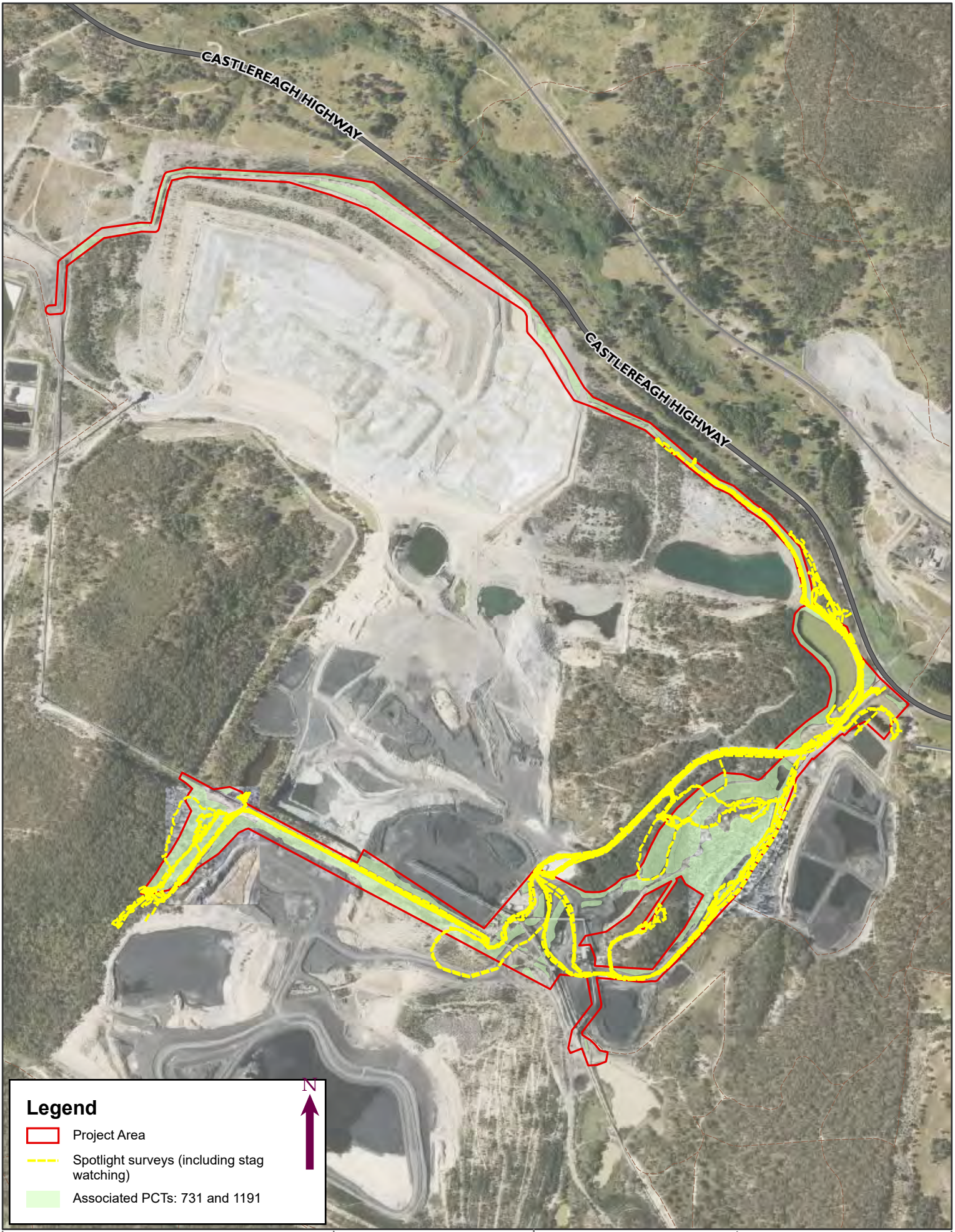


**FIGURE 3-7:**
**FAUNA SURVEY EFFORT: NINOX CONNIVENS (BARKING OWL); NINOX STRENUA (POWERFUL OWL); TYTO NOVAEHOLLANDIAE (MASKED OWL)**

VERSION:
**A**
DATE EXPORTED:
**26/11/2021 11:57 AM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,488 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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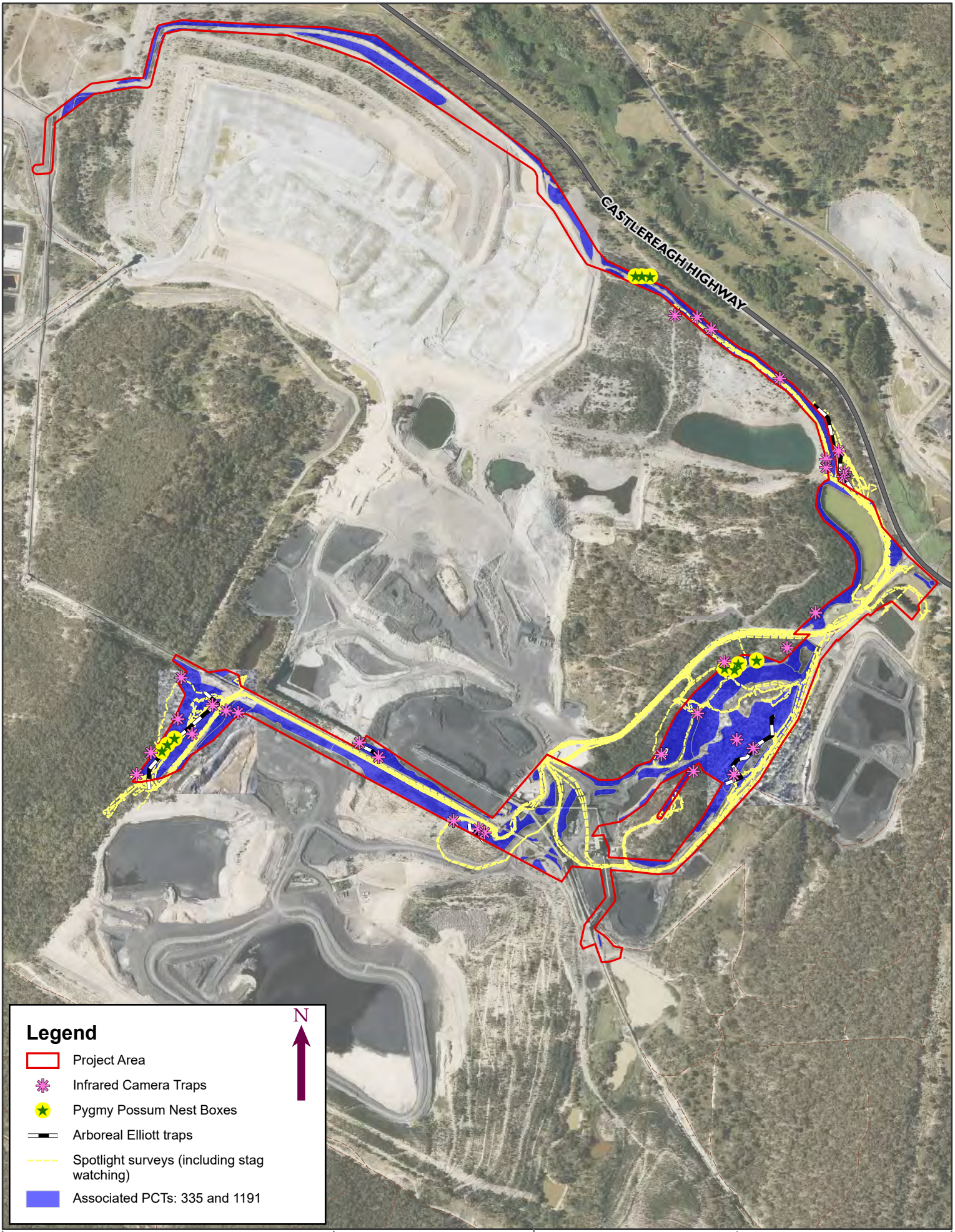


**FIGURE 3-8:**
**FAUNA SURVEY EFFORT: CERCARTETUS NANUS (EASTERN PYGMY-POSSUM); PETAUROIDES VOLANS (GREATER GLIDER); PHASCOLARCTOS CINEREUS (KOALA)**

VERSION:
**A**
DATE EXPORTED:
**30/11/2021 2:14 PM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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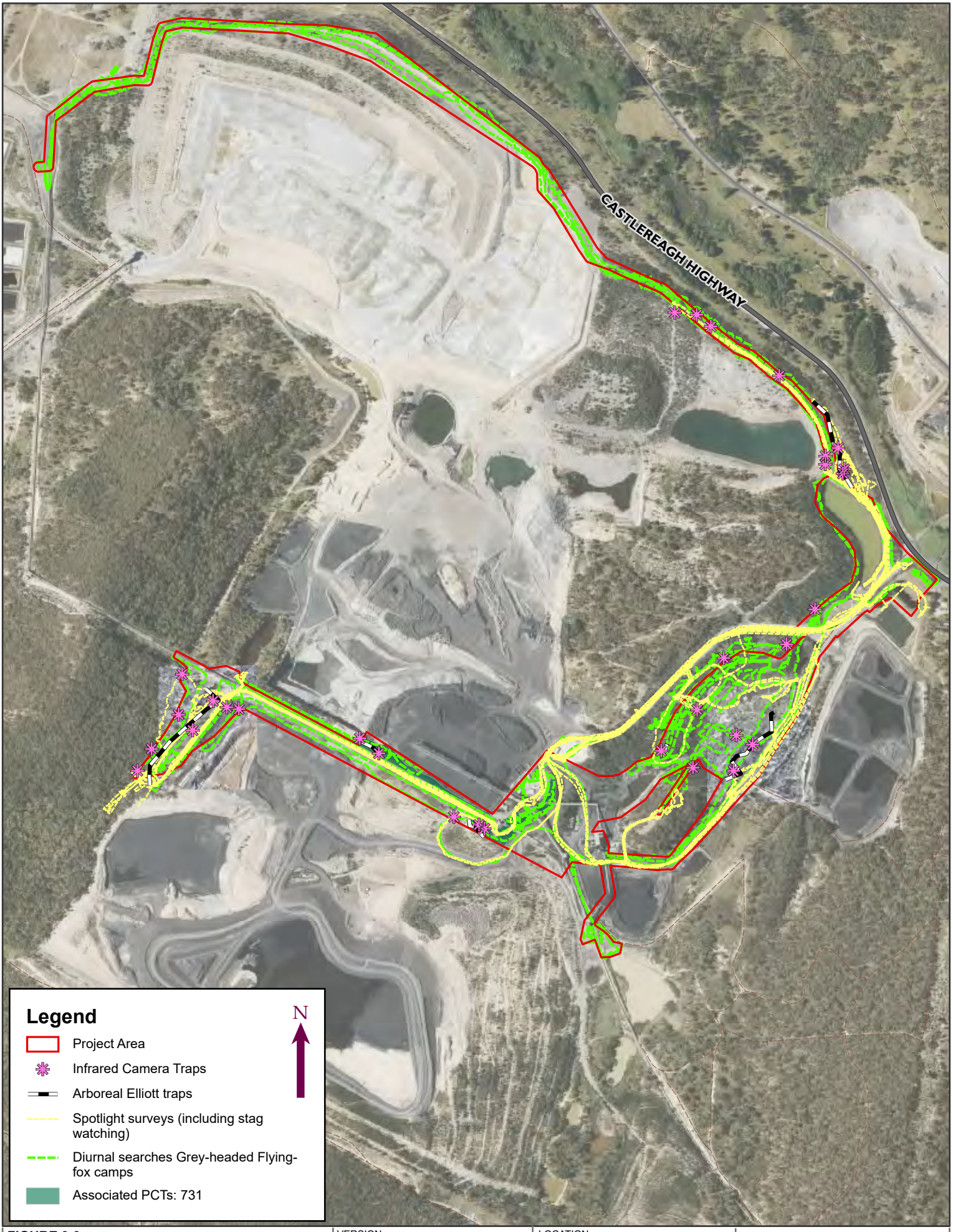


**FIGURE 3-9:**
**FAUNA SURVEY EFFORT: PETAURUS NORFOLCENSIS (SQUIRREL GLIDER); PETROGALE PENICILLATA (BRUSH-TAILED ROCK-WALLABY); PTEROPUS POLIOCEPHALUS (GREY-HEADED FLYING-FOX)**

VERSION:
**A**
DATE EXPORTED:
**26/11/2021 12:17 PM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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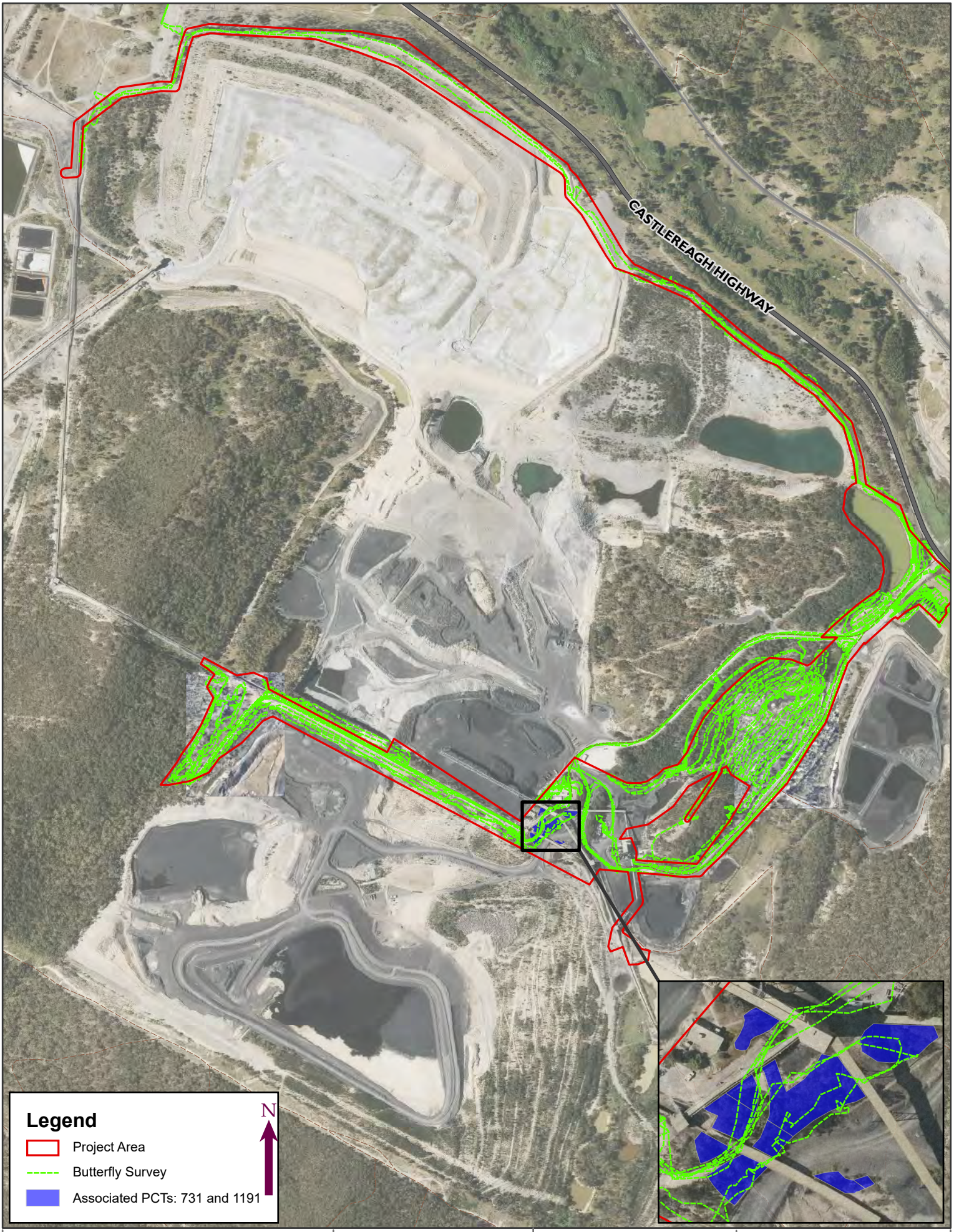


**FIGURE 3-10:**
**FAUNA SURVEY EFFORT: PARALUCIA SPINIFERA (BATHURST COPPER BUTTERFLY)**

VERSION:
**A**
DATE EXPORTED:
**30/11/2021 2:16 PM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\148221_WCS_MOD4\148221_WCS_MOD4_B.aprx

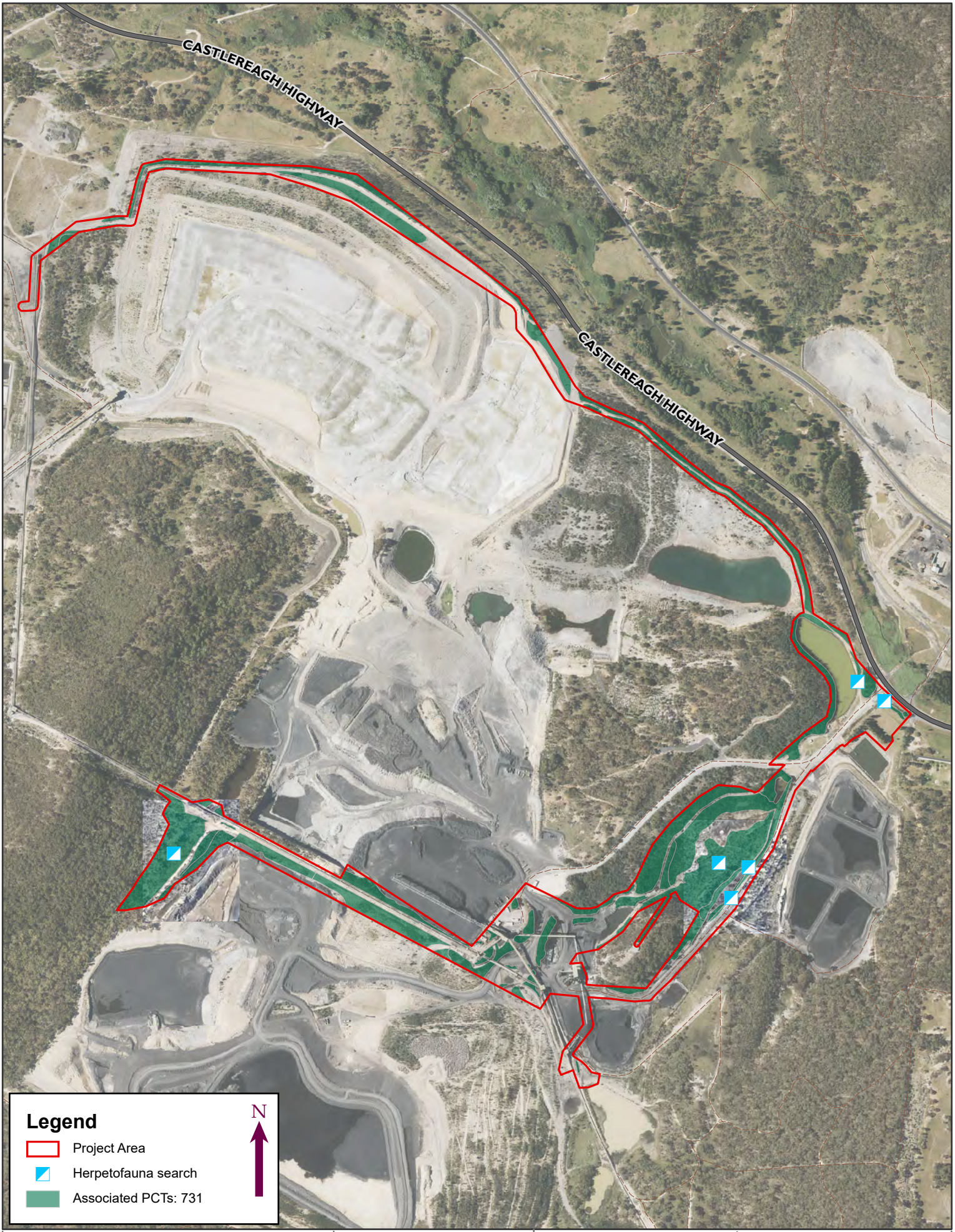


**FIGURE 3-11:**
**FAUNA SURVEY EFFORT: HELEIOPORUS AUSTRALIACUS (GIANT BURROWING FROG); LITORIA BOOROOLONGENSIS (BOOROOLONG FROG)**

VERSION:
**A**
DATE EXPORTED:
**26/11/2021 5:02 PM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,141 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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## 3.4 Survey Dates and Weather Conditions

Weather conditions for days flora and fauna surveys were undertaken is provided in **Table 3-8**. Weather information was accessed from Marrangaroo (station number 63308) at Latitude 33.4346° S, Longitude 150.1305° E, and 955 m ASL elevation (BOM 2021a). The weather station is approximately 11 km to the south-east of the Project Area.

**Table 3-8 Weather conditions during survey period[1]**

| Date | Min Temp (°C) | Max Temp (°C) | Rainfall (mm) | Max wind speed and direction | Task |
|---|---|---|---|---|---|
| 27 January 2021 | 16.9 | 21.7 | 0.2 | ESE @ 30 km/hr | BAM Plots; RDPs |
| 28 January 2021 | 13.6 | 17.0 | 0 | SSE @ 33 km/hr | BAM Plots; RDPs |
| 28 April 2021 | 1.4 | 18.3 | 0.2 | ENE @ 17 km/hr | Threatened Flora survey |
| 29 April 2021 | -0.3 | 19.1 | 0 | NE @ 15 km/hr | Threatened Flora survey |
| 7 June 2021 | -4.8 | 15.1 | 0 | NW @ 26 km/hr | BAM Plots; Habitat tree mark-up; Threatened Flora survey |
| 8 June 2021 | 1.1 | 13.9 | 0 | NW @ 43 km/hr | BAM Plots; Habitat tree mark-up; Threatened Flora survey |
| 9 June 2021 | -2.5 | 5.2 | 5.2 | WNW @ 31 km/hr | BAM Plots; Habitat tree mark-up; Threatened Flora survey |
| 28 June 2021 | -4.2 | 10.7 | 0 | SE @ 17 km/hr | Arboreal Elliot trapping; Camera traps installed |
| 29 June 2021 | 0.7 | 10.7 | 0 | SE @ 19 km/hr | Arboreal Elliot trapping; Nocturnal Mammal/bird spotlight surveys; Camera traps installed |
| 30 June 2021 | 3.1 | 12.8 | 0 | NNE @ 22 km/hr | Arboreal Elliot trapping; Nocturnal Mammal/bird spotlight surveys |
| 1 July 2021 | 3.1 | 12.7 | 0 | NNW @ 17 km/hr | Arboreal Elliot trapping; Nocturnal Mammal/bird spotlight surveys |
| 18 October 2021 | -0.1 | 19.8 | 0 | NW @ 30 km/hr | Nest boxes installed; Diurnal bird survey; Nocturnal Mammal/bird spotlight surveys; Herpetofauna survey |
| 19 October 2021 | 2.9 | 20.6 | 0 | SW @ 31 km/hr | Threatened Flora survey; Diurnal bird survey; Nocturnal Mammal/bird spotlight surveys; Herpetofauna survey; Bathurst Copper Butterfly survey |
| 20 October 2021 | 1.0 | 15.2 | 0 | SSE @ 30 km/hr | Threatened Flora survey; Diurnal bird survey; Nocturnal Mammal/bird spotlight surveys; Herpetofauna survey |
| 21 October 2021 | 1.8 | 16.9 | 0.4 | NE @ 28 km/hr | Threatened Flora survey; Diurnal bird survey; Nocturnal Mammal/bird spotlight surveys; Herpetofauna survey |
| 15 November 2021 | 4.9 | 12.2 | 4.4 | WSW @ 52 km/hr | Threatened Flora survey; retrieve Nest boxes |
| 16 November 2021 | 2.8 | 18.0 | 0 | SW @ 35 km/hr | Threatened Flora survey; retrieve Nest boxes |

1. Note weather conditions not displayed for camera trapping and nest boxes for brevity; installed over 53 and 28 days, respectively.

## 3.5 Limitations

Limitations associated with this assessment are presented in the following sections. The limitations have been considered specifically in relation to threatened species assessments, results and conclusions.

### 3.5.1 Property access

Access to EnergyAustralia property was restricted due to COVID-19 safety requirements from 28 June 2021 to 9 July 2021. As such, arboreal trapping, camera trapping and spotlight surveys could not be undertaken on that property during the June/July survey effort (these field components were undertaken on the week of 28 June 2021). Nevertheless, the survey effort was considered representative since the vegetation surveyed was part of the same vegetation zone as that surveyed using these methods on the WCS property.

One heritage site (approx. 10 x 20 m) was present within the Project Area and was barricaded off during the fieldwork period. Nevertheless, the open nature of vegetation in this area allowed for observations of threatened plants to be made from the edge of this area.

### 3.5.2 Safety

Steep and rocky terrain, dense blackberry thickets, snake encounters, unstable ground, fallen trees and construction/plant activities constrained spacing of parallel transects in some locations and at times. All efforts were made to achieve this targeted survey spacing, however safety of staff is a priority for RPS and no unnecessary risks were taken. Where surveys deviated from the targeted spacing due to safety concerns, these unsafe areas were observed from a distance, as per DPIE (2020).

### 3.5.3 Seasonality

Some plant species that occur in the local area, such as cryptic species, are annuals and are present only in the seed bank for much of the year. Other plant species are perennial but are inconspicuous or difficult to identify unless flowering.

Similarly, some fauna species have potential to occur on a seasonal, vagrant or migratory basis and may be absent from the locality for much for the year. Fauna species that are easily disturbed or cryptic may not have been detected. It is possible that several flora and fauna species occurring in the Project Area were not detected during the current survey due to the above factors.

These potential limitations have been addressed by: literature research, through identification of potential habitats for flora and fauna species. Assessment of the potential for targeted species to occur on the Project Area based on:

- Previous records;
- The type and condition of habitats present;
- The land use throughout the Project Area and surrounds; and
- The landscape context.

The precautionary principle (assumed presence) was applied where habitat was identified, or species were predicted to utilise habitat components at some stage during their life cycle.

### 3.5.4 Data Availability and Accuracy

The collated threatened flora and fauna species records provided by NSW Atlas of Wildlife Database for the region are known to vary in accuracy and reliability. Traditionally, this is due to the reliability of information provided to the NSW Atlas of Wildlife Database for collation and/or the need to protect specific threatened species locations. For the purposes of this report this information has been considered to have an accuracy of ± 1 km, however for some threatened species, records may be denatured by up to 2 km.

Threatened flora and fauna records within the region were predominantly sourced from the NSW Atlas of Wildlife Database (DPIE 2021a) and an EPBC Act Protected Matters Search (DAWE 2021a). Similar limitations are known to exist with regards to these data sources and their accuracy.

Data recorded by RPS during the survey period, has been gathered with a Trimble Differential GPS unit, which is capable of sub-metre accuracy following post processing.

# 4 RESULTS

## 4.1 Desktop Assessment

### 4.1.1 Database Interrogation – Species

Database search results (DPIE 2021a; DAWE 2021a) identified five threatened flora and 31 threatened and or migratory fauna species with the potential to occur within the locality (i.e. 10 km of the Project Area). A comprehensive list of threatened species, including their habitat types, is provided in **Appendix C**.

A summary of the threatened or migratory species with a moderate or greater likelihood of occurrence based on DPIE database search, literature review, EPBC Protected Matters Search and BAM Calculator output is provided in **Table 4-1**.

**Table 4-1 Threatened and or migratory species with 'Moderate' or greater likelihood of occurring**

| Scientific Name | Common Name | BC Act | EPBC Act |
|---|---|---|---|
| **Flora** | | | |
| *Caesia parviflora var. minor* | Small Pale Grass-lily | E | - |
| *Eucalyptus cannonii* | | V | - |
| *Genoplesium superbum* | Superb Midge Orchid | E | - |
| *Thesium australe* | Austral Toadflax | V | V |
| *Veronica blakelyi* | | V | - |
| **Fauna** | | | |
| *Artamus cyanopterus cyanopterus* | Dusky Woodswallow | V | - |
| *Callocephalon fimbriatum* | Gang-gang Cockatoo | V | - |
| *Calyptorhynchus lathami* | Glossy Black-Cockatoo | V | - |
| *Cercartetus nanus* | Eastern Pygmy-possum | V | - |
| *Chthonicola sagittata* | Speckled Warbler | V | - |
| *Circus assimilis* | Spotted Harrier | V | - |
| *Climacteris picumnus victoriae* | Brown Treecreeper (eastern subspecies) | V | - |
| *Daphoenositta chrysoptera* | Varied Sittella | V | - |
| *Dasyurus maculatus maculatus* | Spotted-tailed Quoll | V | E |
| *Falco subniger* | Black Falcon | V | - |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | - |
| *Glossopsitta pusilla* | Little Lorikeet | V | - |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V | M |
| *Hieraaetus morphnoides* | Little Eagle | V | - |
| *Hirundapus caudacutus* | White-throated Needletail | - | V |
| *Lophoictinia isura* | Square-tailed Kite | V | - |
| *Melanodryas cucullata cucullata* | Hooded Robin (south-eastern form) | V | - |
| *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V | - |
| *Monarcha melanopsis* | Black-faced Monarch | - | M |
| *Ninox connivens* | Barking Owl | V | - |
| *Ninox strenua* | Powerful Owl | V | - |
| *Petauroides volans* | Greater Glider | - | V |
| *Petaurus norfolcensis* | Squirrel Glider | V | - |
| *Petroica boodang* | Scarlet Robin | V | - |

| Scientific Name | Common Name | BC Act | EPBC Act |
|---|---|---|---|
| *Petroica phoenicea* | Flame Robin | V | - |
| *Rhipidura rufifrons* | Rufous Fantail | - | M |
| *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | V | - |
| *Stagonopleura guttata* | Diamond Firetail | V | - |
| *Tyto novaehollandiae* | Masked Owl | V | - |
| *Tyto tenebricosa* | Sooty Owl | V | - |
| *Varanus rosenbergi* | Rosenberg's Goanna | V | - |

Key: V: Vulnerable; E: Endangered; CE: Critically Endangered; M = Migratory

### 4.1.2 Literature Review

Threatened species listed in **Table 4-2** have previously been detected in or near the Project Area.

**Table 4-2 Previously detected threatened species**

| Scientific Name | Common Name | BC Act | EPBC Act |
|---|---|---|---|
| **Flora** | | | |
| *Eucalyptus aggregata*[1] | Black Gum | V | V |
| *Eucalyptus cannonii*[2] | Capertee Stringybark | V | - |
| **Fauna** | | | |
| *Climacteris picumnus victoriae*[1] | Brown Treecreeper (eastern subspecies) | V | - |
| *Callocephalon fimbriatum*[1] | Gang-gang Cockatoo | V | - |
| *Hieraaetus morphnoides*[1] | Little Eagle | V | - |
| *Petroica boodang*[1] | Scarlet Robin | V | - |
| *Chalinolobus dwyeri*[1] | Large-eared Pied Bat | V | V |
| *Falsistrellus tasmaniensis*[1] | Eastern Falsistrellus | V | - |
| *Miniopterus orianae oceanensis*[1] | Eastern Bent wing Bat | V | - |
| *Saccolaimus flaviventris*[1] | Yellow Bellied Sheathtail Bat | V | - |

Note: 1. RPS (2013) 2. RPS (2015)

### 4.1.3 Spatial Datasets

The Project Area is located within the Southeast Highland IBRA region and Capertee Uplands subregion and Capertee Plateau Mitchell Landscape (NPWS 2003a). This is described as:

“Wide valleys, low rolling hills below sandstone cliffs on Permian conglomerates, sandstones, and shales with coal at the base of the Sydney Basin and exposure of underlying Devonian shale, siltstone or quartzite. Small areas of Tertiary basalt. General elevation 800 to 1000 m, local relief 100-120 m. Isolated flat top mountains in the valleys formed as pinnacles or remnant pieces of plateau. Shoulder slopes with stone pillars or ‘pagodas’ above steep canyons on tributary streams falling into gorges. Low gradient swampy streamlines. Shallow stony texture-contrast profiles, usually with gritty well drained A-horizons, over tough yellow or grey poorly drained clays. Bouldery debris with clay matrix below cliffs (talus). Organic sand in swamps. Red brown structured loams on basalt. Woodlands of; rough-barked apple (*Angophora floribunda*), red stringybark (*Eucalyptus macrorhyncha*), red box (*Eucalyptus polyanthemos*), yellow box (*Eucalyptus melliodora*), Blakely’s red gum (*Eucalyptus blakelyi*) with shrubby understorey and wallaby grass (*Austrodanthonia sp.*) in open valleys. Scribbly gum (*Eucalyptus sclerophylla*), red stringybark (*Eucalyptus macrorhyncha*), red box and broad-leaved ironbark (*Eucalyptus fibrosa ssp. fibrosa*) on talus slopes. Silvertop ash (*Eucalyptus sieberi*) and Sydney peppermint (*Eucalyptus piperita*) on sandstone peaks. Dwarf casuarina (*Allocasuarina nana*), tea-tree (*Leptospermum sp.*), and sedge on pagoda margins.”

Vegetation mapping and inspection of recent aerial photography indicates a considerably cleared and fractured landscape in the Local Area, attributed to roads, agriculture, coal mining operations and associated

infrastructure, and Mt Piper Power Station (including ash dam and power easements). Nevertheless, the Project Area is connected to Ben Bullen State Forest, with tentative connection to a vast extent of contiguous vegetation associated with Newnes State Forest, Gardens of Stone National Park (NP), Wollemi NP, Yengo NP and further into the Great Dividing Range.

### 4.1.4 Candidate Species Survey Matrix – BAM Calculator

A candidate species list was constructed through entering the sub-bioregion, landscape and PCTs present into the NSW BAM Calculator (BAM-C). A matrix indicating the required timing of surveys was then yielded by the BAM-C. This list was refined to target only threatened species which may be impacted, as explained in **Section 3.2.4**.

Species and appropriate survey periods (i.e. grey shading) are provided in **Table 4-3**, with the timing of survey efforts indicated by a tick (i.e. ✓). Note that species ruled out from survey due to a lack of suitable habitat are listed in **Section 4.1.5**, with this further justified in the BDAR.

**Table 4-3 Candidate species list and survey timing for PCT 335; 731 and 1191**

| Candidate Species | PCT | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Plants** | | | | | | | | | | | | | |
| *Acacia bynoeana*[3] Bynoe's Wattle | | ✓ | | | ✓ | | ✓ | ✓ | | | ✓ | ✓ | |
| *Acacia meiantha*[3] | | | | | | | | ✓ | | | ✓ | | |
| *Eucalyptus aggregata* | 1191 | ✓ | | | ✓ | | ✓ | ✓ | | | ✓ | ✓ | |
| *Eucalyptus cannonii*[3] Capertee Stringybark | | ✓ | | | ✓ | | ✓ | ✓ | | | ✓ | ✓ | |
| *Eucalyptus pulverulenta* Silver-leafed Gum | 731 | ✓ | | | ✓ | | ✓ | ✓ | | | ✓ | ✓ | |
| *Leocochrysum albicans var. tricolor*[1] Hoary Sunray | | ✓ | | | ✓ | | | | | | ✓ | ✓ | |
| *Prasophyllum petilum* Tarengo Leek Orchid | 1191 | | | | | | | | | | ✓ | ✓ | |
| *Swainsona sericea* Silky Swainson-pea | 1191 | | | | | | | | | | ✓ | ✓ | |
| *Thesium australe* Austral Toadflax | 1191 | ✓ | | | | | | | | | | ✓ | |
| *Veronica blakelyi*[4] | 731 | ✓ | | | ✓ | | ✓ | | | | ✓ | ✓ | |
| **Birds** | | | | | | | | | | | | | |
| *Anthochaera phrygia*[2] Regent Honeyeater | 731; 1191 | | | | | | | | | | | | |
| *Callocephalon fimbriatum* Gang-gang Cockatoo | 731; 1191 | ✓ | | | | | | | | | ✓ | ✓ | |
| *Calyptorhynchus lathami* Glossy Black-Cockatoo | 731; 1191 | ✓ | | | | | ✓ | | | | | | |
| *Haliaeetus leucogaster* White-bellied Sea-Eagle | 335; 1191 | | | | | | | ✓ | | | ✓ | ✓ | |
| *Hieraaetus morphnoides* Little Eagle | 335; 731; 1191 | | | | | | | | | | ✓ | | |
| *Lophoictinia isura* Square-tailed Kite | 731 | ✓ | | | | | | | | | ✓ | ✓ | |

| Candidate Species | PCT | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Ninox connivens* Barking Owl | 731; 1191 | | | | | | ✓ | ✓ | | | ✓ | | |
| *Ninox strenua* Powerful Owl | 731; 1191 | | | | | | ✓ | ✓ | | | | | |
| *Tyto novaehollandiae* Masked Owl | 731; 1191 | | | | | | ✓ | ✓ | | | | | |
| **Frogs** | | | | | | | | | | | | | |
| *Heleioporus australiacus* Giant Burrowing Frog[2,5] | 731 | | | | | | | | | | ✓ | | |
| *Litoria booroolongensis* Booroolong Frog[2] | 731 | | | | | | | | | | ✓ | | |
| **Mammals** | | | | | | | | | | | | | |
| *Cercartetus nanus* Eastern Pygmy-possum | 731; 1191 | | | | | | | | | | ✓ | ✓ | |
| *Petauroides volans*[1] Greater Glider | | | | | | | ✓ | ✓ | | | ✓ | | |
| *Petaurus norfolcensis* Squirrel Glider | 731 | | | | | | ✓ | ✓ | | | ✓ | | |
| *Petrogale penicillata*[2] Brush-tailed Rock-wallaby | 731 | | | | | | ✓ | ✓ | | | ✓ | | |
| *Phascogale tapoatafa*[2,5] Brush-tailed Phascogale | 731 | | | | | | ✓ | ✓ | | | | | |
| *Phascolarctos cinereus* Koala | 731; 1191 | | | | | | ✓ | ✓ | | | ✓ | | |
| *Pteropus poliocephalus* Grey-headed Flying-fox | 731 | | | | | | | | | | ✓ | | |
| **Microbats** | | | | | | | | | | | | | |
| *Chalinolobus dwyeri*[2] Large-eared Pied Bat | 731 | | | | | | | | | | | | |
| *Miniopterus orianae oceanensis*[2] Large Bent-winged Bat | 731; 1191 | | | | | | | | | | | | |
| **Insects** | | | | | | | | | | | | | |
| *Paralucia spinifera* Purple Copper Butterfly, Bathurst Copper Butterfly | 731; 1191 | | | | | | | | | | ✓ | | |

Note: ✓ indicates timing of survey effort. 1. EPBC Act listed species only. 2. Species ruled out due to a lack of suitable habitat (see BDAR for further details). 3. Species added as a Candidate species due to potential to occur (see BDAR for further details). 4. Species surveyed outside of season, however sufficient botanic characteristics available to positively identify if present (see BDAR for further details). 5. Species vagrant to IBRA subregion.

### 4.1.5 Species ruled out

Species removed as Candidate Species due to lack of suitable habitat, either due distance from mapped breeding habitat, a lack of habitat features or habitat degradation, were:

- *Anthochaera phrygia* (Regent Honeyeater; removed as Project Area is outside mapped breeding area);
- *Lathamus discolor* (Swift Parrot; removed as Project Area is outside mapped breeding area);
- *Chalinolobus dwyeri* (Large-eared Pied Bat; no suitable roosting habitat present);

- *Heleioporus australiacus* (Giant Burrowing Frog; no suitable habitat present; species vagrant to IBRA subregion);
- *Hoplocephalus bungaroides* (Broad-headed Snake; no suitable rocky habitat present);
- *Litoria booroolongensis* (Booroolong Frog; no suitable habitat present);
- *Litoria littlejohni* (Littlejohn's Tree Frog; no suitable habitat present);
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat; no suitable roosting habitat present); and
- *Petrogale penicillata* (Brush-tailed Rock-wallaby; Project area is more than 1 km from suitable rocky habitat); and
- *Phascogale tapoatafa tapoatafa* (Brush-tailed Phascogale; species vagrant to IBRA subregion).

### 4.1.6 Survey sufficiency

Survey effort was considered representative for all the above listed Candidate species, where suitable habitat was present (**Table 4-3**).

## 4.2 Vegetation Cover

### 4.2.1 Plant Community Types (PCTs)

Three PCTs were located within the Project Area. These PCTs are listed in **Table 4-4** and are displayed in **Figure 3-1**. A description of this vegetation type is provided in **Sections 4.2.1.1** to **4.2.1.4**. BAM plot photographs and data are provided in **Appendix F** and **G**. Note that further detail regarding the selection of PCTs based on floristic composition, geology, landscape position etc is provided in the BDAR.

**Table 4-4 PCTs and condition classes within the Project Area**

| Zone | PCT | Condition | Project Area (ha) | No. BAM plots undertaken | No. BAM plots required |
|---|---|---|---|---|---|
| 1 | 335 | Moderate/Poor | 0.93 | 1 | 1 |
| 2 | 731 | Moderate | 0.88 | 1 | 2 |
| 3 | 1191 | Moderate | 1.85 | 1 | 2 |
| 4 | 1191 | Rehabilitation | 10.07 | 4 | 7 |
| 5 | 1191 | Regrowth | 1.16 | 1 | 2 |
| 6 | 1191 | Poor (Canopy only) | 0.19 | 1 | 1 |
| 7 | 1191 | Poor (Understory only) | 0.11 | 1 | 1 |
| 8 | Cleared/Modified | - | 14.78 | - | - |

#### 4.2.1.1 PCT 335 - Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion

| | |
|---|---|
| **Description:** | Tall tussock grassland to mid-high sedgeland to rushland or reedland dominated by tussock snow *grass Poa labillardierei var. labillardierei*, sedges including *Carex appressa*, rushes such as *Juncus homalocaulis* and *Juncus fockei*. In wetter areas a taller layer of water plants including the Common Reed (*Phragmites australis*) and bulrush (*Typha domingensis*) may be present. Varies considerably over range due to edaphic and hydrological differences and the degree of grazing. |
| **Zone/s** | 1 |
| **BAM Plot Number/s:** | 13 |
| **Diagnostic upper stratum species:** | None |
| **Diagnostics middle stratum species:** | *Phragmites australis*; *Typha domingensis*; *Acacia dealbata*; *Harmogia densifolia* |
| **Diagnostic ground stratum species:** | *Bothriochloa macra*; *Carex appressa*; *Juncus homalocaulis*; *Rumex brownii*; *Juncus fockei*; *Juncus holoschoenus*; *Acaena ovina*; *Cynodon dactylon*; *Microlaena stipoides var. stipoides*; *Aristida ramosa var. ramosa*; *Geranium neglectum*; *Geranium retrorsum*; *Dichopogon fimbriatus*; *Caesia parviflora var. parviflora*; *Xerochrysum viscosum*; *Arthropodium milleflorum*; *Microtis unifolia* |
| **Classification:** | No associated TEC |
| **Condition:** | Moderate |

**Plate 4-1 Zone 1: PCT 335 (Poor Condition) along central section of Project Area on WCS land**

### 4.2.1.2 PCT 731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion

| | |
|---|---|
| **Description:** | Open forest with a sparse shrub layer and grassy groundcover. Occurs on undulating hills between 550 and 1100 m from the western Blue Mountains to near Braidwood. |
| **Zone/s** | Zone 2 |
| **BAM Plot Number/s:** | 6 and 7 |
| **Diagnostic upper stratum species:** | *Eucalyptus dives*; *Eucalyptus macrorhyncha*; *Eucalyptus mannifera*; *Eucalyptus dalrympleana subsp. dalrympleana*; *Eucalyptus rossii*; *Eucalyptus cinerea* |
| **Diagnostics middle stratum species:** | *Melichrus urceolatus* |
| **Diagnostic ground stratum species:** | *Austrodanthonia racemosa*; *Gonocarpus tetragynus*; *Goodenia hederacea*; *Hibbertia obtusifolia*; *Hydrocotyle laxiflora*; *Hypericum gramineum*; *Lomandra filiformis subsp. coriacea*; *Microlaena stipoides var. stipoides*; *Oxalis perennans* |
| **Classification:** | No associated TEC |
| **Condition:** | Moderate |

**Plate 4-2 Zone 2: PCT 731 (Moderate Condition) between coal stockpiles and conveyor on WCS land**

### 4.2.1.3 PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion

| | |
|---|---|
| **Description:** | Open forest, woodland (or occasionally as grassland patches) with a sparse shrub layer and a dense grassy groundcover. Occurs on frost-hollow flats and footslopes in undulating tableland areas between 600 and 1100 m. |
| **Zones** | Zone 3: Moderate Condition; Zone 4: Rehabilitation; Zone 5: Regrowth; Zone 6: Poor (Canopy only); Zone 7: Poor (Understory only) |
| **BAM Plot Number/s:** | Zone 3: Plots 1 and 15, Zone 4: Plots 2, 3, 8, 9, 10, 11, 12, Zone 5: Plot 14, Zone 7: Plot 17, RDPs 1, 2, 6, 10 |
| **Diagnostic upper stratum species:** | *Eucalyptus pauciflora*; *Eucalyptus rubida subsp. rubida*; *Eucalyptus stellulata*; *Eucalyptus viminalis*; *Eucalyptus bridgesiana*; *Eucalyptus aggregata* |
| **Diagnostics middle stratum species:** | *Acacia dealbata*; *Acacia melanoxylon*; *Lissanthe strigosa* |
| **Diagnostic ground stratum species:** | *Chrysocephalum apiculatum*; *Elymus scaber*; *Gonocarpus tetragynus*; *Hydrocotyle laxiflora*; *Hypericum gramineum*; *Microlaena stipoides var. stipoides*; *Themeda australis* |
| **Classification:** | Consistent with BC Act listed Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions EEC. No associated EPBC Act listed TEC. |
| **Condition:** | Moderate; Rehabilitation Poor; Regrowth; Poor (Canopy only); Poor (Groundcover only) |

**Plate 4-3 Zone 3: PCT 1191 (Moderate Condition) far western extent of Project Area, adjacent Ben Bullen SF on WCS land**

**Plate 4-4 Zone 4: PCT 1191 Rehabilitation along central section of Project Area on WCS land**

**Plate 4-5 Zone 5: PCT 1191 Regrowth toward western arm of Project Area on WCS land**

**Plate 4-6 Zone 6: PCT 1191 Poor (Canopy Only) near WCS front gate**

**Plate 4-7 Zone 7: PCT 1191 Poor (Groundcover only) adjacent Castlereagh Highway**

### 4.2.1.4 Cleared/ Disturbed land

| | |
|---|---|
| **Description:** | Non-native vegetation and disturbed land associated with historic impacts associated with the WCS and MPPS operations and facility. Land uses leading to disturbance include earth works associated with construction of roads, access tracks, plant (e.g. coal washery), stockpiles, equipment and machine laydown areas, conveyor belts, buildings etc. |
| **Zone/s** | Zone 8 |
| **BAM Plot Number/s:** | NA |
| **Diagnostic upper stratum species:** | None |
| **Diagnostics middle stratum species:** | None |
| **Diagnostic ground stratum species:** | None |
| **Classification:** | No associated TEC |
| **Condition:** | Not native |

**Plate 4-8 Zone 8: Cleared/ Disturbed land adjacent MPPS**

**Plate 4-9 Zone 8: Cleared/ Disturbed land on MPPS ash dam wall**

**Plate 4-10 Zone 8: Cleared/ Disturbed land on MPPS ash dam wall (note weed management)**

## 4.3 Flora Surveys

In total, 173 flora species were detected within the BAM plots; 142 native and 31 weed species. For a full list of species see **Appendix D**.

### 4.3.1 Threatened Flora

*Eucalyptus aggregata* (Black Gum; BC Act: Vulnerable; EPBC Act: Vulnerable) was the only threatened flora species recorded in the Project Area. In total, 32 individual *E. aggregata* were recorded inside the Project Area (an additional 29 individuals were recorded within 50 m of the Project Area). These individuals appeared to be planted during past rehabilitation efforts; indicated by the uncharacteristic position on a hillslope and wooden stakes at the base of many of these trees (**Plate 4-11**). The location of this threatened flora species is shown in **Figure 4-1**.

**Plate 4-11 *Eucalyptus aggregata* planted as part of past rehabilitation effort**

### 4.3.2 Weeds

Four High Threat Weeds (HTWs) were detected during surveys and require due consideration of NSW WeedWise (2020; **Table 4-5**). The Project Area is subject to the Central Tablelands Regional Strategic Weed Management Plan 2017-2022.

**Table 4-5 HTWs detected within the Project Area and their management requirements**

| Scientific Name | Common Name | BAM High Threat Weed | Weed of National Significance | Duty under Biosecurity Act (2015) |
|---|---|---|---|---|
| *Eragrostis curvula* | African Lovegrass | ☒ | ☐ | **General Biosecurity Duty**<br>All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. |
| *Hypericum perforatum* | St Johns Wort | ☒ | ☐ | **Regional Recommended Measure***<br>Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.<br>Protect grazing land that is free of St. John's wort. |
| *Paspalum dilatatum* | Paspalum | ☒ | ☐ | **General Biosecurity Duty**<br>All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. |
| *Rosa rubiginosa* | Sweet Briar | ☒ | ☐ | **General Biosecurity Duty**<br>All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. |

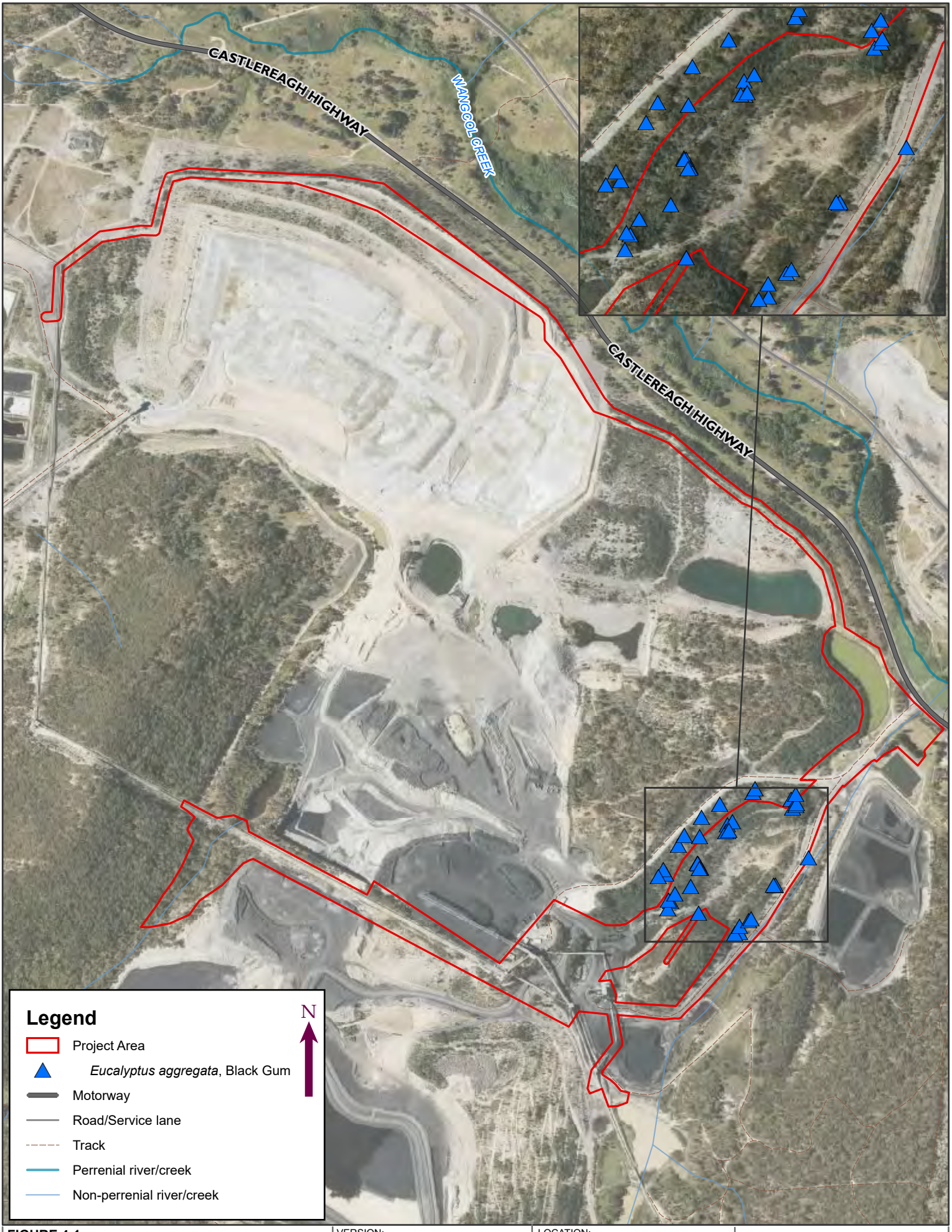


**FIGURE 4-1**
**THREATENED FLORA**

VERSION:
**B**
DATE EXPORTED:
**25/11/2021 10:29 PM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

**IMPORTANT NOTE**
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.
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f. lodgement of this plan with any local authority against the recommendation of RPS Australia East Pty Ltd;
g. the accuracy, reliability, suitability or completeness of any approximations or estimates made or referred to by RPS Australia East Pty Ltd in this plan.

Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\148221_WCS_MOD4\148221_WCS_MOD4_B.aprx

## 4.4 Fauna Surveys

Threatened fauna detected during field surveys (either opportunistic or targeted surveys) within or nearby the Project Area were:

- Brown Treecreeper [(eastern subspecies) *Climacteris picumnus*; BC Act = Vulnerable; EPBC Act = Not Listed)];
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*; BC Act = Vulnerable; EPBC Act = Not Listed);
- Gang Gang Cockatoo (*Callocephalon fimbriatum*; BC Act = Vulnerable; EPBC Act = Not Listed);
- Little Eagle (*Hieraaetus morphnoides*; BC Act = Vulnerable; EPBC Act = Not Listed);
- Large-eared Pied Bat (*Chalinolobus dwyeri*; BC Act = Vulnerable; EPBC Act = Vulnerable);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*; BC Act = Vulnerable; EPBC Act = Not Listed);
- Scarlet Robin (*Petroica boodang*; BC Act = Vulnerable; EPBC Act = Not Listed); and
- Yellow Bellied Sheathtail Bat (*Saccolaimus flaviventris*; BC Act = Vulnerable; EPBC Act = Not Listed).

A glider was detected by camera trap, as shown in **Plate 4-12** and **Plate** 4-13. Photos of this glider were sent to the Australian Museum for identification. Correspondence from the Mammalogy Department provided on 1 November stated the following "*Consensus is that it's not a Squirrel Glider (Petaurus norfolcensis). Sugar Gliders were recently revised taxonomically and there are now two species of what was known as Sugar Glider (Petaurus breviceps) in NSW – a coastal species (P. breviceps) and a more inland one "Krefft's Glider" (P. notatus). Their ranges do overlap in some areas. The one in the image looks like Krefft's Glider as it has the dorsal stripe which is often lacking in the coastal species*." A full list of fauna detected are provided in **Appendix H**.

### 4.4.1 Targeted Herpetofauna Census

No threatened herpetofauna were detected within the Project Area during diurnal or nocturnal surveys. Eight common frog species were recorded within the Project Area, as detailed in **Appendix H**.

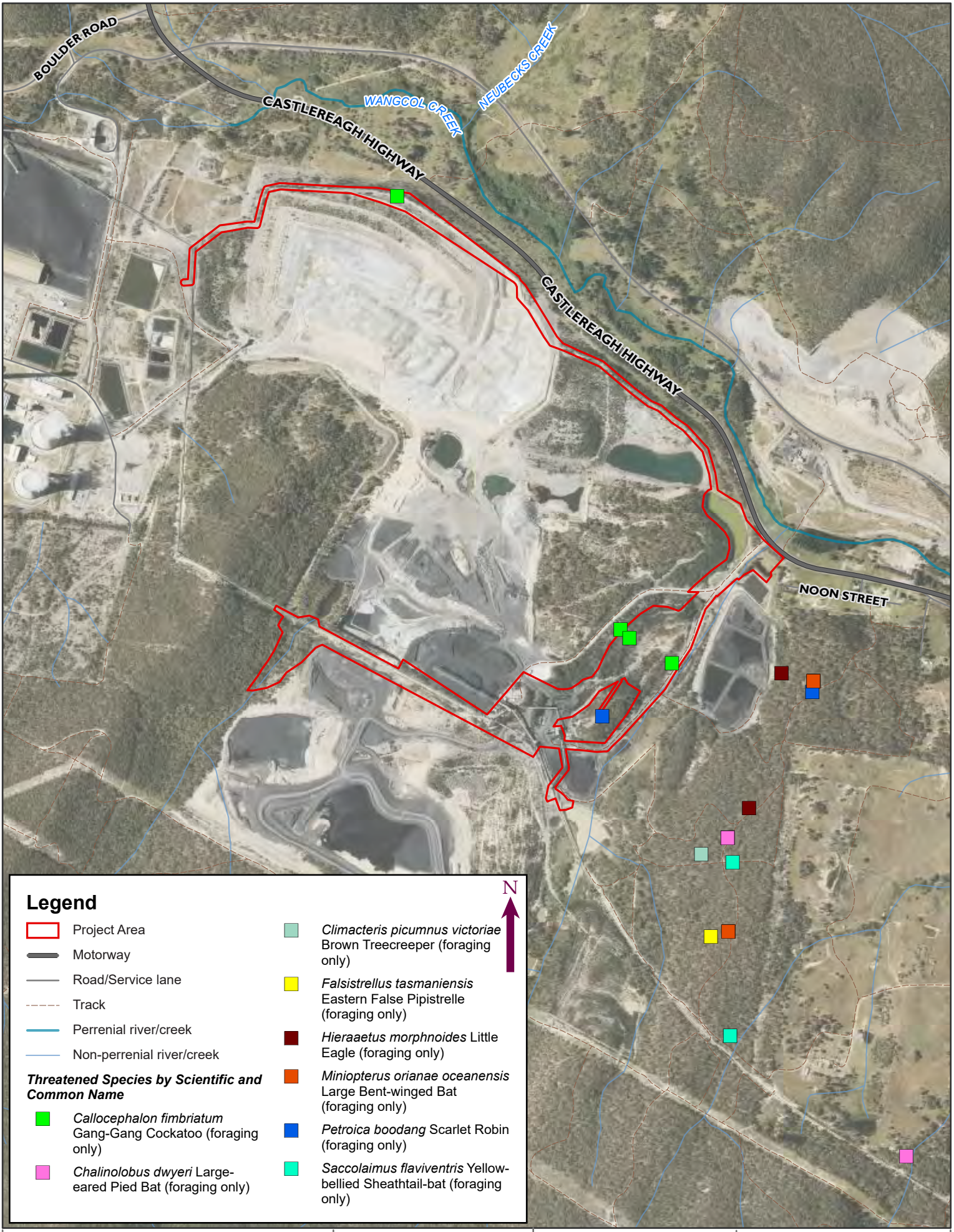


**FIGURE 4-2**
**THREATENED FAUNA**

VERSION:
**B**
DATE EXPORTED:
**26/11/2021 12:32 PM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 400 500 m

SCALE 1:15,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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c. any inaccuracies or other faults with information or data sourced from a Third Party;
d. RPS Australia East Pty Ltd relying on surface indicators that are incorrect or inaccurate;
e. the Client or any Third Party not verifying information in this plan where recommended by RPS Australia East Pty Ltd;
f. lodgement of this plan with any local authority against the recommendation of RPS Australia East Pty Ltd;
g. the accuracy, reliability, suitability or completeness of any approximations or estimates made or referred to by RPS Australia East Pty Ltd in this plan.

Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\148221_WCS_MOD4\148221_WCS_MOD4_B.aprx

**Plate 4-12 Krefft's Glider detected by Camera Trap**

**Plate 4-13 Krefft's Glider detected by Camera Trap**

## 4.4.2 Habitat Survey

Habitat values identified within the Project Area for fauna included: hollow-bearing trees; sandstone rock; bodies of water; and termite mounds. These habitat features provide potential foraging and / or breeding habitat for a range of bird, reptile, amphibian and mammal species. **Sections 4.4.2.1** to **4.4.2.4** concentrate on results from targeted habitat surveys for hollow-associated fauna, cave-associated microbats, rocky habitat and aquatic habitat. **Section 4.4.2.5** provides results of survey for potential *Paralucia spinifera* (Bathurst Copper Butterfly) Habitat (i.e. *Bursaria spinosa subsp. lasiophylla*).

### 4.4.2.1 Habitat tree survey

Seven hollow-bearing trees were located within the Project Area. The attributes of these trees are summarised in

**Table 4-6** and displayed in **Figure 4-3**.

**Table 4-6 Hollow-bearing trees within Project Area**

| Species | DBH (cm) | Height (m) | Hollow Class | | |
|---|---|---|---|---|---|
| | | | C1 (>20cm) | C2 (11-20cm) | C3 (<10cm) |
| *Eucalyptus mannifera* | 61-70 | 16-20 | 2 | - | 3 |
| *Eucalyptus mannifera* | 71-80 | 16-20 | 2 | - | - |
| *Eucalyptus viminalis* | 61-70 | 21-25 | - | 1 | - |
| *Eucalyptus dalrympleana* | 81-90 | 16-20 | 3 | 3 | 4 |
| *Eucalyptus viminalis* | 51-60 | 16-20 | 1 | 2 | 3 |
| *Eucalyptus viminalis* | 61-70 | 21-25 | 2 | 2 | 1 |
| *Eucalyptus viminalis* | 81-90 | 16-20 | 0 | 4 | 3 |

### 4.4.2.2 Cave survey

There were no caves located in or within 100 m of the Project Area.

### 4.4.2.3 Rocky habitat survey

No natural rocky areas were identified in the Project Area. That is, there were no cliffs, pagodas, overhangs, caves, rock platforms, rock slabs or natural boulders. The only rock identified was recently emplaced in the Project Area for erosion and drainage control measures (see **Plate 4-14**). Only one small patch of small rocks appeared to be natural to the site, offering very limited habitat potential for rock-associated reptiles, as shown in the lower left photo of **Plate 4-14**. These rock aggregations are not of a kind that are suitable for Broad-headed Snake (*Hoplocephalus bungaroides*).

**FIGURE 4-3**
**HOLLOW-BEARING TREES RECORDED**

VERSION:
**A**
DATE EXPORTED:
**19/08/2021 4:08 PM**
TECHNICIAN:
**Natalie.Wood**

LOCATION:
**Western Coal services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 m

SCALE 1:10,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\148221_WCS_MOD4\148221_WCS_MOD4.aprx

**Plate 4-14 Examples of disturbed/modified rock substrate within the Project Area**

### 4.4.2.4 Aquatic habitat survey

Waterbodies within the Project Area were primarily man-made, with the purpose of treating runoff. The ponds were both ephemeral and permanent, as displayed in **Plate 4-15**. These ponds were primarily associated with PCT 335, with vegetation dominated by *Typha spp*. and *Juncus spp*. Top right and bottom photos in **Plate 4-15** exemplify this waterbody type. There was only one natural waterway located within the Project Area, a once natural third order tributary that now terminates adjacent to a coal stockpile site, as shown in the top left photo in **Plate 4-15**. Vegetation adjacent to this natural creek was PCT 1191.

### 4.4.2.5 Bathurst Copper Butterfly habitat

A small patch of *Bursaria spinosa subsp. lasiophylla* was found within the Project Area (consisting of approximately 43 individuals; **Plate 4-16**), which offers potential habitat for the *Paralucia spinifera* (Bathurst Copper Butterfly). The location of this habitat and extent of potentially suitable habitat is presented as a species polygon within the BDAR; given that surveys for this species were not undertaken prior to submission. Nevertheless, survey for larvae will be undertaken in December 2021, to confirm presence/ absence of this species.

**Plate 4-15 Examples of disturbed/modified aquatic habitat in the Project Area**

**Plate 4-16 Patch of *Bursaria spinosa subsp. lasiophylla***

# 5 IMPACT ASSESSMENT

## 5.1 NSW State Groundwater Dependant Ecosystems

The potential for Groundwater Dependent Ecosystems (GDE) was explored using The Groundwater Dependent Ecosystems Atlas (GDE Atlas). The GDE Atlas was developed as a national dataset of Australian GDEs to inform groundwater planning and management (BOM 2021b).

The primary source of groundwater in the region is the NSW Murray Darling Basin Fractured Rock Groundwater of the Lachlan Fold Belt.

The PCTs within the Project Area that have a moderate or greater potential to be a GDE include:

- PCT 335 - Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion; and
- PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion.

Based on the nature of the Project, impacts on groundwater are expected to be negligible. There would be no large extent of hard surface installed as part of the Project that may influence infiltration of surface water and the proposed DWP-B will be lined to minimise interactions with the groundwater system.

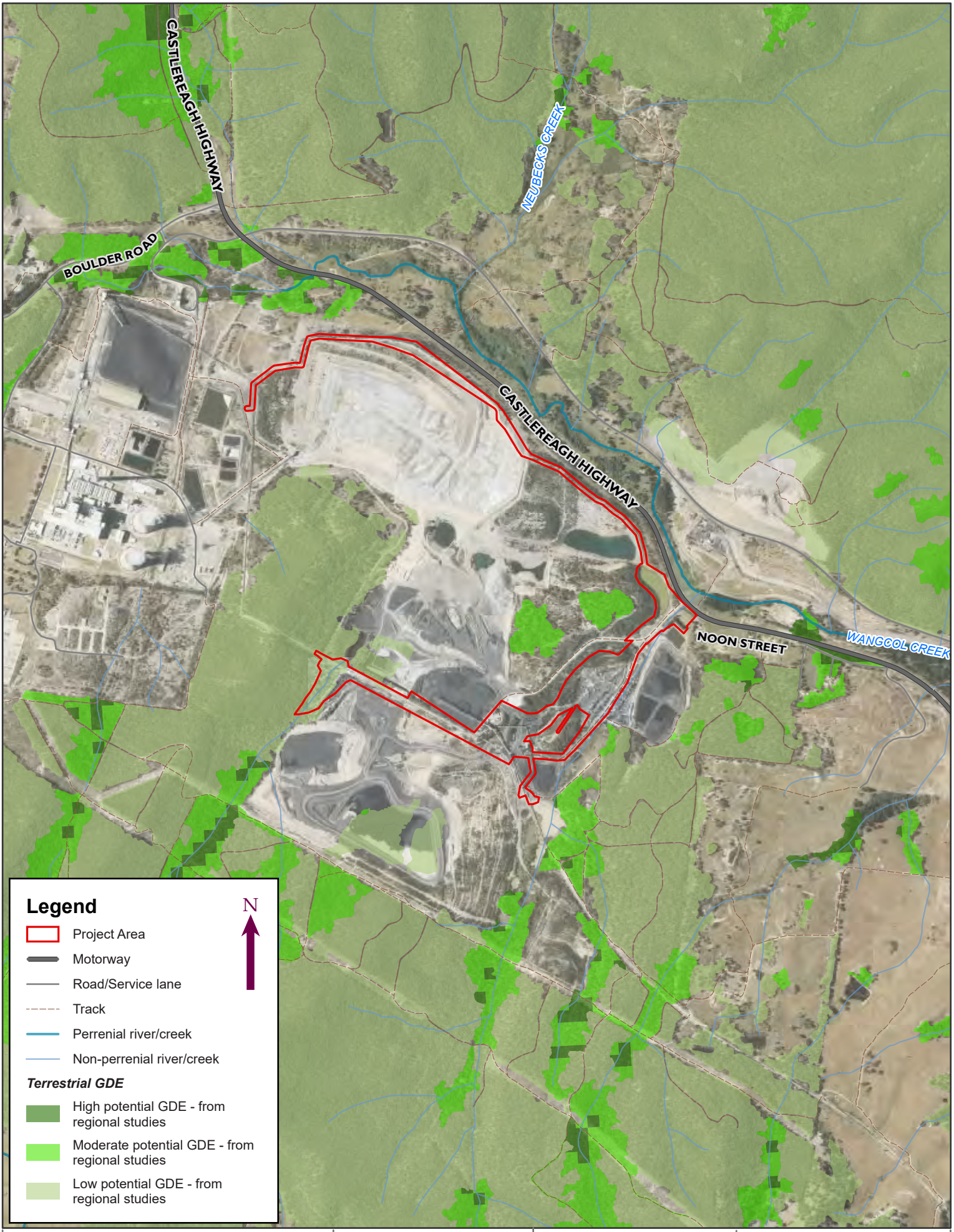


**FIGURE 5-1**
**GROUNDWATER DEPENDENT ECOSYSTEMS (BOM 2021B)**

VERSION: **A**
DATE EXPORTED: **23/08/2021 8:48 AM**
TECHNICIAN: **Natalie.Wood**

LOCATION: **Western Coal Services**

DATA SOURCES
Centennial, RPS,

0 100 200 300 400 500 600 700 m

SCALE 1:20,000 AT A4 SIZE
SPATIAL REFERENCE: GDA2020 MGA Zone 56

CLIENT: **Centennial**
PROJ: **PR128221**
PURPOSE: **BIR**

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Project path: S:\Centennial\All Jobs\148221 WCS MOD4 Impact Assessment\10 - Drafting\148221_WCS_MOD4\148221_WCS_MOD4.aprx

## 5.2 Environmental Protection and Biodiversity Conservation Act 1999

### 5.2.1 EPBC Act Listed Migratory Species

Thirteen nationally listed migratory terrestrial and wetland species were recorded on the DAWE online database or are considered to have potential habitat available within 10 km of the Project Area (**Table 5-1**).

**Table 5-1 Migratory birds listed under EPBC Act**

| Scientific Name | Common Name |
|---|---|
| **Migratory Terrestrial Species** | |
| *Hirundapus caudacutus* | White-throated Needletail |
| *Monarcha melanopsis* | Black-faced Monarch |
| *Motacilla flava* | Yellow Wagtail |
| *Rhipidura rufifrons* | Rufous Fantail |
| **Migratory Wetland Species** | |
| *Actitis hypoleucos* | Common Sandpiper |
| *Calidris acuminata* | Sharp-tailed Sandpiper |
| *Calidris ferruginea* | Curlew Sandpiper |
| *Calidris melanotos* | Pectoral Sandpiper |
| *Gallinago hardwickii* | Latham's Snipe |
| *Numenius madagascariensis* | Eastern Curlew |
| *Pandion haliaetus* | Osprey |

Due to the minor extent of impact on habitat for these above listed migratory birds, as a result of the highly disturbed nature of much of the Project Area and limited habitat value/ extent offered by intact vegetation, the Project is considered unlikely to impact on any area considered to be 'important habitat' for these migratory species or impact a significant proportion of a migratory population.

### 5.2.2 EPBC Act Listed Threatened Species

Forty-five nationally threatened species have been recorded or may occur within 10 km of the Project Area. Through the LoOA,, four EPBC Act listed species were deemed as having a moderate or greater likelihood of occurring within the Project Area (**Appendix C**). EPBC Act Listed threatened species identified as having a moderate or greater likelihood of occurring are:

- Black Gum (*Eucalyptus aggregata*; EPBC Act: Vulnerable);
- Greater Glider (*Petauroides volans*; EPBC Act: Vulnerable);
- Large-eared Pied Bat (*Chalinolobus dwyeri*; foraging habitat only; EPBC Act: Vulnerable);
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus*; EPBC Act: Vulnerable); and
- Bathurst Copper Butterfly (*Paralucia spinifera*; EPBC Act: Endangered).

Out of the above species Black Gum, Greater Glider and Large-eared Pied Bat (foraging only) were detected within or nearby the Project Area. Note that detections of Greater Glider and Large-eared Pied Bat (foraging only) were made during previous studies at WCS (RPS 2013 and 2015). A small patch of suitable habitat for Bathurst Copper Butterfly (*Paralucia spinifera*; BC Act: Vulnerable; EPBC Act: Endangered) was also found within the Project Area.

An EPBC Act Assessment of Significance was undertaken for the above EPBC listed threatened species with a moderate or greater likelihood of occurrence, concluding that the Project is unlikely to have a significant impact on these species (**Appendix I**).

### 5.2.3 Threatened Ecological Communities

No TECs listed under the EPBC Act were detected within the Project Area. As such, no assessment for EPBC Act Listed Threatened Ecological Communities is provided in this report.

# 6 CONCLUSIONS AND RECOMMENDATIONS

This BIR provides ecological survey results required to inform the preparation of a BDAR for impacts on biodiversity values arising from modification of aspects of water management at SCSS, as part of MOD 4 to SSD 5579.

This report also assesses matters not addressed in the BDAR, such as assessments required under the EPBC Act and relevant SEPPs. Conclusions and recommendations are provided in the following sections.

## 6.1 State Requirements (BC Act)

Three PCTs were located within the Project Area. These PCTs were:

- PCT 335 - Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion;
- PCT 731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion; and
- PCT 1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion.

Of the BC Act listed threatened flora, only *Eucalyptus aggregata* (Black Gum; BC Act: Vulnerable; EPBC Act: Vulnerable) was detected. In total, 32 individuals (appearing to be planted during past rehabilitation efforts) were recorded within the Project Area (29 individuals were outside the Project Area).

The following fauna species listed under the BC Act were found within or nearby the Project Area:

- Brown Treecreeper [(eastern subspecies) *Climacteris picumnus*; BC Act: Vulnerable; EPBC Act: Not Listed); Foraging only];
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only);
- Gang Gang Cockatoo (*Callocephalon fimbriatum*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only); and
- Large-eared Pied Bat (*Chalinolobus dwyeri*; BC Act: Vulnerable; EPBC Act: Vulnerable; Foraging only);
- Little Eagle (*Hieraaetus morphnoides*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only);
- Scarlet Robin (*Petroica boodang*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only); and
- Yellow Bellied Sheathtail Bat (*Saccolaimus flaviventris*; BC Act: Vulnerable; EPBC Act: Not Listed; Foraging only).

A small patch of suitable habitat for Bathurst Copper Butterfly (*Paralucia spinifera*; BC Act: Vulnerable; EPBC Act: Endangered) was also found within the Project Area. One survey effort in October was undertaken in that potential habitat patch during suitable conditions, with no adults observed. However, due to the sporadic timing of this species' lifecycle, a follow-up survey for larvae during December 2021 is recommended to confirm its' absence.

Impacts to the above listed PCT and Species Credit Species are addressed in the BDAR.

## 6.2 Commonwealth Requirements (EPBC Act)

No TECs listed under the EPBC Act were detected within the Project Area. As such, no assessment for EPBC Act listed TECs is required.

Of the EPBC Act listed species, Black Gum (*Eucalyptus aggregata*); Large-eared Pied Bat (*Chalinolobus dwyeri*) and Greater Glider (*Petauroides volans*; EPBC Act: Vulnerable) were found within or nearby the Project Area. Potential habitat for Bathurst Copper Butterfly (*Paralucia spinifera*; EPBC Act: Endangered) was also detected.

An Assessment of Significance was undertaken in **Appendix I** due to potential impacts on EPBC Act listed species with a moderate or greater likelihood of occurring, which were:

- Black Gum (*Eucalyptus aggregata*; EPBC Act: Vulnerable);
- Greater Glider (*Petauroides volans*; EPBC Act: Vulnerable);
- Large-eared Pied Bat (*Chalinolobus dwyeri*; foraging habitat only; EPBC Act: Vulnerable);
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus*; EPBC Act: Vulnerable); and
- Bathurst Copper Butterfly (*Paralucia spinifera*; EPBC Act: Endangered).

Based on the self-assessment (AoS), it is considered that the Project is unlikely to have a significant impact on the above EPBC Act listed species. Although we believe the action does not constitute a controlled action (i.e. not a significant impact on Black Gum; Large-eared Pied Bat, Greater Glider, Spotted-tailed Quoll or Bathurst Copper Butterfly), Centennial may consider referring the Project to the Minister for the Minister's decision under Section 68 (2) of the EPBC Act for the purposes of regulatory certainty. Alternatively, it is recommended that Centennial retain this assessment as evidence of a proper self-assessment being undertaken for these four species.

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# Appendix A

# Staff Qualifications

# Hayden Beck

Senior Ecologist

## Role at RPS
Senior Ecologist

## Location
Newcastle, NSW, Australia

## Qualifications
BSc (Mar Sc); BEnvSc (Hons); MSc (Res); PhD

BAM Accredited Assessor (BAAS19000)

AUSRIVAS Macroinvertebrate Bioassessment Training

Contaminated Site Assessment, Remediation and Management (CSARM) short course, UTS4X4 driving Certificate

White Card

Rail Industry Safety Induction – RISI

## Memberships
Ecological Consultants Association of NSW (Practicing Member)

## Why Hayden for this role

Hayden specialises in terrestrial, aquatic and marine ecology. As an Ecologist at RPS, Hayden undertakes fieldwork and prepares reports for diverse projects, including the mining and housing sectors.

Being a Biodiversity Assessment Method (BAM) Accredited Assessor, Hayden has considerable experience preparing Biodiversity Assessment Reports under the NSW *Biodiversity Conservation Act 2016*.

## Relevant projects

### Woolooga Solar Farm, Lightsource BP, 2020 - 2021

Hayden prepared Preliminary Documentation to assist with Commonwealth assessment for a proposed solar farm in Woolooga, QLD. Preparation of this report involved collating several specialist reports to assess impacts on biodiversity values. As part of this project, Hayden also prepared a Biodiversity Management Plan (BMP) and Offset Management Plan (OMP).

### Fernleigh Track Extension REF and EIS, Lake Macquarie City Council, 2020

RPS was engaged for a Review of Environmental Factors (REF) and Environmental Impact Statement (EIS) for the Fernleigh Awabakal Shared Track (FAST) Extension from Belmont to Blacksmiths. Hayden provided ecological advice including Fauna trapping and aquatic ecology.

### 33kV Power Easement for Mandalong Coal Mine, Centennial Coal, 2019

Hayden prepared a Biodiversity Development Assessment Report (BDAR) to determine the offset liability for this State Significant Development (SSD). This project extended 7.6km easement will extent through multiple Plant Communities. Preparation of this report involved collating multiple years of field data and specialist reports to assess impacts on biodiversity values. As part of this project, Hayden supported the lodgement an EPBC Act referral due to uncertain impacts on threatened flora.

### LW22-24a and LW 25-31 Mandalong Coal Mine, Centennial Coal, 2019 - 2021

Hayden organises annual monitoring of sensitive ecological communities, as well as frogs, to detect impacts of longwall mining. As a project manager, he coordinates teams of up to six ecologists to undertake surveys across a vast area.

### Jemalong Solar Farm, Genex Power Pty Ltd, 2019

Hayden prepared an EPBC Act referral document for a proposed Solar Farm (SSD) in Jemalong, NSW. This Project involved assessing impacts of removing hollow-bearing trees on Swift Parrot and Corben's Long-eared Bat.

## Relevant projects

### Basalt Quarry, Boral, 2019

Hayden undertook a feasibility assessment for a proposed basalt mine at North Star, NSW. This project involved undertaking flora surveys across Semi-evergreen Vine Thicket EEC to determine the offset liability to develop the site. Three extraction options were assessed. Involvement included fieldwork, preparation of a report and presentation to the client.

### NBN tower Installation, Vision Stream, 2019

Hayden prepared a BDAR to determine the offset liability for an infrastructure Project at Tallong, NSW. Impacts to ecosystems and threatened species were assessed for the installation of an access track, NBN tower and associated facilities.

### Newcastle Light Rail (NLR) Project, Downer, 2019

Hayden prepared the ecological sections of an Infrastructure sustainability rating (ISCA) application for the 'As Built' stage of the NLR Project

### Tikitere Quarry, SMK Consultants, 2017

Hayden assisted the ecological assessment of a basalt quarry at North Star, NSW. Tasks included fieldwork and assistance with reporting.

### Concrete Batch Plant at Bushells Ridge, Advision, 2017

Hayden prepared a Flora and Fauna impact assessment for the proposed establishment of a concrete batch plant. This facility is currently being used to facilitate widening of the M1. This project involved several survey efforts targeting multiple threatened flora and fauna species, including a critically endangered orchid that was found on site.

### Roads and Maritime Services, Road Upgrade Projects, 2016 to 2018

Hayden undertook Biodiversity Assessments for 15 road projects. Examples include:

- Widening of Golden Highway, Castlereagh Junction to Dunedoo;
- Shoulder Widening, Golden Highway (Segments 240 to 260), Denman;
- Culvert rehabilitation (23 sites): Old Pacific Highway, Kariong to Mooney;
- Manns Road Upgrade, West Gosford; and
- Drainage Upgrades to M1, Mt Pleasant, Roads and Maritime Services.

### Dungog Council, Road Upgrade Projects, 2016

Hayden undertook Biodiversity Assessments and preclearance surveys for two road projects in Dungog Shire Council LGA.

### Climate change impacts on tropical fishes, University of Technology Sydney, 2012-2015

This project was aimed at understanding factors mediating the geographic response of marine reef fishes to climate change. This project involved extensive, multi-year underwater surveys of temperate and tropical marine ecosystems in eastern Australia and western Japan. Various aquarium experiments were undertaken to study how predator-prey interactions may structure recruitment success of tropical fishes when colonising a new range. A new method was devised to survey rare reef fish species, which uses a towed GPS to delineate survey effort.

### Impacts of soil pollution on reef fish recruitment, Kochi University, 2014

Studied impacts of red soil pollution on reef fish recruitment within Japan, which stems from water pollution arising from agricultural runoff. This project included coral and reef fish surveys, as well as laboratory experiments.

### Characterisation of Stormwater pollution in Sydney Harbour, Marrickville, City of Sydney and Leichhardt Councils, 2010-2012

Measured and analysed water pollution within Sydney Harbour catchments, including metals, nutrients and suspended solids. This project involved generating water pollution budgets for different flow conditions, then devising a water treatment strategy.

### Research Assistant, Macquarie University, 2007-2010

Organised and conducted fieldwork and laboratory experiments for several aquatic ecology-focused projects, including a sea urchin aquaculture venture and collaborations with James Cook University and NSW DPI. In this role, Hayden surveyed marine fishes and invertebrates throughout NSW.

### Water Quality Officer, NSW Department of Environment, 2009

Undertook monitoring of water quality through Sydney's Waterways and Beaches. Role involved operating a small vessel to collect water samples from remote locations.

### Connectivity of sea urchin populations between southern and eastern Australian Coastlines, Deakin University, 2007

Undertook hierarchically nested surveys of the sea urchin *Heliocidaris erythrogramma* along the coastline from Sydney to Adelaide. This study demonstrated potential breaks in connectivity between populations on the Southern and Eastern coastlines of Australia. Breeding experiments were undertaken to explore a genetic cause for patterns in colour variation of this sea urchin.

# Mark Aitkens

## Principal Ecologist

**Role at RPS**
Principal Ecologist

**Location**
Newcastle, NSW, Australia

**Qualifications**
Bachelor of Science (Environmental Biology), University of Technology Sydney (UTS)

Accredited Biodiversity Assessment Method Assessor under Section 6.10 of the *Biodiversity Conservation Act* 2016

Rail Industry Safety Induction - RISI

**Memberships**
Ecological Society of Australia

## Why Mark for this role

Mark is a Principal Ecologist with 25 years' experience in the delivery of terrestrial and aquatic ecology services to the private and public sectors. Mark is accredited to perform assessments in accordance with the Biodiversity Assessment Methodology (BAM) and has conducted a range of BBAM and BAM assessments for State Significant Infrastructure and State Significant Developments. He is also experienced in the application of the EPBC Act preparation of EPBC Act offset calculations.

Mark is experienced in all aspects of project delivery including design and implementation of seasonally based flora and fauna surveys, identification of terrestrial and aquatic species and ecological communities, impact assessments, and design and implementation of monitoring programs.

## Relevant projects

### Fernleigh Awabakal Track Extension REF and EIS, Lake Macquarie City Council, 2020 - present

RPS was engaged for a Review of Environmental Factors (REF) and Environmental Impact Statement (EIS) for the Fernleigh Awabakal Shared Track (FAST) Extension from Belmont to Blacksmiths. Mark oversaw ecological field work requirements and preparation of biodiversity assessment documentation for the project including the preparation of a Biodiversity Development Assessment Report. This report informed an overarching Review of Environmental Factors, which aimed to avoid, minimise and mitigate impacts upon local biodiversity in the Lake Macquarie Local Government Area.

### Medlow Bath upgrade, Transport for NSW (TfNSW), 2020 – 2021

As part of the Great Western Highway Upgrade Program, the Medlow Bath section will be upgraded to allow dual lanes and safety improvements. Mark prepared a biodiversity assessment report as part of the REF for the Medlow Bath upgrade project.

### The Horsley Drive, Transport for NSW (TfNSW), 2021 – present

Mark is the project ecologist engaged for the preparation of an addendum biodiversity assessment to support an REF for the Horsley Drive upgrade between the M7 Motorway and Cowpasture Road to a four-lane divided road. Mark is actively working with the project team to identify impact avoidance, minimisation and mitigation measures suitable for the management of impacts on locally occurring threatened ecological communities including Cumberland Plain Woodland and River-flat Eucalypt Forest.

## Relevant projects

### NSW Telco Authority (Visionstream), 2018-2021

Preparation of biodiversity assessments for multiple existing and proposed telecommunication sites scattered throughout NSW involving a range of impacts including green field development (e.g. installation of lattice towers) to brownfield works (e.g. bush fire mitigation works). Assessments were performed in accordance with Part 5 of the EP&A Act (i.e. preparation of Test of Significance under Section 7.3 of the BC Act) to determine if the works are likely to have a significant impact on threatened species and ecological communities. Important measures for avoiding and minimising impacts on affected threatened species and ecological communities are provided to manage impacts.

### Garfield Road West Upgrade, TfNSW, 2019 -2020

Mark prepared a specialist biodiversity assessment report prepared under Part 5 of the EP&A Act for inclusion in a REF for the reconstruction of Garfield West Road, Riverstone along a new alignment. Challenges successfully encountered included the management of roadside impacts on critically endangered ecological communities, threatened species habitat and key fish habitat (Eastern Creek).

### TAP3 Project, TfNSW, 2017 - 2020

Mark is the project ecologist involved in the preparation of biodiversity assessment documentation for rail station upgrade for inclusion in the REF. Assessments have included the identification and assessment of threatened species and ecological communities found within the rail corridor for multiple rail stations located within the greater Sydney metropolitan area.

### Kings Hill Concept Plan, Kings Hill Developments, 2015 - present

Mark prepared a Species Impact Statement for a 500 ha development site located within the Newcastle drinking water supply (Grahamstown Dam). Key affected species included the Koala, Brush-tailed Phascogale, woodland birds and threatened orchids. Impacts on coastal wetlands and swamp sclerophyll forest situated in mapped coastal wetlands were also prepared. Assessments were based on comprehensive seasonal surveys involving the project management of eight ecologists. Mark utilised innovative techniques to assess the projects impacts on the Koala (i.e. use of detection dogs and foliage nutrient analysis). Other commissions included the preparation of Biodiversity Management Plan for a dedicated Conservation Area, Vegetation Management Plan and Aquatic Impact Assessment.

### Woolooga Solar Farm, lightsourceBP, 2020 - 2021

Mark provided high level support to the RPS environment team assisting with Commonwealth assessment for a proposed solar farm in Woolooga, QLD. He also reviewed the RPS Biodiversity Management Plan (BMP) and Offset Management Plan (OMP) for this project.

### Chaffey Dam, WaterNSW, 2020

Mark was involved in the reconfiguration of the approved Biodiversity Offset Strategy for the endangered Booroolong Frog. Involvement includes the reconsideration of offset mechanisms and locations in light of implementation challenges associated with land tenure, impacts of drought and broader conservation needs for the species. Mark is working with a team of specialists to achieve an improved offsetting outcome for the species.

### Holsworthy Base Training Facility Project, 2020

A new training facility proposed on Commonwealth land within the Holsworthy Military Base required detailed biodiversity investigations and assessment against the Significant impact guidelines 1.2 - Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies. Matters of National Environmental Significance identified (i.e. threatened species and ecological communities) were mapped and used to identify an impact footprint with the least impact on these matters (i.e. avoid, minimise). Assessments were performed for the Koala, a range of threatened flora and two critically endangered ecological communities. Mitigation measures were recommended.

### Bulga to Broke Water Pipeline, Singleton Council, 2019

Biodiversity assessment for the installation of a water pipeline to supply potable water from Broke to Bulga. Works initially involved a routes selection process to determine the option with the least environmental impact. Detailed assessments were then performed for the preferred pipeline option, which included the mapping of site scale habitat to vegetation mapping including condition classes for critically endangered vegetation. Impact avoidance, minimisation and mitigation measures were provided within a Review of Environmental Factors assessment framework. State and Commonwealth assessments were performed for affected threatened species and ecological communities.

### NBN Build, Visionstream, 2018 - 2019

Preparation of biodiversity assessments for multiple greenfield NBN Towers from Mullumbimby to Tallong (five sites). Biodiversity constraints were identified and managed within tight assessment timeframes to meet NBN delivery objectives.

### NBN Build, Tata Consulting, 2016 - 2018

Preparation of biodiversity assessments for multiple greenfield NBN cabling installations from Tweed Heads to Merimbula and west to Braidwood (27 sites). Biodiversity constraints were identified and

managed within tight assessment timeframes to meet NBN delivery objectives.

### Waterloo Road Upgrade, RMS, 2017

Mark prepared a specialist biodiversity assessment report as part of a Review of Environmental Factors for the Upgrade of Waterloo Road, North Ryde. Challenges successfully encountered included the management of roadside impacts on critically endangered ecological communities and threatened species habitat.

### Wyong Hospital Enabling Works, Health Infrastructure NSW, 2016

Mark prepared a Flora and Fauna Assessment for the Wyong Hospital Enabling Works to inform a Review of Environmental Factors (REF). The approach adopted for field surveys for the Flora and Fauna Assessment was in accordance with the BioBanking Methodology (OEH 2014), enabling the surveys and results of the assessment to be transferrable to any BioBanking Assessments that may be required if the project became considered a Major Project (i.e. State Significant Infrastructure (SSI) or a State Significant Development (SSD)).

### Bells Line of Road Upgrade, RMS, 2016 - 2017

Mark prepared a specialist biodiversity assessment report as part of a Review of Environmental Factors for the Upgrade of Bells Line of Road from Lithgow to Bell. Challenges successfully encountered included the management of roadside impacts on endangered ecological communities and threatened species habitat. Investigations included assessments for terrestrial and aquatic matters.

### Finley Solar Farm EIS, ESCO, 2017

Mark was involved in RPS' preparation of an Environmental Impact Statement (EIS) for the Finley Solar Farm Project. The Finley Solar Farm would produce 170MW over 500 hectares of land. Numerous RPS service lines worked together to prepare the document. To date RPS have successfully liaised with the NSW Department of Planning and Environment, as well as the client, to progress the project smoothly in line with the desired outcomes.

### Western Region Biodiversity Offset Strategy, Centennial Coal, 2018

Preparation of a biodiversity offset strategy for multiple approved coal mining operations in the NSW 'Western Coal Fields' near Lithgow. Involved a post hoc assessment of Project impacts and comparable offsets using the repealed Framework for Biodiversity Offsets (Major Projects) and Part 7A of the *Threatened Species Conservation Act* 1995. Demonstrated a suitable offset strategy for approved projects by gaining approval through the NSW Department of Planning and Environment and Office of Environment and Heritage.

### Springvale Coal, Centennial Coal, 2018

Preparation and implementation of Biodiversity Management Plans (BMP) and Swamp Monitoring Programs (SMP) as subplans of Longwall Extractions Plans for the Springvale Coal Extension Project. BMPs and SMPs are reviewed by the Independent Monitoring Panel and State/ Commonwealth regulators prior to the approval of secondary coal extraction. Works involved the synthesis of a growing knowledge base on best practice monitoring and management of endangered upland peat swamps listed on State and Commonwealth legislation.

### Albion Park, Tower Holdings, 2015 - 2016

Prepared Biodiversity Management Plans for the protection of State and Commonwealth listed endangered and critically endangered plant species (*Zieria granulata* and *Cynanchum elegans*) and ecological communities (Illawarra and South Coast Lowland Forest and Woodland). Management prescriptions centred on weed and fire management, with the latter linked to asset protection zones for the adjoining approved residential subdivision.

### Rosewood Estate Tamworth, 2014 - 2015

Project managed and prepared Preliminary Documentation for a 'controlled action' declared under the EPBC Act. Assessment involved a detailed consideration of White Box Yellow Box Blakely's Redgum Grassy Woodland and Derived Native Grasslands, a critically endangered ecological community.

### Mary's Mount Blue Metal Quarry, Gunnedah Quarry Products, 2013 - 2014

Project managed and prepared Preliminary Documentation for a 'controlled action' declared under the EPBC Act for a quarry project linked to the delivery of ballast needed for the inland rail project. Assessment involved the consideration of MNES impacted by the quarry including, but not restricted to Semi-evergreen Vine Thicket EEC and the Koala. Calculated and report biodiversity offset requirements in accordance with Commonwealth Offsets Policy and incorporated into a Biodiversity Offset Strategy.

### Pacific Highway Upgrade: Oxley Highway to Kempsey, RMS, 2012 - 2014

Assisted in the procurement of approvals under State and Commonwealth legislation including participation in risk assessments, field surveys, reporting, project design and impact assessments (i.e. EPBC Act Preliminary Documentation). Performed monitoring surveys for the State listed *Maundia triglochinoides* and the State and Commonwealth listed Giant Barred Frog (*Mixophyes iteratus*) in accordance with a Before Impact Control After monitoring design. Analysed results and

reported findings including an evaluation of Project impacts and performance of mitigation measures.

### Water Quality Monitoring Program, Orchard Hills Defence Facility, 2012

Prepared a Water Quality Monitoring Program for a defence facility in western Sydney. Monitoring works included measures of abiotic and biotic indicators for a catchment containing defence activities imbedded within a highly sensitive natural setting containing the critically endangered Cumberland Plan Woodland and nationally listed threatened species. The program included the monitoring of groundwater dependant ecosystems.

### Midal Cabling Project, Midal Cabling, 2011 - 2012

The approved Midal aluminium cabling plant is a heavy industrial development located adjacent to the Tomago aluminium smelter. Mark's role in the approvals process involved the preparation of State and Commonwealth assessments for impacts on lands adjacent to the Tomago sands beds (Newcastle water supply). Considered impacts on the threatened New Holland Mouse and Ramsar Wetlands. The EPBC Act Referral adequately demonstrated that Project was not a controlled action.

### Maitland to Minimbah Third Track Project, 2011 - 2012

As part of the Hunter8 Alliance, Mark performed integral part of the approvals, post approvals and biodiversity offsetting components of a 30 km section of new rail track constructed adjacent to the existing rail corridor between Maitland and Minimbah, NSW. Prepared and, implemented management plans for microbat exclusion from culverts, pre-clearance surveys and reporting, vegetation clearing audits, biodiversity offset site identification, evaluation and assessment.

### Reconstruction of the Limbri to Weabonga Road, Tamworth Regional Council, 2011

Performed biodiversity surveys and assessment for the reconstruction of the Limbri to Weabonga Road following flood damage from the adjacent Swamp Oak Creek. The endangered Booroolong Tree Frog (*Litoria booroolongensis*) and Eel-tailed Catfish (*Tandanus tandanus*) were detected adjacent to the construction area. Impact minimisation involving the establishment of exclusion zones and frog hygiene (Chytrid control) was successfully used to avoid a significant impact on the species. Works could proceed in accordance with an EPBC Act 'Particular Manner' decision notice.

### ELF Stage 2 Construction Biodiversity Assessment, Singleton Military Area, 2010

Prepared a Biodiversity Assessments for multiple defence training installations associated with the ELF program located within the Singleton Military Area. Included the assessment of development and operational impacts such as 'ballistic pruning' on threatened flora and fauna species including the Slaty Redgum (*Eucalyptus glaucina*) and habitat occupied by threatened woodland birds. Assessments adopted the 'good neighbour policy' (i.e. consideration of impacts on State listed threatened species and ecological communities).

# Shelomi Doyle

Senior Ecologist

### Role at RPS
Ecologist

### Location
Newcastle, NSW, Australia

### Qualifications
Accredited Assessor under the Biodiversity Assessment Method (BAAS20032)

Graduate Diploma in Science (Biodiversity Science) University of New England, 2019

Rail Industry Safety Induction – RISI

Bachelor of Horticulture (Environmental Specialisation) Charles Sturt University, 2013

Construction White Card

4WD driver training

### Memberships
Australian Network for Plant Conservation

Ecological Consultants of Australia of NSW (Practicing Member)

## Why Shelomi for this role

Shelomi is an experienced ecologist with a focus on botany, which was developed in her previous horticulture positions over 10 years. This experience with native and introduced plants has progressed into a strong knowledge of flora and vegetation communities, along with associated legislation. Shelomi's career has centred around plant identification, and has expanded to include a variety of flora and fauna assessment techniques, data management and reporting.

## Relevant projects

### *Caesia parviflora var. minor* research project, Centennial Coal, 2020 - 2021

Research and field work to assess the distribution and taxonomic status of this threatened species on the Newnes plateau. This role includes project management and design, collection of morphological data and DNA samples, and liaison with genetic service providers and industry experts.

### TAP 3 Train Station Upgrade project, Transport for NSW, 2020

Shelomi undertook field work and preparation of Biodiversity assessment for inclusion in applicable Review of Environmental Factors (REF) for upgrades to Pymble, St Peters and Erskineville train stations. Assessments have included the identification and assessment of threatened species and ecological communities found within the rail corridor for multiple rail stations located within the greater Sydney metropolitan area.

### Telecommunications tower upgrades, Visionstream, 2020

Shelomi conducted ecological field surveys and preparation of Flora and Fauna assessments for changes to existing sites located within National Parks and on private property at Lower Portland, Boonanghi, and Bolaro. Potential impacts to ecosystems and threatened species were assessed for the construction of access tracks, towers and associated facilities.

### Springvale Temperate Highland Peat Swamp on Sandstone (THPSS) monitoring, Centennial Coal, 2017 - present

Project management, ecological field surveys and associated monitoring report preparation for assessment of Endangered Ecological Communities within the Newnes Plateau and surrounding areas for the Springvale underground mine. This extensive long term project includes nested transects, floristic quadrats, annual swamp transects and ground truthing of remotely sensed imagery. In 2021 results were collated and presented to the client and stakeholders.

### Jemalong Solar Farm, Genex Power, 2019

Shelomi prepared a Biodiversity Management Plan for a proposed Solar Farm (SSD) in Jemalong, NSW. This included management actions for rehabilitation, weed monitoring and control, fauna exclusion and disturbance minimisation.

## Relevant projects

### Angus Place LW 920-980 swamp flora monitoring, Centennial Coal, 2018 - present

Shelomi manages this monitoring program, which includes seasonal field flora quadrats and associated reporting of potential impacts to an Endangered Ecological Community. Annual reports include comparisons between plots and seasons with similarity matrices and Non-metric Multi-dimensional Scaling using PRIMER-e.

### *Persoonia hindii* status and monitoring program, Centennial Coal, 2017 - 2021

Shelomi conducted field monitoring and associated reporting of known populations of threatened *P. hindii* on the Newnes Plateau, including distribution, disturbance and translocation assessments.

### Kings Hill Concept Plan, Kings Hill Developments, 2017 - 2020

Field work conducted for a 500 ha development site north of Newcastle. Targeted threatened species included the Koala, woodland birds and threatened orchids. Vegetation surveys included coastal wetlands and swamp sclerophyll forest, and involved comprehensive seasonal surveys using belt transects, rapid data points, weed transects and floristic plots.

### Springvale Blue Mountains Water Skink (*Eulamprus leuraensis*) monitoring, Centennial Coal, 2017 - present

Field monitoring to assess the population dynamics of Blue Mountains Water Skink within swamps of the Newnes Plateau, including funnel trapping, animal handling and assessment, and DNA collection.

### Newstan Annual Monitoring, Centennial Coal, 2019 - 2021

Newstan mine requires monitoring of their rehabilitated areas on an annual basis. This project is managed by Shelomi and includes field work and reporting for flora plots, bird surveys, insect trapping, camera and anabat monitoring for fauna and nest box monitoring.

### Coomera Health Precinct Koala EPBC advice, Carrara Health Centre, 2020

Shelomi produced a letter of advice to address the ecological risk associated with a proposed development, and the possibility that the koala is likely to be significantly impacted by the Project with respect to the EPBC Act.

### Airly vegetation mapping project, Centennial Coal, 2018

This project required extensive vegetation surveys to determine plant community type and delineate extents of Endangered Ecological Communities including Box Gum Woodland to inform constraints.

### Angus Place water treatment project BDAR waiver, Centennial Coal, 2020

This project involved reporting of biodiversity values relevant to necessary pipeline upgrades, to support waiver of the BAM assessment process.

### Charbon Road Widening BDAR, Centennial Coal, 2020

Shelomi completed field work and vegetation sections for this modification to consent, which involved clearing of native and exotic vegetation for construction of a haul road.

### Mandalong Offset Site assessment, Centennial Coal, 2018

Shelomi's contribution to this project included vegetation community analysis and completion of floristic plots using the Biodiversity Assessment Method.

### Western Region Biodiversity Offset Strategy (WRBOS), Centennial Coal, 2017

This project involved field work for the assessment of Centennial's offset sites to establish suitability for offsetting project impacts on biodiversity.

### Black Hill Biodiversity Assessment, Maitland Diocese, 2017

Ecological field surveys including floristic quadrats, bird surveys and biometric data collection to inform reporting under the Framework for Biodiversity Assessment.

### Bulga to Broke Water Pipeline, Singleton Council, 2017

Biodiversity assessment for the installation of a water pipeline to supply potable water to Bulga. Included field surveys and pre-clearance threatened species searches, with associated reporting, impact assessment and design recommendations to avoid Endangered Ecological Communities.

### Curator - Horticulture, Port Moresby Nature Park, 2016

A 12 month capacity building role in Papua New Guinea supported by the Australian government. Responsibilities included plant identification, botany and horticulture training, garden design and installation, media engagement.

### Nursery Manager, Muswellbrook Forest Nursery, 2012 - 2015

In this role Shelomi became intimately acquainted with the flora of the Hunter Valley, through site visits for plant identification and seed collection, and germination, maintenance and planting of seedlings. Other responsibilities included provision of planting plans for mining rehabilitation, landcare and government projects and community engagement.

# Tara Boreham

Ecologist

**Role at RPS**
Ecologist

**Location**
Newcastle, NSW, Australia

**Qualifications**
Bachelor of Science (Chemistry; Biology), Macquarie University

Certificate IV in Design

First Aid Certificate

White Card

Coal Order 43 Medical

Rail Industry Worker

RIIVEH305E Operate and maintain a four wheel drive vehicle

## Why Tara for this role

Tara is an experienced Ecologist with a sound understanding of State and Commonwealth legislation. She has been involved in numerous Management Plans, Review of Environmental Factors, Biodiversity Assessments, flora and fauna targeted surveys, flora and fauna monitoring, vegetation surveys, weed mapping and Biodiversity Assessment Methodology surveys.

Tara has been responsible for desktop research and scientific database assessment, field surveys, reporting, mapping, data management and project management.

## Relevant projects

### Airly Coal Mine Flora and Fauna Surveys and Assessment, Centennial Coal, 2019 – present

Tara undertook a range of flora and fauna surveys to inform the Annual Airly Coal Mine Flora and Fauna Report. Project tasks included diurnal bird surveys, assessment of fauna habitat quality and value to threatened species, identification of project impacts and measures to avoid or mitigate potential impacts.

### Newnes Plateau Shrub Swamp EEC, Centennial Coal Springvale, 2019 – present

Assistance on a long term monitoring project of Endangered Ecological Communities (EEC) across the Newnes Plateau; adjacent to Springvale Colliery. Tasks included flora monitoring, due diligence, fauna and ecological community monitoring and biodiversity management planning. Tara is also responsible for data management, mapping and aspects of reporting for the project.

### Biodiversity Development Assessment Report, Centennial Coal Angus Place West, 2021

Tara was responsible for undertaking ecological investigations as according to the Biodiversity Assessment Methodology to inform a Biodiversity Development Assessment Report. She was responsible for field works, data management, plant identification and vegetation mapping.

## Relevant projects

### Review of Environmental Factors (Part 5)

**The Horsley Drive Upgrade, Transport for NSW, 2021**

Provision of a Biodiversity Assessment Report to inform the REF for the upgrade of The Horsley Drive, Fairfield.

**Waratah West Cliffline Rehabilitation Works, Newcastle City Council, 2021**

Provision of a Biodiversity Assessment Report to inform an REF for the rehabilitation of a cliff line in Waratah West.

**Fern Creek Rehabilitation Works Warriewood, Northern Beaches Council, 2020***

Report reparation, site survey and mapping for the REF for the creek rehabilitation works and RFS creek crossing upgrades for the Northern Beaches Council. The project encountered a potential significant impact on the threatened Red-crowned Toadlet, therefore recommendations were made to first avoid and minimise impacts.

**Centre Trail upgrade REF, NSW National Parks and Wildlife Service (NPWS), 2020***

Provision of a Review of Environmental Factors (REF) for the upgrade of Centre Trail fire trail in Ku-ring-gai Chase National Park.

**Medowie Road Flora and Fauna Impact Assessment, Port Stephens Council, 2020***

Tara undertook a flora and fauna impact assessment at Medowie Road in Port Stephens.

**Bundeena Drive REF, Sutherland Shire Council, 2020***

Provision of a Review of Environmental Factors (REF) for the reconstruction of a section of Bundeena Drive in the Royal National Park.

**Dobroyd Head REF, NSW National Parks and Wildlife Service (NPWS), 2020***

Provision of a Review of Environmental Factors (REF) for the Dobroyd Head walking track upgrade.

**Honeymoon Track Upgrade, NSW National Parks and Wildlife Service (NPWS), 2021***

Provision of a Constraints Assessment Report for the works on a popular walking track within the Royal National Park. The purpose of the report is to determine if sensitive features are present warranting the requirement for a Review of Environmental Factors (REF).

**Two Creeks Track REF, NSW National Parks and Wildlife Service (NPWS), 2020***

Provision of a Review of Environmental Factors (REF) for the Two Creeks walking track upgrade.

### Biodiversity Assessment Reports (Part 4)

**Biodiversity Development Assessment Report, Private Landowner, 2020***

Provision of a Biodiversity Development Assessment Report (BDAR) for private development in Allambie Heights.

**Georges River FFIA, Private Client, 2020***

Tara was engaged for the provision of a Flora and Fauna Impact Assessment (FFIA) for a development adjacent to the Georges River in the Canterbury-Bankstown LGA.

**International Centre of Training Excellence FFIA, Blacktown City Council, 2020***

Tara undertook a Flora and Fauna Impact Assessment (FFIA) for the International Centre of Training Excellence at the Blacktown International Sports Park.

### Targeted Threatened Species Searches

**Dee Why Lagoon surveys, Northern Beaches Council, 2019-2020***

Tara undertook seasonal woodland and wetland bird surveys at Dee Why Lagoon for Northern Beaches Council.

**Mustons Road Targeted Surveys, Port Stephens Council, 2020***

Tara undertook targeted Surveys for multiple cryptic threatened species at Mustons Road within the Port Stephens LGA.

**Monitoring, MTE Developments, 2019 – 2020***

Tara undertook Dural Land Snail and Yellow-bellied Glider Monitoring at Cattai.

**Targeted surveys, Centennial Coal, 2019 – 2020**

Tara undertook targeted surveys for a number of threatened flora species and threatened species monitoring.

**Cockle Creek catchment monitoring, Office of Environment and Heritage, 2020***

Tara undertook *Persoonia Mollis* subsp. *maxima* monitoring within the Cockle Creek catchment.

### Biodiversity Monitoring

**Newnes Plateau Shrub Swamp EEC, Centennial Coal Springvale, 2021 – present**

Assistance on a long term monitoring project of Endangered Ecological Communities (EEC) across the Newnes Plateau; adjacent to Springvale Colliery. Tasks included flora monitoring, due diligence, fauna and ecological community monitoring and biodiversity management planning. Tara is also

responsible for data management, baseline, seasonal and annual reporting for the project.

### Airly Coal Mine Flora and Fauna Surveys and Assessment, Centennial Coal, 2019 – present

Tara undertook a range of flora and fauna surveys to inform the Annual Airly Coal Mine Flora and Fauna Report. Project tasks included diurnal bird surveys, assessment of fauna habitat quality and value to threatened species, identification of project impacts and measures to avoid or mitigate potential impacts.

## Vegetation Management Plans

### Vegetation Management Plan, private client 2020*

Preparation of a three-year management plan for a private client within Sydney's north shore area aimed at habitat protection and enhancement.

### Ecological Bushfire Management Plan, Williamtown and Orchard Hills RAAF, BGIS, 2020*

Preparation of a ecological bushfire management plan and environmental assessment as according to the RFS Bush Fire Environmental Assessment Code.

### Vegetation and Heritage Management Plan, BGIS, 2020*

Preparation of a vegetation and heritage management plan for the historical garden at Glenbrook RAAF Base.

### Vegetation Management Plan for Johnstons Creek Naturalisation, Diona/Sydney Water, 2020*

Preparation of a five year management plan for the vegetation within and surrounding Johnstons Creek in Annandale including management actions for the Coastal Saltmarsh Endangered Ecological Community.

### Georges River Vegetation Management Plan, Private Client, 2020*

Provision of a Vegetation Management Plan for a development adjacent to the Georges River in the Canterbury-Bankstown LGA.

### Biodiversity Action Plan, Waverley Council, 2020*

Provision of a Biodiversity Action Plan for remnant vegetation sites across the Waverly LGA.

## Other specialist experience

### Biodiversity study to inform a Local Environment Plan, Georges River Council, 2020

Desktop and field analysis of biodiversity hotspots within the local government area.

### Post Fire Habitat Assessment, Centennial Coal, 2019

Tara undertook a Post Fire Habitat Assessment at Newnes Plateau for Centennial Coal.

### Various floristic studies and bush regeneration, 2019-2020*

Bush regeneration, floristic studies and site monitoring at various sites across the Central Coast, Northern Beaches, Ku-ring-gai and Hornsby Shire LGAs, including works within the Umina Coastal Sandplain Woodland, Coorumbine Creek and ongoing WSUD maintenance.

### Kangaroo River surveys, Macquarie University, 2018*

Tara undertook Kangaroo River longitudinal aquatic ecology surveys (AUSRIVA) and a rapid riparian assessment.

** projects undertaken for previous employers*

# Rhys Corrigan

Ecologist

**Role at RPS**
Ecologist

**Location**
Newcastle, NSW, Australia

**Qualifications**
Bachelor of Biotechnology (Hons), University of Newcastle, 2016

First Aid Certificate

White Card

4WD Ticket

**Memberships**
Member - Animal Care and Rescue Native Animal Trust Fund (Hunter Wildlife Rescue), 2016 - present

## Why Rhys for this role

Rhys has over 5 years' field experience conducting various wildlife, vegetation and habitat assessments. He has a sound understanding of State and Commonwealth legislation, along with substantial experience in wildlife research, rehabilitation, and monitoring for the purpose of conservation.

His expertise lies in flora and fauna surveys and monitoring efforts; regularly preparing documentation and reports for clients in relation to monitoring programs and their outcomes.

## Relevant projects

### Newnes Plateau Shrub Swamp EEC, Centennial Coal Springvale, 2018 – present

Rhys was engaged on this large-scale, long term monitoring project of Endangered Ecological Communities (EEC) across the Newnes Plateau; adjacent to Springvale Colliery. Tasks included flora monitoring, due diligence, fauna and ecological community monitoring and biodiversity management planning. Rhys also provided data management, baseline, seasonal and annual reporting for the project.

### Airly Coal Mine Flora and Fauna Surveys and Assessment, Centennial Coal, 2018 – present

Rhys undertook a range of flora and fauna surveys to inform the Annual Airly Coal Mine Flora and Fauna Report. Project tasks included diurnal bird surveys, assessment of fauna habitat quality and value to threatened species, identification of project impacts and measures to avoid or mitigate potential impacts.

### Kings Hill Concept Plan, Kings Hill Developments, 2018 – present

Rhys assisted in the preparation of a Species Impact Statement for a 500 ha development site with focal species being the Koala, Brush-tailed Phascogale, woodland birds and threatened orchids. Documentation was based on comprehensive seasonal surveys; utilising innovative techniques to assess the projects impacts on the Koala.

### Temperate Highland Peat Swamp (THPSS) Monitoring, Centennial Coal, 2019

Rhys is engaged for a complex seasonal and annual monitoring program for this State and Commonwealth listed threatened ecological community. Monitoring includes flora based repeated measures sampling within a BACI monitoring design and Soil Adjusted Normalised Vegetation Index (SANDVI) analysis of remotely sensed imagery (7cm resolution RGBI imagery) on a quarterly basis.

## Relevant projects

### Newstan Extension Ecology Assessment, Centennial Coal, 2019

Rhys undertook flora and fauna surveys for threatened species located above a proposed mine extension. These surveys involved walking wandering transects to locate threatened species, installing nest boxes and carrying out bird surveys. Data was then analysed and reported to the client.

### Boronia Deanei Monitoring, Springvale Colliery, 2018 – 2019

Rhys assisted in the development of an innovative method to detect Boronia deanei from the spatial analysis of areal imagery in combination with field-based surveys. This resulted in the development of a cost and time effective methodology for the monitoring or this population over an area of 200km2.

### Blue Mountains Water Skink (Eulamprus leurensis) monitoring, Centennial Coal, 2018 – 2019

Rhys assisted in the development of a habitat model for this species in correlation with field monitoring to assess the population dynamics of Blue Mountains Water Skink within swamps of the Newnes Plateau.

### Large monitor species research, Western Australia, 2018*

Rhys performed trapping and manual handling of large monitor species (*V. panoptes*); dissection of reproductive tracts from specimens; recording data taken on morphometrics and reproductive tracts; engagement with local Indigenous communities to exchange information about the study; and assisted in cryopreservation of germ cells obtained from dissected specimens.

### Project Manager, University of Newcastle for Newcastle Coal and Infrastructure Group, 2016 – 2018*

Responsible for managing the captive breeding program for endangered amphibians. This included managing and conducting the reintroduction and monitoring of green and golden bell frogs to the NCIG created habitat areas on Kooragang Island. Rhys organised, translocated, housed and monitored tadpoles in constructed offset habitat; developed effective ecological restoration strategies for endangered amphibians; regulated and maintained the health and well-being of the population.

### Ecologist, University of Newcastle / University of Melbourne, 2015 – 2018*

Engaged to detect and quantify the amphibian chytrid fungus from samples using TaqMan qPCR assays for various clients using aseptic techniques.

### Research for Conservation Biology Group, University of Newcastle, 2014 – 2016*

Rhys worked as part of the team to conduct research into the conservation of amphibians threatened with extinction. He conducted field surveys as part of the works for the Newcastle Coal and Infrastructure Group (NCIG); detected and quantified the amphibian chytrid fungus from samples using TaqMan qPCR assays in a controlled laboratory setting.

** projects undertaken for previous employers*

# Appendix B

# EPBC Act Protected Matters Search

Australian Government

Department of Agriculture, Water and the Environment

# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

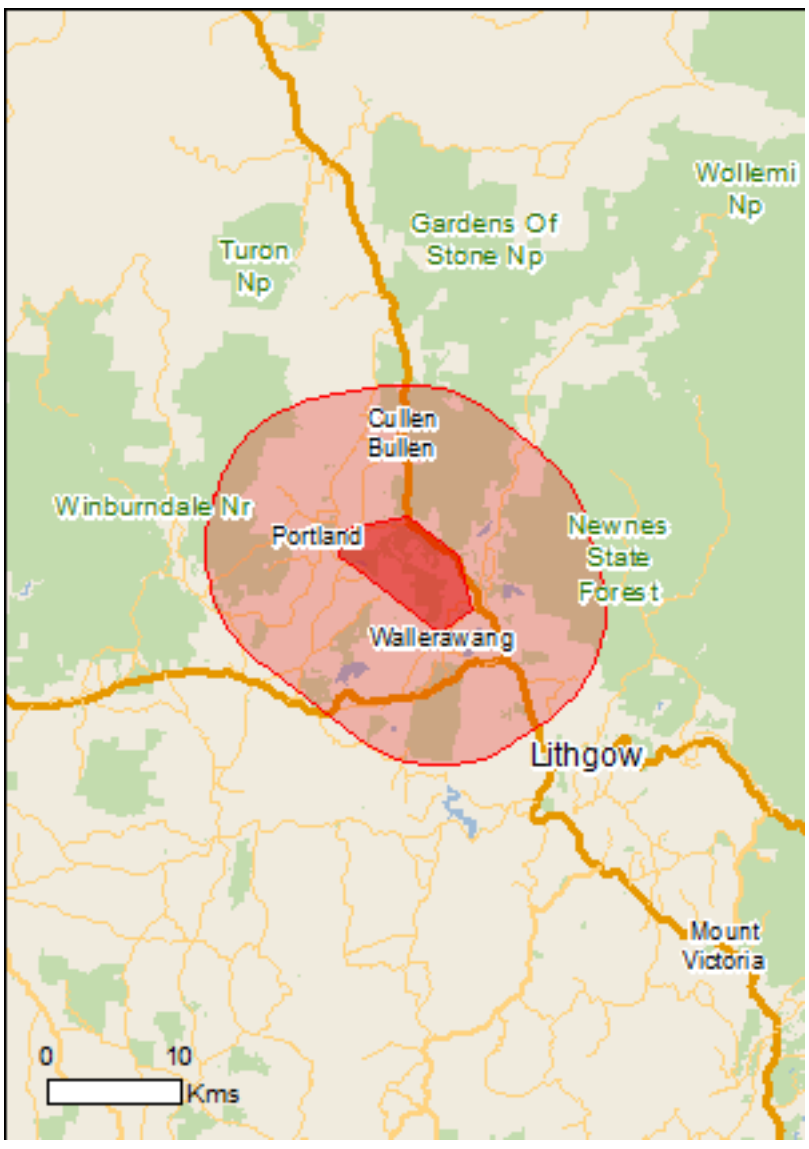
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 25/01/21 14:41:13


Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements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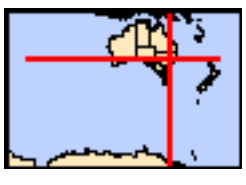
Coordinates

Buffer: 10.0Km



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | 4 |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 4 |
| Listed Threatened Species: | 53 |
| Listed Migratory Species: | 13 |

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

| | |
|---|---|
| Commonwealth Land: | 6 |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 20 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | None |

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

| | |
|---|---|
| State and Territory Reserves: | 3 |
| Regional Forest Agreements: | None |
| Invasive Species: | 39 |
| Nationally Important Wetlands: | None |
| Key Ecological Features (Marine) | None |

# Details

## Matters of National Environmental Significance

### Wetlands of International Importance (Ramsar) [ Resource Information ]

| Name | Proximity |
|---|---|
| Banrock station wetland complex | 800 - 900km upstream |
| Riverland | 800 - 900km upstream |
| The coorong, and lakes alexandrina and albert wetland | 900 - 1000km upstream |
| The macquarie marshes | 300 - 400km upstream |

### Listed Threatened Ecological Communities [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

| Name | Status | Type of Presence |
|---|---|---|
| Natural Temperate Grassland of the South Eastern Highlands | Critically Endangered | Community may occur within area |
| Temperate Highland Peat Swamps on Sandstone | Endangered | Community may occur within area |
| Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion | Endangered | Community may occur within area |
| White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland | Critically Endangered | Community likely to occur within area |

### Listed Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| Birds | | |
| Anthochaera phrygia<br>Regent Honeyeater [82338] | Critically Endangered | Species or species habitat known to occur within area |
| Botaurus poiciloptilus<br>Australasian Bittern [1001] | Endangered | Species or species habitat likely to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Falco hypoleucos<br>Grey Falcon [929] | Vulnerable | Species or species habitat may occur within area |
| Grantiella picta<br>Painted Honeyeater [470] | Vulnerable | Species or species habitat known to occur within area |
| Hirundapus caudacutus<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area |
| Lathamus discolor<br>Swift Parrot [744] | Critically Endangered | Species or species habitat likely to occur within area |
| Leipoa ocellata<br>Malleefowl [934] | Vulnerable | Species or species habitat likely to occur |

| Name | Status | Type of Presence within area |
|---|---|---|
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area |
| **Fish** | | |
| Maccullochella macquariensis<br>Trout Cod [26171] | Endangered | Species or species habitat may occur within area |
| Maccullochella peelii<br>Murray Cod [66633] | Vulnerable | Species or species habitat may occur within area |
| Macquaria australasica<br>Macquarie Perch [66632] | Endangered | Species or species habitat known to occur within area |
| Prototroctes maraena<br>Australian Grayling [26179] | Vulnerable | Species or species habitat may occur within area |
| **Frogs** | | |
| Heleioporus australiacus<br>Giant Burrowing Frog [1973] | Vulnerable | Species or species habitat may occur within area |
| Litoria booroolongensis<br>Booroolong Frog [1844] | Endangered | Species or species habitat likely to occur within area |
| Litoria littlejohni<br>Littlejohn's Tree Frog,  Heath Frog [64733] | Vulnerable | Species or species habitat may occur within area |
| Mixophyes balbus<br>Stuttering Frog, Southern Barred Frog (in Victoria) [1942] | Vulnerable | Species or species habitat may occur within area |
| **Insects** | | |
| Paralucia spinifera<br>Bathurst Copper Butterfly, Purple Copper Butterfly, Bathurst Copper, Bathurst Copper Wing, Bathurst-Lithgow Copper, Purple Copper [26335] | Vulnerable | Species or species habitat known to occur within area |
| **Mammals** | | |
| Chalinolobus dwyeri<br>Large-eared Pied Bat, Large Pied Bat [183] | Vulnerable | Species or species habitat known to occur within area |
| Dasyurus maculatus  maculatus (SE mainland population)<br>Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184] | Endangered | Species or species habitat known to occur within area |
| Nyctophilus corbeni<br>Corben's Long-eared Bat, South-eastern Long-eared Bat [83395] | Vulnerable | Species or species habitat may occur within area |
| Petauroides volans<br>Greater Glider [254] | Vulnerable | Species or species habitat known to occur within area |
| Petrogale penicillata<br>Brush-tailed Rock-wallaby [225] | Vulnerable | Species or species habitat likely to occur within area |
| Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)<br>Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104] | Vulnerable | Species or species habitat known to occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| [Pseudomys novaehollandiae](#)<br>New Holland Mouse, Pookila [96] | Vulnerable | Species or species habitat likely to occur within area |
| [Pteropus poliocephalus](#)<br>Grey-headed Flying-fox [186] | Vulnerable | Foraging, feeding or related behaviour may occur within area |
| Plants | | |
| [Acacia bynoeana](#)<br>Bynoe's Wattle, Tiny Wattle [8575] | Vulnerable | Species or species habitat may occur within area |
| [Boronia deanei](#)<br>Deane's Boronia [8397] | Vulnerable | Species or species habitat likely to occur within area |
| [Cryptostylis hunteriana](#)<br>Leafless Tongue-orchid [19533] | Vulnerable | Species or species habitat may occur within area |
| [Eucalyptus aggregata](#)<br>Black Gum [20890] | Vulnerable | Species or species habitat known to occur within area |
| [Eucalyptus pulverulenta](#)<br>Silver-leaved Mountain Gum, Silver-leaved Gum [21537] | Vulnerable | Species or species habitat known to occur within area |
| [Eucalyptus robertsonii subsp. hemisphaerica](#)<br>Robertson's Peppermint [56223] | Vulnerable | Species or species habitat likely to occur within area |
| [Euphrasia arguta](#)<br>[4325] | Critically Endangered | Species or species habitat may occur within area |
| [Haloragodendron lucasii](#)<br>Hal [6480] | Endangered | Species or species habitat may occur within area |
| [Kunzea cambagei](#)<br>[11420] | Vulnerable | Species or species habitat known to occur within area |
| [Leucochrysum albicans subsp. tricolor](#)<br>Hoary Sunray, Grassland Paper-daisy [89104] | Endangered | Species or species habitat may occur within area |
| [Persoonia marginata](#)<br>Clandulla Geebung [10852] | Vulnerable | Species or species habitat known to occur within area |
| [Pomaderris brunnea](#)<br>Rufous Pomaderris, Brown Pomaderris [16845] | Vulnerable | Species or species habitat likely to occur within area |
| [Pomaderris cotoneaster](#)<br>Cotoneaster Pomaderris [2043] | Endangered | Species or species habitat may occur within area |
| [Prasophyllum petilum](#)<br>Tarengo Leek Orchid [55144] | Endangered | Species or species habitat may occur within area |
| [Prasophyllum sp. Wybong (C.Phelps ORG 5269)](#)<br>a leek-orchid [81964] | Critically Endangered | Species or species habitat may occur within area |
| [Pultenaea glabra](#)<br>Smooth Bush-pea, Swamp Bush-pea [11887] | Vulnerable | Species or species habitat known to occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| [Pultenaea parrisiae](#) [56699] | Vulnerable | Species or species habitat may occur within area |
| [Rhizanthella slateri](#) Eastern Underground Orchid [11768] | Endangered | Species or species habitat may occur within area |
| [Swainsona recta](#) Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580] | Endangered | Species or species habitat may occur within area |
| [Thesium australe](#) Austral Toadflax, Toadflax [15202] | Vulnerable | Species or species habitat known to occur within area |
| [Velleia perfoliata](#) [17190] | Vulnerable | Species or species habitat likely to occur within area |
| [Xerochrysum palustre](#) Swamp Everlasting, Swamp Paper Daisy [76215] | Vulnerable | Species or species habitat likely to occur within area |
| Reptiles | | |
| [Aprasia parapulchella](#) Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665] | Vulnerable | Species or species habitat may occur within area |
| [Delma impar](#) Striped Legless Lizard, Striped Snake-lizard [1649] | Vulnerable | Species or species habitat may occur within area |
| [Eulamprus leuraensis](#) Blue Mountains Water Skink [59199] | Endangered | Species or species habitat known to occur within area |
| [Hoplocephalus bungaroides](#) Broad-headed Snake [1182] | Vulnerable | Species or species habitat known to occur within area |

## Listed Migratory Species [ Resource Information ]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

| Name | Threatened | Type of Presence |
|---|---|---|
| Migratory Marine Birds | | |
| [Apus pacificus](#) Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Migratory Terrestrial Species | | |
| [Hirundapus caudacutus](#) White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area |
| [Monarcha melanopsis](#) Black-faced Monarch [609] | | Species or species habitat known to occur within area |
| [Motacilla flava](#) Yellow Wagtail [644] | | Species or species habitat may occur within area |
| [Myiagra cyanoleuca](#) Satin Flycatcher [612] | | Species or species habitat known to occur within area |
| [Rhipidura rufifrons](#) Rufous Fantail [592] | | Species or species habitat known to occur within area |
| Migratory Wetlands Species | | |

| Name | Threatened | Type of Presence |
|---|---|---|
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat may occur within area |

## Other Matters Protected by the EPBC Act

### Commonwealth Land [ Resource Information ]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

| Name |
|---|
| Commonwealth Land - |
| Commonwealth Land - Australian Telecommunications Commission |
| Commonwealth Land - Australian Telecommunications Corporation |
| Commonwealth Land - Commonwealth Trading Bank of Australia |
| Commonwealth Land - Telstra Corporation Limited |
| Defence - MARRANGAROO |

### Listed Marine Species [ Resource Information ]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

| Name | Threatened | Type of Presence |
|---|---|---|
| Birds | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea alba<br>Great Egret, White Egret [59541] | | Species or species habitat known to occur within area |
| Ardea ibis<br>Cattle Egret [59542] | | Species or species habitat may occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Chrysococcyx osculans<br>Black-eared Cuckoo [705] | | Species or species habitat likely to occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur within area |
| Hirundapus caudacutus<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area |
| Lathamus discolor<br>Swift Parrot [744] | Critically Endangered | Species or species habitat likely to occur within area |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Monarcha melanopsis<br>Black-faced Monarch [609] | | Species or species habitat known to occur within area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat may occur within area |
| Rhipidura rufifrons<br>Rufous Fantail [592] | | Species or species habitat known to occur within area |
| Rostratula benghalensis (sensu lato)<br>Painted Snipe [889] | Endangered* | Species or species habitat likely to occur within area |

# Extra Information

## State and Territory Reserves [ Resource Information ]

| Name | State |
|---|---|
| Forestry Management Areas in Bathurst (FMZ2) | NSW |
| Marrangaroo | NSW |
| Snow Gum | NSW |

## Invasive Species [ Resource Information ]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

| Name | Status | Type of Presence |
|---|---|---|
| **Birds** | | |
| Acridotheres tristis<br>Common Myna, Indian Myna [387] | | Species or species habitat likely to occur within area |
| Alauda arvensis<br>Skylark [656] | | Species or species habitat likely to occur within area |
| Anas platyrhynchos<br>Mallard [974] | | Species or species habitat likely to occur within area |
| Carduelis carduelis<br>European Goldfinch [403] | | Species or species habitat likely to occur within area |
| Columba livia<br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species habitat likely to occur within area |
| Passer domesticus<br>House Sparrow [405] | | Species or species habitat likely to occur within area |
| Passer montanus<br>Eurasian Tree Sparrow [406] | | Species or species habitat likely to occur within area |
| Pycnonotus jocosus<br>Red-whiskered Bulbul [631] | | Species or species habitat likely to occur within area |
| Streptopelia chinensis<br>Spotted Turtle-Dove [780] | | Species or species habitat likely to occur within area |
| Sturnus vulgaris<br>Common Starling [389] | | Species or species habitat likely to occur within area |
| Turdus merula<br>Common Blackbird, Eurasian Blackbird [596] | | Species or species habitat likely to occur within area |
| **Mammals** | | |
| Bos taurus<br>Domestic Cattle [16] | | Species or species habitat likely to occur within area |
| Canis lupus familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| Capra hircus<br>Goat [2] | | Species or species habitat likely to occur within area |
| Equus caballus<br>Horse [5] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Feral deer<br>Feral deer species in Australia [85733] | | Species or species habitat likely to occur within area |
| Lepus capensis<br>Brown Hare [127] | | Species or species habitat likely to occur within area |
| Mus musculus<br>House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus norvegicus<br>Brown Rat, Norway Rat [83] | | Species or species habitat likely to occur within area |
| Rattus rattus<br>Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Sus scrofa<br>Pig [6] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| Plants | | |
| Asparagus asparagoides<br>Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473] | | Species or species habitat likely to occur within area |
| Chrysanthemoides monilifera<br>Bitou Bush, Boneseed [18983] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera subsp. monilifera<br>Boneseed [16905] | | Species or species habitat likely to occur within area |
| Cytisus scoparius<br>Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934] | | Species or species habitat likely to occur within area |
| Genista monspessulana<br>Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126] | | Species or species habitat likely to occur within area |
| Genista sp. X Genista monspessulana<br>Broom [67538] | | Species or species habitat may occur within area |
| Lycium ferocissimum<br>African Boxthorn, Boxthorn [19235] | | Species or species habitat likely to occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| Nassella neesiana<br>Chilean Needle grass [67699] | | Species or species habitat likely to occur within area |
| Nassella trichotoma<br>Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884] | | Species or species habitat likely to occur within area |
| Opuntia spp.<br>Prickly Pears [82753] | | Species or species habitat likely to occur within area |
| Pinus radiata<br>Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780] | | Species or species habitat may occur within area |
| Rubus fruticosus aggregate<br>Blackberry, European Blackberry [68406] | | Species or species habitat likely to occur within area |
| Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii<br>Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497] | | Species or species habitat likely to occur within area |
| Senecio madagascariensis<br>Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624] | | Species or species habitat likely to occur within area |
| Ulex europaeus<br>Gorse, Furze [7693] | | Species or species habitat likely to occur within area |

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods.  Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc).  In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Coordinates

-33.369181 149.994137,-33.367891 149.99139,-33.36316 149.990189,-33.351976 149.993622,-33.34581 150.038254,-33.367748 150.070869,-33.397419 150.081169,-33.410746 150.058338,-33.369181 149.994137

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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# Appendix C

# Likelihood of Occurrence

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Acacia bynoeana* (Bynoe's Wattle) | E | V | Grows mainly in heath and dry sclerophyll forest in sandy soils. Mainly south of Dora Creek-Morisset area to Berrima and the Illawarra region, west to the Blue Mountains, also recorded from near Kurri Kurri in the Hunter Valley and from Morton National Park. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Actitis hypoleucos* (Common Sandpiper) | - | M, MAR | Utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Anthochaera phrygia* (Regent Honeyeater) | CE | E,M | The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The distribution of the species has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
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| | | | areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests. | | habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Aprasia parapulchella* (Pink-tailed Legless Lizard) | V | V | Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by kangaroo grass. Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) | V | - | The Dusky Woodswallow is widespread in eastern, southern and southwestern Australia. In New South Wales it is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. It is sparsely scattered in, or largely absent from, much of the Upper Western region. The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with coarse woody debris (Higgins and Peter 2002). Birds are also often observed in farm land, usually at the edges of | 9 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |

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| | | | forest or woodland or in roadside remnants or wind breaks with dead timber. | | |
| *Boronia deanei* | V | V | Scattered populations occur between the far south-east of NSW and the Blue Mountains (including the upper Kangaroo River near Carrington Falls, the Endrick River near Nerriga and Nalbaugh Plateau), mainly in conservation reserves. Grows in wet heath, often at the margins of open forest adjoining swamps or along streams. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Botaurus poiciloptilus* (Australasian Bittern) | E | E | The Australasian Bitterns is widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Caesia parviflora var. minor* (Small Pale Grass-lily) | E | - | Found in damp places in open forest on sandstone. | 4 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
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| | | | | | may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Calidris acuminata* (Sharp-tailed Sandpiper) | - | M | Freshwater or saltwater wetlands- the muddy edges of lagoons, swamps, lakes, dams, soaks, sewage dams or temporary floodwaters. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Calidris ferruginea* (Curlew Sandpiper) | E | - | The Curlew Sandpiper is distributed around most of the coastline of Australia. It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes the inland | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Calidris melanotos* (Pectoral Sandpiper) | - | M | Tends to live and feed over shallow coastal waters- the estuaries, lagoons and channels around river and harbour entrances and along the shallows close in shore. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
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| | | | | | represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Callocephalon fimbriatum* (Gang-gang Cockatoo) | V | - | In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed. | 44 | Known. Species observed and habitat values within the investigation area are generally consistent with descriptions provided in the BCD TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Habitat occupancy is likely to be associated with important life cycle processes; however, the reliance on this habitat would depend on additional factors (e.g. size and extent of local population, effect of KTPs). Species recently observed in the locality (NSW BioNet records). |
| *Calyptorhynchus lathami* (Glossy Black-Cockatoo) | V | - | Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina. | 5 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known ‘area of occurrence’ but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Cercartetus nanus* (Eastern Pygmy-possum) | V | - | Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest. Because of its small size it is able to utilise a range of hollow sizes including very small hollows. Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5ha area over a 5 month period. | 7 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known ‘area of occurrence’ but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species |

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| | | | | | incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Chalinolobus dwyeri* (Large-eared Pied Bat) | V | V | Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range. Can also be found on the edges of rainforests and in wet sclerophyll forests. This species roosts in caves and mines in groups of between 3 and 37 individuals. | 18 | Known. Species observed and habitat values within the investigation area are generally consistent with descriptions provided in the BCD TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Habitat occupancy is likely to be associated with important life cycle processes; however, the reliance on this habitat would depend on additional factors (e.g. size and extent of local population, effect of KTPs). Species recently observed in the locality (NSW BioNet records). |
| *Chthonicola sagittata* (Speckled Warbler) | V | - | The Speckled Warbler lives in a wide range of eucalypt dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known ‘area of occurrence’ but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Circus assimilis* (Spotted Harrier) | V | - | The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known ‘area of occurrence’ but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |

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| *Climacteris picumnus victoriae* (Brown Treecreeper (eastern subspecies)) | V | - | Found in eucalypt woodlands (including box-gum woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and river red gum forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. | 0 | Known. Species observed and habitat values within the investigation area are generally consistent with descriptions provided in the BCD TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Habitat occupancy is likely to be associated with important life cycle processes; however, the reliance on this habitat would depend on additional factors (e.g. size and extent of local population, effect of KTPs). Species recently observed in the locality (NSW BioNet records). |
| *Cryptostylis hunteriana* (Leafless Tongue-orchid) | V | V | Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*). | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known ‘area of occurrence’ but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Daphoenositta chrysoptera* (Varied Sittella) | V | - | Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-barked trees, such as stringybarks or ironbarks, but also in paperbarks or mature Eucalypts with hollows. | 14 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known ‘area of occurrence’ but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs |

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| | | | | | may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Dasyurus maculatus maculatus* (Spotted-tailed Quoll) | V | E | Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Delma impar* (Striped Legless Lizard) | V | V | Found mainly in natural temperate grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near natural temperate grassland and occasionally in open box-gum woodland. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Ephippiorhynchus asiaticus* (Black-necked Stork) | E | - | Mainly found on shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation, including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters, as well as extending into adjacent grasslands, paddocks and open savannah woodlands. They also forage within or around estuaries | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km |

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| | | | and along intertidal shorelines, such as saltmarshes, mudflats and sandflats, and mangrove vegetation. | | (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Eucalyptus aggregata* (Black Gum) | V | - | Found in the NSW Central and Southern Tablelands, with small isolated populations in Victoria and the ACT. Has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands in the lowest parts of the landscape, on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Also occurs as isolated paddock trees in modified native or exotic pastures. | 236 | Known. Species observed and habitat values within the investigation area are generally consistent with descriptions provided in the BCD TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Habitat occupancy is likely to be associated with important life cycle processes; however, the reliance on this habitat would depend on additional factors (e.g. size and extent of local population, effect of KTPs). Species recently observed in the locality (NSW BioNet records). |
| *Eucalyptus cannonii* | V | - | Restricted to an area of about 100 by 60 km in the central tablelands of NSW. The western border is approximately marked by a line between Bathurst and Mudgee, while the eastern locations occur approximately on a line between Lithgow and the town of Bylong. Within this area the species is often locally frequent. Recorded from Tablelands Grassy woodland Complex communities and Talus Slope woodland, and in Winburndale Nature Reserve within woodland dominated by *Eucalyptus macrorhyncha* and *Eucalyptus goniocalyx*. | 70 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known ‘area of occurrence’ but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Eucalyptus pulverulenta* (Silver-leaved Mountain Gum) | V | V | Found in two quite separate areas, the Lithgow to Bathurst area and the Monaro (Bredbo to Bombala).Grows in shallow soils as an understorey plant in open forest, typically dominated by brittle gum, red stringybark, broad-leaved peppermint, silvertop ash and apple box. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known ‘area of occurrence’ but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km |

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| | | | | | (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Eucalyptus robertsonii subsp. hemisphaerica* (Robertson's Peppermint) | V | V | Locally frequent in grassy or dry sclerophyll woodland or forest, on lighter soils and often on granite. Usually found in closed grassy woodlands in locally sheltered sites. Habitats include quartzite ridges, upper slopes and a slight rise of shallow clay over volcanics. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Eulamprus leuraensis* (Water skink) | E | E | The species is restricted to isolated and naturally fragmented habitats of permanent sedge and hanging swamps (these develop at moderate to high altitudes on sloping rock faces composed of Narrabeen sandstone which are subject to a constant supply of water), in open forest and open scrub or heath. | 2 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Euphrasia arguta* | CE | CE | Occur in eucalypt forest with a mixed grass and shrub understorey within Nundle State forest. Sites have either been logged in the last few decades, or appear to have regrown from past clearing. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
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| | | | | | incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Falco hypoleucos* (Grey Falcon) | E | - | Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Falco subniger* (Black Falcon) | V | - | The Black Falcon is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. It roosts in trees at night and often on power poles by day. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Falsistrellus tasmaniensis* (Eastern False Pipistrelle) | V | - | Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor. This species also appears to | 34 | Known. Species observed and habitat values within the investigation area are generally consistent with descriptions provided in the BCD TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Habitat occupancy is likely to be associated with important life cycle processes; however, |

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| | | | be highly mobile and records showing movements of up to 12 km between roosting and foraging sites. | | the reliance on this habitat would depend on additional factors (e.g. size and extent of local population, effect of KTPs). Species recently observed in the locality (NSW BioNet records). |
| *Gallinago hardwickii* (Latham's Snipe) | - | M | Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania, passing through the north and New Guinea on passage. Latham's Snipe breed in Japan and on the east Asian mainland. seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Genoplesium superbum* (Superb Midge Orchid) | E | - | The Superb Midge Orchid occurs predominantly in wet heathland on shallow soils above a sandstone cap but has also been found in open woodland interspersed with heath and dry open shrubby woodland. | 2 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Glossopsitta pusilla* (Little Lorikeet) | V | - | Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes. | 1 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
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| | | | | | incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Grantiella picta* (Painted Honeyeater) | V | - | The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits boree, brigalow and box-gum woodlands and box-ironbark forests. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Haliaeetus leucogaster* (White-bellied Sea-Eagle) | V | M | Inhabits coastal and near coastal areas, building large stick nests, and feeding mostly on marine and estuarine fish and aquatic fauna. | 2 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Haloragodendron lucasii* | E | E | Occurs on Hawkesbury Sandstone in moist sandy loam soil. The species prefers sheltered aspects and inhabits gentle slopes below cliff lines near creeks in low open woodland or open forest. Its distribution is correlated with high soil moisture and phosphorus levels. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat |

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| | | | | | quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Heleioporus australiacus* (Giant Burrowing Frog) | V | V | The Giant Burrowing Frog has been recorded breeding in a range of water bodies associated with more sandy environments of the coast and adjacent ranges from the Sydney Basin south the eastern Victoria. It breeds in hanging swamps, perennial non-flooding creeks and occasionally permanent pools, but permanent water must be present to allow its large tadpoles time to reach metamorphosis. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Hieraaetus morphnoides* (Little Eagle) | V | - | Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland and forest in tall trees. | 1 | Known. Species observed and habitat values within the investigation area are generally consistent with descriptions provided in the BCD TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Habitat occupancy is likely to be associated with important life cycle processes; however, the reliance on this habitat would depend on additional factors (e.g. size and extent of local population, effect of KTPs). Species recently observed in the locality (NSW BioNet records). |
| *Hirundapus caudacutus* (White-throated Needletail) | - | M | An aerial species found in feeding concentrations over cities, hilltops and timbered ranges. | 4 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is |

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| | | | | | within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Hoplocephalus bungaroides* (Broad-headed Snake) | E | V | Occurs almost exclusively in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they spend most of the year sheltering in and under rock crevices and exfoliating rock. However, some individuals will migrate to tree hollows to find shelter during hotter parts of summer. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Kunzea cambagei* | V | V | Occurs in wet heath and woodland on coarse sandy soil on sandstone and quartzite. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |

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| *Lathamus discolor* (Swift Parrot) | E | CE | The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Leucochrysum albicans var. tricolor* (Hoary Sunray) | Not listed | V | Hoary Sunray occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils. Plants can be found in natural or semi-natural vegetation and grazed or ungrazed habitat. Bare ground is required for germination. In NSW, the species is often found in association with yellow box, Blakely's red gum and red box. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Litoria booroolongensis* (Booroolong Frog) | E | E | The Booroolong Frog is found along permanent western flowing streams of the Great Dividing Range through most of NSW and down into northern Victoria. Streams range from small slow-flowing creeks to large rivers and the adults are found on or near cobble banks and other rock structures within stream margins and shelter under rocks or amongst vegetation near the ground on the | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species |

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| | | | stream edge. The species occurs along streams in both forested areas and open pasture, but has been affected by the presence of the introduced willow tree. Booroolong Frogs sometimes basks in the sun on exposed rocks near flowing water during summer. | | incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Litoria littlejohni* (Littlejohn's Tree Frog) | V | V | Occurs in wet and dry sclerophyll forests and heathland associated with sandstone outcrops between 280 and 1000 m on the eastern slopes of the Great Dividing Range from the Central Coast down into Victoria. Individuals have been collected from a wide range of water bodies that includes semi-permanent dams, permanent ponds, temporary pools and permanent streams, with calling occurring from fringing vegetation or on the banks. Individuals have been observed sheltering under rocks on high exposed ridges during summer and within deep leaf litter adjacent to the breeding site. Calling occurs in all months of the year, often in association with heavy rains. The tadpoles are distinctive, being large and very dark in colouration. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Lophoictinia isura* (Square-tailed Kite) | V | - | Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by *Eucalyptus longifolia*, *Corymbia maculata*, *E. elata* or *E. smithii*. Individuals appear to occupy large hunting ranges of more than 100km2. They require large living trees for breeding, particularly near water with surrounding woodland -forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Maccullochella macquariensis* (Trout Cod) | - | E | Occurs from riffle and boulder areas in relatively small upland streams to larger deeper rivers with sand and clay substrates and submerged timber and snags. Found in still and fast-flowing waters, usually over bedrock, boulder and gravel bottoms of streams. Large fish | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' |

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| | | | confined to deep holes between falls and rapids, while small ones are found among boulders. Feeds on insects, crayfish, shrimp, and small fishes; cannibalism occurs. | | and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Maccullochella peelii peelii* (Murray Cod) | - | V | The Murray Cod is found in a wide range of warm water habitats, from clear, rocky streams to slow-flowing turbid rivers and billabongs. Generally, they are found in waters up to 5 m deep and in sheltered areas with cover from rocks, timber or overhanging banks. The species is highly dependant on wood debris for habitat, using it to shelter from fast-flowing water. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Macquaria australasica* (Macquarie Perch) | E (FM Act) | E | Macquarie perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Melanodryas cucullata cucullata* (Hooded Robin (south-eastern form)) | V | - | Occupy a wide range of eucalypt woodlands, Acacia shrublands and open forests. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs |

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| | | | | | may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Melithreptus gularis gularis* (Black-chinned Honeyeater (eastern subspecies)) | V | - | Eucalypt woodlands within an approximate annual rainfall range of 400-700 mm | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Micronomus norfolkensis* (Eastern Freetail-bat) | V | - | Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Miniopterus orianae oceanensis* | V | - | Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete | 42 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be |

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| (Large Bent-winged Bat) | | | populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. | | located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Mixophyes balbus* (Stuttering Frog) | E | V | Associated with streams in dry sclerophyll and wet sclerophyll forests and rainforests of more upland areas of the Great Dividing Range of NSW and down into Victoria. Breeding occurs along forest streams with permanent water where eggs are deposited within nests excavated in riffle zones by the females and the tadpoles swim free into the stream when large enough to do so. Outside of breeding, individuals range widely across the forest floor and can be found hundreds of metres from water. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Monarcha melanopsis* (Black-faced Monarch) | - | M | Found along the coast of eastern Australia, becoming less common further south. Inhabits rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |

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| *Motacilla flava* (Yellow Wagtail) | - | MAR, MIG | Often seen near water. Listen for high-pitched, piercing call note. Common breeder on Arctic tundra from Alaska to Russia; found in grassy and waterside habitats in Southeast Asian wintering grounds and in migration. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Myiagra cyanoleuca* (Satin Flycatcher) | - | M | The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. Found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Neophema pulchella* (Turquoise Parrot) | V | - | The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts, from | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km |

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| | | | August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust. | | (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Ninox connivens* (Barking Owl) | V | - | Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country. | 1 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Ninox strenua* (Powerful Owl) | V | - | Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. It is most commonly recorded within red turpentine in tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm. | 11 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Numenius madagascariensis* (Eastern Curlew) | - | CE | The Eastern curlew spends its breeding season in northeastern Asia, including Siberia to Kamchatka, and Mongolia. Its breeding habitat is composed of marshy and swampy wetlands and lakeshores. Most individuals winter in coastal Australia, with a few heading to South | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' |

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| | | | Korea, Thailand, Philippines and New Zealand, where they stay at estuaries, beaches, and salt marshes. It uses its long, decurved bill to probe for invertebrates in the mud. It may feed in solitary but it generally congregates in large flocks to migrate or roost. Its call is a sharp, clear whistle, cuuue-reee, often repeated. | | and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Nyctophilus corbeni* (South-eastern Long-eared Bat) | V | V | The South-eastern Long-eared Bat has a limited distribution that is restricted around the Murray-Darling Basin in south-eastern Australia. Even in this region its distribution is scattered and it is rarely recorded. It occurs in far eastern South Australia, in areas north of the Murray River, east of Canegrass Station and south of the Barrier Highway. These areas include the Riverland Biosphere Reserve, Danggali Conservation Park and the Birds Australia Gluepot Reserve. It is distributed throughout inland NSW except in the north-west area which is dominated by treeless plains. It can be found in the Hunter Valley, extending from central NSW to the eastern Hunter Valley coast. Considered *Nyctophilus timorensis* south eastern form under TSC Act. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Pandion cristatus* (Osprey) | V | - | Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Paralucia spinifera* (Bathurst Copper Butterfly) | E | V | The Copper Butterfly is only found in the Central Tablelands of NSW. Its habitat is restricted to elevations above 900 m where it feeds exclusively on a form of blackthorn. The butterfly's life cycle relies on a 'mutualistic' relationship with the ant *Anonychomyrma* | 18 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is |

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| | | | *itinerans*, and on the presence of blackthorn (*Bursaria spinosa subsp. lasiophylla*). | | within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Persoonia hindii* | E | - | Occurs in dry sclerophyll forests and woodlands on sandy soils. Stoloniferous (has underground horizontal stems) and is thought to be clonal. Hence, each location may comprise only one to a few individuals. | 2 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Persoonia marginata* | V | V | Grows in dry sclerophyll forest and woodland communities on sandstone. Appears to respond well to disturbance, with greater densities found along the edges of tracks and in areas disturbed by forestry activities. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Petalura gigantea* (Giant Dragonfly) | E | - | The Giant Dragonfly is found along the east coast of NSW from the Victorian border to northern NSW. It is not found west of the Great Dividing Range. There are known occurrences in the Blue Mountains and Southern | 1 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
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| | | | Highlands, in the Clarence River catchment, and on a few coastal swamps from north of Coffs Harbour to Nadgee in the south. Live in permanent swamps and bogs with some free water and open vegetation. Adults emerge from late October and are short-lived, surviving for one summer after emergence. | | state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species recently observed in the locality (NSW BioNet records). |
| *Petauroides volans* (Greater Glider) | - | V | The Greater Glider occurs in eucalypt forests and woodlands. Utilise tree hollows. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Petaurus australis* (Yellow-bellied Glider) | V | - | Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. | 1 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the |

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| | | | | | negative effects of active/ uncontrolled KTPs. Species recently observed in the locality (NSW BioNet records). |
| *Petaurus norfolcensis* (Squirrel Glider) | V | - | Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range . Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA. | 5 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Petrogale penicillata* (Brush-tailed Rock-wallaby) | E | V | Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves and crevices. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Petroica boodang* (Scarlet Robin) | V | - | The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. | 103 | Known. Species observed and habitat values within the investigation area are generally consistent with descriptions provided in the BCD TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Habitat occupancy is likely to be associated with important life cycle processes; however, the reliance on this habitat would depend on additional factors (e.g. size and extent of local population, effect of KTPs). |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
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| | | | | | Species recently observed in the locality (NSW BioNet records). |
| *Petroica phoenicea* (Flame Robin) | V | - | Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The species is also found in Tasmania. The preferred habitat in summer includes eucalyptus forests and woodland, whilst in winter prefers open woodlands and farmlands. It is considered migratory. The Flame Robin breeds from about August to January. | 97 | High. Habitat values within the investigation area are generally consistent with descriptions provided in the BCD TSPD. Habitat is likely to be located within the known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are unlikely to adversely influence the capacity of the species to occupy the habitat. Pre-existing and active KTPs are unlikely to be substantially influencing species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Phascogale tapoatafa* (Brush-tailed Phascogale) | V | - | The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known ‘area of occurrence’ but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Phascolarctos cinereus* (Koala) | V | V | Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall . | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known ‘area of occurrence’ but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing |

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| | | | | | the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Polytelis swainsonii* (Superb Parrot) | V | V | The Superb Parrot is found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. Inhabits box-gum, box-cypress-pine and boree woodlands and river red gum forest. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Pomaderris brunnea* (Brown Pomaderris) | V | V | The species is expected to live for 10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years. Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area. It also occurs at Walcha on the New England Tableland and in far eastern Gippsland in Victoria. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |

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| *Pomaderris cotoneaster* | E | E | - | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Pomatostomus temporalis* (Grey-crowned Babbler (eastern subspecies)) | V | - | In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands. Inhabits open box-gum woodlands on the slopes, and box-cypress-pine and open box woodlands on alluvial plains. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Prasophyllum petilum* (Tarengo Leek Orchid) | E | E | Grows in open sites within Natural Temperate Grassland at the Boorowa and Delegate sites and in grassy woodland in association with River Tussock *Poa labillardieri*, Black Gum *Eucalyptus aggregata* and tea-trees *Leptospermum spp.* near Queanbeyan and within the grassy ground layer dominated by Kangaroo Grass under Box-Gum Woodland at Ilford (and Hall, ACT). | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km |

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| | | | | | (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Prasophyllum sp. Wybong* (A leek orchid) | - | CE | Endemic to NSW. It is known from seven populations in eastern NSW near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell and Tenterfield. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Prostanthera cryptandroides subsp. cryptandroides* | V | - | At Glen Davis, occurs in open forest dominated by Eucalyptus fibrosa. Other eucalypt species may be present as sub-dominants. In the Denman-Gungal and Widden-Baerami Valley areas, occurs on rocky ridgelines on Narrabeen Group Sandstones in association with a range of communities. | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Prototroctes maraena* (Australian Grayling) | - | V | Historically, this species occurred in coastal streams from the Grose River Valley, southwards through NSW, Vic. and Tas. It also occasionally occurred high upstream in the Snowy R. A single juvenile specimen was collected from Lake Macquarie in 1974. This species spends only part of its lifecycle in freshwater. The Tambo River population inhabits a clear, gravel-bottomed stream with | 0 | None. Species specific habitat types (i.e. important habitat features) and known vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are absent from the investigation area. The investigation area is also likely located outside the species known 'area of occurrence' and may also occur outside the species 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Species |

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|---|---|---|---|---|---|
| | | | alternating pools and riffles, and granite outcrops. It has also been associated with clear, gravel-bottomed habitats in the Mitchell & Wonnangatta Rivers but was present in a muddy-bottomed, heavily silted habitat in the Tarwin R. | | incidence is not expected and, if detected, would likely represent atypical occurrence (e.g. incidence linked with transient activity). Presence unlikely associated with habitat occupancy involving important lifecycle processes. |
| *Pseudomys novaehollandiae* (New Holland Mouse) | - | V | The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Pteropus poliocephalus* (Grey-headed Flying-fox) | V | V | This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km. | 1 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species recently observed in the locality (NSW BioNet records). |
| *Pultenaea glabra* | V | V | Grows in swamp margins, hillslopes, gullies and creekbanks and occurs within dry sclerophyll forest and | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
|---|---|---|---|---|---|
| | | | tall damp heath on sandstone. Restricted to the higher Blue Mountains. | | species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Rhipidura rufifrons* (Rufous Fantail) | - | M | Found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. Inhabits tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Rhizanthella slateri* | V, EP (Great Lakes) | E | Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
|---|---|---|---|---|---|
| | | | | | habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Rostratula australis* (Australian Painted Snipe) | E | E, M | In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Not recently observed in the locality (NSW BioNet records). |
| *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat) | V | - | Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. | 11 | Known. Species observed and habitat values within the investigation area are generally consistent with descriptions provided in the BCD TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Habitat occupancy is likely to be associated with important life cycle processes; however, the reliance on this habitat would depend on additional factors (e.g. size and extent of local population, effect of KTPs). Species recently observed in the locality (NSW BioNet records). |
| *Scoteanax rueppellii* (Greater Broad-nosed Bat) | V | - | Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches. | 1 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
|---|---|---|---|---|---|
| | | | | | the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species recently observed in the locality (NSW BioNet records). |
| *Stagonopleura guttata* (Diamond Firetail) | V | - | Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Found in grassy eucalypt woodlands, including box-gum woodlands and snow gum woodlands. Also occurs in open forest, mallee, natural temperate grassland, and in secondary grassland derived from other communities. | 1 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |
| *Swainsona recta* (Small Purple-pea) | E | E | Before European settlement, this species occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's red gum, yellow box, candlebark gum and long-leaf box. Grows in association with understorey dominants that include kangaroo grass, poa tussocks and spear-grasses. | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| *Swainsona sericea* (Silky Swainson-pea) | V | - | Recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. Its stronghold is on the Monaro. Found in Natural | 0 | Low. Vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) are present; however, species specific habitat types (i.e. important habitat features) are either absent, in low abundance and/ or in a disturbed |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
|---|---|---|---|---|---|
| | | | Temperate Grassland and Snow Gum Woodland on the Monaro. Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes. Sometimes found in association with cypress-pines. | | state. The investigation area is likely to be located outside the species known 'area of occurrence' but may be within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality are likely to be negatively influencing the likelihood of habitat occupancy. If detected, species activity is most likely low and associated with landscape scale habitat use such as movement between areas of higher value habitat, the use of supplementary habitat or reflect the negative effects of active/ uncontrolled KTPs. Species not recently observed in the locality (NSW BioNet records). |
| Thesium australe (Austral Toadflax) | V | V | Grows in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland. Grows on kangaroo grass tussocks but has also been recorded within the exotic coolatai grass. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species not recently observed in the locality (NSW BioNet records). |
| *Tyto novaehollandiae* (Masked Owl) | V | - | Inhabits a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |

| Scientific Name (Common Name) | BC Act | EPBC Act | Habitat | Records (DPIE 2021a) | Likelihood of Occurrence |
|---|---|---|---|---|---|
| *Tyto tenebricosa* (Sooty Owl) | V | - | Often found in tall old-growth forests, including temperate and subtropical rainforests. In NSW mostly found on escarpments with a mean altitude less than 500 m. Nests and roosts in hollows of tall emergent trees, mainly eucalypts often located in gullies. Nests have been located in trees 125 to 161 cm in diameter. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Varanus rosenbergi* (Rosenberg's Goanna) | V | - | This species is a Hawkesbury-Narrabeen sandstone outcrop specialist. Occurs in coastal heaths, humid woodlands and both wet and dry sclerophyll forests. | 0 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Not recently observed in the locality (NSW BioNet records). |
| *Veronica blakelyi* | V | - | Restricted to the western Blue Mountains, near Clarence, near Mt Horrible, on Nullo Mountain and in the Coricudgy Range. Occurs at fewer than 20 locations, none of which is in a conservation reserve. Occurs in eucalypt forest, often in moist areas. | 7 | Moderate. Species specific (i.e. important habitat features) and vegetation classification based habitat surrogates (i.e. PCT and/ or vegetation formations) occur within the investigation area. The investigation area may or may not be located within the species known 'area of occurrence' but is within the known 'extent of occurrence' [i.e. standard grid size of 2x2km (IUCN 2017)]. Factors such as connectivity, patch size, habitat quantum and/ or quality may be influencing the capacity for habitat occupancy. Pre-existing and active KTPs may potentially have a negative influence on species incidence and/ or habitat occupancy. Species recently observed in the locality (NSW BioNet records). |

# Appendix D

## Flora List

| Scientific Name | BC Act | EPBC Act | BAM 1 | | BAM 2 | | BAM 3 | | BAM 4 | | BAM 5 | | BAM 6 | | BAM 7 | | BAM 8 | | BAM 9 | | BAM 10 | | BAM 11 | | BAM 12 | | BAM 13 | | BAM 14 | | BAM 15 | | BAM 16 | | BAM 17 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A | C | A |
| *Acacia dealbata* | | | 0.5 | 5 | 0.1 | 15 | | | 12 | 40 | 1 | 5 | | | | | 0.5 | 2 | | | 0.2 | 1 | 0.1 | 1 | | | | | 1 | 3 | 2 | 25 | 2 | 3 | 0.5 | 5 |
| *Acacia decurrens* | | | | | | | 0.1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Acacia irrorata* | | | | | | | | | | | | | | | | | 0.2 | 2 | | | | | | | | | | | | | | | | | | |
| *Acacia leucolobia* | | | | | | | | | | | | | | | 0.1 | 1 | 0.3 | 5 | 0.5 | 5 | 0.5 | 20 | | | 0.3 | 5 | | | 5 | 25 | | | | | | |
| *Acacia parramattensis* | | | | | | | | | | | | | | | 0.5 | 1 | 1 | 2 | 5 | 20 | 2 | 5 | | | 20 | 20 | | | 2 | 1 | | | | | | |
| *Acacia rubida* | | | | | 25 | 16 | 30 | 50 | | | | | | | | | 2 | 5 | | | | | 4 | 8 | | | | | | | | | | | 2 | 10 |
| *Acacia terminalis* | | | | | 0.5 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Acaena novae-zelandiae* | | | 0.1 | 10 | | | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Allocasuarina spp.* | | | | | | | | | | | | | | | | | | | | | 5 | 1 | | | | | 0.2 | 1 | | | | | | | | |
| *Aristida ramosa* | | | | | | | | | | | 1.5 | 50 | 1 | 25 | | | 0.5 | 50 | 0.5 | 50 | | | | | 3 | 40 | | | 1 | 50 | | | | | | |
| *Aristida spp.* | | | | | 0.2 | 10 | 10 | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Aristida vagans* | | | | | | | | | | | | | | | | | | | 1 | 80 | 5 | 200 | | | 1 | 20 | | | | | | | | | | |
| *Arthropodium milleflorum* | | | 0.1 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Austrostipa pubescens* | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 50 | | | 2 | 50 | 45 | 1000 | | | | |
| *Austrostipa spp.* | | | 15 | 1000 | 5 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 25 | | | | |
| *Billardiera scandens* | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Boronia microphylla* | | | | | | | | | | | | | | | 0.2 | 1 | | | | | | | | | | | | | | | | | | | | |
| *Bossiaea kiamensis* | | | | | | | | | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| *Bossiaea neo-anglica* | | | | | | | | | | | | | | | | | 0.1 | 2 | | | | | | | | | | | | | 0.1 | 5 | | | | |
| *Cassinia sifton* | | | 0.1 | 2 | 2 | 8 | 5 | 40 | 35 | 80 | 8 | 50 | 4 | 30 | 0.5 | 10 | 15 | 100 | 3 | 20 | 2 | 50 | | | 3 | 20 | | | 15 | 150 | 1 | 3 | 0.1 | 4 | 0.4 | 10 |
| *Cenchrus clandestinus** | | | | | | | | | 0.3 | 10 | | | | | | | | | | | 0.5 | 50 | | | | | 2 | 100 | | | | | 70 | 1000 | | |
| *Centaurium erythraea** | | | 0.1 | 15 | 0.1 | 7 | 0.1 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Centaurium tenuiflorum** | | | | | | | | | 0.3 | 20 | | | | | | | | | 0.5 | 20 | 0.1 | 5 | 0.1 | 10 | | | | | | | 0.1 | 20 | 0.5 | 50 | 0.1 | 20 |
| *Centella asiatica* | | | 0.1 | 20 | | | | | | | | | | | | | 0.1 | 20 | | | | | | | | | 0.2 | 250 | | | | | | | | |
| *Cheilanthes sieberi* | | | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.3 | 15 | | | | |
| *Chrysocephalum apiculatum* | | | | | | | | | | | | | 0.1 | 2 | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | |
| *Cirsium vulgare** | | | 0.1 | 3 | | | 0.1 | 1 | 0.1 | 1 | 0.1 | 2 | | | | | | | 0.1 | 20 | | | 0.2 | 20 | | | | | | | 0.2 | 1 | | | 0.1 | 5 |
| *Conospermum spp.* | | | | | | | | | | | | | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | |
| *Conyza spp.** | | | 0.1 | 2 | | | | | 0.3 | 25 | 0.1 | 10 | | | | | | | 0.1 | 10 | | | 0.1 | 10 | | | | | 0.1 | 10 | 0.5 | 50 | 0.1 | 10 | 0.5 | 20 |
| *Coronidium scorpioides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 100 | | | | | | |
| *Cortaderia selloana** | | | | | | | | | 0.2 | 1 | | | | | | | | | | | | | 0.1 | 1 | | | | | | | | | | | | |
| *Cymbonotus lawsonianus* | | | 0.1 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Cynodon dactylon* | | | | | | | | | | | 0.5 | 30 | | | | | | | 1 | 50 | | | | | | | | | | | | | 10 | 200 | | |
| *Cynoglossum australe* | | | 0.1 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Scientific Name | BC Act | EPBC Act | BAM 1 | | BAM 2 | | BAM 3 | | BAM 4 | | BAM 5 | | BAM 6 | | BAM 7 | | BAM 8 | | BAM 9 | | BAM 10 | | BAM 11 | | BAM 12 | | BAM 13 | | BAM 14 | | BAM 15 | | BAM 16 | | BAM 17 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Cyperus spp.* | | | | | | | 0.1 | 20 | | | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| *Desmodium spp.* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 5 | | | | |
| *Desmodium varians* | | | 0.1 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Dianella revoluta* | | | | | | | | | | | | | 3 | 40 | 1 | 25 | 0.2 | 5 | | | | | | | | | | | | | | | | |
| *Dichelachne parva* | | | 0.1 | 1 | 0.1 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Dichelachne spp.* | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 20 | | | | | | |
| *Dichondra repens* | | | | | | | | | 0.2 | 25 | | | | | | | | | | | | | | | | | | | 0.1 | 50 | | | | |
| *Dillwynia phylicoides* | | | | | | | | | | | | | | | 0.5 | 5 | 0.5 | 25 | | | | | 0.1 | 1 | | | 0.5 | 5 | | | | | | |
| *Dillwynia retorta* | | | | | | | 0.1 | 3 | | | 0.3 | 10 | 0.4 | 3 | | | | | | | | | | | | | | | | | | | | |
| *Echinopogon caespitosus* | | | | | | | | | 1 | 30 | | | 0.5 | 15 | | | | | | | | | | | | | 0.5 | 25 | 0.5 | 25 | | | | |
| *Echinopogon ovatus* | | | 0.1 | 2 | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Echinopogon spp.* | | | | | | | 0.1 | 2 | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 10 | | |
| *Echium vulgare** | | | 0.1 | 20 | | | 0.1 | 1 | | | | | | | | | | | 0.1 | 10 | | | | | | | | | | | | | 0.1 | 10 |
| *Eragrostis curvula** | | | | | | | | | | | | | | | | | | | | | | | 0.8 | 15 | 10 | 50 | | | | | | | 70 | 200 |
| *Eragrostis spp.* | | | | | 0.1 | 3 | 0.1 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Erodium spp.* | | | | | | | | | 0.3 | 50 | | | | | | | | | 0.8 | 50 | 0.5 | 75 | | | | | | | 0.3 | 25 | 0.1 | 25 | 0.1 | 10 | | |
| *Eucalyptus bridgesiana* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 12 | 5 | | |
| *Eucalyptus dalrympleana* | | | | | | | | | | | 4 | 10 | | | | | | | | | 1 | 3 | | | | | | | 8 | 2 | 5 | 3 | | |
| *Eucalyptus dives* | | | | | | | 0.2 | 1 | 4 | 10 | | | | | 5 | 10 | | | | | | | 2 | 2 | | | | | | | | | | |
| *Eucalyptus macrorhyncha* | | | | | | | | | | | | | 30 | 18 | 3 | 2 | | | | | | | | | | | | | 8 | 5 | | | | |
| *Eucalyptus mannifera* | | | | | | | | | | | | | 5 | 3 | 10 | 5 | | | | | | | | | | | | | 5 | 3 | | | | |
| *Eucalyptus pauciflora* | | | 3 | 20 | | | | | | | 4 | 6 | | | | | | | | | 20 | 999 | 5 | 5 | | | 30 | 15 | | | | | | |
| *Eucalyptus radiata* | | | | | | | | | | | | | | | | | | | | | | | 2 | 2 | | | | | | | | | | |
| *Eucalyptus rubida* | | | 10 | 2 | | | | | | | 1 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| *Eucalyptus stellulata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 5 | 1 | | |
| *Eucalyptus viminalis* | | | 10 | 3 | | | | | 20 | 25 | 8 | 10 | | | | | | | | | | | | | | | | | 20 | 5 | | | | |
| *Euchiton japonicus* | | | | | | | | | | | | | 0.1 | 5 | | | | | | | | | | | | | | | 0.2 | 20 | | | 0.1 | 10 |
| *Euchiton sphaericus* | | | 0.1 | 100 | | | | | | | | | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | |
| *Euchiton spp.* | | | | | 0.1 | 1 | | | 0.2 | 10 | | | | | | | | | | | | | | | | | | | 0.3 | 200 | | | | |
| *Galium spp.* | | | 0.2 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 50 | | | | |
| *Geranium solanderi* | | | | | | | | | 0.2 | 25 | | | | | | | | | | | | | | | | | 0.1 | 10 | | | 0.1 | 5 | 0.1 | 10 |
| *Geranium spp.* | | | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Gnaphalium involucratum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 10 |
| *Gompholobium minus* | | | | | | | | | 0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| *Gompholobium spp.* | | | | | | | | | | | | | 0.2 | 2 | 0.2 | 5 | | | | | | | | | | | | | | | | | | |
| *Gonocarpus tetragynus* | | | 0.1 | 10 | 0.2 | 50 | 0.1 | 15 | 0.5 | 30 | 0.2 | 20 | 0.2 | 25 | | | 0.3 | 100 | | | | | 0.1 | 1 | | | | | 1 | 250 | | | | |
| *Goodenia bellidifolia* | | | | | | | | | 0.2 | 25 | | | 0.2 | 25 | 0.2 | 5 | 0.2 | 25 | | | | | | | | | | | 0.1 | 25 | | | | |

| Scientific Name | BC Act | EPBC Act | BAM 1 | | BAM 2 | | BAM 3 | | BAM 4 | | BAM 5 | | BAM 6 | | BAM 7 | | BAM 8 | | BAM 9 | | BAM 10 | | BAM 11 | | BAM 12 | | BAM 13 | | BAM 14 | | BAM 15 | | BAM 16 | | BAM 17 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Haloragis heterophylla* | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 10 | 0.1 | 10 | 0.1 | 1 | | | | |
| *Haloragis spp.* | | | 0.1 | 100 | | | 0.1 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Hardenbergia violacea* | | | | | | | | | | | 0.2 | 1 | | | | | 0.2 | 5 | | | | | | | | | | | | | | | | |
| *Helichrysum spp.* | | | 0.2 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Hemarthria uncinata* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.3 | 5 | | | | |
| *Hibbertia diffusa* | | | | | | | | | | | 0.2 | 1 | | | 0.2 | 1 | | | | | | | | | 0.3 | 5 | | | | | | | | |
| *Hibbertia obtusifolia* | | | | | | | | | | | 0.1 | 1 | 0.2 | 5 | 0.2 | 3 | 0.8 | 5 | | | | | | | | | | | 0.5 | 3 | 0.3 | 5 | | | | |
| *Hibbertia rufa* | | | | | 0.1 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Hibbertia spp.* | | | | | 0.1 | 1 | 0.1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Holcus mollis** | | | | | | | | | | | | | | | | | | | 0.2 | 30 | 0.1 | 20 | | | | | | | | | | | | |
| *Holcus spp.** | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 50 | 0.3 | 20 | | | 0.2 | 30 | 1 | 50 |
| *Hovea heterophylla* | | | | | | | | | | | | | | | 0.1 | 3 | 0.1 | 5 | | | | | | | | | | | | | | | | |
| *Hydrocotyle laxiflora* | | | 0.2 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 250 | | |
| *Hydrocotyle sibthorpioides* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 50 | | |
| *Hypericum gramineum* | | | | | | | | | 0.5 | 10 | | | 0.2 | 50 | | | 0.2 | 50 | | | | | | | | | | | | | 0.3 | 50 | | | 0.1 | 10 |
| *Hypericum japonicum* | | | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Hypericum perforatum** | | | 0.1 | 10 | | | 0.1 | 3 | 0.8 | 30 | | | | | | | | | | | | | 0.3 | 30 | | | | | 0.1 | 50 | | | | |
| *Hypochaeris radicata** | | | 1 | 200 | 0.1 | 25 | 0.1 | 5 | 0.2 | 50 | | | 0.2 | 15 | 0.1 | 5 | | | 0.1 | 10 | | | 0.3 | 30 | 0.1 | 10 | | | 0.1 | 25 | 0.3 | 50 | 1 | 50 | 2 | 30 |
| *Juncus acutus subsp. acutus** | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 25 | | | | | | |
| *Juncus planifolius* | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 50 | | | | | | |
| *Juncus prismatocarpus* | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.5 | 75 | | | | | | |
| *Juncus spp.* | | | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Juncus usitatus* | | | | | | | | | | | | | | | | | | | | | | | 0.2 | 1 | | | 15 | 100 | | | | | | |
| *Lagenifera stipitata* | | | | | | | | | 0.5 | 30 | 0.1 | 1 | | | | | | | | | | | | | | | | | | | 0.1 | 10 | | |
| *Laxmannia gracilis* | | | | | | | | | | | 0.1 | 2 | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | |
| *Leptospermum myrtifolium* | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 2 | | | | | | |
| *Leptospermum polygalifolium* | | | | | | | | | 0.8 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| *Leptospermum spp.* | | | | | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Leucopogon microphyllus* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 1 | | |
| *Leucopogon virgatus* | | | | | | | | | | | | | 0.2 | 15 | 0.4 | 15 | | | | | | | | | | | | | | | | | | |
| *Linum trigynum** | | 0.1 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Lissanthe strigosa* | | 0.1 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Lomandra filiformis* | | | | | | | | | 0.5 | 15 | 0.2 | 10 | | | | | | | | | | | | | | | | | | | | | | |
| *Lomandra glauca* | | 0.2 | 5 | | | | | | 0.2 | 15 | 0.2 | 25 | 8 | 500 | 1 | 50 | 0.3 | 15 | | | | | | | | | | | | | 0.3 | 50 | | |
| *Lomandra longifolia* | | 10 | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3 | 30 | | |
| *Lomandra multiflora* | | 0.2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Lysimachia arvensis** | | 0.1 | 10 | 0.1 | 3 | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 20 |

| Scientific Name | BC Act | EPBC Act | BAM 1 | | BAM 2 | | BAM 3 | | BAM 4 | | BAM 5 | | BAM 6 | | BAM 7 | | BAM 8 | | BAM 9 | | BAM 10 | | BAM 11 | | BAM 12 | | BAM 13 | | BAM 14 | | BAM 15 | | BAM 16 | | BAM 17 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Malva spp.* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 5 |
| *Microlaena stipoides* | | | 0.1 | 50 | 10 | 1000 | 1 | 100 | 0.5 | 50 | 0.2 | 20 | | | | | 0.2 | 20 | | | | | | | | | | | 10 | 1000 | 2 | 100 | 0.5 | 50 |
| *Microtis spp.* | | | | | | | | | | | | | | | | | 0.1 | 3 | | | | | | | | | | | | | | | | |
| *Mirbelia platylobioides* | | | | | | | | | | | | | | | 0.1 | 1 | 0.3 | 5 | | | | | | | | | | | | | | | | |
| *Mirbelia spp.* | | | | | | | | | | | 0.3 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| *Mitrasacme serpyllifolia* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.2 | 50 | | | | |
| *Monotoca elliptica* | | | | | | | | | | | | | | | 0.5 | 5 | 0.1 | 2 | | | | | | | | | | | | | | | | |
| *Opercularia aspera* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.2 | 100 | | | | |
| *Opercularia diphylla* | | | 0.1 | 20 | | | | | | | 0.5 | 25 | | | | | | | | | | | | | | | | | | | | | | |
| *Opercularia hispida* | | | | | | | | | | | | | | | | | 0.1 | 2 | | | | | 0.1 | 2 | | | | | | | | | | |
| *Oplismenus spp.* | | | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Orchidaceae spp.* | | | | | | | | | | | 0.1 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| *Oxalis corniculate** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 10 |
| *Oxalis perennans* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 50 | | | | |
| *Oxalis spp.* | | | 0.2 | 3 | 0.1 | 10 | 0.1 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Ozothamnus spp.* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 50 | | | | |
| *Panicum effusum* | | | | | | | | | | | 0.5 | 10 | | | | | | | | | | | | | | | | | | | | | | |
| *Panicum simile* | | | | | | | | | 0.5 | 20 | | | 0.2 | 20 | | | 0.5 | 20 | | | | | | | 1 | 20 | 0.5 | 30 | | | 0.1 | 20 | | | 0.5 | 50 |
| *Panicum spp.* | | | 0.1 | 1 | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Patersonia sericea* | | | | | | | | | | | 1 | 25 | | | | | 0.5 | 10 | | | | | | | | | | | | | | | | |
| *Persoonia linearis* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.2 | 1 | | | | |
| *Phyllanthus spp.* | | | 0.1 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Phyllota squarrosa* | | | | | | | | | | | 1 | 20 | 0.2 | 2 | | | 1 | 50 | | | | | 0.1 | 1 | 0.3 | 8 | | | | | | | | |
| *Pinus radiata** | | | | | | | | | | | | | | | | | | | | | | | | | 3 | 1 | | | | | | | | |
| *Plantago debilis* | | | 0.1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Plantago lanceolata** | | | | | | | | | | | | | | | | | | | 0.8 | 30 | 0.2 | 25 | | | | | | | 0.1 | 20 | | | 1 | 80 | 1 | 50 |
| *Poa labillardierei* | | | 0.2 | 5 | 0.2 | 6 | | | | | 1 | 30 | 2 | 25 | | | | | 0.2 | 20 | | | 0.3 | 20 | 1 | 40 | | | | | | | | |
| *Poa sieberiana* | | | | | 0.2 | 30 | | | 1 | 30 | 2 | 75 | 0.5 | 25 | 2 | 75 | | | 1 | 50 | 1 | 50 | | | 1 | 40 | | | 5 | 250 | 0.5 | 50 | 1 | 50 | 2 | 50 |
| *Poaceae indeterminate** | | | 0.1 | 30 | 0.1 | 3 | 0.1 | 2 | | | | | | | | | | | | | | | 0.3 | 20 | | | | | | | | | | |
| *Podolobium ilicifolium* | | | | | | | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| *Poranthera microphylla* | | | 0.1 | 30 | | | | | 0.2 | 30 | 0.3 | 25 | 0.2 | 30 | 0.2 | 20 | | | | | | | | | | | | | 0.1 | 20 | 0.2 | 25 | | | | |
| *Prunella vulgaris** | | | 0.1 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 20 |
| *Pterostylis spp.* | | | | | | | | | | | | | | | 0.1 | 10 | | | | | | | | | | | | | 0.1 | 5 | 0.1 | 5 | | |
| *Pultenaea spp.* | | | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Ranunculus inundatus* | | | 2 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Rosa rubiginosa** | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Rosa spp.** | | | | | | | | | | | | | | | | | | | 0.5 | 3 | | | | | | | | | 0.4 | 2 | 0.2 | 2 | | |

| Scientific Name | BC Act | EPBC Act | BAM 1 | | BAM 2 | | BAM 3 | | BAM 4 | | BAM 5 | | BAM 6 | | BAM 7 | | BAM 8 | | BAM 9 | | BAM 10 | | BAM 11 | | BAM 12 | | BAM 13 | | BAM 14 | | BAM 15 | | BAM 16 | | BAM 17 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Rubus fruticosus** | | | 0.2 | 6 | 0.1 | 2 | 0.1 | 10 | 0.3 | 10 | 0.3 | 5 | | | | | 0.3 | 2 | 1 | 20 | 1 | 10 | 0.1 | 10 | 0.1 | 5 | | | 0.5 | 10 | 0.3 | 5 | 0.1 | 1 | 0.1 | 5 |
| *Rytidosperma caespitosum* | | | 0.1 | 50 | 30 | 1000 | 0.2 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Rytidosperma pallidum* | | | | | | | 0.1 | 50 | 4 | 50 | 1 | 30 | 20 | 200 | 5 | 50 | 15 | 75 | | | | | | | 0.5 | 10 | | | 2 | 50 | 2 | 75 | | | | |
| *Rytidosperma racemosum* | | | | | | | | | 1 | 30 | 0.6 | 30 | | | | | | | 0.1 | 10 | | | | | 0.1 | 10 | | | | | 0.5 | 25 | 0.2 | 20 | | |
| *Rytidosperma spp.* | | | 5 | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Rytidosperma tenuius* | | | | | | | | | | | 1 | 25 | 0.5 | 25 | 0.5 | 20 | 0.5 | 25 | | | | | | | 0.5 | 10 | | | | | 0.1 | 20 | 0.1 | 10 | 0.1 | 20 |
| *Scabiosa spp.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 5 |
| *Schoenus apogon* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 10 |
| *Schoenus spp.* | | | | | | | | | 0.1 | 20 | 0.1 | 10 | | | | | | | | | | | | | | | 0.5 | 100 | | | 0.2 | 50 | | | | |
| *Senecio diaschides* | | | 0.1 | 3 | | | 0.1 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Senecio madagascariensis** | | | | | | | | | | | | | | | | | | | | | | | 1 | 30 | | | 0.2 | 25 | 0.2 | 25 | 0.2 | 10 | 0.1 | 20 | | |
| *Senecio spp.* | | | | | | | | | | | | | | | | | | | 0.8 | 50 | 0.3 | 30 | | | | | | | | | | | | |
| *Setaria pumila** | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 50 | | | | | | |
| *Solanum nigrum** | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Sonchus oleraceus** | | | | | | | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| *Sowerbaea juncea* | | | | | | | | | | | 0.1 | 1 | 0.2 | 8 | | | | | | | | | | | | | | | | | | | | |
| *Stellaria media** | | | | | | | | | 0.1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| *Stylidium graminifolium* | | | | | 0.1 | 3 | | | | | 0.1 | 5 | 0.2 | 10 | | | 0.1 | 3 | | | | | | | | | | | | | | | | |
| *Themeda triandra* | | | 0.1 | 50 | 0.1 | 1 | | | | | | | 3 | 30 | | | 0.5 | 25 | | | | | | | | | | | 3 | 75 | 8 | 500 | | | 1 | 60 |
| *Typha spp.* | | | | | | | | | | | | | | | | | | | | | | | | | | | 5 | 50 | | | | | | |
| *Verbascum thapsus** | | | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 5 |
| *Verbena incompta** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | 5 |
| *Veronica plebeia* | | | 0.1 | 5 | 0.1 | 2 | 0.1 | 3 | | | | | | | | | | | | | | | | | | | | | 0.1 | 5 | 0.2 | 10 | | |
| *Viola betonicifolia* | | | 0.1 | 1 | | | 0.1 | 1 | | | | | 0.1 | 10 | | | 0.1 | 10 | | | | | | | | | | | 0.1 | 10 | 0.1 | 10 | | |
| *Vittadinia cuneata* | | | 0.2 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Wahlenbergia spp.* | | | | | | | | | | | 0.2 | 3 | | | | | 0.2 | 5 | | | | | | | | | | | | | | | | |
| *Wahlenbergia stricta* | | | 0.1 | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Xerochrysum bracteatum* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.3 | 25 | 0.3 | 25 | | |

# Appendix E
# Cluster analysis

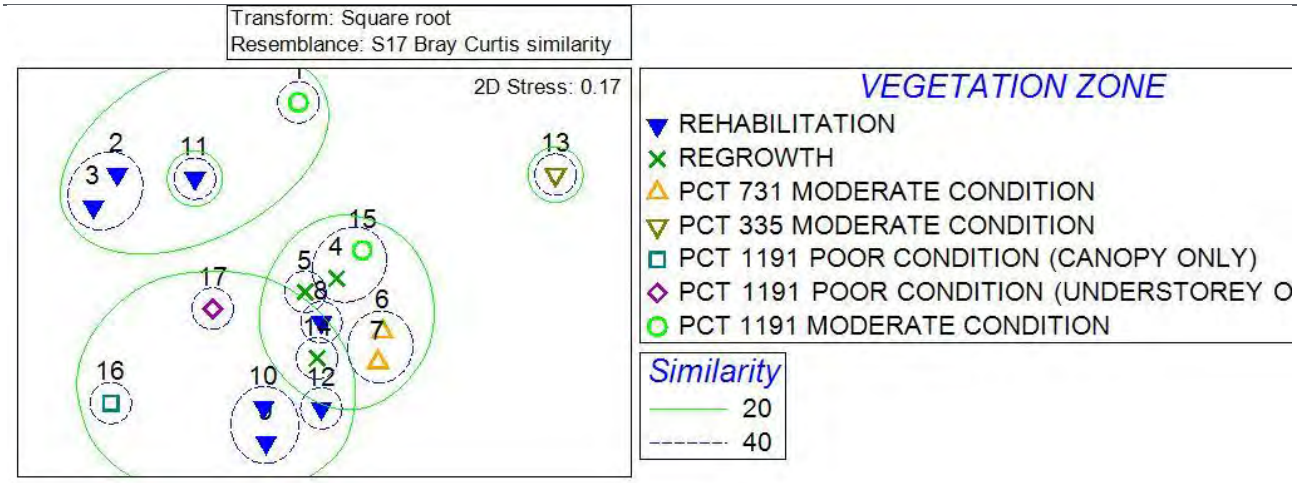



**Figure A1** Cluster analysis of BAM plots (as numbered) indicating alignment of rehabilitation/regrowth vegetation to PCTs within Project Area

# Appendix F
# BAM Plot Photographs

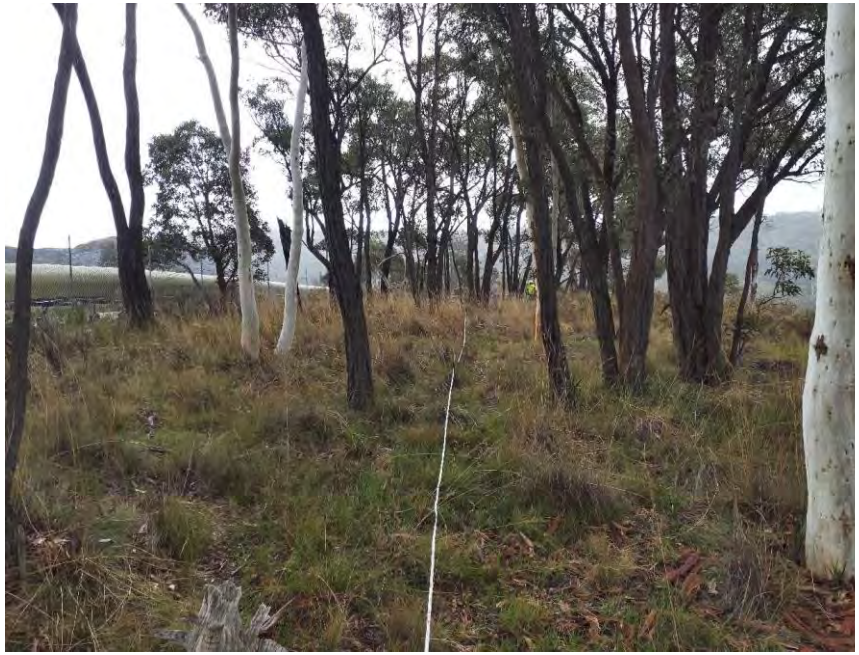
| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 1 | 42.94 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 2 | 182.44 | | |

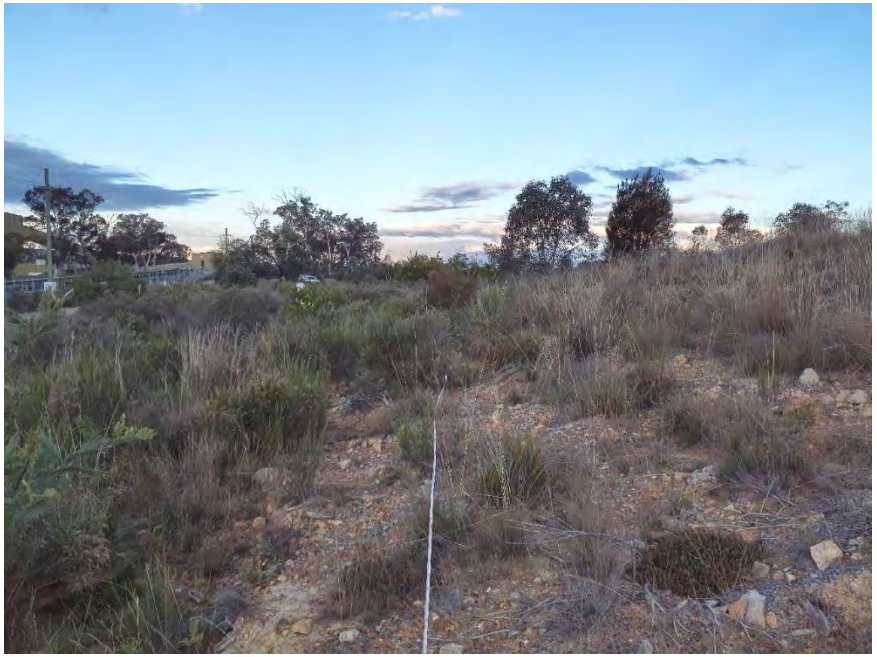
| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 3 | 69.81 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 4 | 215.63 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 5 | 331.57 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 6 | 335.03 | |  |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 7 | 314.20 | | |

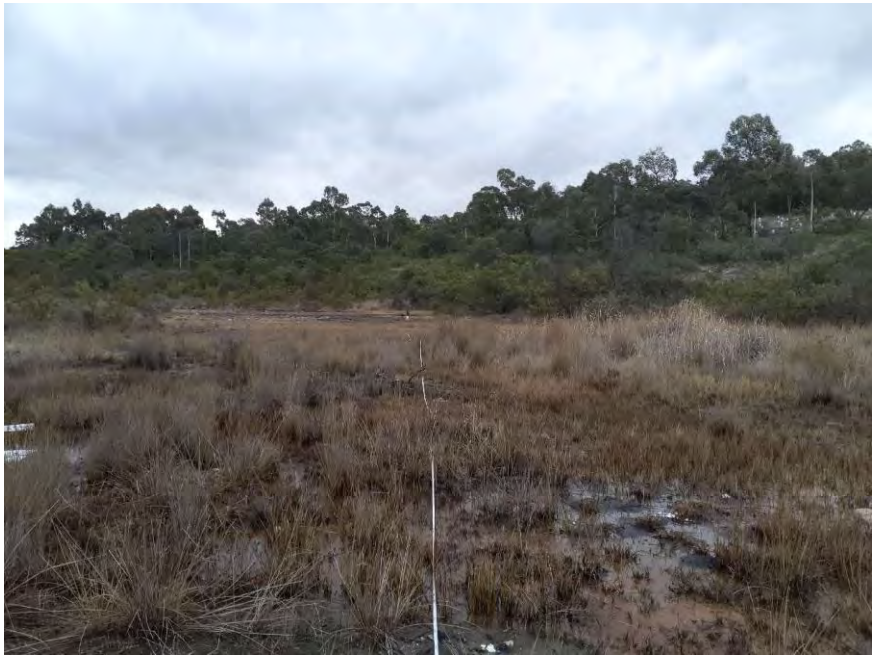
| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 8 | 327.29 |  | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 9 | 255.64 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 10 | 353.13 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 11 | 293.88 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 12 | 332.54 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 13 | 188.24 |  | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 14 | 60.34 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 15 | 260.62 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 16 | 277.54 | | |

| Plot | Bearing | Photograph | |
|---|---|---|---|
| | | Start | End |
| 17 | 123.23 | | |

# Appendix G
# BAM Plot Datasheets

**Note: Data was collected digitally using Survey 123. A macro-enabled datasheet (allowing enquiry of species composition, structure and plot functionality) will be provided upon request.**

# Appendix H

# Fauna List

| Family | Scientific Name | Common Name | Detection method |
|---|---|---|---|
| **Birds** | | | |
| Acanthizidae | *Acanthiza reguloides* | Buff-rumped Thornbill | Bird Survey |
| Acanthizidae | *Sericornis frontalis* | White-browed Scrubwren | Bird Survey |
| Acanthizidae | *Acanthiza lineata* | Striated Thornbill | Bird Survey |
| Anatidae | *Chenonetta jubata* | Australian Wood Duck | Bird Survey |
| Anatidae | *Anas superciliosa* | Pacific Black Duck | Bird Survey |
| Ardeidae | *Egretta novaehollandiae* | White-faced Heron | Bird Survey |
| Artamidae | *Cracticus tibicen* | Australian Magpie | Camera traps |
| Alcedinidae | *Dacelo novaeguineae* | Laughing Kookaburra | Bird Survey |
| Artamidae | *Strepera graculina* | Pied Currawong | Bird Survey |
| Cacatuidae | ***Callocephalon fimbriatum*** | **Gang-gang Cockatoo** | Bird Survey |
| Cacatuidae | *Zandra funerea* | Yellow-tailed Black Cockatoo | Bird Survey |
| Cacatuidae | *Cacatua galerita* | Sulphur-crested Cockatoo | Bird Survey |
| Cacatuidae | *Eolophus roseicapilla* | Galah | Bird Survey |
| Campephagidae | *Lalage tricolor* | White-winged Triller | Bird Survey |
| Charadriidae | *Vanellus miles* | Masked Lapwing | Bird Survey |
| Cinclosomatidae | *Cinclosoma punctatum* | Spotted quail-thrush | Bird Survey |
| Climacteridae | *Cormobates leucophaea* | White-throated Treecreeper | Camera traps |
| Corvidae | *Corvus coronoides* | Australian Raven | Bird Survey |
| Cuculiformes | *Caccomantis flabelliformis* | Fan-tailed Cuckoo | Bird Survey |
| Falconidae | *Falco cenchroides* | Nankeen Kestrel | Bird Survey |
| Monarchidae | *Myiagra inquieta* | Restless Flycatcher | Bird Survey |
| Meliphagidae | *Acanthorhynchus tenuirostris* | Eastern Spinebill | Bird Survey |
| Meliphagidae | *Nesoptilotis leucotis* | White-eared Honeyeater | Bird Survey |
| Meliphagidae | *Philemon corniculatus* | Noisy Friarbird | Bird Survey |
| Meliphagidae | *Anthochaera chrysoptera* | Little Wattlebird | Bird Survey |
| Meliphagidae | *Caligavis chrysops* | Yellow-faced Honeyeater | Bird Survey |
| Meliphagidae | *Lichenostomus leucotis* | White-eared Honeyeater | Camera traps |
| Pachycephalidae | *Pachycephala rufiventris* | Rufous Whistler | Bird Survey |
| Pachycephalidae | *Colluricincla harmonica* | Grey Shrike-thrush | Camera traps and Bird Survey |
| Passeriformes | *Corvus mellori* | Little Raven | Camera traps |
| Passeriformes | *Rhipidura leucophrys* | Willy Wagtail | Bird Survey |
| Passeriformes | *Malurus cyaneus* | Superb Fairy Wren | Bird Survey |
| Passeriformes | *Zosterops lateralis* | Silvereye | Bird Survey |
| Pardalotidae | *Pardalouts punctatus* | Spotted Pardalote | Bird Survey |
| Petroicidae | *Eopsaltria australis* | Eastern Yellow Robin | Camera traps and Bird surveys |
| Petroicidae | ***Petroica boodang*** | **Scarlet Robin** | Bird Survey |
| Podargidae | *Podargus strigoides* | Tawny Frogmouth | Spotlight survey |
| Psittaculidae | *Platycercus elegans* | Crimson Rosella | Bird Survey |
| Psophodidae | *Cinclosoma punctatum* | Spotted Quail-thrush | Camera traps |
| Rhipiduridae | *Rhipidura albiscapa* | Grey Fantail | Bird Survey |
| **Mammals** | | | |
| Canidae | *Vulpes vulpes** | Fox | Camera traps |

| Family | Scientific Name | Common Name | Detection method |
|---|---|---|---|
| Dasyuridae | *Antechinus stuartii* | Brown Antechinus | Elliot Trapping and Camera Traps |
| Leporidae | *Oryctolagus cuniculus** | Rabbit | Camera traps |
| Macropodidae | *Macropus giganteus* | Eastern Grey Kangaroo | Camera traps |
| Macropodidae | *Macropus rufogriseus* | Red-necked Wallaby | Camera traps |
| Macropodidae | *Wallabia bicolor* | Swamp Wallaby | Camera traps |
| Muridae | *Rattus fuscipes* | Bush Rat | Camera traps |
| Muridae | *Rattus rattus** | Black Rat | Camera traps |
| Petauridae | *Petaurus breviceps* | Sugar Glider | Spotlighting and Camera Traps |
| Petauridae | *Petaurus notatus* | Krefft's Glider | Camera traps |
| Pseudocheiridae | *Pseudocheirus peregrinus* | Common Ringtail Possum | Camera traps |
| Tachyglossidae | *Tachyglossus aculeatus* | Short-beaked Echidna | Opportunistic sighting |
| Vombatidae | *Vombatus ursinus* | Common Wombat | Camera traps |
| **Herpetofauna** | | | |
| Myobatrachidae | *Crinia signifera* | Common Eastern Froglet | Herpetofauna survey |
| Limnodynastidae | *Limnodynastes dumerilii* | Eastern Banjo Frog | Herpetofauna survey |
| Limnodynastidae | *Limnodynastes tasmaniensis* | Spotted Marsh Frog | Herpetofauna survey |
| Limnodynastidae | *Limnodynastes peronii* | Striped Marsh Frog | Herpetofauna survey |
| Pelodryadidae | *Litoria ewingii* | Brown Tree Frog | Herpetofauna survey |
| Pelodryadidae | *Litoria peronii* | Peron's Tree Frog | Herpetofauna survey |
| Pelodryadidae | *Litoria verreauxii* | Whistling Tree Frog | Herpetofauna survey |
| Scincidae | *Liopholis whitii* | White's Skink | Opportunistic sighting |
| **Insects** | | | |
| Parastacidae | *Cherax destructor* | Common Yabby | Opportunistic sighting |

**Bold** = Threatened species listed under BC Act and or EPBC Act. * = introduced species.

# Appendix I

# EPBC Act: Assessment of Significance

# Assessment of Significance for Vulnerable Species

**Table A1 Fauna species listed as Vulnerable under the EPBC Act**

| Significant Impact criteria | *Chalinolobus dwyeri* (Large-eared Pied Bat) | *Petauroides volans* (Greater Glider) | *Dasyurus maculatus maculatus* (Spotted-tailed Quoll) |
|---|---|---|---|
| Lead to a long-term decrease in the size of an important population of a species | **Unlikely.** No caves were found inside or within 100 m of the Project Area, hence there is no suitable roosting habitat to be impacted by the Project. Although this species was detected nearby, it was foraging only. Hence, the minor loss of poor condition foraging habitat for this species is considered unlikely to a lead to a long-term decrease in the size of an important population. | **Unlikely.** This species was not detected during targeted surveys. It may however opportunistically use habitat at the northwest extent of the Project Area, where the highest quality habitat occurs (adjacent to Ben Bullen SF). As the Project would remove largely disturbed vegetation, offering low quality habitat value to this species, whilst large tracts of higher quality habitat occur in the local area, it is expected that the Project is unlikely to a lead to a long-term decrease in the size of an important population. | **Unlikely.** Targeted surveys were undertaken, and this species was not detected. It may however opportunistically use habitat at the northwest extent of the Project Area, where the highest quality habitat occurs (adjacent to Ben Bullen SF). As the Project would remove largely disturbed vegetation, offering low quality habitat value to this species, whilst large tracts of higher quality habitat occur in the local area, it is expected that the Project is unlikely to a lead to a long-term decrease in the size of an important population. |
| Reduce the area of occupancy of an important population | **Unlikely.** No caves were found inside or within 100 m of the Project Area, hence there is no suitable roosting habitat to be impacted by the Project. Hence, the Project is expected to lead to a minor loss of poor condition foraging habitat only. Hence, it is expected that the Project is unlikely to reduce the area of occupancy of an important population. | **Unlikely.** This species was not detected during targeted surveys. It may however opportunistically use habitat at the northwest extent of the Project Area, where the highest quality habitat occurs (adjacent to Ben Bullen SF). As the Project would remove largely disturbed vegetation, offering low quality habitat value to this species, whilst large tracts of higher quality habitat occur in the local area, it is expected that the Project is unlikely to reduce the area of occupancy of an important population. | **Unlikely.** Targeted surveys were undertaken, and this species was not detected. It may however opportunistically use habitat at the northwest extent of the Project Area, where the highest quality habitat occurs (adjacent to Ben Bullen SF). As the Project would remove largely disturbed vegetation, offering low quality habitat value to this species, whilst large tracts of higher quality habitat occur in the local area, it is expected that the Project is unlikely to reduce the area of occupancy of an important population. |
| Fragment an existing important population into two or more populations | **Unlikely**. Suitable habitat for this species is available throughout the local area, which includes vast tracts of conserved vegetation, including the adjacent Ben Bullen and Newnes State Forests. Based on the vast availability of suitable habitat nearby, and narrowness of patch of bushland to be impacted, it is considered that the Project is unlikely to fragment any important populations of this species. | **Unlikely**. Suitable habitat for this species is available throughout the local area, which includes vast tracts of conserved vegetation, including the adjacent Ben Bullen and Newnes State Forests. Based on the vast availability of suitable habitat nearby, and narrowness of patch of bushland to be impacted, it is considered that the Project is unlikely to fragment any important populations of this species. | **Unlikely**. Suitable habitat for this species is available throughout the local area, which includes vast tracts of conserved vegetation, including the adjacent Ben Bullen and Newnes State Forests. Based on the vast availability of suitable habitat nearby, and narrowness of patch of bushland to be impacted, it is considered that the Project is unlikely to fragment any important populations of this species. |

| Significant Impact criteria | *Chalinolobus dwyeri* (Large-eared Pied Bat) | *Petauroides volans* (Greater Glider) | *Dasyurus maculatus maculatus* (Spotted-tailed Quoll) |
|---|---|---|---|
| Adversely affect habitat critical to the survival of a species | **Unlikely.** Critical habitat has not been declared for this species. However, it is unlikely that critical habitat for the survival of the species would be impacted as suitable roosting habitat (i.e. caves) were not found inside or within 100 m of the Project Area, whilst vast tracts of similar bushland present suitable habitat for this species in the local area (including the adjacent Ben Bullen and Newnes State Forests). | **Unlikely.** Critical habitat has not been declared for this species. However, it is unlikely that critical habitat for the survival of the species would be impacted as this species was not detected in targeted surveys, whilst vast tracts of similar bushland present suitable habitat for this species in the local area (including the adjacent Ben Bullen and Newnes State Forests). | **Unlikely.** Critical habitat has not been declared for this species. However, it is unlikely that critical habitat for the survival of the species would be impacted as this species was not detected in targeted surveys, whilst vast tracts of similar bushland present suitable habitat for this species in the local area (including the adjacent Ben Bullen and Newnes State Forests). |
| Disrupt the breeding cycle of an important population | **Unlikely.** The Project is unlikely to disrupt the breeding cycle of an important population given this species since breeding habitat is not inside or within 100 m of the Project Area, whilst vast tracts of similar bushland present suitable habitat for this species in the local area. | **Unlikely.** The Project is unlikely to disrupt the breeding cycle of an important population given this species was not detected in targeted surveys, bushland to be impacted is typically in poor condition, whilst vast tracts of similar bushland present suitable habitat for this species in the local area. | **Unlikely.** The Project is unlikely to disrupt the breeding cycle of an important population given this species was not detected in targeted surveys, bushland to be impacted is typically in poor condition, whilst vast tracts of similar bushland present suitable habitat for this species in the local area. |
| Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | **Unlikely**. Suitable habitat for this species is available throughout the local area, which extends throughout the adjacent Ben Bullen and Newnes State Forests. Based on the availability of suitable habitat, and small extent of primarily poor condition bushland to be removed, it is considered that the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. | **Unlikely**. Suitable habitat for this species is available throughout the local area, which extends throughout the adjacent Ben Bullen and Newnes State Forests. Based on the availability of suitable habitat, and small extent of primarily poor condition bushland to be removed, it is considered that the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. | **Unlikely**. Suitable habitat for this species is available throughout the local area, which extends throughout the adjacent Ben Bullen and Newnes State Forests. Based on the availability of suitable habitat, and small extent of primarily poor condition bushland to be removed, it is considered that the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. |
| Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat | **Unlikely**. It is unlikely that the affected area will experience an increase in invasive species. Risks of weed introduction would be managed by following weed management protocols during all works. | **Unlikely**. It is unlikely that the affected area will experience an increase in invasive species. Risks of weed introduction would be managed by following weed management protocols during all works. | **Unlikely**. It is unlikely that the affected area will experience an increase in invasive species. Risks of weed introduction would be managed by following weed management protocols during all works. |
| Introduce disease that may cause the species to decline | **Unlikely.** The proposed activity is unlikely to lead to introduce a disease that may cause the species to decline. | **Unlikely.** The proposed activity is unlikely to lead to introduce a disease that may cause the species to decline. | **Unlikely.** The proposed activity is unlikely to lead to introduce a disease that may cause the species to decline. |

| Significant Impact criteria | *Chalinolobus dwyeri* (Large-eared Pied Bat) | *Petauroides volans* (Greater Glider) | *Dasyurus maculatus maculatus* (Spotted-tailed Quoll) |
|---|---|---|---|
| Interfere substantially with the recovery of the species | **Unlikely.** Large areas of equal or better-quality habitat are available for this species within the surrounding area, including Ben Bullen and Newnes State Forests. Hence, it is considered unlikely that the expected clearing required for the Project, of which only a small extent constitutes poor quality foraging habitat for this species, will substantially interfere with the recovery of the species. | **Unlikely.** Large areas of equal or better-quality habitat are available for this species within the surrounding area, including Ben Bullen and Newnes State Forests. Hence, it is considered unlikely that the expected clearing/modification required for the Project, of which only a small extent constitutes suitable habitat for this species, will substantially interfere with the recovery of the species. | **Unlikely.** Large areas of equal or better-quality habitat are available for this species within the surrounding area, including Ben Bullen and Newnes State Forests. Hence, it is considered unlikely that the expected clearing/modification required for the Project, of which only a small extent constitutes suitable habitat for this species, will substantially interfere with the recovery of the species. |

**Table A2 Flora species listed as Vulnerable under the EPBC Act**

| Significant Impact criteria | *Eucalyptus aggregata* (Black Gum) |
|---|---|
| Lead to a long-term decrease in the size of an important population of a species | **Unlikely.** The Coxs' River Area, which encompasses the Project Area, is a proposed priority management site for *Eucalyptus aggregata* (Black Gum) under the Saving Our Species Program by DPIE (2021b). As such, the 32 individuals to be removed are likely to be part of an important population. However, these individuals appear to be planted as part of past rehabilitation efforts, so they are artificial additions to this population. Moreover, the impacts of the loss of these individuals will be minimised by avoiding impacts to 29 individuals located outside the Project Area. The species is also locally abundant in frost hollow and drainage lines (DPIE 2021a), with approximately 715 individuals recorded in the Lithgow region (North: -33.05 West: 149.59; East: 150.39; South: -33.71; the approximate extent of the Coxs' River Population as defined by DPIE 2021b). Moreover, >500 saplings were planted ~3.5 km south of the Project Area (at Centennial's Lidsdale Siding as per Condition 22 of SSD 08_0223; H. Beck Pers. Obs. 2018), whilst many individuals are protected by a stewardship site established by Centennial (Wolgan Rd North) and in Marrangaroo National Park. Furthermore, an offset for the loss of these 32 individuals in a stewardship site established approximately 5 km north-east of the Project Area (Wolgan Road North; Lot 56 DP751636; as already secured by Centennial). Hence, the loss of these 32 individuals (apparently planted during past rehabilitation efforts at WCS), when considering the size of the local population, the retained individuals and provision of local offsets, is considered unlikely to lead to a long-term decrease in the size of an important population. |
| Reduce the area of occupancy of an important population | **Unlikely.** The Project Area is located toward the middle of the Coxs' River population, in a region where approximately 715 individuals have been recorded (North: -33.05 West: 149.59; East: 150.39; South: -33.71; the approximate extent of the Coxs' River Population as defined by DPIE 2021b). As such, the loss of 32 individuals is unlikely to reduce the area of occupancy of this important population. Moreover, retention of at least 29 individuals (to be retained and protected from impact) would ensure the area of occupancy is not reduced (note that areas outside the Project Area were not exhaustively searched for *E. aggregata*, so the number to be retained is likely to be far greater than 29 individuals). Locally acquired offsets (at Wolgan Rd; Lot 56 DP751636) would also mitigate the risk of reducing the area of occupancy of the important population. Lastly, >500 *E. aggregata* saplings were planted as per Condition 22 of SSD 08_0223 (H. Beck pers obs. 2018), which are located ~3.5 km south of the Project Area and contribute to the viability and stability of the local population of *E. aggregata*. |

| Significant Impact criteria | *Eucalyptus aggregata* (Black Gum) |
|---|---|
| | Hence, it is not expected that the loss of 21 individuals (apparently planted during past rehabilitation efforts at WCS) within the Project Area would reduce the area of occupancy for the Coxs' River population. |
| Fragment an existing important population into two or more populations | **Unlikely**. It is unlikely that the loss of 32 individuals (apparently planted during past rehabilitation efforts at WCS) would fragment the Coxs' River population into two or more populations given the relatively small extent of local population to be impacted, the retention of individuals adjacent to the Project Area and provision of offsets locally (i.e. stewardship site approximately 5km to the Northeast; Lot 56 DP751636). Moreover, >500 *E. aggregata* saplings were planted as part of the Biodiversity Management Plan at Lidsdale siding (as per Condition 22 of SSD 08_0223; H. Beck Pers. Obs. 2018), ~3.5 km south of the Project Area, which will continue to strengthen the local population as these plants mature. |
| Adversely affect habitat critical to the survival of a species | **Unlikely.** Critical habitat has not been declared for this species. However, it is unlikely that critical habitat for the survival of the species would be impacted as suitable habitat (i.e. frost hollows and drainage lines on valley flats) are abundant in the Lithgow LGA (including Marrangaroo National Park, Centennial stewardship site on Wolgan Rd (Lot 56 DP751636) and Lidsdale Siding where >500 *E. aggregata* saplings were planted as per Condition 22 of SSD 08_0223. |
| Disrupt the breeding cycle of an important population | **Unlikely.** It is unlikely that the loss of 32 individuals (apparently planted during past rehabilitation efforts at WCS) would disrupt the breeding cycle of the Coxs' River population since given the relatively small extent of local population to be impacted, the retention of individuals adjacent to the Project Area and provision of offsets locally (i.e. stewardship site approximately 5 km to the Northeast; Lot 56 DP751636). Moreover, >500 *E. aggregata* saplings were planted as per Condition 22 of SSD 08_0223, ~3.5 km south of the Project Area, which likely will contribute substantially to the reproductive viability of the local population of *E. aggregata* as these individuals mature. |
| Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | **Unlikely**. Suitable habitat for this species is available throughout the local area, which extends throughout the nearby Marrangaroo National Park. Based on the availability of suitable habitat, and small extent of primarily poor condition bushland to be removed, it is considered that the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. |
| Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat | **Unlikely**. It is unlikely that the affected area will experience an increase in invasive species. Risks of weed introduction would be managed by following weed management protocols during all works. |
| Introduce disease that may cause the species to decline | **Unlikely.** The proposed activity is unlikely to lead to introduce a disease that may cause the species to decline. |
| Interfere substantially with the recovery of the species | **Unlikely.** Large areas of equal or better-quality habitat are available for this species within the surrounding area, including Marrangaroo National Park. Hence, it is considered unlikely that the expected clearing required for the Project, of which only a small extent constitutes poor quality habitat for this species, will substantially interfere with the recovery of the species. |

# Assessment of Significance for Endangered Species

### Fauna species listed as Endangered under the EPBC Act

| Significant Impact criteria | *Paralucia spinifera* (Bathurst Copper Butterfly) |
|---|---|
| Lead to a long-term decrease in the size of a population | **Unlikely.** This species has a highly restricted distribution, with the nearest records located just west of Wallerawang Colliery, adjacent from WCS (i.e. approx. 1.5 km east of suitable habitat in Project Area; BioNet 2021a). A survey was undertaken of within the patch of *Bursaria spinosa subsp. lasiophylla* (i.e. potential habitat) during October 2021, when this species is likely to be in adult form (DPIE 2021c). No adults were observed. Moreover, although the preferred habitat of *Bursaria spinosa subsp. lasiophylla* was present, this butterfly prefers sunny hillside locations with a north or west aspect open to exposure to full day sun (NPWS 2001), however the habitat within the Project Area is south-east facing and partially shaded by a large overhead conveyor belt and infrastructure upslope. Moreover, the patch is located between two access roads, so foraging opportunities are limited (given a 40 m foraging range for this species; DPIE 2021c) Therefore, it is unlikely that the Project would lead to a long-term decrease in the size of a population given the null survey result and disturbed/shaded nature of the site. |
| Reduce the area of occupancy of the species | **Unlikely.** A survey was undertaken of this patch of *Bursaria spinosa subsp. lasiophylla* during October 2021, when this species is likely to be in adult form (DPIE 2021c). No adults were observed. Moreover, although the preferred habitat of *Bursaria spinosa subsp. lasiophylla* was present, this species prefers sunny hillside locations with a north or west aspect open to exposure to full day sun (NPWS 2001). However, the habitat within the Project Area is south-east facing and partially shaded by a large overhead conveyor belt and infrastructure upslope. Moreover, the patch is located between two access roads, so foraging opportunities are limited (given a 40 m foraging range for this species; DPIE 2021c) Therefore, it is unlikely that the Project Area is occupied by this species and hence should not reduce the area of occupancy of the species. |
| Fragment an existing population into two or more populations | **Unlikely.** There are no records of *Paralucia spinifera* on the western side of Castlereagh Highway. Given this, the lack of detection of the species within the Project Area, and that the Project involves clearing a narrow band of disturbed vegetation only, it is unlikely that the Project would Fragment an existing population into two or more populations. |
| Adversely affect habitat critical to the survival of a species | **Unlikely.** There are no records of *Paralucia spinifera* on the western side of Castlereagh Highway, hence potential habitat in the Project Area is not considered to be critical to the survival of a species. Although the Project would involve clearing a small patch of potential habitat (i.e. approximately 47 *Bursaria spinosa subsp. lasiophylla* individuals), surveys to date have not detected this species, whilst shading, aspect and local disturbance (clearing for access roads) suggests that this habitat is not optimal, and hence is unlikely to be important in determining the survivorship of this species. |
| Disrupt the breeding cycle of a population | **Unlikely.** There are no records of *Paralucia spinifera* on the western side of Castlereagh Highway (nearest record is approximately 1.5 km east of suitable habitat in Project Area), hence potential habitat in the Project Area is not considered to be critical to the survival of a species. Although the Project would involve clearing a small patch of potential habitat (i.e. approximately 47 *Bursaria spinosa subsp. lasiophylla* individuals), surveys to date have not detected this species, whilst shading, aspect and local disturbance (e.g. clearing for access roads) that this habitat unlikely to support a population, and hence is unlikely to disrupt the breeding cycle of a population. |
| Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | **Unlikely.** Although the Project would involve clearing a small patch of potential habitat (i.e. approximately 47 *Bursaria spinosa subsp. lasiophylla* individuals), surveys to date have not detected this species, whilst shading from WCS infrastructure, unsuitable aspect (e.g. south-eastern aspect) and local disturbance (e.g. clearing for access roads) suggests the potential habitat in Project Area unlikely to be important for the persistence of the |

| Significant Impact criteria | *Paralucia spinifera* (Bathurst Copper Butterfly) |
|---|---|
| | species. Hence, the Project is considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. |
| Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat | **Unlikely**. It is unlikely that the affected area will experience an increase in invasive species. Risks of weed introduction would be managed by following weed management protocols during all works. |
| Introduce disease that may cause the species to decline | **Unlikely.** The proposed activity is unlikely to lead to introduce a disease that may cause the species to decline. |
| Interfere with the recovery of the species | **Unlikely.** Given the highly degraded and shading of the potential habitat patch in the Project, large areas of equal or better-quality habitat are available for this species within the surrounding area, including Ben Bullen State Forest. Hence, it is considered unlikely that the expected clearing required for the Project, of which only a small extent constitutes poor quality habitat for this species, will substantially interfere with the recovery of the species. |

# Appendix B
## Biodiversity Credit Report

# BAM Credit Summary Report

## Proposal Details

Assessment Id
00027298/BAAS19000/21/00027299

Proposal Name
WCS SSD 5579 MOD 4

BAM data last updated *
24/11/2021

Assessor Name
Hayden John Beck

Report Created
26/11/2021

BAM Data version *
50

Assessor Number
BAAS19000

BAM Case Status
Open

Date Finalised
To be finalised

Assessment Revision
0

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

| Zone | Vegetation zone name | TEC name | Current Vegetation integrity score | Change in Vegetation integrity (loss / gain) | Area (ha) | BC Act Listing status | EPBC Act listing status | Species sensitivity to gain class (for BRW) | Biodiversity risk weighting | Potential SAII | Ecosystem credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion** | | | | | | | | | | | |
| 2 | 731_Zone2_PCT731_Mod | Not a TEC | 70.3 | 70.3 | 0.94 | | | High Sensitivity to Potential Gain | 2.00 | | 33 |
| | | | | | | | | | | **Subtotal** | **33** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion** | | | | | | | | | | | |
| 3 | 1191_Zone 3_PCT1191 _Mod | Not a TEC | 75.3 | 75.3 | 1.8 | | | High Sensitivity to Potential Gain | 2.50 | | 87 |
| 4 | 1191_Zone 4_PCT1191 _Rehab | Not a TEC | 34.2 | 34.2 | 10 | | | High Sensitivity to Potential Gain | 2.50 | | 214 |
| 5 | 1191_Zone 5_PCT1191 _Regr | Not a TEC | 51.3 | 51.3 | 1.2 | | | High Sensitivity to Potential Gain | 2.50 | | 37 |
| 6 | 1191_Zone 6_PCT1191 _PrCan | Not a TEC | 40.2 | 40.2 | 0.19 | | | High Sensitivity to Potential Gain | 2.50 | | 5 |
| 7 | 1191_Zone 7_PCT1191 _PrUnd | Not a TEC | 3 | 3.0 | 0.11 | | | High Sensitivity to Potential Gain | 2.50 | | 0 |
| | | | | | | | | | | **Subtotal** | **343** |
| **Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion** | | | | | | | | | | | |
| 1 | 335_Zone1 _PCT335_Pr | Not a TEC | 14.9 | 14.9 | 0.93 | | | High Sensitivity to Potential Gain | 2.00 | | 0 |
| | | | | | | | | | | **Subtotal** | **0** |
| | | | | | | | | | | **Total** | **376** |

## Species credits for threatened species

| Vegetation zone name | Habitat condition (Vegetation Integrity) | Change in habitat condition | Area (ha)/Count (no. individuals) | BC Act Listing status | EPBC Act listing status | Biodiversity risk weighting | Potential SAII | Species credits |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ***Eucalyptus aggregata / Black Gum ( Flora )*** | | | | | | | | |
| 1191_Zone5_PCT1191_Regr | N/A | N/A | 8 | Vulnerable | Vulnerable | 2 | False | 16 |
| 1191_Zone4_PCT1191_Rehab | N/A | N/A | 24 | Vulnerable | Vulnerable | 2 | False | 48 |
| | | | | | | | **Subtotal** | **64** |
| ***Paralucia spinifera / Purple Copper Butterfly, Bathurst Copper Butterfly ( Fauna )*** | | | | | | | | |
| 731_Zone2_PCT731_Mod | 70.3 | 70.3 | 0.21 | Endangered | Vulnerable | 2 | False | 7 |
| 1191_Zone4_PCT1191_Rehab | 34.2 | 34.2 | 0.03 | Endangered | Vulnerable | 2 | False | 1 |
| | | | | | | | **Subtotal** | **8** |

# Appendix C
## Variation rules

# BAM Biodiversity Credit Report (Variations)

## Proposal Details

**Assessment Id**
00027298/BAAS19000/21/00027299

Proposal Name
WCS SSD 5579 MOD 4

BAM data last updated *
24/11/2021

Assessor Name
Hayden John Beck

Assessor Number
BAAS19000

BAM Data version *
50

Proponent Name(s)

Report Created
26/11/2021

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Major Projects

Date Finalised
To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Potential Serious and Irreversible Impacts

| Name of threatened ecological community | Listing status | Name of Plant Community Type/ID |
|---|---|---|
| **Nil** | | |

| Species |
|---|
| **Nil** |

## Additional Information for Approval

PCTs With Customized Benchmarks

| PCT |
|---|
| No Changes |

Predicted Threatened Species Not On Site

# BAM Biodiversity Credit Report (Variations)

| Name |
|---|
| **Grantiella picta /** Painted Honeyeater |

## Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

| Name of Plant Community Type/ID | Name of threatened ecological community | Area of impact | HBT Cr | No HBT Cr | Total credits to be retired |
|---|---|---|---|---|---|
| 335-Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion | Not a TEC | 0.9 | 0 | 0 | 0.00 |
| 731-Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion | Not a TEC | 0.9 | 33 | 0 | 33.00 |
| 1191-Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | Not a TEC | 13.3 | 87 | 256 | 343.00 |

**335-Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion**

**Like-for-like credit retirement options**

| Class | Trading group | Zone | HBT | Credits | IBRA region |
|---|---|---|---|---|---|
| Inland Floodplain Swamps This includes PCT's: 66, 204, 205, 335, 360, 447, 465, 1291 | Inland Floodplain Swamps >=70% and <90% | 335_Zone1_PCT335_Pr | No | 0 | Capertee Uplands,Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

**Variation options**

| Formation | Trading group | Zone | HBT | Credits | IBRA region |
|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| | Freshwater Wetlands | Tier 2 or higher threat status | 335_Zone1_PCT335_Pr | No | 0 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| **731-Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion** | **Like-for-like credit retirement options** | | | | | |
| | Class | Trading group | Zone | HBT | Credits | IBRA region |
| | Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 680, 703, 705, 731, 1103, 1330, 1334, 1501 | Southern Tableland Grassy Woodlands >=70% and <90% | 731_Zone2_PCT731_Mod | Yes | 33 | Capertee Uplands,Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| | **Variation options** | | | | | |
| | Formation | Trading group | Zone | HBT | Credits | IBRA region |
| | Grassy Woodlands | Tier 2 or higher threat status | 731_Zone2_PCT731_Mod | Yes (including artificial) | 33 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| **1191-Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion** | **Like-for-like credit retirement options** | | | | | |
| | Class | Trading group | Zone | HBT | Credits | IBRA region |
| | Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone3_PCT1191_Mod | Yes | 87 | Capertee Uplands,Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

| | | | | | |
|---|---|---|---|---|---|
| Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone 4_PCT1191 _Rehab | No | 214 | Capertee Uplands,Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone 5_PCT1191 _Regr | No | 37 | Capertee Uplands,Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone 6_PCT1191 _PrCan | No | 5 | Capertee Uplands,Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone 7_PCT1191 _PrUnd | No | 0 | Capertee Uplands,Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

**Variation options**

| Formation | Trading group | Zone | HBT | Credits | IBRA region |
|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| | Grassy Woodlands | Tier 1 | 1191_Zone 3_PCT1191 _Mod | Yes (includi ng artificia l) | 87 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| | Grassy Woodlands | Tier 1 | 1191_Zone 4_PCT1191 _Rehab | No | 214 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| | Grassy Woodlands | Tier 1 | 1191_Zone 5_PCT1191 _Regr | No | 37 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| | Grassy Woodlands | Tier 1 | 1191_Zone 6_PCT1191 _PrCan | No | 5 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| | Grassy Woodlands | Tier 1 | 1191_Zone 7_PCT1191 _PrUnd | No | 0 | IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

## Species Credit Summary

| Species | Vegetation Zone/s | Area / Count | Credits |
|---|---|---|---|
| **Eucalyptus aggregata** / Black Gum | **1191_Zone5_PCT1191_Regr, 1191_Zone4_PCT1191_Rehab** | 32.0 | 64.00 |

| | | | |
|---|---|---|---|
| **Paralucia spinifera** / Purple Copper Butterfly, Bathurst Copper Butterfly | **731_Zone2_PCT731_Mod, 1191_Zone4_PCT1191_Rehab** | 0.2 | 8.00 |

## Credit Retirement Options

**Like-for-like options**

| | | | |
|---|---|---|---|
| **Eucalyptus aggregata**/ Black Gum | Spp | IBRA region | |
| | **Eucalyptus aggregata**/Black Gum | Any in NSW | |
| | **Variation options** | | |
| | Kingdom | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region |
| | Flora | Vulnerable | Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| **Paralucia spinifera**/ Purple Copper Butterfly, Bathurst Copper Butterfly | Spp | IBRA region | |
| | **Paralucia spinifera**/Purple Copper Butterfly, Bathurst Copper Butterfly | Any in NSW | |
| | **Variation options** | | |
| | Kingdom | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region |

| | | | |
|---|---|---|---|
| | Fauna | Endangered | Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

# BAM Biodiversity Credit Report (Like for like)

## Proposal Details

Assessment Id
00027298/BAAS19000/21/00027299

Proposal Name
WCS SSD 5579 MOD 4

BAM data last updated *
24/11/2021

Assessor Name
Hayden John Beck

Assessor Number
BAAS19000

BAM Data version *
50

Proponent Names

Report Created
26/11/2021

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Major Projects

Date Finalised
To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Potential Serious and Irreversible Impacts

| Name of threatened ecological community | Listing status | Name of Plant Community Type/ID |
|---|---|---|
| **Nil** | | |

| Species |
|---|
| **Nil** |

## Additional Information for Approval

PCTs With Customized Benchmarks

# BAM Biodiversity Credit Report (Like for like)

| PCT |
| --- |
| No Changes |

Predicted Threatened Species Not On Site

| Name |
| --- |
| **Grantiella picta /** Painted Honeyeater |

## Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

| Name of Plant Community Type/ID | Name of threatened ecological community | Area of impact | HBT Cr | No HBT Cr | Total credits to be retired |
| --- | --- | --- | --- | --- | --- |
| 335-Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion | Not a TEC | 0.9 | 0 | 0 | 0 |
| 731-Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion | Not a TEC | 0.9 | 33 | 0 | 33 |
| 1191-Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion | Not a TEC | 13.3 | 87 | 256 | 343 |

# BAM Biodiversity Credit Report (Like for like)

**335-Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion**

**Like-for-like credit retirement options**

| Class | Trading group | Zone | HBT | Credits | IBRA region |
|---|---|---|---|---|---|
| Inland Floodplain Swamps<br>This includes PCT's: 66, 204, 205, 335, 360, 447, 465, 1291 | Inland Floodplain Swamps >=70% and <90% | 335_Zone1_PCT335_Pr | No | 0 | Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

**731-Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion**

**Like-for-like credit retirement options**

| Class | Trading group | Zone | HBT | Credits | IBRA region |
|---|---|---|---|---|---|
| Southern Tableland Grassy Woodlands<br>This includes PCT's: 303, 312, 350, 654, 680, 703, 705, 731, 1103, 1330, 1334, 1501 | Southern Tableland Grassy Woodlands >=70% and <90% | 731_Zone2_PCT731_Mod | Yes | 33 | Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

# BAM Biodiversity Credit Report (Like for like)

**1191-Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion**

**Like-for-like credit retirement options**

| Class | Trading group | Zone | HBT | Credits | IBRA region |
|---|---|---|---|---|---|
| Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone3_PCT1191_Mod | Yes | 87 | Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone4_PCT1191_Rehab | No | 214 | Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone5_PCT1191_Regr | No | 37 | Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone6_PCT1191_PrCan | No | 5 | Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| | Subalpine Woodlands This includes PCT's: 677, 1191 | Subalpine Woodlands >=90% | 1191_Zone7_PCT1191_PrUnd | No | 0 | Capertee Uplands, Capertee Valley, Hill End, Inland Slopes and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| | | | | | | |

## Species Credit Summary

| Species | Vegetation Zone/s | Area / Count | Credits |
|---|---|---|---|
| **Eucalyptus aggregata** / Black Gum | **1191_Zone5_PCT1191_Regr, 1191_Zone4_PCT1191_Rehab** | 32.0 | 64.00 |
| **Paralucia spinifera** / Purple Copper Butterfly, Bathurst Copper Butterfly | **731_Zone2_PCT731_Mod, 1191_Zone4_PCT1191_Rehab** | 0.2 | 8.00 |

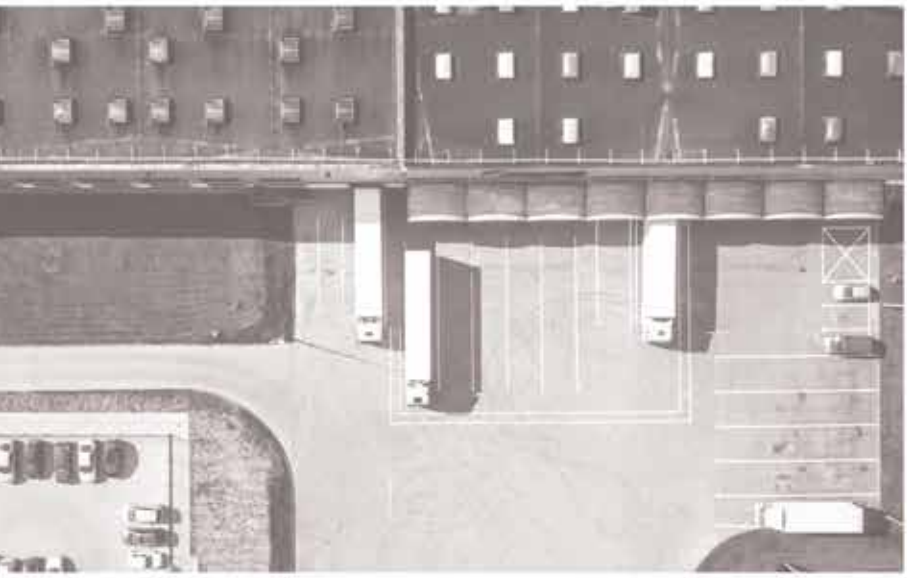
## Credit Retirement Options

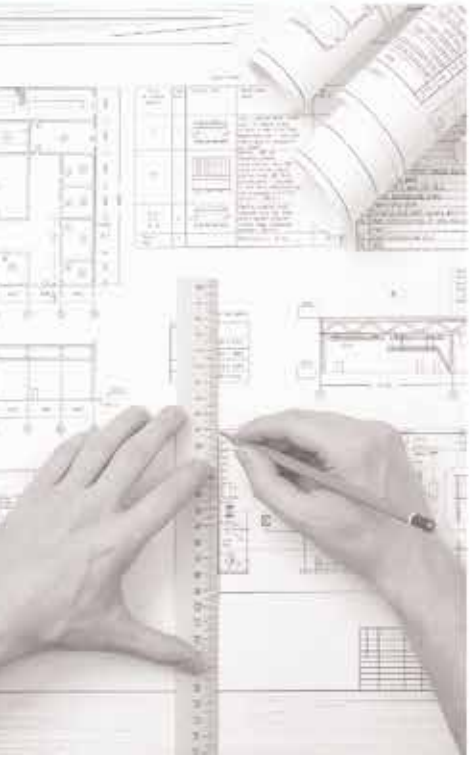
Like-for-like credit retirement options

| | | |
|---|---|---|
| **Eucalyptus aggregata** / Black Gum | Spp | IBRA subregion |
| | **Eucalyptus aggregata /** Black Gum | Any in NSW |
| **Paralucia spinifera** / Purple Copper Butterfly, Bathurst Copper Butterfly | Spp | IBRA subregion |
| | **Paralucia spinifera /** Purple Copper Butterfly, Bathurst Copper Butterfly | Any in NSW |

# Appendix F

## Traffic impact assessment





# Western Coal Services Project

Traffic impact assessment

Prepared for Springvale Coal Pty Ltd
December 2021

EMM Sydney
Ground floor, 20 Chandos Street
St Leonards NSW 2065

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# Western Coal Services Project

## Traffic impact assessment

**Report Number**

J190806 RP8

**Client**

Springvale Coal Pty Ltd

**Date**

3 December 2021

**Version**

v1 Final

| **Prepared by** | **Approved by** |
| --- | --- |
| | |
| **Baqir Husain**<br>Traffic Engineer<br>3 December 2021 | **Abdullah Uddin**<br>Associate Traffic Engineer<br>3 December 2021 |

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

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# Table of Contents


1 Introduction 1

1.1 Overview of the proposed modification 1

1.2 Background 3

1.3 Stakeholder engagement 6

2 Proposed modification 8

2.1 New SCSS Water Transfer System 8

2.2 Transfer of water to McPhillamys Gold Project 8

2.3 Transfer of water to MPPS 9

2.4 Receipt of water from Angus Place Colliery 9

2.5 Redesign of SCSS's water management system 9

3 Existing conditions 12

3.1 Road network 12

3.2 Site access intersection 16

3.3 Existing Castlereagh Highway traffic volumes 18

3.4 Crash analysis 18

3.5 Public transport 20

3.6 On-site parking 20

4 Traffic and parking 22

4.1 Construction traffic 22

4.2 Construction vehicles 23

4.3 Construction hours and duration 23

4.4 Construction workforce 23

4.5 Operational traffic and workforce 23

4.6 Traffic distribution 23

4.7 Car parking 24

5 Impact assessment 25

5.1 Intersection performance 25

5.2 Mid-block capacity analysis 25

5.3 Warrants for intersection turn treatments 25

5.4 Safety assessment 25

6 Conclusion 27

References 28

## Appendices

Appendix A TfNSW correspondence A.1

## Tables

Table 1.1 Comments from TfNSW and responses 6

Table 3.1 Castlereagh Highway – road geometry 14

Table 3.2 Site Access Road – road geometry 15

Table 3.3 Castlereagh Highway/Site Access Road intersection geometry 16

Table 4.1 Construction traffic schedule 22

## Figures

Figure 1.1 Regional context 2

Figure 1.2 Local context 5

Figure 2.1 Proposed modification elements 11

Figure 3.1 TfNSW road network classification 13

Figure 3.2 Site access intersection 17

Figure 3.3 AM and PM peak surveyed traffic volumes - 2019 18

Figure 3.4 Crash data between 2015 and 2019 19

Figure 3.5 Bus stop in vicinity of SCSS 21

## Plates

Plate 3.1 Castlereagh Highway (looking south) 14

Plate 3.2 Site Access Road (looking towards Castlereagh Highway) 15

Plate 3.3 Castlereagh Highway/Site Access Road intersection 16

# 1 Introduction

This traffic impact assessment (TIA) has been prepared in response to Transport for NSW's (TfNSW) letter (dated 14 July 2021) in relation to the proposed modification to SSD-5579 (Western Coal Services) (Appendix A). TfNSW's comments and EMM's responses to these are provided in Table 1.1.

The proposed modification will not generate any additional traffic during ongoing operations. All additional traffic (light and heavy vehicles) will be generated during construction activities at Springvale Coal Services Site (SCSS). As such, this TIA has undertaken a quantitative assessment during the construction stage only in accordance with *Guide to Traffic Generating Developments* (RTA 2002).

## 1.1 Overview of the proposed modification

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates Western Coal Services (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1.1).

WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine (SSD-5594), Angus Place Colliery (SSD 06_0021) and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Development Consent 08_0223). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (SSD-7592). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

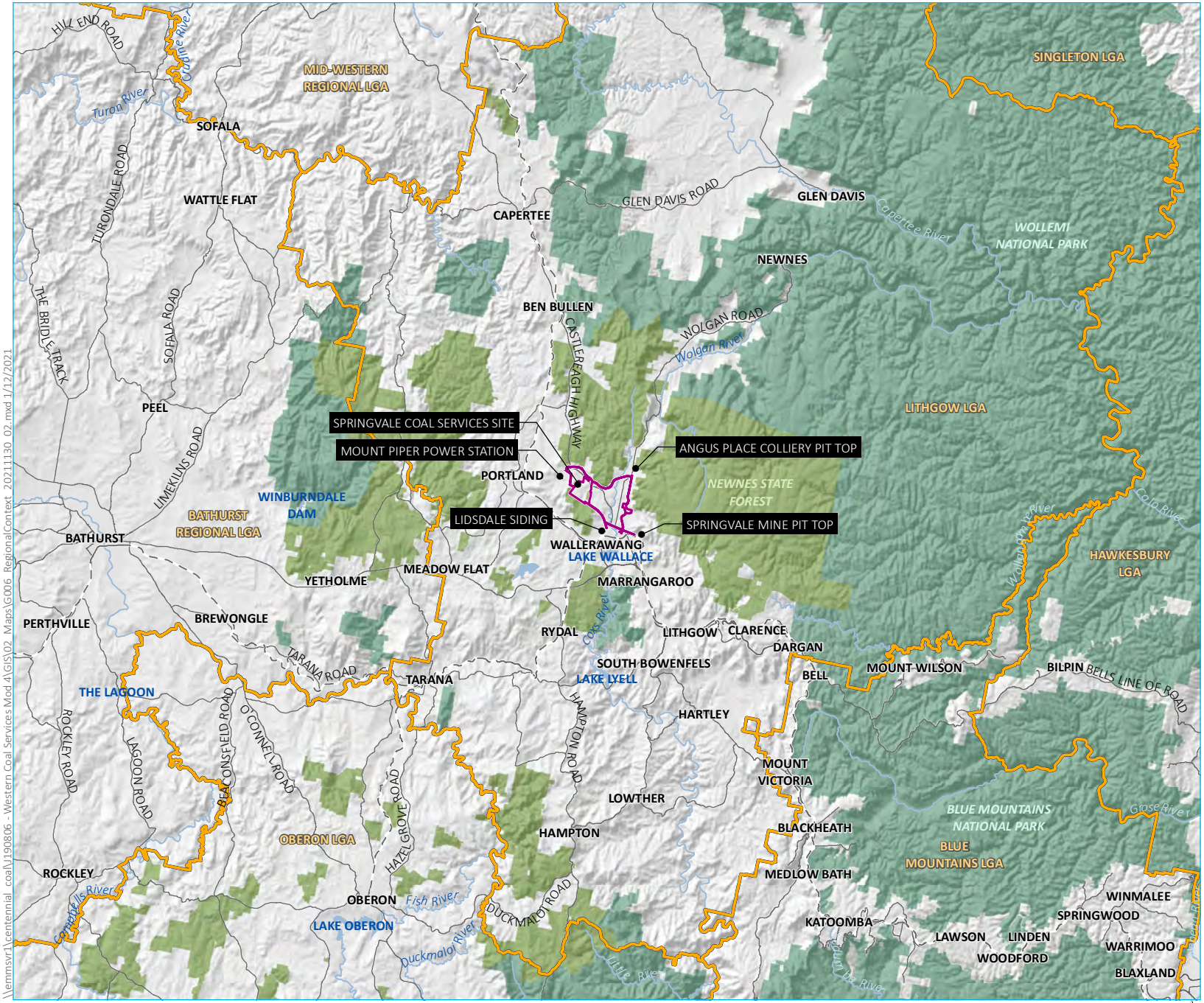
Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at SCSS, including:

- Centennial Angus Place Pty Limited (operators of Angus Place Colliery);
- Energy Australia (operators of MPPS); and
- Regis (proponents of McPhillamys Gold Project).

As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region. To facilitate the transfer of water to these operations, as well as the transfer of land back to Energy Australia, Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to change the existing water management system at SCSS to facilitate the transfer of water between WCS and other operations, and to improve the quality of water discharged to Wangcol Creek (herein referred to as the proposed modification).

The upgrade of the water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will require a minor increase to the project application area.



KEY

- Project application area (SSD-5579)
- Rail line
- Major road
- River
- Named waterbody
- NPWS reserve
- State forest
- Local government area

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2021); Centennial Coal (2021); DFSI (2017); GA (2011); ASGC (2006)

\\emmsvr1\centennial_coal\J190806 - Western Coal Services Mod 4\GIS\02_Maps\G006_RegionalContext_20211130_02.mxd 1/12/2021

# Regional context

Western Coal Services Project
Traffic Impact Assessment
Figure 1.1

EMM
creating opportunities

## 1.2 Background

### 1.2.1 Western Coal Services Project

The project application area for WCS is west of the Blue Mountains in the Lithgow LGA (Figure 1.1). Land uses within and surrounding the project application area vary and include industrial, mining, power generation, residential, agricultural and forestry uses. MPPS is immediately west of SCSS, whilst the locality of Blackmans Flat is east of SCSS (Figure 1.1). Pine Dale Coal Mine (currently in care and maintenance) is north of SCSS and sections of Ben Bullen State Forest are within the project application area to the south and north-east of SCSS (Figure 1.1).

WCS operations are spread across a number of sites (Figure 1.2). The main components are:

- Springvale Coal Services Site (SCSS) – a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP;
- Kerosene Vale Stockpile Area (KVSA) – a coal stockpile area approved under SSD-5579, but managed day-to-day by Angus Place Colliery;
- an overland conveyor system extending from Springvale Mine's pit top to Mount Piper Power Station (MPPS) via SCSS to Lidsdale Siding;
- Mount Piper Haul Road – extending from Angus Place Colliery's pit top to MPPS;
- Wallerawang Haul Road – extending from Angus Place Colliery's pit top to Wallerawang Power Station;
- Link Haul Road – a private road to be constructed between the Mount Piper Haul Road and SCSS; and
- a residual waste stream pipeline – transferring residual waste material from SWTP to SCSS.

### 1.2.2 Springvale Coal Services Site water management system

The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek (Figure 1.2). Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

The primary objectives of the water management system at SCSS are to:

- provide a secure water supply for coal washing, washdown and dust suppression (including haul roads and coal stockpiles); and
- control the quantity and quality of water discharged into Wangcol Creek via LDP001.

The discharge of untreated groundwater into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted extensively with NSW Environment Protection Authority (EPA) regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek.

### 1.2.3 Springvale Water Treatment Plant

The SWTP (SSD-7592) involves the transfer and treatment of water from existing underground mine dewatering facilities at Springvale Mine and Angus Place Colliery for beneficial reuse at MPPS. It was initiated to improve environmental outcomes for the Coxs River catchment (ie by eliminating mine water discharges at Springvale Mine and Angus Place Colliery).

### 1.2.4 McPhillamys Gold Project (SSD-9505)

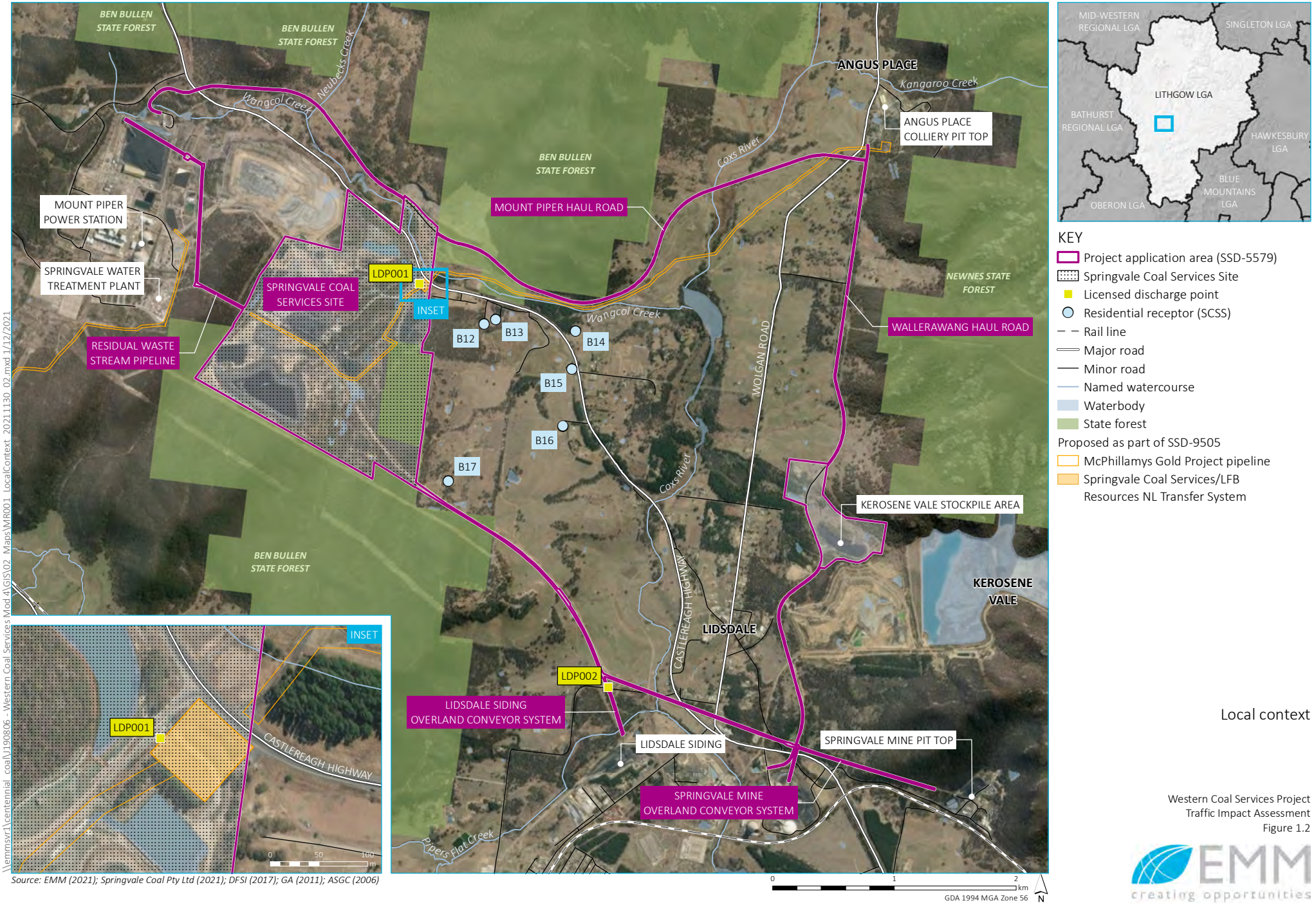
Regis is seeking development consent for the construction and operation of the McPhillamys Gold Project (SSD-9505). This is a proposed greenfield open cut gold mine and associated water supply pipeline in the Central West of NSW. The project comprises two key components:

- the mine site where the ore will be extracted and processed; and
- an associated water pipeline which will enable the supply water from near Lithgow to the mine site.

As part of the project, Regis proposes to construct a water pipeline to transfer water from three existing operations to supply water for the gold mine's operations. The water for the project (if approved and constructed) would be supplied from the following sources:

- untreated mine water currently discharged from SCSS through LDP001 to Wangcol Creek;
- process and blowdown water from MPPS; and
- untreated mine water from Angus Place Colliery.

As part of the development application for the McPhillamys Gold Project, Regis is seeking approval to construct and operate a pumping station and storage tank close to SCSS that will be used to transfer water from SCSS to the water pipeline (Springvale Coal Services/Regis transfer system on Figure 2.1).







KEY

- Project application area (SSD-5579)
- Springvale Coal Services Site
- Licensed discharge point
- Residential receptor (SCSS)
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- State forest

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline
- Springvale Coal Services/LFB Resources NL Transfer System

Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)

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# Local context

Western Coal Services Project
Traffic Impact Assessment
Figure 1.2

EMM creating opportunities

## 1.3 Stakeholder engagement

Springvale Coal submitted a letter to TfNSW (dated 18 June 2021) describing the proposed modification. TfNSW responded to this letter on 14 July 2021 and provided comments on the proposed assessment approach with regards to traffic and transport. TfNSW's comments and EMM's responses are provided in Table 1.1.

**Table 1.1 Comments from TfNSW and responses**

| Item number | Comments from TfNSW | Response |
|---|---|---|
| From a review of the information submitted, it appears that the additional disturbance footprint will be located very close to the Castlereagh Highway.<br>In order to determine any impacts on the classified road network as a result of the modification, it is requested that the modification application documentation address the following within a Traffic Impact Assessment: | | |
| 1 | Details of any physical works proposed in or in the vicinity of the Castlereagh Highway road reserve. | The proposed modification will not impact the Castlereagh Highway road reserve. The physical works to the road reserve will be approximately 50 m from the road reserve at their closest point, and are associated with the construction of a bidirectional pipeline between MPPS and SCSS. |
| 2 | Quantification of the construction and operational traffic expected to be generated by the modification, including categorisation into light and heavy vehicles, for both daily traffic and peak hour traffic. | The highest number of daily vehicles will occur at DWP-A and DWP-B, with up to 14 light vehicles (28 daily light vehicle movements), up to 6 heavy vehicles delivering construction materials (12 daily heavy vehicle movements) and up to 11 heavy construction vehicles that will remain on the site over multiple days (11 daily heavy vehicle movements). Therefore, there will be up to 51 daily traffic movements will be (28 light vehicle movements and 23 heavy vehicle movements). It has been conservatively assumed that all vehicles will enter or leave the site in the morning or afternoon peak hour.<br>The proposed modification will not generate additional light or heavy vehicle movements during the ongoing operation of SCSS. |
| 3 | Consideration of the impact of the traffic generated by the modification on the local road network including key affected intersections. This is to include consideration of capacity, geometry and safety. | The proposed modification will generate a maximum of 51 daily traffic movements (28 light vehicle movements and 23 heavy vehicle movements). This number of vehicles will only be generated if DWP-A and DWP-B are constructed concurrently.<br>All vehicles associated with the proposed modification only require temporary access to SCSS over the approximately 23-month construction period.<br>Due to the low volumes of construction traffic associated with the the proposed modification, impacts on the performance of the site access intersection and capacity along the Castlereagh Highway will be minimal. |
| 4 | Inclusion of the changes to the design vehicle or staff numbers. | The proposed modification will not result in an increase to the number of staff permanently based at SCSS.<br>During construction, it is anticipated that the majority of the additional workers required will be contractors that are already mobilised by SCSS and regularly form part of the maintenance and servicing requirements associated with existing operations. The peak construction workforce is anticipated to be 22 employees with an average of 15 employees. |

## Table 1.1 Comments from TfNSW and responses

| Item number | Comments from TfNSW | Response |
|---|---|---|
| 5 | Changes to any haulage or transportation routes for staff or heavy vehicles required as a part of the modification. | No changes to the existing site access intersection for SCSS are required as part of the proposed modification.<br>Light and heavy vehicles will continue to access SCSS directly from the Castlereagh Highway. The primary off-site transportation route will continue to be a combination of Castlereagh Highway and Great Western Highway. The proposed modification is not seeking to change approved annual coal handling and processing limits under SSD-5579.<br>On-site vehicle movements at SCSS may change temporarily during construction. Site access arrangements during construction will be managed through a Construction Traffic Management Plan, which will include details of any temporary changes to the internal road network at SCSS. |
| 6 | Any additional oversize/overmass vehicles that are proposed as a part of the modification. | No additional oversize or overmass vehicles will need to access SCSS as part of the proposed modification. |
| 7 | Number of heavy vehicle and light vehicle movements anticipated at the AM and PM peak entering the site from the classified road network per an hour. | The proposed modification will generate a maximum of 51 daily traffic movements (28 light vehicle movements and 23 heavy vehicle movements). This number of vehicles will only be generated if DWP-A and DWP-B are constructed concurrently. It has been conservatively assumed that all vehicles will enter or leave the site in the morning or afternoon peak hour.<br>A breakdown of vehicle movements associated with the proposed modification is provided in Table 4.1. |
| 8 | Any proposed access via level crossing or any work within the rail corridor required as a part of modification 4. | No works are required within the designated rail corridor as part of the proposed modification.<br>Due to their low volume in comparison to existing vehicle numbers on the local and regional road network, the additional light and heavy vehicle movements during construction are not expected to have a significant impact on the delay experienced at any level crossings. |
| 9 | An assessment of the existing approved workforce, the cumulative work force and the difference between the existing and proposed workforce. | SSD-5579 provides for the employment of 25 full-time equivalent (FTE) personnel at SCSS. In addition, contractors are also on-site daily (as required). The proposed modification will not result in an increase to the number of staff permanently based at SCSS.<br>During construction, it is anticipated that the majority of the additional workers required will be contractors that are already mobilised by SCSS and regularly form part of the maintenance and servicing requirements associated with existing operations. The peak construction workforce is anticipated to be 22 employees with an average of 15 employees. |

# 2 Proposed modification

Springvale Coal proposes to modify SSD-5579 to allow:

- construction and operation of the SCSS Water Transfer System, consisting of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001;
- transfer of water from the SCSS Water Transfer System:
  - to the SCSS/Regis Transfer System for use at the McPhillamys Gold Mine;
  - to MPPS for treatment and reuse within the MPPS cooling water system;
- receipt of raw water from the Angus Place Water Transfer System for use in the coal preparation plant at SCSS;
- changes to the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and to improve the quality of water discharged to Wangcol Creek;
- an increase in the capacity of the Washery Dam at SCSS; and
- administrative changes to Condition 45 of Schedule 3 of SSD-5579 to align with amendments to the NSW *Mining Act 1992* and NSW Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021 (Mining Amendment Regulation).

The key components of WCS and the proposed modification are shown on Figure 1.2 and Figure 2.1.

The upgrade of the water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will require a minor increase to the project application area.

It is not proposed to modify the approved handling, processing or transport operations, the limits on these activities, or the project life.

## 2.1 New SCSS Water Transfer System

The SCSS Water Transfer System will include the construction of a transfer pit, pumps, valves, transformer and motor control centre upstream of LDP001. This infrastructure will be constructed on disturbed land adjacent to the proposed Springvale Coal Services/Regis transfer system (Figure 2.1).

## 2.2 Transfer of water to McPhillamys Gold Project

The SCSS Water Transfer System will be used to transfer up to 15.6 ML/day of water from SCSS to the proposed Springvale Coal Services/Regis transfer system (Figure 2.1). The transfer systems will facilitate the transfer of water to the proposed water pipeline (Figure 1.2) and will enable the supply of water from SCSS to the McPhillamys Gold Project.

As well as supplying water to the McPhillamys Gold Mine, the proposed modification will reduce, and potentially at times remove, the need to discharge poor quality water from LDP001 to Wangcol Creek. If the gold mine and associated water transfer system are not approved/do not proceed, discharges from LDP001 to Wangcol Creek will continue.

## 2.3 Transfer of water to MPPS

It is proposed to transfer up to 2.6 ML/day of water from the SCSS Water Transfer System at SCSS to MPPS for treatment and reuse. This water is currently discharged through LDP001. This will generally reduce the volume of water discharged through LDP001 and provide spare capacity to discharge water from LDP001 under non-routine water management conditions.

Water transferred to MPPS will be temporarily stored within Pond D at MPPS prior to treatment within MPPS's brine concentrators (Figure 2.1). Permeate from the water treatment process will be transferred to MPPS's cooling water system with brine used to condition ash prior to emplacement within MPPS's ash emplacement areas.

The temporary storage of water within Pond D, treatment of water within MPPS's brine concentrators, transfer of permeate to MPPS's cooling water system and management of brine will require a modification to the development consent for SWTP (SSD-7592).

This aspect of the proposed modification is subject to the successful conclusion of ongoing commercial discussions between Springvale Coal and Energy Australia.

## 2.4 Receipt of water from Angus Place Colliery

An offtake from the Angus Place Colliery Raw Water Pipeline will be constructed. Once constructed, the offtake will allow up to 2.6 ML/day of water from Angus Place Colliery to be used to supplement the washery water supply at SCSS.

Water from Angus Place Colliery is of a higher quality than water currently used on-site at SCSS. The receipt of water from Angus Place Colliery and its use in coal handling and preparation activities at SCSS is expected to improve the quality of water managed within the reject emplacement area (REA) and discharged from LDP001, as this water will be blended with water currently used on-site.

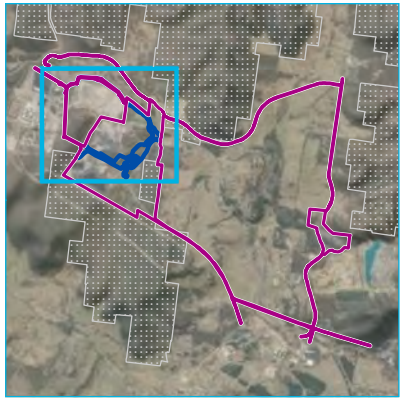
## 2.5 Redesign of SCSS's water management system

The proposed modification to SSD-5579 includes redesign of SCSS's water management system, including:

- Transfer of approximately 50.6 ha of the existing surface water catchment at SCSS to EnergyAustralia as part of the transfer of land from Springvale Coal back to EnergyAustralia. As a result, management of SHG1, H Pit East, H Pit West and Council Pit will be transferred to EnergyAustralia.
- Construction and operation of the Huon Clean Water Pond, which will intercept the clean water catchment of Huon Gully upstream of SHG1 and transfer it to Wangcol Creek via the Lamberts Gully clean water diversion.
- Construction and operation of two new dirty water ponds:
  - DWP-A will be constructed downslope and to the north of the Huon Clean Water Pond to capture dirty water from the coal conveyor corridor and prevent runoff flowing north onto EnergyAustralia's land.
  - DWP-B will be constructed upstream of Cooks Dam and will provide additional dirty water storage capacity at SCSS.
- Extension of the dewatering pipeline from the Transfer Tower 3 or TT03 sump to DWP-A.

- Construction and operation of a bi-directional pipeline between SCSS and MPPS. The pipeline will facilitate the proposed transfer of water to MPPS.
- Construction and operation of an offtake from the Angus Place Colliery Raw Water Pipeline to facilitate the proposed transfer of water from Angus Place Colliery to SCSS.
- Construction and operation of associated pumping, pipelines and drainage channels.
- Increase the capacity of the Washery Dam to 6.1 ML. The material excavated from the Washery Dam during desilting and maintenance works will be utilised on-site at SCSS as part of ongoing rehabilitation works.

Key elements of the proposed modification are labelled on Figure 2.1.



KEY

- Proposed project application area
- Construction envelope
- Springvale Coal Services Site
- Licensed discharge point
- Mt Piper Power Station Pond D
- Surface water catchment to be managed by Energy Australia

Proposed modification elements

- Bidirectional pipeline
- Offtake from Angus Place Raw Water Pipeline Project
- General flow direction
- Huon Clean Water Pond
- DWP-A
- DWP-B

Proposed modification area

- Regis and EnergyAustralia water transfer system area
- DWP-B area
- Angus Place water offtake and transfer system area
- DWP-A and clean water diversion area

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline easement
- Springvale Coal Services Site/Regis Transfer System

Existing environment

- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- State forest

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*Source: EMM (2021); Springvale Coal Pty Ltd (2021); ESRI (2021); DFSI (2017); GA (2011)*

0 250 500 m

GDA 1994 MGA Zone 56

N

## Proposed modification elements

Western Coal Services Project
Traffic Impact Assessment
Figure 2.1

EMM creating opportunities

# 3 Existing conditions

## 3.1 Road network

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy as follows:

- State roads – freeways and primary arterials (TfNSW managed);
- regional roads – secondary or sub arterials (managed by local council and part funded by the State); and
- local roads – collector and local access roads (managed by local council).

Key roads in the vicinity of SCSS are Castlereagh Highway and Site Access Road (Figure 3.1). Road geometry is provided in Table 3.1 (Castlereagh Highway) and Table 3.2 (Site Access Road).

The Site Access Road is a private road, despite Figure 3.1 showing it as a council-controlled local road. A number of local roads identified in Figure 3.1 are also on privately-owned land and unlikely to be managed by local council.

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*Source: EMM (2021); TfNSW (2021); DFSI (2017)*

TfNSW road network classifications

Western Coal Services Project
Traffic Impact Assessment
Figure 3.1

EMM
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## Table 3.1 Castlereagh Highway – road geometry

| Aspect | Description |
|---|---|
| Road classification and connectivity | State road between Golden Highway, Birriwa (north) and Great Western Highway (south). |
| Alignment | North-south at the vicinity of SCSS. |
| Number of lanes | One lane each way, excluding near intersections (Plate 3.1). |
| Carriageway type | Sealed road with shoulders (Plate 3.1). |
| Carriageway width | Varies, approximately 11.5 m with 3.5 m travel lane each way. |
| Posted speed limit | 100 kilometres per hour (km/h). |
| Heavy vehicle access | Yes, up to 26 m B-doubles. |
| Traffic function | Carries local and regional traffic. |
| Additional comments | Access to SCSS is provided via Castlereagh Highway. |

## Plate 3.1 Castlereagh Highway (looking south)

Source: Google (2021).

## Table 3.2 Site Access Road – road geometry

| Aspect | Description |
|---|---|
| Road classification and connectivity | Private road between Castlereagh Highway (north) and SCSS (south). |
| Alignment | North-east to south-west. |
| Number of lanes | One lane each way, no lane markings. |
| Carriageway type | Short length of sealed road from Castlereagh Highway (Plate 3.2) before unsealed on approach to SCSS. |
| Carriageway width | Varies, approximately 7 m to 11 m. |
| Posted speed limit | 40 kilometres per hour (km/h). |
| Heavy vehicle access | Yes, up to 26 m low loader. |
| Traffic function | Carries site related traffic. |
| Additional comments | Public throughfare is generally restricted. |

## Plate 3.2 Site Access Road (looking towards Castlereagh Highway)

Source: Springvale Coal (2021).

## 3.2 Site access intersection

The site access intersection is at Blackmans Flat, approximately 2.5 km east of MPPS. The intersection is a T-intersection with the Site Access Road on give-way control. The intersection of Castlereagh Highway and the Site Access Road (Figure 3.2) will experience additional vehicle movements as a result of the proposed modification. The intersection geometry is described in Table 3.3**Error! Reference source not found.**.

**Table 3.3 Castlereagh Highway/Site Access Road intersection geometry**

| Aspect | Description |
|---|---|
| Intersection control | Give-way intersection. |
| Major road | Castlereagh Highway. |
| North-west approach | One lane each direction, additional lanes in each direction in accordance with Austroads auxiliary right turn (AUR) and auxiliary left turn (AUL) treatments. |
| South-east approach | One lane each direction, additional lanes in each direction due to AUR and AUL turn treatments. |
| South-west approach | One lane each direction, no lane marking at present. |
| Pedestrian connectivity | Pedestrian connectivity is not provided on any approach. |
| Traffic function | Predominantly carries regional and local traffic. |
| Speed limit | 100 km/h on Castlereagh Highway approaches, 40 km/hour on Site Access Road approach. |

**Plate 3.3 Castlereagh Highway/Site Access Road intersection**

Source: SIX Maps (2021).

KEY

- Site access intersection
- Project application area (SSD-5579)
- Springvale Coal Services Site
- Major road
- Minor road
- Vehicular track
- Named watercourse
- State forest

\\emmsvr1\centennial coal\J190806 - Western Coal Services Mod 4\GIS\02 Maps\TIA002 RoadIntersection 20211202 02.mxd 3/12/2021

Source: EMM (2021); DFSI (2017)

0 100 200 m

GDA 1994 MGA Zone 56

N

Site access intersection

Western Coal Services Project
Traffic impact assessment
Figure 3.2

EMM
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## 3.3 Existing Castlereagh Highway traffic volumes

Traffic volumes on Castlereagh Highway have been determined from *Western Coal Services Project Modification 2 Traffic Impact Assessment* prepared by Arc Traffic + Transport (2017). The report presents seven day average daily traffic (ADT) flow and average weekday traffic (AWT) flow on Castlereagh Highway, south-east of Main Street for the year 2015 which is approximately 5 km south of the site access intersection. The surveys indicated seven day ADT flows of 5,500 vehicles per day (vpd) and AWT flows of 5,800 vpd.

The nearest intersection counts available in the vicinity of SCSS are at Castlereagh Highway/Wolgan Road/Main Street intersection as presented in the *Angus Place Mine Extension Project Amendment Report – Traffic Impact Assessment* (EMM Consulting 2019). The intersection is approximately 5 km south of the site access intersection. The intersection counts were conducted in August 2019 and the survey results indicated the following peak hours:

- AM peak hour: 6 am to 7 am; and
- PM peak hour: 3:45 pm to 4:45 pm.

The AM and PM peak hour traffic volumes for the intersection are summarised in Figure 3.3. The traffic data is approximately two years old and is still valid in the context of this report.

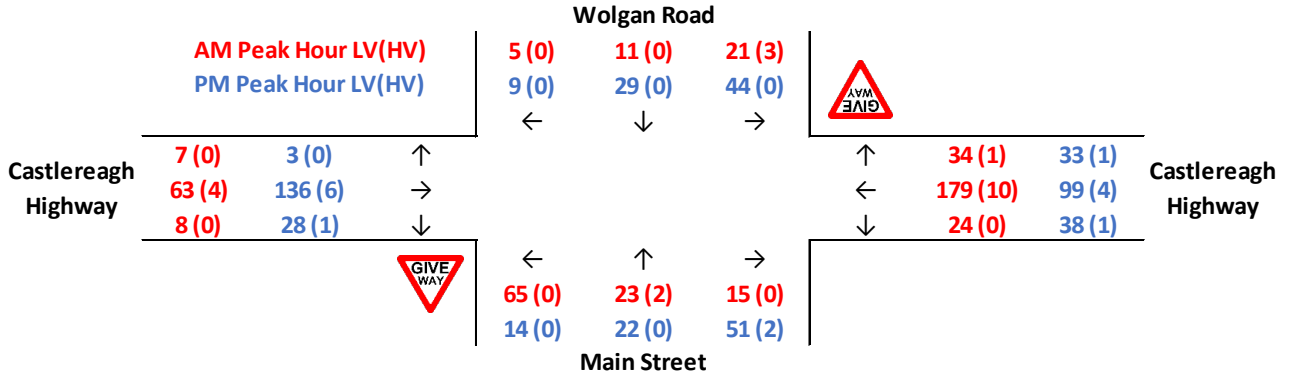


**Figure 3.3 AM and PM peak surveyed traffic volumes - 2019**

The peak hour traffic volumes on Castlereagh Highway for the northbound and southbound directions are:

- northbound AM peak - 259 vehicles;
- northbound PM peak - 126 vehicles;
- southbound AM peak - 106 vehicles; and
- southbound PM peak - 239 vehicles.

## 3.4 Crash analysis

Crash data from TfNSW Centre for Road Safety interactive history database for the five years between 2015 and 2019 has been studied in the vicinity of SCSS and is presented in Figure 3.4. The crashes are categorised based on the severity of the crashes and include fatal; serious injury; moderate injury; minor/other injury; or non-casualty (eg towaway).

KEY

- Project application area (SSD-5579)
- Springvale Coal Services Site
- Major road
- Minor road
- Vehicular track
- Named watercourse
- State forest

Crash history

- Serious injury
- Moderate injury
- Non-casualty (tow-away)

Crash data between 2015 and 2019

\\emmsvr1\centennial coal\J190806 - Western Coal Services Mod 4\GIS\02 Maps\TIA003 CrashHistory 20211202 02.mxd 3/12/2021

Source: EMM (2021); TfNSW (2021); DFSI (2017)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

Western Coal Services Project
Traffic impact assessment
Figure 3.4

EMM creating opportunities

Overall, there were 5 crashes on Castlereagh Highway with all crashes taking place north of the site access intersection. These crashes included the following severity:

- one serious injury;
- one moderate injury; and
- three non-casualty (towaway).

There were no fatal incidents. There were a total of four individuals injured with three of the crashes being off-road type crashes. The overall crash rate on the local road network is considered low over the assessed 5-year period, indicating there are no current road safety issues within the vicinity of SCSS.

## 3.5 Public transport

Regional trains travelling to/from Dubbo-Sydney Central stop at Lithgow and Rydal, which are both within approximately 20 km of SCSS. A private bus service travels along the Castlereagh Highway passing through site access intersection. Bus route no. 600 operates between Lithgow to Portland via Wallerawang and is a loop service. The closest bus stop is 1.6 km south of the site access intersection on Castlereagh Highway (Figure 3.5). Trains and bus services are not considered viable transport modes to travel to SCSS.

## 3.6 On-site parking

On-site parking at SCSS has capacity to accommodate up to 50 vehicles. The existing peak demand is estimated to be at 25 parking spaces. The car park provides a road base/gravel surface. There are no line-marked parking spaces.

KEY

- Bus stop
- Project application area (SSD-5579)
- Springvale Coal Services Site
- Major road
- Minor road
- Vehicular track
- Named watercourse
- State forest

\\emmsvr1\centennial coal\J190806 - Western Coal Services Mod 4\GIS\02 Maps\TIA004 BusStop 20211202 02.mxd 3/12/2021

*Source: EMM (2021); DFSI (2017)*

Bus stop in vicinity of SCSS

Western Coal Services Project
Traffic impact assessment
Figure 3.5

EMM
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# 4 Traffic and parking

## 4.1 Construction traffic

Construction activities associated with the proposed modification will be separated across three areas:

- DWP-A and DWP-B (including construction activities within the DWP-A and clean water diversion area and DWP-B area on Figure 2.1).
- Cooks Dam to Pond-D transfer (including construction activities within the Regis and EnergyAustralia water transfer systems area on Figure 2.1); and
- Angus Place offtake (including construction activities within the Angus Place water offtake and transfer system area on Figure 2.1).

Construction in each area will occur at separate times (ie construction will not occur simultaneously in two/three areas). Construction traffic associated with these areas is shown in Table 4.1.

**Table 4.1 Construction traffic schedule**

| Project area | Vehicle type | Total light vehicles | Total heavy vehicles | Daily access/egress[1] | AM peak movements | PM peak movements |
|---|---|---|---|---|---|---|
| DWP-A and DWP-B | Light vehicle | 14 | - | Yes | 14 | 14 |
| | Heavy vehicle (delivery) | - | 6 | Yes | 12 | 0 |
| | Heavy vehicle (construction) | - | 11 | No | 11 (mobilisation) | 11 (demobilisation) |
| **Maximum** | | **14** | **17** | | **37** | **25** |
| Cooks Dam to Pond-D Transfer | Light vehicle | 11 | - | Yes | 11 | 11 |
| | Heavy vehicle (delivery) | - | 4 | Yes | 8 | 0 |
| | Heavy vehicle (construction) | - | 4 | No | 4 (mobilisation) | 4 (demobilisation) |
| **Maximum** | | **11** | **8** | | **23** | **15** |
| Angus Place offtake | Light vehicle | 11 | - | Yes | 11 | 11 |
| | Heavy vehicle (delivery) | - | 6 | Yes | 12 | 0 |
| | Heavy vehicle (construction) | - | 6 | No | 6 (mobilisation) | 6 (demobilisation) |
| **Maximum** | | **11** | **12** | | **29** | **17** |

1. Construction personnel light vehicles and delivery heavy vehicles will enter and leave the site on the same day while heavy construction vehicles remain on the site over multiple days.

The highest number of daily vehicles will occur at DWP-A and DWP-B, with up to 14 light vehicles (28 daily light vehicle movements), up to 6 heavy vehicles delivering construction materials (12 daily heavy vehicle movements) and up to 11 heavy construction vehicles that will remain on the site over multiple days (11 daily heavy vehicle movements). Therefore, there will be up to 51 daily traffic movements (28 light vehicle movements and 23 heavy vehicle movements). It has been conservatively assumed that all vehicles will enter or leave the site in the morning or afternoon peak hour.

Heavy vehicles making daily access/egress to/from SCSS will be involved in material deliveries (such as pipes or concrete pours). Once deliveries are made, these vehicles will depart as soon as possible and not in the PM peak.

## 4.2 Construction vehicles

A variety of construction vehicles will require access to SCSS including utes, excavators, concrete pump trucks, franna crane, graders, front end loaders, mixer trucks, water trucks, compaction rollers etc.

The construction vehicles required at SCSS as a result of the proposed modification will be consistent with the types of vehicles already accessing SCSS as part of ongoing operations.

The longest vehicle requiring access to SCSS as part of proposed modification will be a 26-m-long low loader truck (including 6-m truck, 16-m float/low loader and 4-m dolly).

There will be no oversize or overmass vehicle deliveries to SCSS as part of the proposed modification.

## 4.3 Construction hours and duration

Construction activities associated with the proposed modification are anticipated to take approximately 23 months. Construction hours will be limited to 7 am to 6 pm on weekdays and 8 am to 1 pm on Saturday. There will be no construction activities on Sundays or public holidays.

## 4.4 Construction workforce

The construction workforce will average at 15 workers, increasing to approximately 22 workers during the peak construction period. Construction workers will travel to SCSS in personal vehicles or small crew buses.

The peak construction workforce will include some hired labour already working at SCSS as part of existing washery and reject management contracts and will roll over to the new construction areas.

## 4.5 Operational traffic and workforce

There will be no operational traffic generated as part of the proposed modification. There will be no increase in the operational workforce at SCSS as part of the proposed modification.

## 4.6 Traffic distribution

No changes to haulage or transportation routes for light or heavy vehicles are required as part of the proposed modification.

Changes to internal traffic routing of light and heavy vehicles may be required on-site at SCSS during construction. This will be managed via the construction environmental management plan (CEMP) and on-site traffic controls.

## 4.7 Car parking

The proposed modification does not include provision of new parking spaces. As noted in Section 4.1, during construction, a maximum of an additional 14 staff vehicles will be required at SCSS at any one time.

The existing car park at SCSS has capacity to accommodate up to 50 light vehicles and existing SCSS activities generate a peak parking demand of 25 light vehicles. The existing car park has ample capacity to accommodate additional parking demand during construction.

# 5 Impact assessment

## 5.1 Intersection performance

The proposed modification is expected to generate low hourly construction volumes (up to 37 movements in the morning peak and up to 25 movements in the afternoon peak during mobilisation/demobilisation). The low volumes of construction traffic are unlikely to have any noticeable impact on the Castlereagh Highway or the site access intersection. Therefore, traffic modelling was not considered warranted.

## 5.2 Mid-block capacity analysis

Average weekday traffic flow on Castlereagh Highway is approximately 5,800 vehicles per day and the proposed modification is expected to generate a maximum of 51 daily movements (<1% of total flow). Therefore, construction traffic associated with the proposed modification will not affect the capacity of Castlereagh Highway.

## 5.3 Warrants for intersection turn treatments

The existing site access intersection configuration incorporates AUL and AUR turn treatments (Plate 3.3). The low volumes of hourly or daily construction volumes associated with the proposed modification are unlikely to cause any safety, delay or capacity issues at this intersection.

## 5.4 Safety assessment

The site access intersection has a reasonably straight geometry with adequate sight distances to the left and right to allow safe turns (Photograph 5.1 and Photograph 5.2). Therefore, there are no safety or sight distance issues.

**Photograph 5.1 Sight distance at the site access intersection (looking left)**

**Photograph 5.2 Sight distance at the site access intersection (looking right)**

# 6 Conclusion

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to change the existing water management system at SCSS to facilitate the transfer of water between WCS and other operations, and to improve the quality of water discharged to Wangcol Creek.

Construction activities at SCSS will occur over 23 months with an average construction workforce of 15 and a peak construction workforce of 22. No changes to the operational workforce at SCSS are required.

The proposed modification will generate a maximum of 51 daily traffic movements (28 light vehicle movements and 23 heavy vehicle movements). This number of vehicles will only be generated if DWP-A and DWP-B are constructed concurrently.

Due to the low volumes of construction traffic associated with the the proposed modification, impacts on the performance of the site access intersection and capacity along the Castlereagh Highway will be minimal. Sight distance visibility at the site access intersection is adequate, with no safety or sight distance issues identified.

Traffic generated during construction activities associated with the proposed modification will not have any significant impacts on the local road network and no additional traffic will be generated during operations.

No mitigation works or road infrastructure upgrades are warranted as a result of the proposed modification.

# References

ARC Traffic + Transport 2017, *Western Coal Services Project Modification 2 Traffic Impact Assessment*.

Austroads 2017, *Guide to Road Design Part 4A: Unsignalised & Signalised Intersections.*

- 2016, Guide to Traffic Management Part 3: Traffic Studies and Analysis.

EMM Consulting 2019, *Angus Place Mine Extension Project – Amendment Report – Traffic Impact Assessment*.

RTA 2002. *Guide to Traffic Generating Developments.*

Appendix A

# TfNSW correspondence

14/07/2021

Mr Iain Hornshaw
Approvals Manager
Centennial Coal Company Pty Limited
Level 18, 1 Market Street
SYDNEY NSW 2000

Dear Mr Hornshaw

**Proposed Modification to SSD-5579 (Western Coal Service Project)**
**Aspects of Western Coal Services (WCS) Project Water Management**

Thank you for your letter dated 18 June 2021 notifying Transport for NSW (TfNSW) of the proposed modification to SSD-5579 (Western Coal Services Project). It is understood that the proposed modification will modify aspects of WCS water management including:

- construction and operation of the Springvale Coal Services Site (SCSS) Water Transfer System (to facilitate the transfer of water from SCSS to the Springvale Coal Services/LFB Resources NL transfer system);
- transfer of water from the SCSS Water Transfer System to the Springvale Coal Services/LFB Resources NL transfer system (for use at the McPhillamy's Gold Mine);
- transfer of water from SCSS to MPPS (for treatment and reuse within the MPPS cooling water system);
- receipt of raw water from the Angus Place Water Transfer System (for use in the coal handling and preparation plant at SCSS); and
- redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and improve the quality of water discharged to Wangcol Creek.
- The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the project application area.

From a review of the information submitted, it appears that the additional disturbance footprint will be located very close to the Castlereagh Highway. In order to determine any impacts on the classified road network as a result of the modification, it is requested that the modification application documentation address the following within a Traffic Impact Assessment:

- Details of any physical works proposed in or in the vicinity of the Castlereagh Highway road reserve.
- Quantification of the construction and operational traffic expected to be generated by the modification, including categorisation into light and heavy vehicles, for both daily traffic and peak hour traffic.
- Consideration of the impact of the traffic generated by the modification on the local road network including key affected intersections. This is to include consideration of capacity, geometry and safety.
- Inclusion of the changes to the design vehicle or staff numbers.
- Changes to any haulage or transportation routes for staff or heavy vehicles required as a part of the modification.
- Any additional oversize/overmass vehicles that are proposed as a part of the modification.
- Number of heavy vehicle and light vehicle movements anticipated at the AM and PM peak entering the site from the classified road network per an hour.
- Any proposed access via level crossing or any work within the rail corridor required as a part of modification 4.
- An assessment of the existing approved workforce, the cumulative work force and the difference between the existing and proposed workforce.

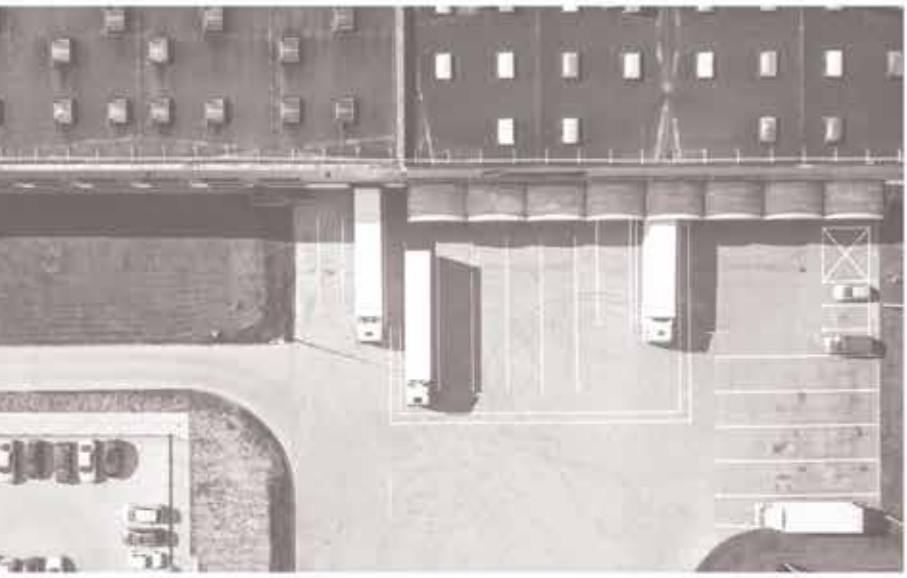
If you wish to discuss this matter further, please contact Alexandra Power on 02 6861 1428.

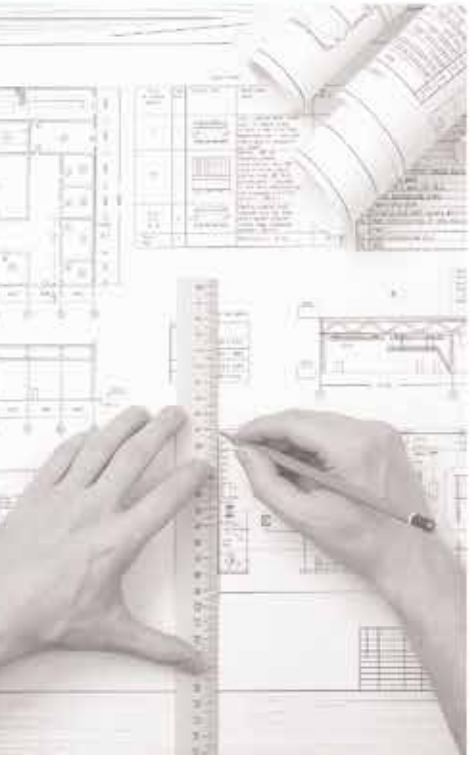
Yours faithfully

**Alexandra Power**
**Team Leader Development Services**
**Development Services West**
**Regional and Outer Metropolitan**

# Appendix G

## Revised schedule of land





## Table G.1 Revised schedule of land

| Lot/DP | Land owner |
|---|---|
| 1/1049889 | Local Government Authority |
| 1/1087684 | Freehold |
| 1/1127043 | Freehold |
| 1/1139982 | Freehold |
| 1/1201852 | Freehold |
| 1/1256036 | Freehold |
| 1/126483 | Freehold |
| 1/252472 | Freehold |
| 1/386554 | Freehold |
| 1/702619 | Freehold |
| 1/803655 | Freehold |
| 1/825124 | Freehold |
| 1/825887 | Freehold |
| 1/88503 | Freehold |
| 10/1139978 | Freehold |
| 10/1187371 | Freehold |
| 101/1137972 | Freehold |
| 101/1240974 | Freehold |
| 101/829410 | Freehold |
| 102/1240974 | Freehold |
| 103/1164619 | Freehold |
| 11/1139978 | Freehold |
| 120/1188105 | Freehold |
| 121/1188105 | Freehold |
| 123/1188105 | Freehold |
| 124/1188105 | Freehold |
| 125/1188105 | Freehold |
| 126/1188105 | Freehold |
| 127/1188105 | Freehold |
| 128/1188105 | Freehold |
| 13/751651 | Freehold |
| 132/1188105 | Freehold |
| 135/1188105 | Freehold |
| 136/1188105 | Freehold |

## Table G.1 Revised schedule of land

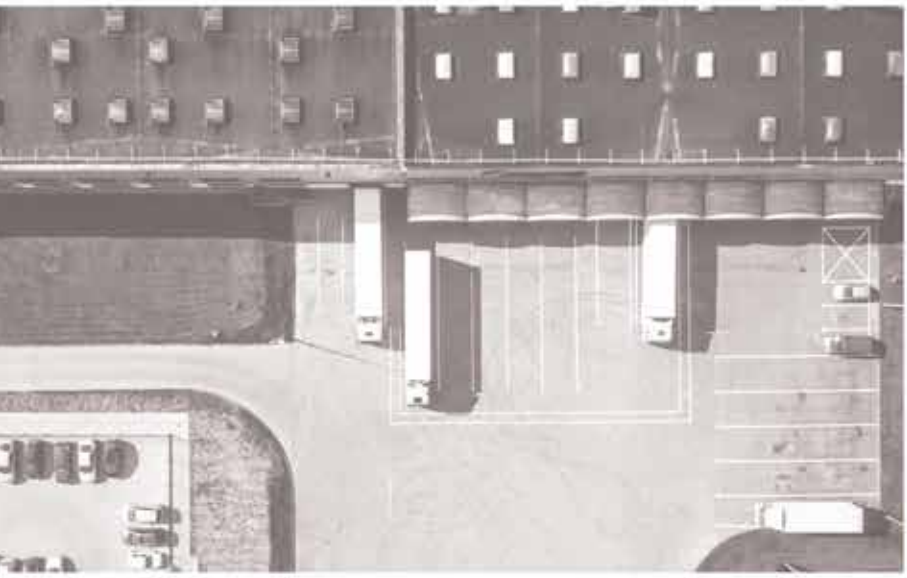
| Lot/DP | Land owner |
|---|---|
| 137/1188105 | Freehold |
| 138/1188105 | Freehold |
| 139/1185660 | Freehold |
| 139/1188105 | Freehold |
| 140/1185660 | Freehold |
| 140/1188105 | Freehold |
| 141/1188105 | Freehold |
| 141/1185660 | Freehold |
| 142/1185660 | Freehold |
| 143/1185660 | Freehold |
| 144/1185660 | Freehold |
| 145/1185660 | Freehold |
| 146/1185660 | Freehold |
| 147/1185660 | Freehold |
| 148/1185660 | Freehold |
| 149/1185660 | Freehold |
| 151/1185660 | Freehold |
| 152/1185660 | Freehold |
| 16/751651 | Freehold |
| 174/751651 | Freehold |
| 191/629212 | Freehold |
| 2/1018958 | Freehold |
| 2/1139982 | Freehold |
| 2/1256036 | Freehold |
| 2/126483 | Freehold |
| 2/260621 | Freehold |
| 2/567915 | Freehold |
| 2/702619 | Freehold |
| 228/1131953 | Freehold |
| 290/751636 | NSW Government |
| 291/751636 | NSW Government |
| 3/1139982 | Freehold |
| 3/1151441 | Freehold |
| 3/542432 | Freehold |

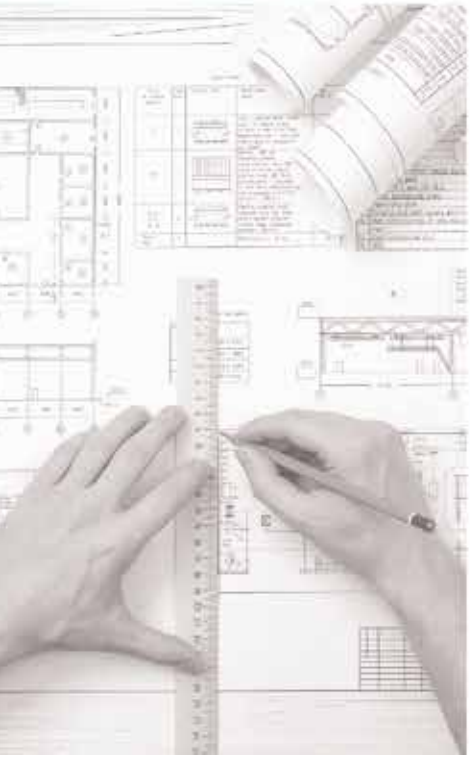
## Table G.1 Revised schedule of land

| Lot/DP | Land owner |
|---|---|
| 3/829137 | Freehold |
| 32/751636 | Freehold |
| 351/751636 | Freehold |
| 357/751651 | Freehold |
| 371/751651 | Freehold |
| 375/751651 | Freehold |
| 385/751651 | Freehold |
| 4/1139982 | Freehold |
| 4/1151441 | Freehold |
| 4/1187371 | Freehold |
| 4/260621 | Freehold |
| 406/751651 | Freehold |
| 41/751636 | Freehold |
| 43/751651 | Freehold |
| 5/1087684 | Freehold |
| 5/1187371 | Freehold |
| 5/1244030 | Freehold |
| 5/804929 | Freehold |
| 5/829137 | Freehold |
| 502/825541 | NSW Government |
| 51/751651 | Freehold |
| 57/751636 | Freehold |
| 6/1187371 | Freehold |
| 6/1244030 | Freehold |
| 67/751636 | Freehold |
| 7/1244030 | Freehold |
| 70/751636 | Crown |
| 7005/1026541 | Crown |
| 8/1244030 | Freehold |
| 8/252472 | Freehold |
| 8/804929 | Freehold |
| 9/1187371 | Freehold |
| 9/804929 | Freehold |

# Appendix H

## Stakeholder correspondence





Mr James Wearne
Group Manager Approvals/Environment
Springvale Coal Limited
PO Box 1000
Toronto NSW 2283

03/05/2021

Dear Mr Wearne

**Western Coal Services (SSD 5579)**
**Modification 4 – Water transfer and management system**

I refer to your correspondence concerning a proposed modification to the Western Coal Services Project development consent (SSD 5579).

The Department has reviewed the proposed approach to preparing a modification application. The Department requests that in addition to the matters identified in your correspondence dated 8 April 2021, the following matters be addressed in the modification report:

- The modification proposes impacts to areas identified in the existing consent as 'Lamberts Gully Rehabilitation Offset Areas' and/or 'Additional Rehabilitation Initiatives areas' (refer to Appendix 7 and conditions 26, 28, 29 and 43 of the development consent). There are a range of existing obligations under the consent and MOP to rehabilitate and manage these areas for conservation. It is understood that these obligations arise from impacts associated with the Lamberts Gully Coal Mine project approval (06-0017). Consultation with BCS regarding an appropriate method of assessing and offsetting the impacts on these areas is recommended, with consideration given to the need to account for previous commitments.
- It is noted that the modification proposes works outside the SSD 5579 project application area. The modification report must identify any proposed changes to the project application area, provide an updated schedule of lands and clarify land ownership/tenure for additional parcels, including provision of landowner's consent where required;
- provide a detailed justification for all elements of the proposed modification;
- Provide details of existing approvals or additional approvals/modifications necessary to facilitate the proposed works and/or water transfers.
- Provide an analysis of statutory requirements, including the relevant matters for consideration under Section 4.15 of the Environmental Planning and Assessment Act 1979 (the Act) and the relevant objects of the Act.
- Explain how the proposal would contribute to achieving water quality objectives for downstream environments.
- Provide a detailed description of the existing and proposed water management system, including process flow diagrams for both existing and proposed operations; and
- Undertake consultation with potentially affected local community, the Community Consultative Committee, State Forests, TfNSW, Heritage NSW, BCS, NSW EPA, DPIE Water and Lithgow City Council.

Your next step will be to lodge your modification application through your dashboard on the new major projects website (http://www.planningportal.nsw.gov.au/major-projects).

If your proposal is likely to have a significant impact on matters of National Environmental Significance, it will require an approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This approval would be in addition to any approvals required under NSW legislation and it is your responsibility to contact the Commonwealth Department of Agriculture, Water and Environment to determine if an approval under the EPBC Act is required (http://www.environment.gov.au or 6274 1111).

If you have any questions, please contact Gabrielle Allan, who can be contacted on 02 9585 6078 or at gabrielle.allan@dpie.nsw.gov.au.

Yours sincerely,

Stephen O'Donoghue
Director
Resource Assessments

22 June 2021

Ms Abigail Goldberg
Chair – Western Region Community Consultative Committee
Via email: abigail@goldbergblaise.com.au

Dear Abigail

**Modification to SSD-5579 (Western Coal Services Project)**

Springvale Coal is planning to seek a modification to the Western Coal Services consent (Modification 4) enabling various changes to its water transfer and management systems on the Springvale Coal Services Site (SCSS) located at Blackman's Flat, that will improve the quality of water discharged into Wangcol Creek from License Discharge Point 1 (LDP001).

The surface water management system consists of a series of water management structures, allowing surface water runoff and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge. However, the discharge of excess mine water into Wangcol Creek as part of the standard operating practice is no longer supported by regulators or the community.

Springvale Coal has consulted extensively with EPA regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. EPA issued Springvale Coal with a Pollution Reduction Program (PRP) on 18 December 2020 following on from previous PRPs to evaluate options for the long-term management of water being discharged from LDP001 at SCSS into Wangcol Creek.

The proposed modification will address the requirements of the PRP and, in part, result in the disconnection of groundwater interactions in discharges from SCSS (a significant contributor to the volume and quality of water discharged via LDP001). A modification report (MR) will be prepared to support the modification application and will include:

- an overview of the proposed modification;
- strategic context for the proposed modification;
- justification for the proposed modification; and
- alternatives considered.

As part of the preparation of the MR, the following technical assessments will be undertaken:

- a water resources assessment – to assess potential for impacts on water resources, other water users and surrounding receptors;

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- a biodiversity assessment – to assess potential for impacts on biodiversity from surface disturbance activities associated with the proposed modification;

- an Aboriginal cultural heritage assessment – to consider potential for impacts on Aboriginal cultural heritage from surface disturbance activities associated with the proposed modification;

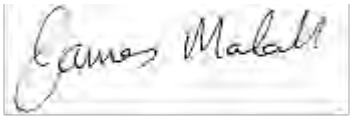
- a construction noise assessment – to assess potential for construction noise to impact receptors within proximity of SCSS; and

- a construction air quality assessment – to assess potential for dust to impact receptors within proximity of SCSS.

Centennial anticipate that the MR will be lodged in Q4, 2021.

Further information relating to the Modification will be provided to the Community Consultative Committee as the technical assessments progress. However in the meantime, should you have any questions or if you would like to arrange a time for a more detailed briefing, please do not hesitate to contact me on 0423 605 324 or james.marshall@centennialcoal.com.au.

Yours sincerely



**James Marshall**
Group Manager Stakeholder Engagement

**Attachment:** Figure 1 – Components of the Western Coal Services Project and the proposed modification

17 June 2021

Mr Tijmen Klootwijk
Fire & Stewardship Manager
Forestry Corporation of NSW
PO Box 143
Bathurst 2795

Dear Tijmen,

**RE: MODIFICATION TO SSD-5579 (WESTERN COAL SERVICES PROJECT)**

## 1. Overview

This letter has been prepared to inform Forestry Corporation of NSW (FCNSW) of the proposed modification to SSD-5579 (ie Western Coal Services Project). It provides a brief description of the proposed modification and a summary of the proposed assessment approach.

## 2. Existing Consent

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates the Western Coal Services Project (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1).

WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine, Angus Place Colliery and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Figure 1). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (Figure 1). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

WCS operations are spread across a number of sites. One of the key components is Springvale Coal Services Site (SCSS), a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP. The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

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## 3. Modification Overview

Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at SCSS, including:

- NSW Environment Protection Authority (EPA);
- Centennial Angus Place Pty Limited (operators of Angus Place Colliery);
- EnergyAustralia (operators of MPPS); and
- LFB Resources NL (proponents of McPhillamys Gold Mine).

As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region and improve the quality of discharges to Wangcol Creek. To facilitate these changes Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to modify aspects of WCS water management. If approved, the proposed modification would authorise:

- construction and operation of the SCSS Water Transfer System (to facilitate the transfer of water from SCSS to the Springvale Coal Services / LFB Resources NL transfer system);
- transfer of water from the SCSS Water Transfer System to the Springvale Coal Services / LFB Resources NL transfer system (for use at the McPhillamys Gold Mine);
- transfer of water from SCSS to MPPS (for treatment and reuse within the MPPS cooling water system);
- receipt of raw water from the Angus Place Water Transfer System (for use in the coal handling and preparation plant at SCSS); and
- redesign of the on-site water management system at SCSS to facilitate the transfer of land from Centennial Springvale Pty Limited & Boulder Mining Pty Ltd back to EnergyAustralia and improve the quality of water discharged to Wangcol Creek.

The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the project application area (Figure 1).

The proposed modification is not seeking to change approved annual coal handling and processing limits under SSD-5579.

## 4. Justification

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDP's). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek. Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

The discharge of excess raw mine water into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted extensively with EPA regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. EPA issued Springvale Coal with a Pollution Reduction Program (PRP) on 18 December 2020 following on from previous PRPs to evaluate options for the long-term management of water being discharged from LDP001 at SCSS into Wangcol Creek.

The proposed modification will address the requirements of the PRP and, in part, result in the disconnection of groundwater interactions in discharges from SCSS (a significant contributor to the volume and quality of water discharged via LDP001). As part of the proposed modification, groundwater seepage originating from old mining voids at SCSS will be redirected from LDP001.

In addition, the proposed modification will also:

- Facilitate the transfer of water from Angus Place Colliery to SCSS. Water from Angus Place Colliery is of a higher quality than water already available on-site at SCSS. Mixing this water on-site at SCSS will improve the quality of water discharged into Wangcol Creek.

- Create a beneficial reuse for water generated at SCSS. The proposed modification will facilitate the transfer of water from SCSS to MPPS and, if constructed, the McPhillamys Gold Mine. The proposed modification will therefore reduce, and potentially at times remove, the need to discharge water from LDP001 to Wangcol Creek.

- Facilitate the transfer of land back to EnergyAustralia. The proposed redesign of the on-site water management system will redirect dirty water at SCSS away from land managed by EnergyAustralia. Dirty water will instead be captured in two new dirty water ponds at SCSS and, where suitable, will be available for beneficial reuse on-site or export to MPPS or, if constructed, McPhillamys Gold Mine.

## 5. Approval Pathway

Development consents may be modified under Section 4.55 of the EP&A Act provided that the development as modified will be substantially the same development as the development for which consent was originally granted.

Springvale Coal are seeking to modify SSD-5579 pursuant to Section 4.55(2) of the EP&A Act to modify aspects of WCS water management.

WCS, as modified, will remain substantially the same development as originally approved being a development to facilitate the receipt, handling and processing of coal from Springvale Mine, Angus Place Colliery and other Centennial operations, and the transportation of this coal to local power stations and export markets.

The proposed modification will be designed to avoid and minimise adverse biophysical, social and economic impacts, where possible and is anticipated to result in minimal environmental impacts beyond those previously assessed and approved under SSD-5579.

## 6. Proposed Environmental Assessment Requirements

A modification report (MR) will be prepared to support the modification application and will include:

- an overview of the proposed modification;
- strategic context for the proposed modification;
- justification for the proposed modification; and
- alternatives considered.

As part of the preparation of the MR, the following technical assessments will be undertaken:

- a water resources assessment – to assess potential for impacts on water resources, other water users and surrounding receptors;
- a biodiversity assessment – to assess potential for impacts on biodiversity from surface disturbance activities associated with the proposed modification;
- an Aboriginal cultural heritage assessment – to consider potential for impacts on Aboriginal cultural heritage from surface disturbance activities associated with the proposed modification;
- a construction noise assessment – to assess potential for construction noise to impact receptors within proximity of SCSS; and
- a construction air quality assessment – to assess potential for dust to impact receptors within proximity of SCSS.

## 7. Closing

We would welcome the opportunity to discuss the proposed modification in further detail. Should you have any questions or if you would like to arrange a time for a more detailed briefing, please do not hesitate to contact Iain Hornshaw from Centennial on (02) 4935 8901 or iain.hornshaw@centennialcoal.com.au.

It is anticipated that DPIE will notify FCNSW once the MR has been lodged. DPIE will also invite comments on the content of the MR at this time. Centennial anticipate that the MR will be lodged in Q4, 2021.

Yours sincerely

John Maynard

**John Maynard**
Manager Property Titles & Survey

**Attachment:** Figure 1 – Components of the Western Coal Services Project and the proposed modification

18 June 2021

Mr Andrew McIntyre
Manager Land Use Assessment
Western Region
Transport for NSW
PO Box 334
Parkes NSW 2870
Email: development.western@rms.nsw.gov.au

Dear Andrew,

**Modification to SSD-5579 (Western Coal Services Project)**

## 1. Overview

This letter has been prepared to inform Transport for NSW (TfNSW) of the proposed modification to SSD-5579 (ie Western Coal Services Project). It provides a brief description of the proposed modification and a summary of the proposed assessment approach.

## 2. Existing consent

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates the Western Coal Services Project (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1).

WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine, Angus Place Colliery and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Figure 1). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (Figure 1). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

WCS operations are spread across a number of sites. One of the key components is Springvale Coal Services Site (SCSS), a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP. The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

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Sydney NSW 2000, Australia
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E: info@centennialcoal.com.au
www.centennialcoal.com.au

## 3. Modification overview

Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at SCSS, including:

- NSW Environment Protection Authority (EPA);
- Centennial Angus Place Pty Limited (operators of Angus Place Colliery);
- EnergyAustralia (operators of MPPS); and
- LFB Resources NL (proponents of McPhillamys Gold Mine).

As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region and improve the quality of discharges to Wangcol Creek. To facilitate these changes Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to modify aspects of WCS water management. If approved, the proposed modification would authorise:

- construction and operation of the SCSS Water Transfer System (to facilitate the transfer of water from SCSS to the Springvale Coal Services/LFB Resources NL transfer system);
- transfer of water from the SCSS Water Transfer System to the Springvale Coal Services/LFB Resources NL transfer system (for use at the McPhillamys Gold Mine);
- transfer of water from SCSS to MPPS (for treatment and reuse within the MPPS cooling water system);
- receipt of raw water from the Angus Place Water Transfer System (for use in the coal handling and preparation plant at SCSS); and
- redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and improve the quality of water discharged to Wangcol Creek.

The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the project application area (Figure 1).

The proposed modification is not seeking to change approved annual coal handling and processing limits under SSD-5579.

## 4. Justification

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek. Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

The discharge of excess raw mine water into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted extensively with EPA regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. EPA issued Springvale Coal with a Pollution Reduction Program (PRP) on 18 December 2020 following on from previous PRPs to evaluate options for the long-term management of water being discharged from LDP001 at SCSS into Wangcol Creek.

The proposed modification will address the requirements of the PRP and, in part, result in the disconnection of groundwater interactions in discharges from SCSS (a significant contributor to the volume and quality of water discharged via LDP001). As part of the proposed modification, groundwater seepage originating from old mining voids at SCSS will be redirected from LDP001.

In addition, the proposed modification will also:

- Facilitate the transfer of water from Angus Place Colliery to SCSS. Water from Angus Place Colliery is of a higher quality than water already available on-site at SCSS. Mixing this water on-site at SCSS will improve the quality of water discharged into Wangcol Creek.

- Create a beneficial reuse for water generated at SCSS. The proposed modification will facilitate the transfer of water from SCSS to MPPS and, if constructed, the McPhillamys Gold Mine. The proposed modification will therefore reduce, and potentially at times remove, the need to discharge water from LDP001 to Wangcol Creek.

- Facilitate the transfer of land back to EnergyAustralia. The proposed redesign of the on-site water management system will redirect dirty water at SCSS away from land managed by EnergyAustralia. Dirty water will instead be captured in two new dirty water ponds at SCSS and, where suitable, will be available for beneficial reuse on-site or export to MPPS or, if constructed, McPhillamys Gold Mine.

## 5. Approval pathway

Development consents may be modified under Section 4.55 of the EP&A Act provided that the development as modified will be substantially the same development as the development for which consent was originally granted.

Springvale Coal are seeking to modify SSD-5579 pursuant to Section 4.55(2) of the EP&A Act to modify aspects of WCS water management.

WCS, as modified, will remain substantially the same development as originally approved being a development to facilitate the receipt, handling and processing of coal from Springvale Mine, Angus Place Colliery and other Centennial operations, and the transportation of this coal to local power stations and export markets.

The proposed modification will be designed to avoid and minimise adverse biophysical, social and economic impacts, where possible and is anticipated to result in minimal environmental impacts beyond those previously assessed and approved under SSD-5579.

## 6. Proposed environmental assessment requirements

A modification report (MR) will be prepared to support the modification application and will include:

- an overview of the proposed modification;

- strategic context for the proposed modification;

- justification for the proposed modification; and
- alternatives considered.

As part of the preparation of the MR, the following technical assessments will be undertaken:

- a water resources assessment – to assess potential for impacts on water resources, other water users and surrounding receptors;
- a biodiversity assessment – to assess potential for impacts on biodiversity from surface disturbance activities associated with the proposed modification;
- an Aboriginal cultural heritage assessment – to consider potential for impacts on Aboriginal cultural heritage from surface disturbance activities associated with the proposed modification;
- a construction noise assessment – to assess potential for construction noise to impact receptors within proximity of SCSS; and
- a construction air quality assessment – to assess potential for dust to impact receptors within proximity of SCSS.

## 7. Closing

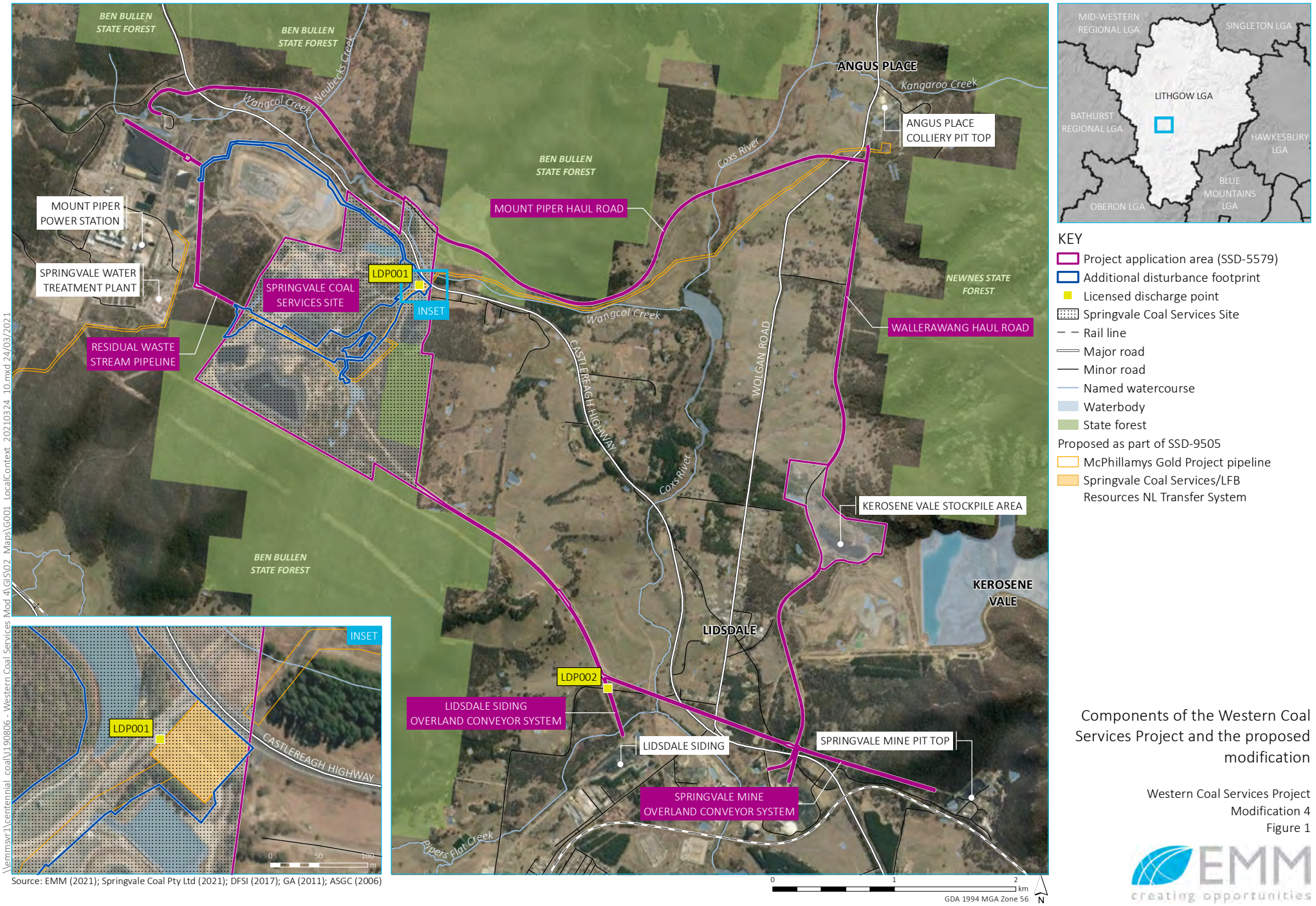
We would welcome the opportunity to discuss the proposed modification in further detail. Should you have any questions or if you would like to arrange a time for a more detailed briefing, please do not hesitate to contact me on (02) 4935 8901 or iain.hornshaw@centennialcoal.com.au.

It is anticipated that DPIE will notify TfNSW once the MR has been lodged. DPIE will also invite comments on the content of the MR at this time. Centennial anticipate that the MR will be lodged in Q4, 2021.

Yours sincerely

**Iain Hornshaw**
Approvals Manager

**Attachment:** Figure 1 – Components of the Western Coal Services Project and the proposed modification







KEY

- Project application area (SSD-5579)
- Additional disturbance footprint
- Licensed discharge point
- Springvale Coal Services Site
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- State forest

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline
- Springvale Coal Services/LFB Resources NL Transfer System

Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)

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# Components of the Western Coal Services Project and the proposed modification

Western Coal Services Project
Modification 4
Figure 1

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14/07/2021

Mr Iain Hornshaw
Approvals Manager
Centennial Coal Company Pty Limited
Level 18, 1 Market Street
SYDNEY NSW 2000

Dear Mr Hornshaw

**Proposed Modification to SSD-5579 (Western Coal Service Project)**
**Aspects of Western Coal Services (WCS) Project Water Management**

Thank you for your letter dated 18 June 2021 notifying Transport for NSW (TfNSW) of the proposed modification to SSD-5579 (Western Coal Services Project). It is understood that the proposed modification will modify aspects of WCS water management including:

- construction and operation of the Springvale Coal Services Site (SCSS) Water Transfer System (to facilitate the transfer of water from SCSS to the Springvale Coal Services/LFB Resources NL transfer system);
- transfer of water from the SCSS Water Transfer System to the Springvale Coal Services/LFB Resources NL transfer system (for use at the McPhillamy's Gold Mine);
- transfer of water from SCSS to MPPS (for treatment and reuse within the MPPS cooling water system);
- receipt of raw water from the Angus Place Water Transfer System (for use in the coal handling and preparation plant at SCSS); and
- redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and improve the quality of water discharged to Wangcol Creek.
- The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the project application area.

From a review of the information submitted, it appears that the additional disturbance footprint will be located very close to the Castlereagh Highway. In order to determine any impacts on the classified road network as a result of the modification, it is requested that the modification application documentation address the following within a Traffic Impact Assessment:

- Details of any physical works proposed in or in the vicinity of the Castlereagh Highway road reserve.
- Quantification of the construction and operational traffic expected to be generated by the modification, including categorisation into light and heavy vehicles, for both daily traffic and peak hour traffic.
- Consideration of the impact of the traffic generated by the modification on the local road network including key affected intersections. This is to include consideration of capacity, geometry and safety.
- Inclusion of the changes to the design vehicle or staff numbers.
- Changes to any haulage or transportation routes for staff or heavy vehicles required as a part of the modification.
- Any additional oversize/overmass vehicles that are proposed as a part of the modification.
- Number of heavy vehicle and light vehicle movements anticipated at the AM and PM peak entering the site from the classified road network per an hour.
- Any proposed access via level crossing or any work within the rail corridor required as a part of modification 4.
- An assessment of the existing approved workforce, the cumulative work force and the difference between the existing and proposed workforce.

If you wish to discuss this matter further, please contact Alexandra Power on 02 6861 1428.

Yours faithfully

**Alexandra Power**
**Team Leader Development Services**
**Development Services West**
**Regional and Outer Metropolitan**

18 June 2021

Heritage NSW
Department of Premier & Cabinet
Email: heritagemailbox@environment.nsw.gov.au

To whom it may concern,

**Modification to SSD-5579 (Western Coal Services Project)**

## 1. Overview

This letter has been prepared to inform Heritage NSW of the proposed modification to SSD-5579 (ie Western Coal Services Project). It provides a brief description of the proposed modification and a summary of the proposed assessment approach.

## 2. Existing consent

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates the Western Coal Services Project (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1).

WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine, Angus Place Colliery and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Figure 1). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (Figure 1). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

WCS operations are spread across a number of sites. One of the key components is Springvale Coal Services Site (SCSS), a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP. The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

**Centennial Coal Company Pty Limited**
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E: info@centennialcoal.com.au
www.centennialcoal.com.au

## 3. Modification overview

Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at SCSS, including:

- NSW Environment Protection Authority (EPA);
- Centennial Angus Place Pty Limited (operators of Angus Place Colliery);
- EnergyAustralia (operators of MPPS); and
- LFB Resources NL (proponents of McPhillamys Gold Mine).

As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region and improve the quality of discharges to Wangcol Creek. To facilitate these changes Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to modify aspects of WCS water management. If approved, the proposed modification would authorise:

- construction and operation of the SCSS Water Transfer System (to facilitate the transfer of water from SCSS to the Springvale Coal Services/LFB Resources NL transfer system);
- transfer of water from the SCSS Water Transfer System to the Springvale Coal Services/LFB Resources NL transfer system (for use at the McPhillamys Gold Mine);
- transfer of water from SCSS to MPPS (for treatment and reuse within the MPPS cooling water system);
- receipt of raw water from the Angus Place Water Transfer System (for use in the coal handling and preparation plant at SCSS); and
- redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and improve the quality of water discharged to Wangcol Creek.

The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the project application area (Figure 1).

The proposed modification is not seeking to change approved annual coal handling and processing limits under SSD-5579.

## 4. Justification

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek. Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

The discharge of excess raw mine water into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted extensively with EPA regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. EPA issued Springvale Coal with a Pollution Reduction Program (PRP) on 18 December 2020 following on from previous PRPs to evaluate options for the long-term management of water being discharged from LDP001 at SCSS into Wangcol Creek.

The proposed modification will address the requirements of the PRP and, in part, result in the disconnection of groundwater interactions in discharges from SCSS (a significant contributor to the volume and quality of water discharged via LDP001). As part of the proposed modification, groundwater seepage originating from old mining voids at SCSS will be redirected from LDP001.

In addition, the proposed modification will also:

- Facilitate the transfer of water from Angus Place Colliery to SCSS. Water from Angus Place Colliery is of a higher quality than water already available on-site at SCSS. Mixing this water on-site at SCSS will improve the quality of water discharged into Wangcol Creek.

- Create a beneficial reuse for water generated at SCSS. The proposed modification will facilitate the transfer of water from SCSS to MPPS and, if constructed, the McPhillamys Gold Mine. The proposed modification will therefore reduce, and potentially at times remove, the need to discharge water from LDP001 to Wangcol Creek.

- Facilitate the transfer of land back to EnergyAustralia. The proposed redesign of the on-site water management system will redirect dirty water at SCSS away from land managed by EnergyAustralia. Dirty water will instead be captured in two new dirty water ponds at SCSS and, where suitable, will be available for beneficial reuse on-site or export to MPPS or, if constructed, McPhillamys Gold Mine.

## 5. Approval pathway

Development consents may be modified under Section 4.55 of the EP&A Act provided that the development as modified will be substantially the same development as the development for which consent was originally granted.

Springvale Coal are seeking to modify SSD-5579 pursuant to Section 4.55(2) of the EP&A Act to modify aspects of WCS water management.

WCS, as modified, will remain substantially the same development as originally approved being a development to facilitate the receipt, handling and processing of coal from Springvale Mine, Angus Place Colliery and other Centennial operations, and the transportation of this coal to local power stations and export markets.

The proposed modification will be designed to avoid and minimise adverse biophysical, social and economic impacts, where possible and is anticipated to result in minimal environmental impacts beyond those previously assessed and approved under SSD-5579.

## 6. Proposed environmental assessment requirements

A modification report (MR) will be prepared to support the modification application and will include:

- an overview of the proposed modification;

- strategic context for the proposed modification;

- justification for the proposed modification; and
- alternatives considered.

As part of the preparation of the MR, the following technical assessments will be undertaken:

- a water resources assessment – to assess potential for impacts on water resources, other water users and surrounding receptors;
- a biodiversity assessment – to assess potential for impacts on biodiversity from surface disturbance activities associated with the proposed modification;
- an Aboriginal cultural heritage assessment – to consider potential for impacts on Aboriginal cultural heritage from surface disturbance activities associated with the proposed modification;
- a construction noise assessment – to assess potential for construction noise to impact receptors within proximity of SCSS; and
- a construction air quality assessment – to assess potential for dust to impact receptors within proximity of SCSS.

## 7. Closing

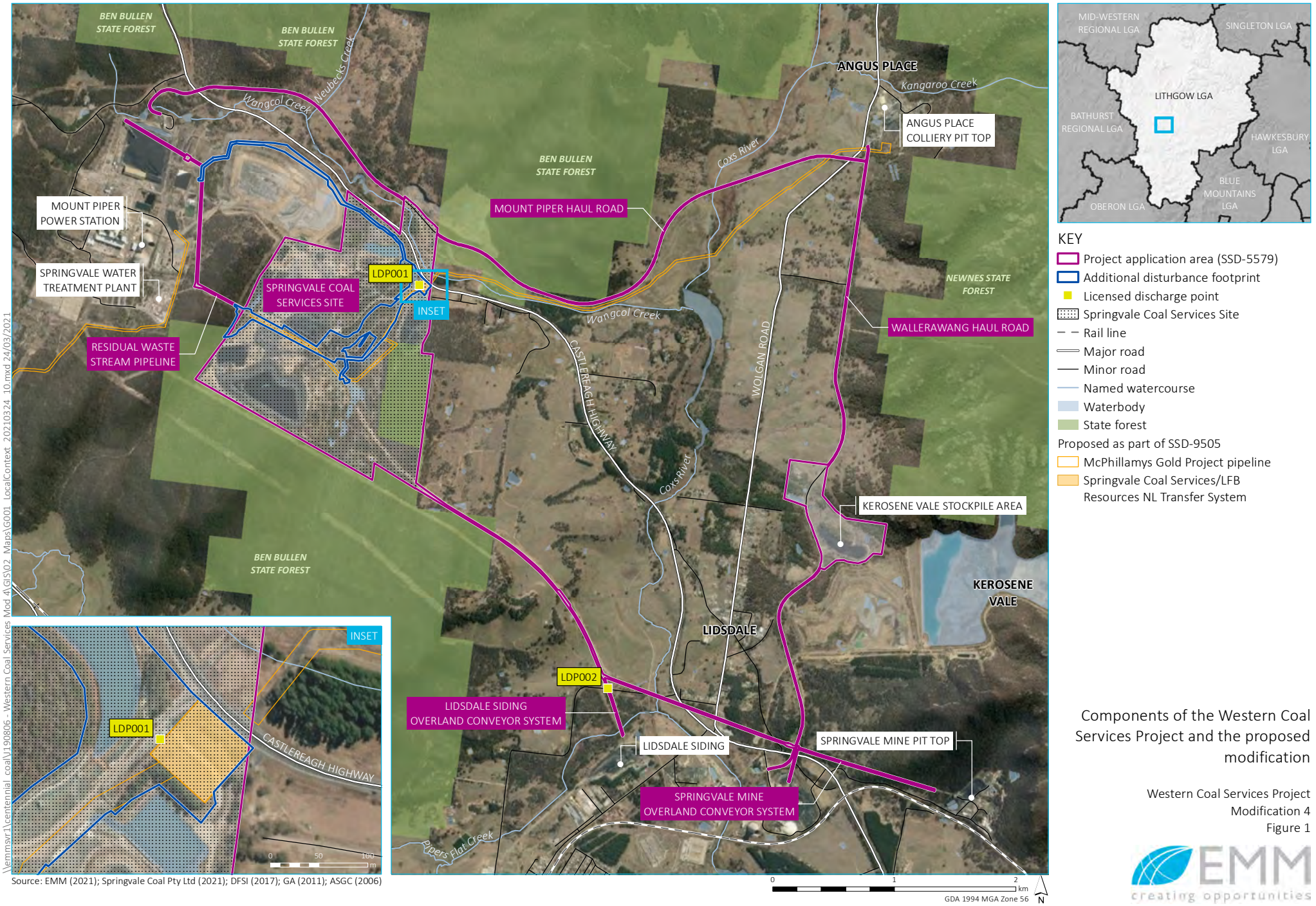
We would welcome the opportunity to discuss the proposed modification in further detail. Should you have any questions or if you would like to arrange a time for a more detailed briefing, please do not hesitate to contact me on (02) 4935 8901 or iain.hornshaw@centennialcoal.com.au.

It is anticipated that DPIE will notify Heritage NSW once the MR has been lodged. DPIE will also invite comments on the content of the MR at this time. Centennial anticipate that the MR will be lodged in Q4, 2021.

Yours sincerely

**Iain Hornshaw**
Approvals Manager

**Attachment:** Figure 1 – Components of the Western Coal Services Project and the proposed modification







KEY

- Project application area (SSD-5579)
- Additional disturbance footprint
- Licensed discharge point
- Springvale Coal Services Site
- Rail line
- Major road
- Minor road
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Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline
- Springvale Coal Services/LFB Resources NL Transfer System

Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)

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# Components of the Western Coal Services Project and the proposed modification

Western Coal Services Project
Modification 4
Figure 1

EMM
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18 June 2021

Samantha Wynn
Senior Team Leader Planning North West
Biodiversity, Conservation and Science Directorate
PO Box 2111
Dubbo NSW 2830
Email: rog.nw@environment.nsw.gov.au

Dear Samantha,

**Modification to SSD-5579 (Western Coal Services Project)**

## 1. Overview

This letter has been prepared to inform the Biodiversity, Conservation and Science Directorate (BCS) of the proposed modification to SSD-5579 (ie Western Coal Services Project). It provides a brief description of the proposed modification and a summary of the proposed assessment approach.

## 2. Existing consent

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates the Western Coal Services Project (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1).

WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine, Angus Place Colliery and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Figure 1). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (Figure 1). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

WCS operations are spread across a number of sites. One of the key components is Springvale Coal Services Site (SCSS), a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP. The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

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Sydney NSW 2000, Australia
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## 3. Modification overview

Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at SCSS, including:

- NSW Environment Protection Authority (EPA);
- Centennial Angus Place Pty Limited (operators of Angus Place Colliery);
- EnergyAustralia (operators of MPPS); and
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As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region and improve the quality of discharges to Wangcol Creek. To facilitate these changes Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to modify aspects of WCS water management. If approved, the proposed modification would authorise:

- construction and operation of the SCSS Water Transfer System (to facilitate the transfer of water from SCSS to the Springvale Coal Services/LFB Resources NL transfer system);
- transfer of water from the SCSS Water Transfer System to the Springvale Coal Services/LFB Resources NL transfer system (for use at the McPhillamys Gold Mine);
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- receipt of raw water from the Angus Place Water Transfer System (for use in the coal handling and preparation plant at SCSS); and
- redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and improve the quality of water discharged to Wangcol Creek.

The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the project application area (Figure 1).

The proposed modification is not seeking to change approved annual coal handling and processing limits under SSD-5579.

## 4. Justification

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek. Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

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In addition, the proposed modification will also:

- Facilitate the transfer of water from Angus Place Colliery to SCSS. Water from Angus Place Colliery is of a higher quality than water already available on-site at SCSS. Mixing this water on-site at SCSS will improve the quality of water discharged into Wangcol Creek.

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- strategic context for the proposed modification;

- justification for the proposed modification; and
- alternatives considered.

As part of the preparation of the MR, the following technical assessments will be undertaken:

- a water resources assessment – to assess potential for impacts on water resources, other water users and surrounding receptors;
- a biodiversity development assessment report (BDAR) – to assess potential for impacts on biodiversity from surface disturbance activities associated with the proposed modification;
- an Aboriginal cultural heritage assessment – to consider potential for impacts on Aboriginal cultural heritage from surface disturbance activities associated with the proposed modification;
- a construction noise assessment – to assess potential for construction noise to impact receptors within proximity of SCSS; and
- a construction air quality assessment – to assess potential for dust to impact receptors within proximity of SCSS.

## 7. Closing

We would welcome the opportunity to discuss the proposed modification in further detail. Should you have any questions or if you would like to arrange a time for a more detailed briefing, please do not hesitate to contact me on (02) 4935 8901 or iain.hornshaw@centennialcoal.com.au.

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Approvals Manager

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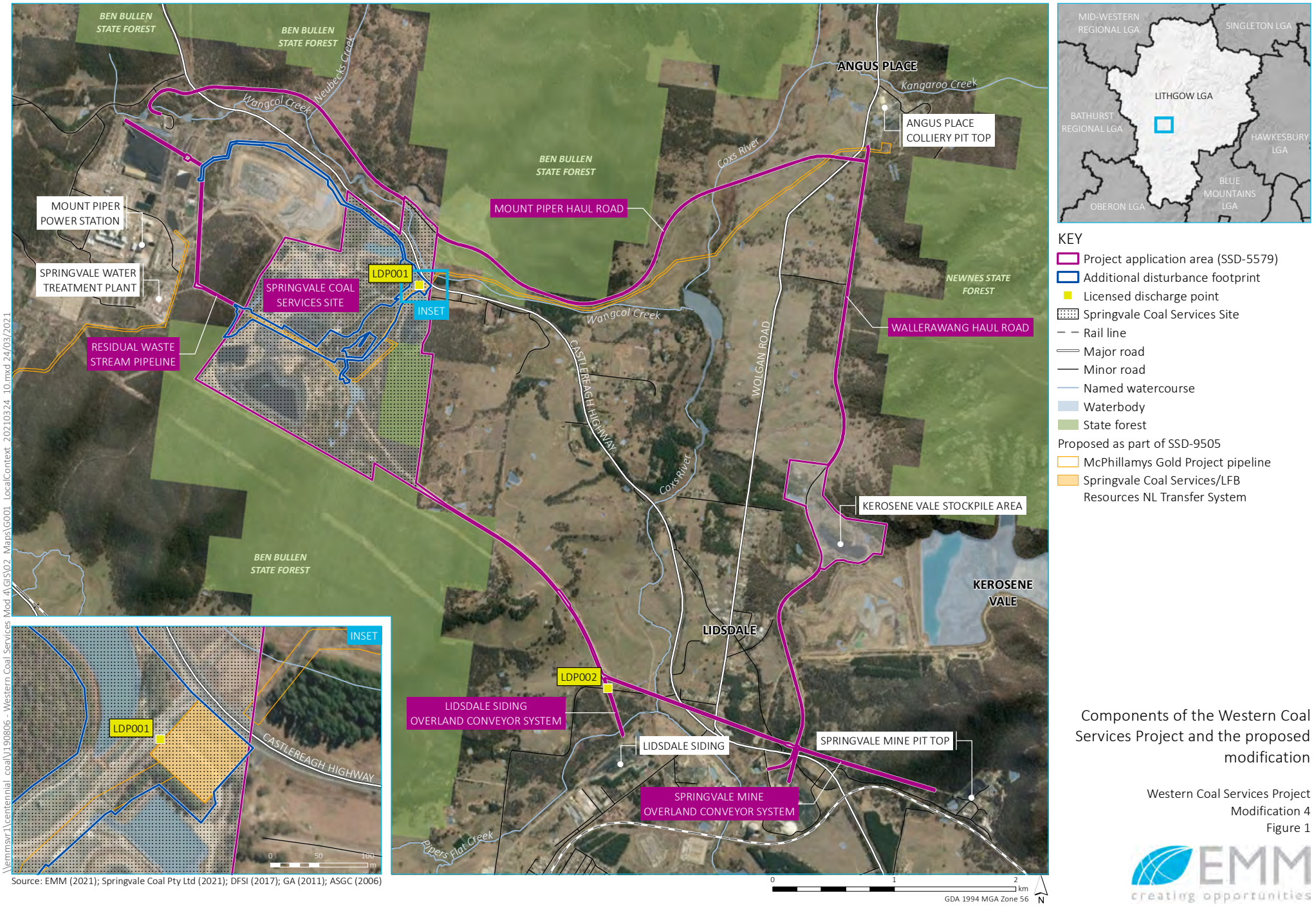





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# Components of the Western Coal Services Project and the proposed modification

Western Coal Services Project
Modification 4
Figure 1

EMM
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18 June 2021

Dr. Sandie Jones
Regional Manager – Regional South Operations
Regulatory Operations Regional
NSW Environment Protection Authority
Locked Bag 5022
Parramatta NSW 2124
Email: epa.southopsregional@epa.nsw.gov.au

Dear Sandie,

**Modification to SSD-5579 (Western Coal Services Project)**

## 1. Overview

This letter has been prepared to inform NSW Environment Protection Authority (EPA) of the proposed modification to SSD-5579 (ie Western Coal Services Project). It provides a brief description of the proposed modification and a summary of the proposed assessment approach.

## 2. Existing consent

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates the Western Coal Services Project (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1).

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## 3. Modification overview

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- transfer of water from the SCSS Water Transfer System to the Springvale Coal Services/LFB Resources NL transfer system (for use at the McPhillamys Gold Mine);
- transfer of water from SCSS to MPPS (for treatment and reuse within the MPPS cooling water system);
- receipt of raw water from the Angus Place Water Transfer System (for use in the coal handling and preparation plant at SCSS); and
- redesign of the on-site water management system at SCSS to facilitate the transfer of land from Springvale Coal back to EnergyAustralia and improve the quality of water discharged to Wangcol Creek.

The redesign of the on-site water management system, construction of the SCSS Water Transfer System and construction and operation of a system to transfer water to MPPS will result in a minor increase to the disturbance footprint within, and extent of, the project application area (Figure 1).

The proposed modification is not seeking to change approved annual coal handling and processing limits under SSD-5579.

## 4. Justification

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek. Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

The discharge of excess raw mine water into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted extensively with EPA regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. EPA issued Springvale Coal with a Pollution Reduction Program (PRP) on 18 December 2020 following on from previous PRPs to evaluate options for the long-term management of water being discharged from LDP001 at SCSS into Wangcol Creek.

The proposed modification will address the requirements of the PRP and, in part, result in the disconnection of groundwater interactions in discharges from SCSS (a significant contributor to the volume and quality of water discharged via LDP001). As part of the proposed modification, groundwater seepage originating from old mining voids at SCSS will be redirected from LDP001.

In addition, the proposed modification will also:

- Facilitate the transfer of water from Angus Place Colliery to SCSS. Water from Angus Place Colliery is of a higher quality than water already available on-site at SCSS. Mixing this water on-site at SCSS will improve the quality of water discharged into Wangcol Creek.

- Create a beneficial reuse for water generated at SCSS. The proposed modification will facilitate the transfer of water from SCSS to MPPS and, if constructed, the McPhillamys Gold Mine. The proposed modification will therefore reduce, and potentially at times remove, the need to discharge water from LDP001 to Wangcol Creek.

- Facilitate the transfer of land back to EnergyAustralia. The proposed redesign of the on-site water management system will redirect dirty water at SCSS away from land managed by EnergyAustralia. Dirty water will instead be captured in two new dirty water ponds at SCSS and, where suitable, will be available for beneficial reuse on-site or export to MPPS or, if constructed, McPhillamys Gold Mine.

## 5. Approval pathway

Development consents may be modified under Section 4.55 of the EP&A Act provided that the development as modified will be substantially the same development as the development for which consent was originally granted.

Springvale Coal are seeking to modify SSD-5579 pursuant to Section 4.55(2) of the EP&A Act to modify aspects of WCS water management.

WCS, as modified, will remain substantially the same development as originally approved being a development to facilitate the receipt, handling and processing of coal from Springvale Mine, Angus Place Colliery and other Centennial operations, and the transportation of this coal to local power stations and export markets.

The proposed modification will be designed to avoid and minimise adverse biophysical, social and economic impacts, where possible and is anticipated to result in minimal environmental impacts beyond those previously assessed and approved under SSD-5579.

## 6. Proposed environmental assessment requirements

A modification report (MR) will be prepared to support the modification application and will include:

- an overview of the proposed modification;

- strategic context for the proposed modification;

- justification for the proposed modification; and
- alternatives considered.

As part of the preparation of the MR, the following technical assessments will be undertaken:

- a water resources assessment – to assess potential for impacts on water resources, other water users and surrounding receptors;
- a biodiversity assessment – to assess potential for impacts on biodiversity from surface disturbance activities associated with the proposed modification;
- an Aboriginal cultural heritage assessment – to consider potential for impacts on Aboriginal cultural heritage from surface disturbance activities associated with the proposed modification;
- a construction noise assessment – to assess potential for construction noise to impact receptors within proximity of SCSS; and
- a construction air quality assessment – to assess potential for dust to impact receptors within proximity of SCSS.

## 7. Closing

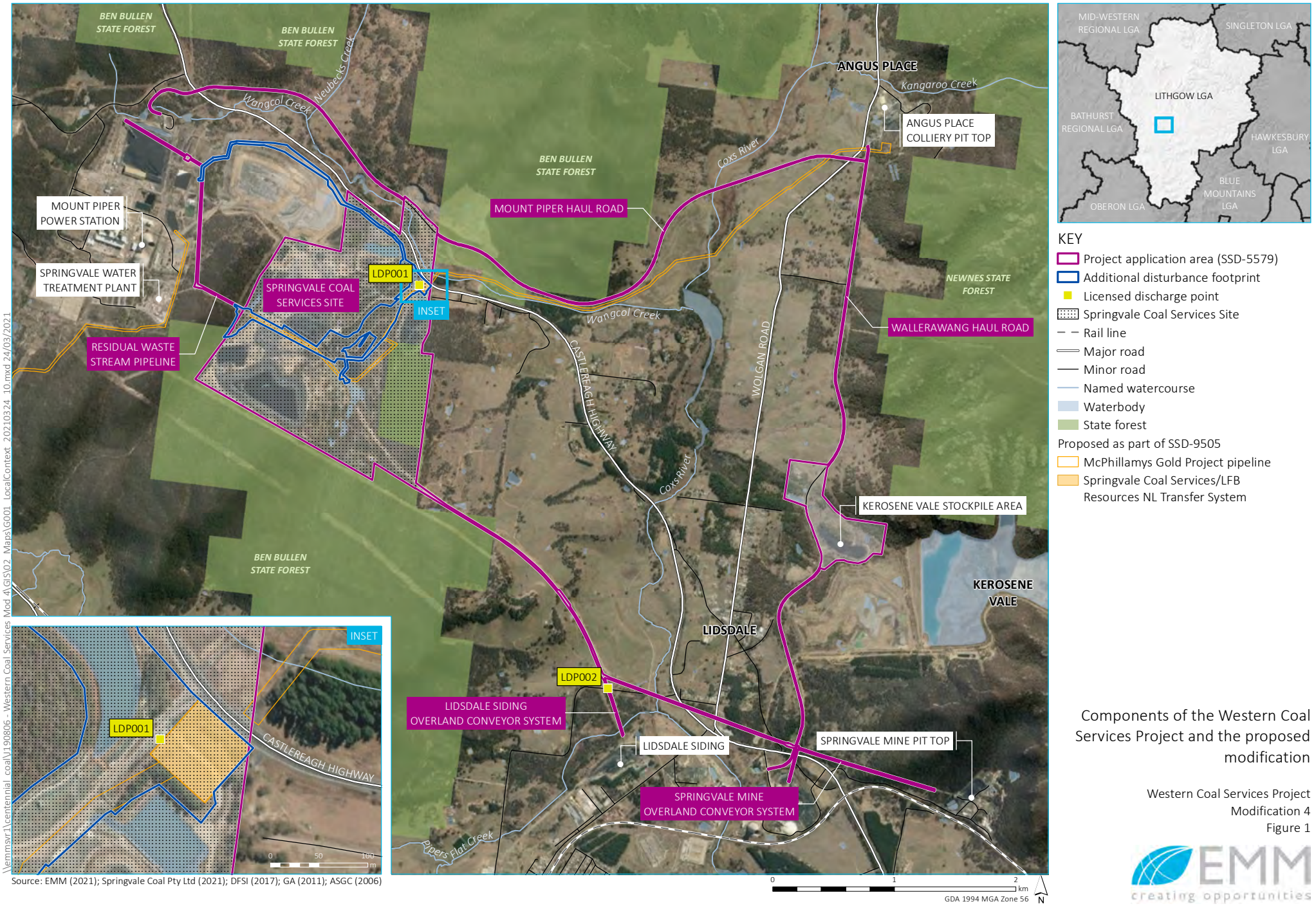
We would welcome the opportunity to discuss the proposed modification in further detail. Should you have any questions or if you would like to arrange a time for a more detailed briefing, please do not hesitate to contact me on (02) 4935 8901 or iain.hornshaw@centennialcoal.com.au.

It is anticipated that DPIE will notify EPA once the MR has been lodged. DPIE will also invite comments on the content of the MR at this time. Centennial anticipate that the MR will be lodged in Q4, 2021.

Yours sincerely

**Iain Hornshaw**
Approvals Manager

**Attachment:** Figure 1 – Components of the Western Coal Services Project and the proposed modification







KEY

- Project application area (SSD-5579)
- Additional disturbance footprint
- Licensed discharge point
- Springvale Coal Services Site
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- State forest

Proposed as part of SSD-9505

- McPhillamys Gold Project pipeline
- Springvale Coal Services/LFB Resources NL Transfer System

Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)

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# Components of the Western Coal Services Project and the proposed modification

Western Coal Services Project
Modification 4
Figure 1

EMM
creating opportunities

18 June 2021

DPIE Water
Locked Bag 5022
Parramatta NSW 2124
Email: water.enquiries@dpie.nsw.gov.au

To whom it may concern,

**Modification to SSD-5579 (Western Coal Services Project)**

## 1. Overview

This letter has been prepared to inform DPIE Water of the proposed modification to SSD-5579 (ie Western Coal Services Project). It provides a brief description of the proposed modification and a summary of the proposed assessment approach.

## 2. Existing consent

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates the Western Coal Services Project (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1).

WCS includes the operation of infrastructure to facilitate the receipt, handling and processing of coal and reject materials from Springvale Mine, Angus Place Colliery and other Centennial operations and the transportation of this coal to Mount Piper Power Station (MPPS) and Lidsdale Siding (Figure 1). WCS also includes the receipt and emplacement of residual waste from the Springvale Water Treatment Project (SWTP) (Figure 1). WCS operates under State significant development (SSD) consent SSD-5579, which was granted on 4 April 2014 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

WCS operations are spread across a number of sites. One of the key components is Springvale Coal Services Site (SCSS), a coal processing and storage facility used for run-of-mine (ROM) coal handling and stockpiling, ROM coal beneficiation (washing), emplacement of coal reject material and emplacement of residual material from SWTP. The surface water management system at SCSS consists of a series of water management structures, allowing surface water runoff from the site and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge.

**Centennial Coal Company Pty Limited**
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Sydney NSW 2000, Australia
T. +61 02 9266 2700
E: info@centennialcoal.com.au
www.centennialcoal.com.au

## 3. Modification overview

Springvale Coal has been liaising with multiple stakeholders in relation to the management of water and land at SCSS, including:

- NSW Environment Protection Authority (EPA);
- Centennial Angus Place Pty Limited (operators of Angus Place Colliery);
- EnergyAustralia (operators of MPPS); and
- LFB Resources NL (proponents of McPhillamys Gold Mine).

As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region and improve the quality of discharges to Wangcol Creek. To facilitate these changes Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to modify aspects of WCS water management. If approved, the proposed modification would authorise:

- construction and operation of the SCSS Water Transfer System (to facilitate the transfer of water from SCSS to the Springvale Coal Services/LFB Resources NL transfer system);
- transfer of water from the SCSS Water Transfer System to the Springvale Coal Services/LFB Resources NL transfer system (for use at the McPhillamys Gold Mine);
- transfer of water from SCSS to MPPS (for treatment and reuse within the MPPS cooling water system);
- receipt of raw water from the Angus Place Water Transfer System (for use in the coal handling and preparation plant at SCSS); and
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## 4. Justification

Springvale Coal holds Environment Protection Licence (EPL) 21229 for WCS, with water currently licensed to be discharged from WCS through two licensed discharge points (LDPs). All of the catchments within SCSS that drain towards LDP001 converge upstream and discharge off-site through a single discharge point into Wangcol Creek. Discharges to Wangcol Creek flow south-east to the Coxs River. No volumetric discharge limits apply to LDP001; however, the volume of water discharged is monitored daily during discharge events.

The discharge of excess raw mine water into Wangcol Creek as part of WCS standard operating practice is no longer supported by regulators or the community. Springvale Coal has consulted extensively with EPA regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. EPA issued Springvale Coal with a Pollution Reduction Program (PRP) on 18 December 2020 following on from previous PRPs to evaluate options for the long-term management of water being discharged from LDP001 at SCSS into Wangcol Creek.

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In addition, the proposed modification will also:

- Facilitate the transfer of water from Angus Place Colliery to SCSS. Water from Angus Place Colliery is of a higher quality than water already available on-site at SCSS. Mixing this water on-site at SCSS will improve the quality of water discharged into Wangcol Creek.

- Create a beneficial reuse for water generated at SCSS. The proposed modification will facilitate the transfer of water from SCSS to MPPS and, if constructed, the McPhillamys Gold Mine. The proposed modification will therefore reduce, and potentially at times remove, the need to discharge water from LDP001 to Wangcol Creek.

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- a construction noise assessment – to assess potential for construction noise to impact receptors within proximity of SCSS; and
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## 7. Closing

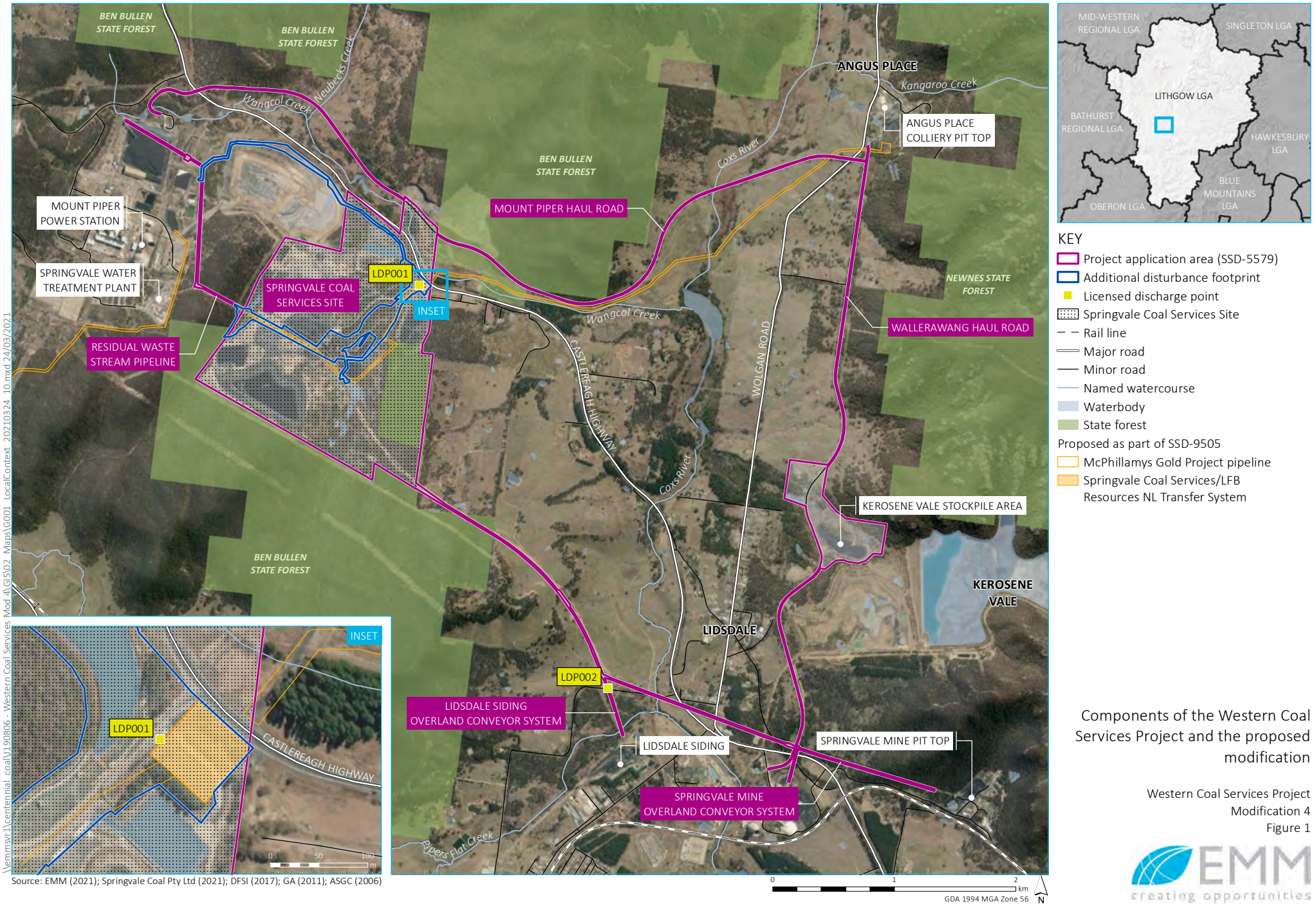
We would welcome the opportunity to discuss the proposed modification in further detail. Should you have any questions or if you would like to arrange a time for a more detailed briefing, please do not hesitate to contact me on (02) 4935 8901 or iain.hornshaw@centennialcoal.com.au.

It is anticipated that DPIE will notify DPIE Water once the MR has been lodged. DPIE will also invite comments on the content of the MR at this time. Centennial anticipate that the MR will be lodged in Q4, 2021.

Yours sincerely

**Iain Hornshaw**
Approvals Manager

**Attachment:** Figure 1 – Components of the Western Coal Services Project and the proposed modification







KEY

- Project application area (SSD-5579)
- Additional disturbance footprint
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- Springvale Coal Services Site
- Rail line
- Major road
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Proposed as part of SSD-9505

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Source: EMM (2021); Springvale Coal Pty Ltd (2021); DFSI (2017); GA (2011); ASGC (2006)

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# Components of the Western Coal Services Project and the proposed modification

Western Coal Services Project
Modification 4
Figure 1

EMM
creating opportunities

18 June 2021

Mr. Andrew Muir
Director Economic Development and Environment
Lithgow City Council
PO Box 19
Lithgow NSW 2790
Email: council@lithgow.nsw.gov.au

Dear Andrew,

**Modification to SSD-5579 (Western Coal Services Project)**

## 1. Overview

This letter has been prepared to inform Lithgow City Council (LCC) of the proposed modification to SSD-5579 (ie Western Coal Services Project). It provides a brief description of the proposed modification and a summary of the proposed assessment approach.

## 2. Existing consent

Centennial Coal Company Limited (Centennial) is a coal mining company supplying thermal and coking coal to domestic and export markets. Springvale Coal Pty Limited (Springvale Coal), a wholly owned subsidiary of Centennial, operates the Western Coal Services Project (WCS), a coal handling and processing operation approximately 15 km north of Lithgow in the Lithgow local government area (LGA) of New South Wales (NSW) (Figure 1).

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## 3. Modification overview

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As part of this engagement, Springvale Coal has identified opportunities to transfer water to and from other operations in the region and improve the quality of discharges to Wangcol Creek. To facilitate these changes Springvale Coal need to redesign the on-site water management system at SCSS, including construction of additional supporting infrastructure.

Springvale Coal is seeking to modify SSD-5579, pursuant to Section 4.55(2) of the EP&A Act, to modify aspects of WCS water management. If approved, the proposed modification would authorise:

- construction and operation of the SCSS Water Transfer System (to facilitate the transfer of water from SCSS to the Springvale Coal Services/LFB Resources NL transfer system);
- transfer of water from the SCSS Water Transfer System to the Springvale Coal Services/LFB Resources NL transfer system (for use at the McPhillamys Gold Mine);
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In addition, the proposed modification will also:

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A modification report (MR) will be prepared to support the modification application and will include:

- an overview of the proposed modification;

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As part of the preparation of the MR, the following technical assessments will be undertaken:

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## 7. Closing

We would welcome the opportunity to discuss the proposed modification in further detail. Should you have any questions or if you would like to arrange a time for a more detailed briefing, please do not hesitate to contact me on (02) 4935 8901 or iain.hornshaw@centennialcoal.com.au.

It is anticipated that DPIE will notify LCC once the MR has been lodged. DPIE will also invite comments on the content of the MR at this time. Centennial anticipate that the MR will be lodged in Q4, 2021.

Yours sincerely

**Iain Hornshaw**
Approvals Manager

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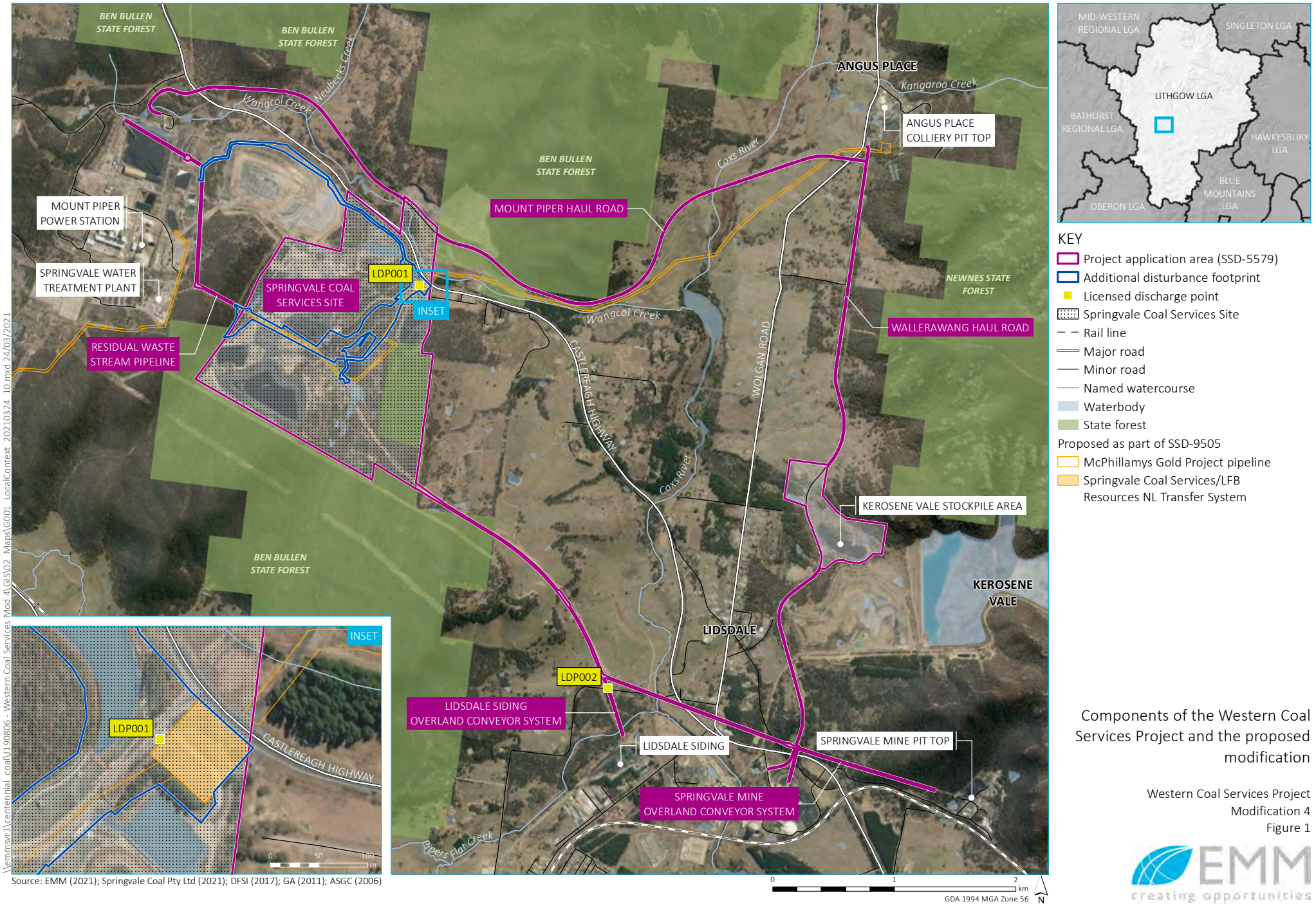





KEY

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# Components of the Western Coal Services Project and the proposed modification

Western Coal Services Project
Modification 4
Figure 1

EMM
creating opportunities

1905259:LGS
Economic Development and Environment

28 June 2021

Iain Hornshaw
Approvals Manager
Centennial
Iain.Hornshaw@centennialcoal.com.au

Dear Iain,

**Proposed Modification to SSD-5579, Water Transfer, Western Coal Services Project/Springvale Coal, Castlereagh Highway Lidsdale NSW 2790**

I refer to the abovementioned project and your notification for the proposed modified development.

Council has no objection to the proposed modification being submitted to the Department of Planning subject to a comprehensive modification report being undertaken identifying the potential impacts of the development.

Council will make further comment once a review of the modification report has been undertaken.

Please do not hesitate to contact Miss Lauren Stevens who is available between 8:15am and 10:30am Monday to Friday on (02) 63549999, in Council's Economic Development and Environment should you have any queries in relation to this matter.

Yours sincerely

Julie Wells
**TEAM LEADER DEVELOPMENT**

24 June 2021

Ms Ros Francis
Secretary Wallerawang Lidsdale progress Association
Via email: wallerawanglidsdaleprogress@gmail.com>

Dear Ros

**Modification to SSD-5579 (Western Coal Services Project)**

Springvale Coal is planning to seek a modification to the Western Coal Services consent (Modification 4) enabling various changes to its water transfer and management systems on the Springvale Coal Services Site (SCSS) located at Blackman's Flat, that will improve the quality of water discharged into Wangcol Creek from License Discharge Point 1 (LDP001).

The surface water management system consists of a series of water management structures, allowing surface water runoff and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge. However, the discharge of excess mine water into Wangcol Creek as part of the standard operating practice is no longer supported by regulators or the community.

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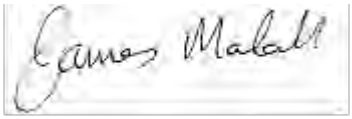
- a construction noise assessment – to assess potential for construction noise to impact receptors within proximity of SCSS; and

- a construction air quality assessment – to assess potential for dust to impact receptors within proximity of SCSS.

Centennial anticipate that the MR will be lodged in Q4, 2021.

Should you have any questions or if you would like to arrange a time for a more detailed briefing, please do not hesitate to contact me on 0423 605 324 or james.marshall@centennialcoal.com.au.

Yours sincerely



**James Marshall**
Group Manager Stakeholder Engagement

**Attachment:** Figure 1 – Components of the Western Coal Services Project and the proposed modification

24 June 2021

Lithgow Environment Group
ATT: Julie Favell
Via email: lithgowenviro@gmail.com

Dear Julie

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The surface water management system consists of a series of water management structures, allowing surface water runoff and water seeping from old underground mine workings to be captured and redistributed within the site for reuse or to improve water quality prior to off-site discharge. However, the discharge of excess mine water into Wangcol Creek as part of the standard operating practice is no longer supported by regulators or the community.

Springvale Coal has consulted extensively with EPA regarding LDP001 discharges and approaches to improve water quality within Wangcol Creek. EPA issued Springvale Coal with a Pollution Reduction Program (PRP) on 18 December 2020 following on from previous PRPs to evaluate options for the long-term management of water being discharged from LDP001 at SCSS into Wangcol Creek.

The proposed modification will address the requirements of the PRP and, in part, result in the disconnection of groundwater interactions in discharges from SCSS (a significant contributor to the volume and quality of water discharged via LDP001). A modification report (MR) will be prepared to support the modification application and will include:

- an overview of the proposed modification;
- strategic context for the proposed modification;
- justification for the proposed modification; and
- alternatives considered.

As part of the preparation of the MR, the following technical assessments will be undertaken:

- a water resources assessment – to assess potential for impacts on water resources, other water users and surrounding receptors;

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- a biodiversity assessment – to assess potential for impacts on biodiversity from surface disturbance activities associated with the proposed modification;

- an Aboriginal cultural heritage assessment – to consider potential for impacts on Aboriginal cultural heritage from surface disturbance activities associated with the proposed modification;

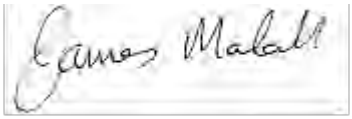
- a construction noise assessment – to assess potential for construction noise to impact receptors within proximity of SCSS; and

- a construction air quality assessment – to assess potential for dust to impact receptors within proximity of SCSS.

Centennial anticipate that the MR will be lodged in Q4, 2021.

Should you have any questions please do not hesitate to contact me on 0423 605 324 or james.marshall@centennialcoal.com.au.

Yours sincerely



**James Marshall**
Group Manager Stakeholder Engagement

**Attachment:** Figure 1 – Components of the Western Coal Services Project and the proposed modification

THE KEY
WHAT'S RIGHT
FOR YOU